

CLIMATE CHANGE

16/2023

Final report

Carbon pricing potential in East and South Asia

Synthesis and case studies for Indonesia, Vietnam, and
Pakistan

by:

Baran Doda, Maia Hall, Constanze Haug, Ernst Kuneman, Trevor Laroche-Theune
adelphi, Berlin
Anatole Boute
CUHK, Hong Kong
Phung Vu Hiep
Independent, Hanoi

publisher:

German Environment Agency

CLIMATE CHANGE 16/2023

Ressortforschungsplan of the Federal Ministry for the
Environment, Nature Conservation, Nuclear Safety and
Consumer Protection

Project No. (FKZ) 3719425010

Report No. FB001009

Final report

Carbon pricing potential in East and South Asia

Synthesis and case studies for Indonesia, Vietnam, and
Pakistan

by

Baran Doda, Maia Hall, Constanze Haug, Ernst Kuneman,
Trevor Laroche-Theune
adelphi, Berlin

Anatole Boute
CUHK, Hong Kong


Phung Vu Hiep
Independent, Hanoi


On behalf of the German Environment Agency

Imprint

Publisher

Umweltbundesamt
Wörlitzer Platz 1
06844 Dessau-Roßlau
Tel: +49 340-2103-0
Fax: +49 340-2103-2285
buergerservice@uba.de
Internet: www.umweltbundesamt.de

 [/umweltbundesamt.de](https://www.facebook.com/umweltbundesamt.de)

 [/umweltbundesamt](https://twitter.com/umweltbundesamt)

Report performed by:

adelphi
Adelphi Alt-Moabit 91
10559 Berlin
Germany

Report completed in:

November 2022

Edited by:

Section V 3.3 Economic Aspects of Emissions Trading, Auctioning, Evaluation
Nadine Pauly

Publication as pdf:

<http://www.umweltbundesamt.de/publikationen>

ISSN 1862-4359

Dessau-Roßlau, April 2023

The responsibility for the content of this publication lies with the author(s).

Abstract: Carbon pricing potential in East and South Asia

Carbon pricing at appropriate levels is critical in the response to climate change, but currently only a fifth of global emissions are priced. Successful carbon pricing in Asia can help jurisdictions in the region achieve their climate targets cost-effectively, spur investments into low-carbon alternatives, and catalyse regional climate action. This report presents in-depth case studies of carbon pricing potential and readiness in Indonesia, Vietnam, and Pakistan. It begins with a synthesis of common issues across the case studies identified through the application of the analytical framework developed in Doda et al. (2021). Although there is strong political will to pursue carbon pricing in all three jurisdictions, the influence of and opposition from vested public and private fossil fuel interests pose a challenge. From a legal perspective, all three jurisdictions have flagship climate laws and key energy policy frameworks in place that are conducive to carbon pricing. Challenges arise in the context of policy coordination in the jurisdictions' fragmented institutional environments and the risk of international investment arbitration. Jurisdictions' economic and trade structure and power market characteristics are also critical, as carbon pricing is a market-based instrument that relies on economic incentives to change behaviour. All three jurisdictions have a high share of and rising power sector emissions. Government and private sector technical knowledge and capacity are also essential to operate the infrastructure for and comply with carbon pricing. Though the three case study jurisdictions are at different stages of progress towards carbon pricing, MRV was identified as the main outstanding technical challenge. Finally, multilateral frameworks provide external incentives for carbon pricing, facilitating cross-border cooperation including on international carbon markets. All three jurisdictions have - in one way or another - been able to draw on carbon pricing support from various organizations and/or other jurisdictions. The report's policy recommendations include: to align carbon pricing with ongoing power market reforms; to remove fossil fuel subsidies and provide targeted support instead; to engage early with relevant stakeholders to understand and alleviate opposition; to further leverage multilateral cooperation and dialogue with jurisdictions which already have experience with carbon pricing implementation, and - in this context - to assess needs and draw support from dedicated multilateral capacity building programs.

Kurzbeschreibung: Potenziale für die CO₂-Bepreisung in Ost- und Südasi

Die Bepreisung von CO₂ in angemessener Höhe ist ein zentrales Instrument im Kampf gegen den Klimawandel, allerdings wird derzeit nur ein Fünftel der weltweiten Emissionen bepreist. Eine erfolgreiche Bepreisung von CO₂-Emissionen in Asien kann den Ländern der Region dabei helfen, ihre Klimaziele kosteneffizient zu erreichen, Investitionen in kohlenstoffarme Alternativen anzustoßen und regionale Klimaschutzmaßnahmen zu fördern. Dieser Bericht umfasst detaillierte Fallstudien zum Potenzial und den institutionellen Voraussetzungen für die Einführung einer CO₂-Bepreisung in Indonesien, Vietnam und Pakistan. Er beginnt mit einer Zusammenfassung der übergreifenden Aspekte der Fallstudien, die durch die Anwendung des durch Doda et al. (2021) im Rahmen des Forschungsvorhabens entwickelten analytischen Rahmens identifiziert werden. Obwohl in allen drei Ländern ein starker politischer Wille zur Bepreisung von CO₂ vorhanden ist, stellen der Einfluss und der Widerstand von Interessengruppen aus dem öffentlichen und privaten Sektor, die fossile Brennstoffe unterstützen, weiterhin ein Hindernis dar. Aus rechtlicher Sicht verfügen alle drei Länder über vorbildliche Klimagesetze und wichtige energiepolitische Rahmenbedingungen, die der CO₂-Bepreisung förderlich sind. Herausforderungen ergeben sich hinsichtlich der politischen

Koordinierung im fragmentierten institutionellen Umfeld der Länder und des Risikos internationaler Investitionsschiedsverfahren (ISDS). Die Wirtschafts- und Handelsstruktur der Länder und die Merkmale des Energiemarktes sind ebenfalls von entscheidender Bedeutung, da CO₂-Bepreisung ein marktbasierendes Instrument ist, das auf wirtschaftliche Anreize zur Verhaltensänderung setzt. In allen drei Ländern ist der Anteil der Emissionen aus dem Stromsektor hoch und steigt weiter an. Die technischen Kenntnisse und Kapazitäten der Regierung und des privaten Sektors sind ebenfalls wichtig für den Betrieb der Infrastruktur und die Umsetzung der CO₂-Bepreisung. Obwohl sich die drei Länder der Fallstudien in unterschiedlichen Stadien der Entwicklung hin zu einer effektiven CO₂-Bepreisung befinden, wird MRV übergreifend als die größte technische Herausforderung identifiziert. Abschließend bieten multilaterale Formate externe Anreize für CO₂-Bepreisung und erleichtern die grenzüberschreitende Zusammenarbeit, auch auf internationalen Kohlenstoffmärkten. Alle drei Ländern konnten bereits auf die eine oder andere Weise auf die Unterstützung verschiedener Organisationen und/oder Staaten zurückgreifen. Zu den politischen Empfehlungen des Berichts gehören: die Bepreisung von CO₂ mit den laufenden Reformen des Strommarktes abzustimmen; Subventionen für fossile Brennstoffe abzuschaffen und stattdessen erneuerbare Energien gezielt zu unterstützen; frühzeitig mit den relevanten Interessengruppen in Kontakt zu treten, um Widerstände zu verstehen und abzubauen; die multilaterale Zusammenarbeit und den Dialog mit Ländern auszubauen, die schon Erfahrung mit der Einführung von CO₂-Bepreisung haben und – in diesem Zusammenhang – den Bedarf nach Aufbau von Kapazitäten zu ermitteln und Unterstützung durch spezielle multilaterale Programme dafür zu erhalten.

Table of contents

Table of contents.....	6
List of figures	7
List of tables	7
List of abbreviations	8
Summary	14
Zusammenfassung.....	18
1 Introduction and overview	23
1.1 Political dimension	24
1.2 Legal dimension	26
1.3 Economic dimension	27
1.4 Technical dimension	29
1.5 Multilateral dimension.....	31
1.6 Overcoming the main challenges to carbon pricing in the region.....	32
2 Indonesia case study	41
2.1 Introduction	41
2.2 Stakeholder mapping	46
2.3 Carbon pricing readiness.....	49
2.4 Synthesis and possible pathways to implementation.....	69
A Appendix: Indonesia interviews	72
3 Vietnam case study	74
3.1 Introduction	74
3.2 Stakeholder mapping	76
3.3 Carbon pricing readiness.....	79
3.4 Synthesis and possible pathways to implementation.....	99
B Appendix: Vietnam interviews	105
4 Pakistan case study	107
4.1 Introduction	107
4.2 Stakeholder mapping	110
4.3 Carbon pricing readiness.....	112
4.4 Synthesis and possible pathways to implementation.....	139
C Appendix: Pakistan interviews	143
5 List of references	144

List of figures

Figure 1: Framework for assessing carbon pricing in Asia	24
Figure 2: Emission shares by sector over time (excl. LULUCF), Indonesia	44
Figure 3: Electricity generation by source in 2020, Indonesia	50
Figure 4: Net fossil fuel imports (imports – exports), Indonesia.....	56
Figure 5: Electricity generation by source over time, Indonesia.....	58
Figure 6: Emission shares over time, Vietnam	75
Figure 7: Electricity generation by source in Vietnam, 2019	80
Figure 8: Net fossil fuel imports (imports - exports), Vietnam.....	88
Figure 9: Emission shares over time, Pakistan	108
Figure 10: Electricity generation by source in Pakistan, 2019	114
Figure 11: Net fossil fuel imports (imports - exports), Pakistan.....	122
Figure 12: Pakistan's energy mix in 1990 and 2019	126

List of tables

Table 1: Overview of Indonesia’s climate change and energy policy mix.....	59
Table 2: Main challenges and recommendations, Indonesia.....	70
Table 3: Overview of Vietnam’s climate change and energy policy mix.....	90
Table 4: Main challenges and recommendations, Vietnam.....	103
Table 5: Shared competencies under the 18th Amendment	117
Table 6: Pakistan’s GHG emissions by sector (2017-2018)	123
Table 7: Sectoral composition of Pakistan’s GDP and employment (in %)	124
Table 8: Proved reserves at end 2020	127
Table 9: Installed capacity (MW).....	129
Table 10: Pakistan's energy policy mix.....	131
Table 11: Main challenges and recommendations, Pakistan.....	141

List of abbreviations

ACE	ASEAN Centre for Energy
ACIA	ASEAN Comprehensive Investment Agreement
ADB	Asian Development Bank
APEC	Asia Pacific Economic Cooperation
APLSI	Indonesia Independent Power Producers Association
APP	Associated Press of Pakistan
ARE	Alternative and renewable energy
ARET	Alternative and renewable energy technology
ASEAN	Association of Southeast Asian Nations
ASEAN ACCEPT	ASEAN Climate Change and Energy Project
ASPI	Asia Society Policy Institute
AWGCC	ASEAN Working Group on Climate Change
BAU	Business-as-usual
BBC	British Broadcasting Corporation
BIT	Bilateral investment treaty
BMU	German Federal Ministry of the Environment
BP	British Petrol
BRI	Belt and Road Initiative
BTAP	Billion Tree Afforestation Programme
BTR	Biennial transparency reports
BTU	British thermal unit
BUR	Biennial updated report
CBAM	Carbon border adjustment mechanism
CCI	Council of Common Interest
CDM	Clean Development Mechanism
CEO	Chief executive officer
CGCB	Vietnam Green Building Council
CIACA	Collaborative Instruments for Ambitious Climate Action
CITEPA	Interprofessional Technical Centre for Atmospheric Pollution Studies
CMEA	Coordinating Ministry for Economic Affairs
CMMIA	Coordinating Ministry of Maritime and Investment Affairs
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
COP	Conference of the Parties
COVID-19	Coronavirus disease
CP	Carbon pricing
CPEC	China-Pakistan Economic Corridor
CPFTA	China-Pakistan Free Trade Agreement

CPPA	Central Power Purchasing Agency
CSCCC	Civil Society Coalition for Climate Change
CTBCM	Competitive Trading Bilateral Contract Market
CUHK	Chinese University Hong Kong
DEHSt	German Emissions Trading Authority
DISCO	Distribution company
DPD	Dewan Perwakilan Daerah (Senate of Indonesia)
DPR	Dewan Perwakilan Rakyat (Indonesian House of Representatives)
EC	European Commission
EFF	Extended fund facility arrangement
EPP	Energy purchase price
EPT	Environmental protection tax
EREA	Electricity and Renewable Energy Authority of Vietnam
ESMAP	Energy Sector Management Assistance Programme
ETM	Energy transition mechanism
ETS	Emissions trading system
EU	European Union
EU ETS	European Union Emissions Trading System
EUR	Euro
EVN	Viet Nam Electricity
FBR	Federal Board of Revenue
FDI	Foreign direct investment
FES	Friedrich-Ebert-Stiftung
FIT	Feed-in-tariff
FY	Fiscal year
G20	Group of Twenty
G7	Group of Seven
GATT	General Agreement on Tariffs and Trade
GCISC	Global Change Impact Studies Centre
GDP	Gross domestic product
GENCO	Power generation company
GGGI	Global Green Growth Institute
GHCL	GENCO Holding Company Limited
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSP	Generalised scheme of preferences
GSP+	Generalised scheme of preferences plus (emphasising sustainable development and good governance)
GW	Gigawatt
HCFCs	Hydrochlorofluorocarbons

HUBCO	Hub Power Company Limited
ICAP	International Carbon Action Partnership
IDR	Indonesian Rupiah
IEA	International Energy Agency
IHA	International Hydropower Association
IIA	International investment agreement
IKI	International Climate Initiative
ILO	International Labour Organisation
IMF	International Monetary Fund
IMHEN	Vietnam Institute of Meteorology, Hydrology, and Climate Change
INDC	Intended nationally determined contribution
IOM	International Organisation for Migration
IPC	Ministry of Inter-Provincial Coordination
IPCC	International Panel on Climate Change
IPP	Independent power producers
ISDS	Investor-state dispute settlement
ISEA	Indonesia Solar Energy Association
ISPONRE	Institute of Strategy and Policy on Natural Resources and Environment
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
JSC	Joint-stock company
KE	K-Electric
KESC	Karachi Electric Supply Company
KLINOVA	Climate Innovation Consulting & Services JSC.
kWh	Kilowatt hour
LNG	Liquefied natural gas
LULUCF	Land use, land-use change, and forestry
MARD	Ministry of Agriculture and Rural Development
MDI	Centre of Media and Development Initiatives
MEMR	Ministry of Energy and Mineral Resources
MEPS	Minimum energy performance standard
METI-IRES	Indonesian Renewable Energy Society
MGCL	Mari Gas Company Limited
mmBtu	Metric million British thermal unit
MO	Market operator
MOCC	Ministry of Climate Change
MoEF	Ministry of Environment and Forestry
MoF	Ministry of Finance
MOI&P	Ministry of Industries and Production
MOIT	Ministry of Industry and Trade

MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MOT	Ministry of Construction, the Ministry of Transport
MOWP	Ministry of Energy Power Division
MPI	Ministry of Planning and Investment
MPNR	Ministry of Energy Petroleum Division
MRV	Monitoring, reporting, and verification
MSOE	Ministry of State-Owned Enterprises
Mt	Megatonne
MW	Megawatt-hour
MWh	Megawatt-hour
NAMA	Nationally Appropriate Mitigation Action
NCCC	National Committee for Climate Change
NCEC	National Committee on the Establishment of Carbon Markets
NDC	Nationally determined contribution
NEC	National Economic Council
NEECA	National Energy Efficiency and Conservation Authority
NEK	Nilai Ekonomi Karbon
NEPRA	National Electric Power Regulatory Authority
NGO	Non-governmental organisation
NOx	Nitrous oxide
NPT	National Power Transmission Corporation
NTDC	National Transmission and Despatch Company
OPEC	Organisation of the Petroleum Exporting Countries
PACE	Pakistan Programme for Affordable and Clean Energy
PAEC	Pakistan Atomic Energy Commission
PBS	Pakistan Bureau of Statistics
PDP VII	Vietnam Power Development Plan for the period 2011-2020
PEPA	Pakistan Environmental Protection Agency
PEPCO	Pakistan Electric Power Company Limited
PJB	PT Pembangkitan Jawa-Bal
PKR	Pakistani Rupee
PLN	PT Perusahaan Listrik Negara
PMI	Partnership for Market Implementation
PMR	Partnership for Market Readiness
PPA	Power purchase agreement
PPIB	Private Power and Infrastructure Board
PPL	Pakistan Petroleum Limited
PPP	Purchasing power parity
PPU	Private power utility

PSO	Pakistan State Oil
PTI	Pakistan Tehreek-e-Insaf
PV	Photovoltaic
PwC	PricewaterhouseCoopers
Q&A	Question and answer
R&D	Research and development
RAD-GRK	Provincial Action Plans to Reduce Greenhouse Gas Emissions
RANPI	National Action Plan to Respond to Climate Change
RCEP	Regional Comprehensive Economic Partnership
RE	Renewable energy
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
RISQ	Ressources for Inventory Safety and Quality
RLNG	Regasified liquefied natural gas
ROE	Return on equity
RUPTL	Rencana Usaha Penyediaan Tenaga Listrik (electricity supply business plan)
SAFTA	South Asia Free Trade Agreement
SBP	State Bank of Pakistan
SDPI	Sustainable Development Policy Institute
SMO	System and market operator
SO	System operator
SO_x	Sulphur dioxide
SP-RCC	Support Programme to Respond to Climate Change
SRN	Sistem Registri Nasional Pengendalian Perubahan Iklim
SRSP	Sindh Rural Support Programme
t	Tonne
T&D	Transmission and distribution
TBTTP	Ten Billion Tree Tsunami Programme
TJ	Terajoule
TNO	Transmission network operator
TPES	Total primary energy supply
UAE	United Arab Emirates
UK	United Kingdom
UK PACT	United Kingdom Partnering for Accelerated Climate Transitions
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
US EIA	United States Energy Information Administration

USAID	United States Agency for International Development
US-BTA	US-Vietnam Bilateral Trade Agreement
USD	United States Dollar
VAT	Value-added tax
VBCSD	Vietnamese Business Council for Sustainable Development
VCEA	Vietnam Clean Energy Association
VCS	Verified Carbon Standard
VIET SE	Vietnam Initiative for Energy Transition
VRE	Variable renewable energy
VUSTA	Viet Nam Union of Science and Technology Associations
VWEM	Vietnamese Wholesale Electricity Market
WAHLI	Indonesian Forum for the Environment
WAPDA	Water and Power Development Authority
WB	World Bank
WEF	World Economic Forum
WRI	World Resources Institute
WTO	World Trade Organisation
WWF	World Wildlife Fund

Summary

Carbon pricing at appropriate levels is a critical instrument in the response to climate change and in delivering on the ambitious targets of the Paris Agreement. Many countries across the globe have already deployed carbon taxes and emissions trading systems (ETS) to impose a carbon price and thus cost-effectively reduce their greenhouse gas emissions. Still, only about 20% of global emissions are covered by a carbon price of varying rigour – increasing this coverage, raising ambition, and building a network of carbon pricing instruments are therefore paramount. On the one hand, this requires the expansion of the scope of coverage and the level of the carbon price in jurisdictions where instruments are already being utilised. On the other hand, carbon pricing instruments need to be introduced anew in many jurisdictions and regions worldwide. In the latter case, it is essential to first undertake a robust assessment of the carbon pricing potential and readiness of the jurisdictions to ensure that carbon taxes and emissions trading systems reflect the local context and circumstances in their design and implementation phases.

This project delivers such an assessment for selected jurisdictions in South and East Asia. Many of these jurisdictions lie at the heart of the global merchandise trade network and are forecast to grow rapidly in the coming decades. Their increasing energy demand is also largely still met with fossil fuels, though most have significant but latent renewable energy potential. Successful carbon pricing can thus not only catalyse and facilitate regional climate action to reduce emissions but will also incentivise investments into low-carbon alternatives and help mitigate costly carbon lock-in.

The project began with the development of an analytical framework which can be used to survey national circumstances along political, legal, economic, technical, and regional dimensions using qualitative and quantitative indicators identified in the literature. The dimensions are deeply intertwined, as the relevant characteristics of an economy can operate through multiple channels simultaneously to determine carbon pricing potential and readiness in practice. Additional details regarding how the analytical framework was constructed can be found in the first report published under the project, Doda et al. (2021) .

The framework was then applied to 15 jurisdictions in the region, using a subset of framework components for which quantitative and qualitative data are broadly available. To that end, a series of detailed factsheets was developed, revealing ways forward for carbon pricing and the key opportunities and challenges it faces in the jurisdictions. The second report, Doda et al. (2022), then grouped the 15 jurisdictions into five clusters based on: 1) the potential high impact of carbon pricing in terms of emissions reductions; 2) where there are least barriers to carbon pricing thanks to favourable political, legal, economic, technical, or multilateral conditions; 3) where the jurisdictions may be particularly exposed to border carbon adjustments; 4) where there may be high technical barriers to carbon pricing despite government interest; and 5) finally, where conversely there are significant political economy obstacles.

A broad conclusion in this second report was that climate ambition in the region is picking up pace. Several jurisdictions have already made considerable headway in advancing their long-term climate strategies, and carbon pricing is often intended to play a critical role in achieving further progress. However, the report also identified factors which could hinder progress: heavy dependence on fossil fuels for energy as well as for public and export revenues; low energy prices which are at times sustained by government subsidies to its production and consumption; and heavy regulation of the power sector which may undermine effectiveness of the carbon price signal in the power markets, but which has proven in many instances difficult to reform.

Motivated by the findings of the first and second reports, three jurisdictions were selected for further analysis: **Indonesia, Vietnam, and Pakistan**. This third and final report under the project extends the previous work and contains the in-depth case studies for these jurisdictions. Section 1 begins with a **broad overview of common themes and issues** across case studies and draws lessons from the project's analysis of the framework conditions in the context of the three jurisdictions. These lessons are also extrapolated to the region more generally and are viewed along the political, legal, economic, technical, and multilateral dimensions that make up the project's theoretical foundation.

The report then moves on to the **three case studies** in Sections 2-4. These plot potential pathways to facilitate the deployment of carbon pricing instruments in the jurisdictions and their regional partners. The case studies go beyond the factsheets in Doda et al. (2022) in that they include a detailed stakeholder mapping; perform interviews with local policymakers and stakeholders from the private sector as well as civil society; and provide review of the state of the power sector and its regulation as they relate to carbon pricing. Each case study ends with a **synthesis** of findings that compiles the major opportunities and challenges for carbon pricing in the jurisdiction and an outlook on the best possible pathways to implementation that lie ahead.

Overcoming **political** resistance and lobbying from groups with vested interests in fossil fuels is critical and can be achieved via targeted compensation schemes and investment support in abatement technologies as well as energy efficiency to reduce the compliance burden. Affected businesses tend to prefer market-based instruments (and indeed often an ETS over a carbon tax) compared to often more rigid and costly command-and-control regulation. However, challenges often include limited awareness of how climate policy instruments like carbon pricing work in practice, their perceived conflict with social and economic development goals, and an absent or underdeveloped green lobby which could provide a counterweight to fossil fuel interests. Despite this, the interviews and analyses undertaken for the three case study jurisdictions have revealed strong political will to pursue carbon pricing and highlights the significant progress they have made along this dimension.

The **legal** conditions for the adoption of a carbon price are favourable for all three countries, which have flagship climate laws, and energy and climate policy frameworks in place. Indonesia and Vietnam are already well on their way to implementing carbon pricing. However, fragmented constitutional and institutional environments, particularly in Indonesia and Pakistan, may lead to challenges for carbon pricing in the process going forward, due to possible conflicts related to the distribution of powers and responsibilities across government levels. Difficulties may also arise from potential challenges by international investors in fossil fuel intensive assets and infrastructure; for instance, both Vietnam and Pakistan receive significant investment from China, though many countries in the region also face similar issues. However, China's recent pledge to stop further coal-fired power plant investments abroad will likely mitigate this issue in future, and more so if other important jurisdictions in the region follow suit.

Carbon pricing is a market-based instrument that relies on **economic** incentives to spur emission reductions. Jurisdictions' economic and trade structure, level of development, and power market characteristics are thus crucial for the analysis of carbon pricing potential. These determine the incentives, trade-offs, and requirements that actors face and thus lay the foundations for the public acceptability of carbon pricing instruments, which in turn can influence their success.

Most jurisdictions in the region have a high share of emissions stemming from the power sector, often making it the primary target of a carbon price. In general, power demand is also steeply on

the rise as economies develop rapidly and work to electrify transport, heating, and other sectors that traditionally use fossil fuels. This has meant that power markets are typically heavily regulated. The design of carbon pricing instruments must thus be tailored to the regulatory set up for the power market. Only then can they work in tandem to facilitate the desired outcome of reducing emissions while ensuring affordable access to clean energy for citizens.

Indeed, all three case jurisdictions face challenges in this regard. In Indonesia, the supply chain for power is highly concentrated. The sector is still undergoing reform which at times has been impeded by constitutional challenges. Long-term PPAs are prevalent, and electricity prices do not reflect costs. Perceived regulatory uncertainty attenuates investment in renewables, despite Indonesia's significant potential. Similarly, in Vietnam, the state-owned enterprise Viet Nam Electricity (EVN) dominates the power sector, market reform is taking place but is delayed, and wholesale and retail prices are highly regulated. In Pakistan, power sector reforms have made much progress in the last three decades, with generation, transmission and dispatch, and distribution unbundling and the move towards competitive trading in the wholesale market well underway. The country also boasts vast renewable energy potential and has set support policies in motion. However, prevalence of long-term power purchase agreements (PPAs) and firm reliance on coal as well as financial and structural fragilities along the power supply chain are relevant and may yet pose obstacles to the introduction of a carbon price.

Elsewhere in the region, power sector challenges are similar: significant state involvement in the sector, delayed market reform, long-term PPAs, and power prices below production, transmission and distribution costs which undermine the financial health of the sector. Governments must therefore ensure that carbon pricing plans consider and reflect these market constraints and conditions. Conversely, power sector reform can play a significant role in determining the success or failure of carbon pricing and should therefore consider the impact of the introduction of carbon prices.

Technical capacity on the part of the government and covered entities is paramount to the success of carbon pricing, including on monitoring, reporting, and verification (MRV), business knowledge, institutional capacity, and cooperation. Whatever the choice of instrument, a carbon price requires public officials and policymakers to perform new functions, draft new laws, and potentially create new institutions. This capacity can be enhanced via dedicated bilateral and multilateral donor programmes that aim to promote the uptake of carbon pricing instruments. On the private sector side, knowledge and capacity are key to ensuring compliance imposes as small a burden as possible. Cost-effective emissions reductions require that regulated entities understand how carbon pricing works and have access to capacities and products that facilitate both the identification and implementation of abatement measures. Such capacities and products cannot be taken for granted, especially in developing and emerging countries. Regulated entities should in the best case also feel ownership of the instrument's design and understand its impact on business operations. Though they are at various stages of carbon pricing implementation, knowledge and capacity regarding MRV are identified as the main technical challenge in all three case study jurisdictions.

Multilateral relations and regional context can provide external incentives for carbon pricing, facilitating cross-border transparency, exchange, and potential carbon market cooperation. Jurisdictions' relationships with others considering (or already implementing) carbon pricing and their participation in multilateral fora provide insights into designs pursued elsewhere. Prior experience in international environmental cooperation can also be conducive to domestic carbon pricing. The findings from the cases studies point to a common theme in this respect. The use of carbon pricing instruments in jurisdictions' regional neighbours (e.g., China; South Korea; Japan) and in major trade partners (e.g., the EU ETS and the EU's move to establish a Carbon

Border Adjustment Mechanism (CBAM)) have provided an added incentive to consider and move closer to eventually implementing domestic carbon pricing. Another important driver of carbon pricing in the multilateral context is the potential gains from participating in Article 6 mechanisms. These have spurred international dialogue on climate action and set the tone for carbon pricing cooperation in various fora. Individual jurisdictions' roles here become significant; for example, the overlap between the Indonesian presidency of the G20 and the German presidency of the G7 alongside the countries' interest in carbon pricing has pushed the topic up the agenda for both. At the same time, it is important to safeguard against the progress being stymied by unrelated geopolitical and diplomatic tensions. Greater involvement in the region by multilateral development banks like the World Bank or Asian Development Bank and international organisations like ASEAN, IEA and ICAP can provide a forum for ongoing dialogue technical cooperation, enhance capacity building efforts and be the foundation for greater diffusion of robust and effective climate policies, including carbon pricing.

Following Doda et al. (2021) and Doda et al. (2022), this report is the third and final publication under the project. In addition, project activities also included a **webinar** which took place on 21 October 2022. Organised in collaboration with the Asia Society Policy Institute and ASEAN ACCEPT, the webinar drew over 80 participants from across the region. A presentation by the project team focused on project findings and recommendations. It was followed by reactions from representatives from ASEAN and ASPI and a final Q&A session with the participants. The three publications under this project and a recording of the webinar can be found at the project website [here](#) and are intended to support and advance the carbon pricing agenda in the region by providing a rich information base.¹

¹ The project website is at:
<https://www.adelphi.de/en/project/carbon-pricing-potential-east-and-south-asia>

Zusammenfassung

Die Bepreisung von CO₂ in angemessener Höhe ist ein zentrales Instrument im Kampf gegen den Klimawandel und zur Erreichung der ambitionierten Ziele des Pariser Abkommens. Viele Länder weltweit haben bereits CO₂-Steuern und Emissionshandelssysteme (EHS) eingeführt, um einen CO₂-Preis zu erheben und so ihre Treibhausgasemissionen kosteneffizient zu reduzieren. Dennoch sind bislang nur etwa 20 % der globalen Emissionen durch einen CO₂-Preis abgedeckt und dies mit unterschiedlicher Stringenz - eine Ausweitung und der Ausbau von Netzwerken der CO₂-Bepreisung sowie Ambitionssteigerungen sind daher von größter Bedeutung. Einerseits erfordert dies die Ausweitung des Anwendungsbereichs und des CO₂-Preisniveaus in Ländern, in denen bereits Instrumente der Kohlenstoffbepreisung existieren; andererseits ist die Einführung von CO₂-Bepreisung in weiteren Ländern und Regionen notwendig. Für Letzteres ist es wichtig, zunächst eine solide Bewertung des Potenzials sowie der institutionellen Voraussetzungen in den jeweiligen Ländern vorzunehmen, um sicherzustellen, dass die Instrumente in der Konzeptions- und Umsetzungsphase die lokalen Gegebenheiten berücksichtigen, um so die Effektivität der CO₂-Bepreisung sicherzustellen.

Im vorliegenden Projekt wird genau eine solche Bewertung für ausgewählte Länder in Süd- und Ostasien durchgeführt. Viele dieser Länder sind im Zentrum des globalen Warenhandels und werden in den kommenden Jahrzehnten weiter schnell wachsen. Der steigende Energiebedarf wird aktuell noch größtenteils mit fossilen Brennstoffen gedeckt, obwohl die meisten Länder über ein beträchtliches, wenn auch noch nicht erschlossenes Potential an erneuerbaren Energien verfügen. Eine erfolgreiche CO₂-Bepreisung kann daher nicht nur regionale Emissionen reduzieren, sondern auch Anreize für Investitionen in kohlenstoffarme Alternativen schaffen und dazu beitragen, die kostenintensive Bindung an fossile Energieträger zu verringern.

Zu Beginn des Projekts wurde zunächst ein analytischer Rahmen entwickelt, mit dem die nationalen Gegebenheiten entlang politischer, rechtlicher, wirtschaftlicher, technischer und regionaler Dimensionen unter Verwendung qualitativer und quantitativer Indikatoren aus der Literatur untersucht werden können. Die Dimensionen sind dabei eng miteinander verwoben und wirken in einer Volkswirtschaft über mehrere Mechanismen zusammen und bestimmen so das Potenzial sowie die institutionellen Voraussetzungen zur Einführung einer CO₂-Bepreisung in der Praxis. Weitere Einzelheiten zum Aufbau des analytischen Rahmens finden sich im ersten im Projekt veröffentlichten Bericht, Doda et al. (2021).

Anschließend wurde der Analyserahmen auf 15 Länder der Region angewandt, wobei der Teil der Rahmenkomponenten verwendet wurde, für den quantitative und qualitative Daten weitgehend verfügbar sind. Hierfür wurde eine Reihe von detaillierten Steckbriefen erstellt, die Wege für die CO₂-Bepreisung und die wichtigsten Chancen und Herausforderungen in den jeweiligen Ländern aufzeigen. Im zweiten Bericht, Doda et al. (2022), wurden die 15 Länder in fünf Gruppen eingeteilt: 1) eine Gruppe mit der potenziell größten Wirkung der CO₂-Bepreisung auf die Emissionsminderung; 2) die Länder, in denen dank günstiger politischer, rechtlicher, wirtschaftlicher, technischer oder multilateraler Bedingungen die geringsten Hindernisse für die CO₂-Bepreisung bestehen; 3) die Länder, die möglicherweise besonders stark von CO₂-Grenzausgleichsmechanismen betroffen sind; 4) die Länder, in denen trotz des Interesses der Regierung hohe technische Hürden für die Umsetzung von CO₂-Bepreisung bestehen; und schließlich 5) die Länder, in denen erhebliche politökonomische Hindernisse bestehen.

Allgemein wurde in diesem zweiten Bericht festgestellt, dass die Klimapolitik in der Region an Bedeutung gewinnt. Einige Länder haben bereits beachtliche Fortschritte bei der Umsetzung ihrer langfristigen Klimastrategien erzielt, und vielerorts wird der Bepreisung von CO₂ eine entscheidende Rolle beigemessen. Der Bericht geht jedoch ebenfalls auf Faktoren ein, die das

Erreichen der Klimaziele beeinträchtigen könnten: die starke Abhängigkeit von fossilen Brennstoffen bei der Energieversorgung sowie die Bedeutung für öffentliche Einnahmen sowie Exporteinnahmen; niedrige Energiepreise, die zuweilen durch staatliche Subventionen für Produktion und Verbrauch aufrechterhalten werden; und die starke Regulierung des Energiesektors, die die Wirksamkeit des CO₂-Preissignals auf den Energiemärkten untergraben kann, sich jedoch in vielen Fällen als schwer reformierbar erweist.

Vor diesem Hintergrund wurden drei Länder für eine weitere Analyse ausgewählt: **Indonesien, Vietnam und Pakistan**. Der vorliegende dritte und letzte Bericht im Rahmen des Projekts erweitert die bisherigen Arbeiten und besteht aus detaillierten Fallstudien für die ausgewählten Länder. Zunächst wird in Abschnitt 1 ein **umfassender Überblick über die gemeinsamen Themen der Fallstudien** gegeben und Lehren aus der Analyse der Rahmenbedingungen in den drei Ländern gezogen. Diese Erkenntnisse werden zudem auf die Gesamtregion übertragen und entlang der politischen, rechtlichen, wirtschaftlichen, technischen und multilateralen Dimensionen untersucht, welche die theoretische Grundlage der Analyse bilden.

In den Abschnitten 2 bis 4 werden anschließend die **drei Fallstudien** vorgestellt. Diese veranschaulichen mögliche Ansätze zur Erleichterung der Einführung einer CO₂-Bepreisung in den Ländern und ihren regionalen Partnern. Dabei gehen die Fallstudien über die Steckbriefe in Doda et al. (2022) hinaus. Sie enthalten ein detailliertes Stakeholder-Mapping, Interviews mit lokalen politischen Entscheidungsträgern und Stakeholdern aus dem privaten Sektor sowie der Zivilgesellschaft. Sie enthalten zudem einen Überblick zu den Gegebenheiten im Energiesektor und dessen Regulierung vor dem Hintergrund einer CO₂-Bepreisung. Am Ende jeder Fallstudie werden die Ergebnisse in einer Synthese zusammengefasst. Potenziale und Herausforderungen für die CO₂-Bepreisung werden vorgestellt und ein Ausblick auf eine bestmögliche Umsetzung im weiteren Prozess gegeben.

Die Überwindung des **politischen** Widerstands und der Lobbyarbeit von Gruppen, welche den Einsatz fossiler Brennstoffe vertreten, ist von entscheidender Bedeutung. Dies kann durch gezielte Kompensationsprogramme und die Förderung von Investitionen in Technologien zur Emissionsminderung sowie in die Energieeffizienz erreicht werden. Betroffene Unternehmen bevorzugen in der Regel marktbasierende Instrumente zur CO₂-Bepreisung (häufig auch ein Emissionshandelssystem gegenüber einer CO₂-Steuer) im Vergleich zu rigideren und oftmals kostspieligeren ordnungspolitischen Instrumenten. Zu den allgemeinen Herausforderungen zählen oft eine begrenzte Kenntnis und Funktionsweise klimapolitischer Instrumenten, der wahrgenommene Konflikt mit sozialen und wirtschaftlichen Entwicklungszielen und eine fehlende oder unterentwickelte grüne Lobby, die ein Gegengewicht zu den Interessensgruppen der fossilen Brennstoffe bilden könnte. Dennoch haben die für diesen Bericht durchgeführten Interviews und Analysen in den drei Fallstudien-Ländern einen starken politischen Willen zur Einführung einer Kohlenstoffbepreisung und bedeutende Fortschritte diesbezüglich aufzeigen können.

Die **rechtlichen** Voraussetzungen für die Einführung einer CO₂-Bepreisung sind in allen drei Ländern günstig, da sie über vorbildliche Klimagesetze sowie energie- und klimapolitische Rahmenbedingungen verfügen. Indonesien und Vietnam sind bereits auf dem besten Weg zur Einführung einer Kohlenstoffbepreisung. Das fragmentierte verfassungsrechtliche und institutionelle Umfeld, insbesondere in Indonesien und Pakistan, kann allerdings zu Herausforderungen im weiteren Prozess führen. Zudem kann die teils unterschiedliche Verteilung von Befugnissen und Zuständigkeiten zwischen den verschiedenen Regierungsebenen Nahrung für Konflikte bieten. Auch internationale Investoren, die in mit fossilen Brennstoffen betriebene Anlagen und Infrastrukturen investieren, können den weiteren Prozess erschweren; so erhalten beispielsweise sowohl Vietnam als auch Pakistan, aber auch

andere Länder in der Region, erhebliche Investitionen aus China. Chinas jüngste Zusage, weitere Investitionen in Kohlekraftwerke im Ausland zu stoppen, wird diese Problematik jedoch in Zukunft wahrscheinlich abschwächen. Dies gilt umso mehr, wenn andere wichtige Länder in der Region dem Beispiel Chinas folgen werden.

Die Bepreisung von CO₂ ist ein marktbasierendes Instrument, das auf **wirtschaftlichen** Anreizen beruht, um Emissionen zu reduzieren. Die Wirtschafts- und Handelsstruktur, der Entwicklungsstand und die Charakteristika des Energiemarktes eines Landes sind daher entscheidend für die Analyse des Potenzials der CO₂-Bepreisung. Diese bestimmen die Anreize, Zielkonflikte und Anforderungen, mit denen die Akteure konfrontiert sind, und legen somit den Grundstein für die öffentliche Akzeptanz von Bepreisungsinstrumenten. Dies wiederum beeinflusst deren Erfolg.

Ein Großteil der Emissionen in den meisten Ländern der Region stammt aus dem Energiesektor, der somit häufig das primäre Ziel einer Kohlenstoffbepreisung ist. Generell steigt die Stromnachfrage stark, da sich die Volkswirtschaften schnell entwickeln und die Elektrifizierung von Verkehr, Wärme und anderen Sektoren vorangetrieben wird, die traditionell fossile Brennstoffe verwendet haben. Dies hat dazu geführt, dass die Strommärkte in der Regel stark reguliert sind. Die Gestaltung der CO₂-Bepreisung muss daher auf die regulatorischen Rahmenbedingungen des Strommarktes zugeschnitten sein, damit eine Wirkung des Instruments erzielt werden kann. Nur dann kann eine Emissionsreduktion erreicht werden, die den Bürger*innen gleichzeitig einen erschwinglichen Zugang zu sauberer Energie ermöglicht.

Alle drei untersuchten Länder stehen in dieser Hinsicht vor Herausforderungen. In Indonesien ist der Strommarkt stark konzentriert. Der Sektor befindet sich noch in einem Reformprozess, der zuweilen durch verfassungsrechtliche Herausforderungen behindert wird. Langfristige Stromabnahmeverträge (*power purchase agreements*, PPA) sind weit verbreitet, und die Strompreise spiegeln nicht die Kosten wider. Die wahrgenommene regulatorische Unsicherheit dämpft Investitionen in erneuerbare Energien, obwohl Indonesien über ein erhebliches Potenzial verfügt. Auch in Vietnam dominiert das Staatsunternehmen *Viet Nam Electricity* (EVN) den Stromsektor, die Marktreform erfolgt nur verzögert, und Groß- und Einzelhandelspreise sind stark reguliert. In Pakistan haben die Reformen des Stromsektors in den letzten drei Jahrzehnten große Fortschritte gemacht: Die Entflechtung von Erzeugung, Übertragung und Verteilung sowie der Übergang zu einem wettbewerbsorientierten Handel auf dem Großhandelsmarkt sind zudem weit fortgeschritten. Das Land verfügt außerdem über ein großes Potenzial an erneuerbaren Energien und hat entsprechende Fördermaßnahmen auf den Weg gebracht. Das Vorherrschen langfristiger PPA und die starke Abhängigkeit von Kohle sowie finanzielle und strukturelle Schwächen des Stromsektors sind jedoch als relevante Hindernisse für die Einführung einer Kohlenstoffbepreisung zu betrachten.

Anderswo in der Region sind die Herausforderungen im Energiesektor ähnlich: erhebliche staatliche Verflechtungen im Sektor, verzögerte Marktreflexionen, langfristige PPA und Strompreise, die unter den Erzeugungs-, Übertragungs- und Verteilungskosten liegen und die finanzielle Stabilität des Sektors untergraben. Die Regierungen müssen daher sicherstellen, dass die CO₂-Bepreisung diese Marktzwänge und -bedingungen berücksichtigt und widerspiegelt. Umgekehrt kann die Reform des Stromsektors eine wichtige Rolle für den Erfolg oder Misserfolg der CO₂-Bepreisung spielen und sollte daher eine mögliche Einführung von CO₂-Preisen berücksichtigen.

Die **technischen** Kapazitäten der Regierung und der betroffenen Unternehmen sind für den Erfolg der CO₂-Bepreisung entscheidend. Dies gilt in Bezug auf Systeme zur Überwachung, Berichterstattung und Verifizierung (MRV), Geschäftswissen, institutionelle Kapazitäten und

Zusammenarbeit. Unabhängig von der Wahl des Instruments erfordert ein CO₂-Preis, dass Vertreter*innen von Behörden und politische Entscheidungsträger*innen neue Aufgaben wahrnehmen, neue Gesetze entwerfen und möglicherweise neue Institutionen schaffen. Diese Kapazitäten können durch spezielle bilaterale und multilaterale Geberprogramme gestärkt werden, die darauf abzielen, die Einführung von CO₂-Bepreisungsinstrumenten zu fördern. Auf der Seite des Privatsektors sind Wissen und Kapazitäten der Schlüssel, um sicherzustellen, dass die Einhaltung der gesetzlichen Vorgaben eine möglichst geringe Belastung darstellt. Kostenwirksame Emissionsminderungen setzen zudem voraus, dass die regulierten Unternehmen wissen, wie die CO₂-Preisgestaltung funktioniert, und dass geeignete Kapazitäten und Produkte zur Verfügung stehen, welche sowohl die Identifizierung als auch die Umsetzung von Minderungsmaßnahmen erleichtern. Diese Kapazitäten und Produkte sind nicht selbstverständlich, insbesondere in Entwicklungs- und Schwellenländern. Die regulierten Unternehmen sollten bestenfalls ein Gefühl der Mitverantwortung für die Gestaltung des Instruments entwickeln und seine Auswirkungen auf ihre Geschäftstätigkeit verstehen. Obwohl sie sich in verschiedenen Phasen der Einführung einer Kohlenstoffbepreisung befinden, werden in allen drei Fallstudienländern Wissen und Kapazitäten in Bezug auf MRV als die größte technische Herausforderung identifiziert.

Multilaterale Beziehungen und ein regionaler Kontext können externe Anreize für die Einführung einer CO₂-Bepreisung setzen, indem sie grenzüberschreitende Transparenz, Austausch und eine potenzielle Entwicklung gemeinsamer Kohlenstoffmärkte ermöglichen. Die Beziehungen der untersuchten Länder zu anderen Ländern, die eine CO₂-Bepreisung in Erwägung ziehen (oder bereits umsetzen), und ihre Teilnahme an multilateralen Foren helfen ihnen, Einblick in die anderswo verfolgten Konzepte zu erhalten. Frühere Erfahrungen in der internationalen umweltpolitischen Zusammenarbeit können sich auch für die nationale CO₂-Bepreisung als förderlich erweisen. Die Erkenntnisse aus den Fallstudien deuten in jedem Fall darauf hin. Die Implementierung von Instrumenten zur CO₂-Bepreisung in den regionalen Nachbarländern (z.B. China, Südkorea, Japan) und bei wichtigen Handelspartnern (z.B. das EU-Emissionshandelssystem und die von der EU geplante Einführung eines CO₂-Grenzausgleichsmechanismus (Carbon Border Adjustment Mechanism - CBAM) haben einen zusätzlichen Anreiz für die untersuchten Länder geschaffen, eine nationale Kohlenstoffbepreisung näher in Betracht zu ziehen und schließlich umzusetzen. Eine weitere wichtige Triebkraft für die CO₂-Bepreisung im multilateralen Kontext sind die potenziellen Vorteile, die sich aus der Teilnahme an den Mechanismen nach Artikel 6 des Pariser Abkommens ergeben. Diese haben den internationalen Dialog über Klimaschutzmaßnahmen angeregt und den Ton für die Zusammenarbeit bei der Bepreisung von CO₂ in verschiedenen Foren angegeben. So hat beispielsweise die Überschneidung zwischen der indonesischen Präsidentschaft der G20 und der deutschen Präsidentschaft der G7 zusammen mit dem Interesse der Länder an der CO₂-Bepreisung dazu geführt, dass das Thema auf beiden Seiten prioritär auf der Tagesordnung steht. Gleichzeitig muss verhindert werden, dass der Fortschritt durch geopolitische und diplomatische Spannungen auf anderen Gebieten gebremst wird. Ein stärkeres Engagement multilateraler Entwicklungsbanken wie der Weltbank oder der Asiatischen Entwicklungsbank (ADB) und internationaler Organisationen wie ASEAN, IEA und ICAP in der Region kann ein Forum für den laufenden Dialog und die technische Zusammenarbeit bieten, den Aufbau von Kapazitäten fördern und die Grundlage für eine stärkere Verbreitung robuster und wirksamer klimapolitischer Maßnahmen, einschließlich der CO₂-Bepreisung, bilden.

Nach Doda et al. (2021) und Doda et al. (2022) ist der vorliegende Bericht die dritte und letzte Veröffentlichung im Rahmen des Projekts. Darüber hinaus umfassten die Projektaktivitäten auch ein **Webinar**, das am 21. Oktober 2022 stattfand. Am in Zusammenarbeit mit dem Asia Society Policy Institute und ASEAN ACCEPT organisierte Webinar nahmen über 80 Personen aus der

gesamten Region teil. Der Vortrag des Projektteams konzentrierte sich auf die Projektergebnisse und Empfehlungen. Es folgten Reaktionen von Fachleuten von ASEAN und ASPI sowie eine anschließende Fragerunde mit den Teilnehmenden. Die drei Veröffentlichungen im Rahmen dieses Projekts und eine Aufzeichnung des Webinars befinden sich auf der **Projektwebsite** und sollen die Bestrebungen der Einführung einer Kohlenstoffbepreisung in der asiatischen Region weiter unterstützen und fördern, indem sie eine umfassende Informationsbasis bieten.²

² Die Projektwebsite ist zu finden unter:
<https://www.adelphi.de/en/project/carbon-pricing-potential-east-and-south-asia>

1 Introduction and overview

This is the third and final report under the project titled “Carbon pricing potential in east and south Asia”. The report applies the analytical framework developed in Doda et al. (2021) to assess carbon pricing readiness in three jurisdictions, namely Indonesia, Vietnam, and Pakistan. The three jurisdictions were selected from a set of 15, which were analysed using a framework based on desk-based research and grouped into clusters as described in Doda et al. (2022).³

The report takes the carbon pricing readiness factsheets in Doda et al. (2022) for the three jurisdictions as a starting point and develops individual case studies for Indonesia (Section 2), Vietnam (Section 3) and Pakistan (Section 4). The case studies extend the research in the respective factsheets along a four-step approach.

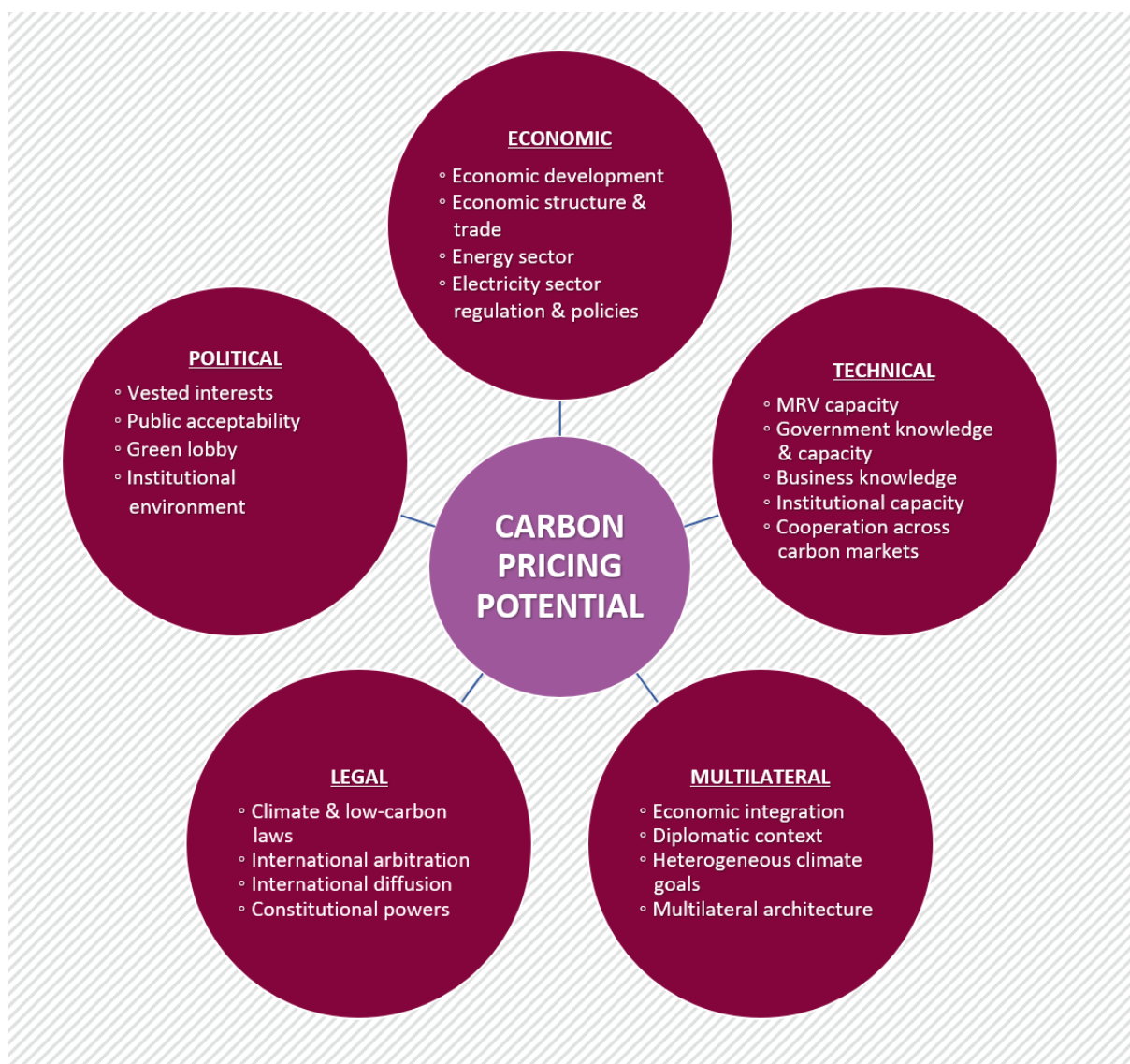
First, a stakeholder mapping exercise was undertaken to identify the key domestic and international actors in the local carbon pricing landscapes. Second, interviews with stakeholders from the public and private sector, as well as civil society, were conducted to delve deeper into the specific issues that were identified in the preliminary factsheet analyses for the jurisdictions. Doing so allowed the project team to develop a more nuanced understanding of the state of carbon pricing readiness in the jurisdiction than would be possible based on desk research alone. Third, special consideration was given to the policies and regulations that are intimately related to and interact with carbon pricing, particularly in the electricity sector. Fourth, based on the project team’s best judgement, a comprehensive overview of the carbon pricing outlook and possible paths to implementation is offered in each case study. These are complemented with an analysis that identifies the main challenges in the respective jurisdictions along with practical recommendations to overcome them.

The analysis in the case studies is organised around the framework developed in Doda et al. (2021) and summarised by Figure 1 also found in this initial report. The figure illustrates the five dimensions of the framework to assess carbon pricing readiness, i.e., political, legal, economic, technical, and multilateral. Each dimension includes the aspects that came to the fore in the academic and grey literature review, which was performed using “a custom methodology inspired by the integrative review method in Snyder (2019)” (Doda et al. 2021). For instance, the aspects highlighted under the political dimension are vested interests; public acceptability; green lobby; and institutional environment.

The report is organised as follows. Sections 1.1-1.5 highlight some of the common challenges that were identified in the three case study jurisdictions for each of the dimensions in Figure 1. Where similar challenges were prominent in the factsheets of the remaining 12 jurisdictions studied during the project, they are also mentioned, though briefly. Section 1.6 summarises the recommendations to overcome the main challenges identified, drawing on the case studies in Sections 2, 3 and 4.⁴

³ The 15 East and South Asian jurisdictions studied in this project are: Bangladesh, Brunei, Hong Kong, India, Indonesia, Malaysia, Mongolia, Pakistan, Philippines, Russia, Sri Lanka, Taiwan, Thailand, Uzbekistan, and Vietnam.

⁴ The research, interviews and drafting of the case studies were led by Maia Hall and Constanze Haug (Indonesia); Anatole Boute and Phung Vu Hiep (Vietnam); Ernst Kuneman, Baran Doda and Trevor Laroche-Theune (Pakistan).

Figure 1: Framework for assessing carbon pricing in Asia

Source: Doda et al (2021)

1.1 Political dimension

The political context in each jurisdiction is important for assessing the potential for carbon pricing, as the policy instrument requires the political will of the government for its introduction as well as buy-in from decisionmakers in the private sphere who reflect a diverse set of interests. It is particularly crucial to overcome resistance and lobbying from groups with vested interests in fossil fuels (Doda et al. 2021). In this respect, the role of vested interests, in e.g., coal production and coal-fired power generation, which is dominant in the region, is particularly relevant. To counter such resistance, compensation schemes to reduce losses, or to finance investment in abatement technologies and energy efficiency can be introduced alongside carbon pricing to enhance public and private sector acceptability of the instrument. Plant owners/operators could be persuaded to support carbon pricing to avoid more costly forms of emission reduction measures (e.g., forced phase-out). Similarly, firms may prefer the flexibility of market instruments over more rigid and costly command-and-control regulation (in the form of technology or performance standards). Nurturing a green lobby can balance the political weight of fossil fuel interests. Interviews in case study jurisdictions with representatives from

the private sector, civil society and thinktanks, as well as ministries and public sector agencies, touched upon various aspects of this issue. Despite the challenges discussed next, an overarching observation is that there is strong political will to pursue carbon pricing, and all three case study countries have made significant progress along this political dimension already.

An unexpected finding when looking across the case study jurisdictions is that heavy dependence on fossil fuels and opposition from vested interests in mining, power, and energy-/carbon-intensive industrial sectors appear to be a greater challenge in Indonesia and Pakistan than in Vietnam. In the latter case, the opposition from industry and the country's power monopoly EVN has so far been limited. However, the interviewed stakeholders in Vietnam suggest limited awareness and understanding of carbon pricing, as well as a lack of specific details regarding the government's plans for implementation, as possible reasons for this weaker-than-expected resistance. Moreover, the perceived possibility that EVN, a state-owned entity, could be shielded from the adverse impacts of carbon pricing in its operations by the government may contribute to the company's relatively neutral stance. Therefore, as the details of a concrete carbon pricing proposal in Vietnam emerge, and as stakes increase and relevant actors become more informed, one might expect growing and more organised resistance. Indeed, this was observed in Indonesia where specific carbon pricing proposals led to greater opposition not only from the private sector but also from different parts of the government.

This type of opposition from fossil fuel interests was identified as the most common, and perhaps the most significant, barrier to the implementation of carbon pricing also elsewhere in the region (Doda et al. 2022). Where a given jurisdiction has substantial fossil fuel reserves, the influence of vested interests can operate through many channels. Governments may be heavily reliant on revenues from the exploitation of reserves either because they own them directly or because they tax the income generated in their production (e.g., Brunei, Russia). Powerful government ministries and state-owned enterprises, which can be directly or indirectly related to the production or use of fossil fuels, can have significant influence over decision making on carbon pricing in the jurisdiction (e.g., India, Malaysia). Infrastructure for the production, transportation, and combustion of fossil fuels may already be in place or in the pipeline. Their owners may resist their early retirement, which may be necessary (e.g., Taiwan, Mongolia among several others). Ample fossil fuel resources can make it tempting for governments to keep energy prices artificially low for jurisdictions' producers and citizens. This in turn encourages inefficiencies in production and makes even modest energy price increases run up against public acceptability constraints (e.g., Uzbekistan).

With or without domestic fossil fuel production, and in the absence of readily available low-carbon alternatives, carbon pricing is likely to increase the prices of energy and energy-intensive goods and services in deregulated markets. This can be seen to conflict with social and development goals, and therefore is politically very sensitive (e.g., Bangladesh, Pakistan). Against this backdrop, the lack of a green lobby, which can act as a counterweight to the vested interests of the brown lobby, can be detrimental to carbon pricing prospects in a jurisdiction. The limited voice of green interests was identified in the interviews as a challenge in both Indonesia and Vietnam.⁵ In contrast, Pakistan has a relatively strong green lobby, partly due to its larger low-carbon power generation base, where the country's government as well as domestic and foreign private investors have ownership interests.

Another issue related to the strength of the green lobby is limited awareness of the causes and consequences of climate change, and more importantly, what governments, business and

⁵ In addition to Indonesia and Vietnam, Doda et al. 2022 finds that this is a significant challenge in Brunei and Hong Kong.

citizens can do to minimise its adverse impacts. Particularly relevant in the current context is the significant lack of understanding regarding how carbon pricing instruments work and why they may be the most suitable instruments for reducing emissions. In jurisdictions where the level of knowledge regarding the causes and consequences of climate change is low, it is difficult to advance carbon pricing as a solution. Moreover, an effective, inclusive, and constructive debate on carbon pricing, both amongst the directly affected stakeholders as well as with the public at large, requires a basic level of understanding of an inherently technical and complex policy instrument. Where this understanding is lacking, carbon pricing is likely to be viewed as an unnecessary intervention, increasing the costs of doing business, hindering economic development, and raising the prices of essential goods and services that citizens purchase daily. Limited awareness of climate change policy instruments in general, and of carbon pricing in particular, can therefore be detrimental to the successful introduction and durability of crucial policies. This was identified as an important challenge in the Indonesia and Vietnam case studies but also applies to a varying degree to all jurisdictions in the region and beyond.

1.2 Legal dimension

The legal dimension of carbon pricing readiness analysis focuses on existing or planned climate laws, channels of international diffusion and arbitration, and the role of constitutional powers (Doda et al. 2021). Implementing an ETS or a carbon tax requires that the instruments are accommodated within national law. A firm legal basis in the form of a flagship climate law that underpins the jurisdiction's response to climate change can therefore facilitate the continued and sustainable operation of carbon pricing instruments. A carbon tax can be included in existing fiscal laws and utilise the established fiscal infrastructure that exists in most jurisdictions. However, an ETS requires more sophisticated legal and regulatory intervention, a task which may be easier to accomplish if the jurisdiction has experience with other market-based policies and regulation. In this context, whether and to what extent a jurisdiction has adopted, for example, renewable energy and energy efficiency laws and policies can shape the propensity to adopt carbon pricing. Aside from a domestic legal context, international law can also positively influence the diffusion of carbon pricing, for instance through the mechanisms outlined in Article 6 of the Paris Agreement. International law, however, can also undermine carbon pricing, as investment protection treaties between sovereign states can be used by carbon-intensive companies/sectors to challenge the introduction of climate change mitigation regulation, including carbon pricing. The divisions of environmental and fiscal powers between central and subnational authorities can help with or obstruct the introduction of carbon pricing, an issue particularly relevant to jurisdictions with federal systems in place. Moreover, a sufficiently strong legal system with an independent judiciary is critical to protect property rights and prevent overreach by the executive branch.

The research and stakeholder interviews undertaken for this report's case studies on Indonesia, Vietnam, and Pakistan indicate favourable legal conditions for the adoption of carbon pricing instruments. All three countries have flagship climate laws and experience with renewable energy and energy efficiency laws, policies, and regulations. Indonesia and Vietnam are well on their way to implementing carbon pricing instruments with legal instruments in both cases already in place, with Indonesia aiming to start implementing its carbon tax during 2022. Although no legal instrument is in place at the time of writing, Pakistan has had a dedicated Ministry of Climate Change since 2012, which has worked with international donors on scoping and feasibility studies for carbon pricing and set up a National Committee on the Establishment of Carbon Markets. All three countries are gearing up to participate in the mechanisms envisioned in Article 6 of the Paris Agreement, which may provide impetus for further legal and regulatory action on carbon pricing domestically.

Despite the promising current conditions, the Indonesia and Pakistan case studies also present some challenging elements given their fragmented constitutional and institutional environments. In Indonesia, the balance of legislative power between the government and the two People's Representative Councils, as well as of fiscal powers between central and district governments, might pose a challenge for developing implementing regulations for the country's upcoming carbon pricing instruments. The perceived lack of effective coordination between various ministries and public bodies on matters related to climate change since the abolishment of the National Council on Climate Change in 2015 was noted with concern in multiple interviews. In Pakistan, the main challenge to carbon pricing is due to the complex and at times overlapping distribution of powers and responsibilities between federal and provincial governments relating to climate and environmental issues. This is firmly established in the country's constitution and can be a factor which slows the development of legislation and associated implementing regulations for carbon pricing. Several interviewees noted that the risk is more prominent when provincial and federal governments are formed by opposing political parties.

These challenges related to the distribution of power between central and subnational governments, as well as across different ministries and public bodies, are not unique to Indonesia and Pakistan. For example, Doda et al. (2022) note that the federal constitutional setups in India and Malaysia pose similar internal difficulties. With an ongoing national conversation regarding a switch to a federal system, Philippines may find itself facing similar issues, which are already present to some extent since environmental management is a local government matter, despite climate and energy portfolios being the central government's responsibility.

A separate but no less important issue that was identified in the Vietnam and Pakistan case studies is the potential challenges from international investors in fossil fuel-producing or -using sectors. These investors, which may be using public (e.g., sovereign wealth funds) or private (e.g., oil and gas majors) resources to finance their activities, are likely to act to protect their interests. They have special rights under international investment protection treaties signed between sovereign nations and may seek arbitration by making the case that their rights will be violated with the introduction of carbon pricing. Both Vietnam and Pakistan are the recipient of significant investment from China, particularly for coal-fired power generation. Interviewees identified exemptions from carbon pricing regulation or delays in the carbon pricing implementation to fend off anticipated future challenges as risks in both jurisdictions. These risks were also judged to be significant in the Brunei, Mongolia, and Uzbekistan factsheets of Doda et al (2022).

1.3 Economic dimension

Carbon pricing is a market-based instrument that relies on economic incentives to spur emission reductions today and in the future (Doda et al. 2021). The characteristics of the economic environment and policy context in which it is deployed are therefore crucial for determining whether and how it can be introduced successfully, and the circumstances under which its interactions with other policies regulations must be carefully assessed. Important aspects to consider for an economic analysis of carbon pricing readiness include the implementing jurisdiction's level of development, the structure of its economy and international trade, energy, and electricity market structure, and the regulatory and policy frameworks underpinning these sectors. Regarding economic development, both the level and distribution of income are important because those with low incomes are much more likely to be pushed into income or energy poverty if energy prices rise due to carbon pricing without the presence of compensatory

measures. This in turn undermines the public acceptability of carbon pricing which, as noted above, is a crucial consideration in developing and advanced countries alike. The composition of a jurisdiction's economic output, as well as its imports and exports, can be an obstacle to carbon pricing if domestic production and major exports are carbon intensive. With many of the jurisdictions in the region having substantial fossil fuel reserves and following export-oriented economic strategies, this aspect is important to consider. Carbon pricing does not and cannot operate in a vacuum. Existing policies and regulations can thus have a large influence on the effectiveness of the carbon price, especially those in the energy and electricity sectors. For example, the ability to pass the increased carbon costs down the value chain can spur downstream changes in production, consumption, and investment choices towards low- and zero-carbon alternatives. In turn, the degree of availability of such alternatives is in part determined by government policies regarding low-carbon technology adoption, deployment, and innovation through R&D.

For most jurisdictions in the region, electricity sector emissions are a major, if not the largest, contributor to the jurisdiction's aggregate GHG emissions. Therefore, the sector is often among the first to be regulated by carbon pricing instruments. At the same time, the sector provides a service which is indispensable for almost all economic activity and for the well-being of citizens. Moreover, the electricity sector is extremely capital-intensive; generation assets often require very large upfront investments with payback starting several years after a large share of the costs have already been incurred. An extensive transmission and distribution network infrastructure is required for service delivery, which must be maintained and upgraded as the location and nature of demand evolves. Designing and enforcing appropriate remuneration mechanisms for the generation, transmission and distribution of assets is difficult (particularly in developing countries) due to the long life span of the required infrastructure. Also, important to consider in this context is the fact that electricity demand in the region is surging as economies develop and climate change mitigation necessitates the electrification of sectors such as transportation, heating, and certain manufacturing sectors, which have traditionally been served by fossil fuels. For these reasons among others, there is typically extensive government intervention in the electricity market. Therefore, it is essential that the design of carbon pricing instruments reflects the market structure and existing policies and regulations in the electricity sector so that they complement each other well, or at a minimum do not work at cross purposes.

Indeed, in all three case study countries, there are significant challenges in this area that need to be addressed for carbon pricing to achieve its potential in reducing emissions from the sector. For example, based on interviews and independent research for this report, the Indonesia case study notes that electricity market reform in the country has been ongoing since the mid-1980s, with some elements challenged in the constitutional court. The state-owned electricity company, PLN, largely remains a vertically integrated monopoly. Independent power producers (IPPs) have some market share, but long-term PPAs are prevalent. Electricity tariffs, most of which must be approved by the parliament, are low and often do not reflect costs. Fossil fuel input prices are attenuated by domestic market obligations for coal and gas, which the country has ample reserves of. This, combined with regulatory and policy uncertainty, risks making investment in renewable energy less attractive despite the country's vast potential. Taken together, these features of the electricity sector in Indonesia suggest that a carbon pricing signal might have a muted impact on emissions unless market reforms are undertaken to address these challenges.

There are several similarities between current states of the electricity markets in Indonesia and Vietnam: the dominance of the state-owned enterprise (EVN in Vietnam) with low participation by independent power producers which enjoy long-term PPAs; subsidised fossil fuel input costs

which are below international levels; long running and not yet complete reform processes; new investments in coal fired generation; and heavily regulated wholesale and retail prices. At the same time, a competitive wholesale electricity market has commenced and is running as a pilot in Vietnam. Plans are in place for an independent system and market operator as well as competitive bidding for new generation capacity. Shadow carbon prices, albeit at relatively low levels, have recently been used in investment planning. The Vietnam case study identifies two significant challenges regarding the outlook for carbon pricing in the country. First, it notes that currently carbon pricing hardly features in the ongoing electricity market reform process and, second, its role in incentivizing renewable energy (in addition to or perhaps instead of auctions) remains unexplored. The misalignment of the electricity market reform process with the introduction of carbon pricing poses a risk of inferior outcomes for both market liberalization and the effectiveness of carbon pricing in reducing emissions.

In Pakistan, the electricity sector reforms have been ongoing since the 1990s and have made significant progress. The vertically integrated public utility has been unbundled into several generation companies, transmission and dispatch company and regional distribution companies. The independent National Electricity Regulatory Authority oversees the electricity sector with a mandate to determine tariff structures, set procedures and standards for investment as well as to enforce performance standards, settle disputes and supervise the transition to wholesale market trading. The transition to competitive trading in the wholesale market is well underway, but the market needs to mature and gain depth. The compensation scheme for generators and dispatch rules will need to be modified to enable carbon prices to have the full desired effect on decommissioning, new investment and operational decisions that reduce the sector's emissions. Pakistan can tap into its vast renewable energy potential where there are encouraging signs, with several renewable support policies in place and auctions for new renewable capacity taking place since 2019. More broadly, less reliance on long-term PPAs, replacing take-or-pay contracts with take-and-pay contracts, and measures targeted at improving the financial health of the sector as a whole, are recommended. However, with several relatively young coal-fired units, vast domestic coal reserves and persistent structural as well as financial fragilities along the supply chain, a carbon pricing instrument in Pakistan will need to be very carefully designed to succeed.

Elsewhere in the region, the challenges in the electricity sector are similar: the prominent role of the State in the sector (e.g., Russia; Uzbekistan); the slow pace of electricity market reforms and lack of competition, particularly in generation (e.g. Bangladesh; Sri Lanka); difficulties in reconciling existing, often long-term, PPAs with channels through which carbon prices operate to reduce emissions (e.g. Malaysia); and the prevalence of low electricity prices which do not reflect costs, can further compromise the financial health of the sector and which risks social/political backlash if rationalised following the introduction of carbon pricing (e.g. Taiwan; India).⁶ Moreover, the necessity of an appropriate set of incentives, so that fossil-fuel-free generators gain an ever-increasing share in generation in the sector in the long run, is a challenge that affects not only jurisdictions in the region but also developing and advanced countries around the world.

1.4 Technical dimension

Technical capacity on the part of the government and covered entities regarding the implementation and continued operation of a carbon pricing instrument is critical to its success.

⁶ The jurisdictions in the parentheses are drawn from Doda et al. 2022 as examples where the specific challenge was assessed to be particularly strong. As noted, many of these challenges are observed, to a greater or lesser extent in all jurisdictions where carbon pricing was assessed.

Doda et al. (2021) identifies five aspects to be considered within the technical dimension of carbon pricing readiness analysis: MRV capacity; government knowledge and capacity; business knowledge; institutional capacity and cooperation across carbon markets. Carbon pricing cannot effectively operate without accurate monitoring, truthful reporting, independent verification of the reports and robust penalties and enforcement in case of non-compliance with MRV rules. The verified emissions of regulated entities must be recorded accurately and securely and this requires the development of comprehensive information systems. A registry is required wherever allowances are traded or when compliance instruments include approved offsets.

The introduction of a carbon price requires public officials and policymakers to perform new functions, draft new laws and potentially create new institutions to effectively implement the market-based, highly technical instrument. This is particularly relevant in the case of an ETS, which entails the creation of a well-functioning, liquid marketplace where allowances and other compliance units are traded. Government knowledge and capacity to implement carbon pricing can be enhanced by engaging officials with programmes that aim to promote climate policy and strengthen technical capacity. In the case of an ETS, a high level of participation in the design phase contributes to a deeper understanding on the part of the regulated entities and often precipitates increased collaborative engagement in the operational phases of the market. On the private sector side, knowledge and capacity are essential for full compliance with carbon pricing. Furthermore, to ensure the longevity of the system, regulated entities should feel ownership of its design and have a sound understanding of its likely impact on business operations.

In all three case studies, technical capacity and knowledge requirements relating to the development and operation of an MRV system were identified as the main challenges under the technical dimension. In fact, in the case of Vietnam, interviewees identified MRV as the main outstanding obstacle to the progress on the carbon pricing agenda in the country. Overall, the case study jurisdictions are at different stages of their progress towards carbon pricing implementation, with Indonesia having experience with a voluntary ETS pilot in the power sector and expecting to implement a carbon tax this year. In contrast, Pakistan is at the initial stages of the carbon pricing journey, with implementation likely several years away. Vietnam has a legal mandate for an ETS in place and plans to run a pilot scheme from 2025 and move to full implementation by 2028. The reflection of these different stages can be seen in the differences observed in the MRV knowledge and capacity needs.

In Indonesia, the preparations for the pilot ETS and experience with the REDD+ led to the development of sector specific MRV systems and registries. Although the MRV systems for electricity and industry sectors are already in place, scarcity of trained and accredited verifiers seems to remain as a bottleneck. MRV development efforts have been ongoing since 2013 in Vietnam, and the legal basis for MRV is already established. These efforts notwithstanding, both the country's government and interviews conducted in the context of this study suggest that further development and improvements would benefit the ongoing and future implementation. As for Pakistan, the MRV system needs to be built from scratch and address the fact that much economic activity takes place in the large informal sector.

Limited exposure to and understanding of carbon pricing as an instrument to reduce emissions appears to be another important constraint among both public authorities who would operate, and private sector entities who would be regulated under, the instrument in all case study countries but particularly in Vietnam and Pakistan. In the latter case, it was reported by an interviewee that knowledge about carbon pricing is concentrated in a handful of units of the federal government. However, support from multilateral development banks (e.g., the World Bank; the Asian Development Bank), international organisations (e.g., the UN through its CIACA

initiative and ICAP) as well as bilateral donors (e.g., German and UK governments) have been used to address this need.

The support of international donors is critical in addressing gaps in technical capacity elsewhere in the region, which are also concentrated in building MRV capacity since it is essential for both carbon taxes and carbon markets, as well as for complying with reporting responsibilities under the UNFCCC. The relevant sections of the jurisdiction factsheets in Doda et al. (2022) provide additional details regarding the status of technical readiness in the region.

1.5 Multilateral dimension

Multilateral relations and regional context can provide a jurisdiction with external incentives to introduce carbon pricing. Cross-border cooperation increases the viability of success for domestic carbon pricing instruments by encouraging transparency given trade and diplomatic considerations, fostering opportunities for future interactions and harnessing multilateral synergies. Accordingly, the analytical framework developed in Doda et al. (2021) identifies key aspects to assess in the multilateral dimension of carbon pricing readiness, including the extent of economic integration; a jurisdiction's diplomatic relationship with others considering (or already implementing) carbon pricing instruments as well as the proximity of their Nationally Determined Contribution (NDC) targets; and the multilateral regimes, e.g., UNFCCC, GATT, ASEAN, etc, in which the jurisdiction participates. For example, the architects of domestic systems benefit from learning about the designs pursued elsewhere along with their implementation experiences and resulting reforms. Prior experience in international environmental cooperation, whether bilateral or under an international environmental or climate regime, can similarly be conducive to domestic carbon pricing. Being linkage-ready, that is considering the future interaction possibilities between a domestic carbon pricing instrument and international ones at the outset, can help facilitate international cooperation in the future and assuage fears of loss of competitiveness. In the context of emissions trading, carbon market connections make the most sense where trade and commercial integration is high, and symbiotic opportunities exist to find lower-cost mitigation options, build capital and technological bases for recipients, smooth out the effects of shocks to market operations and add liquidity to markets where it would otherwise be lacking.

Against this backdrop, the findings from the cases studies below point to a common theme: the positive influence of the existing operation of carbon pricing instruments by a jurisdiction's major trade partners. Carbon pricing instruments have been in place in many key advanced country markets including the EU, South Korea, Japan, New Zealand and several US States and Canada. Two recent developments, namely the move by the EU to establish a Carbon Border Adjustment Mechanism (CBAM) and the launch of the China National ETS, have been identified as significant motivators for carbon pricing in Indonesia, Vietnam and Pakistan. Moreover, several interviewees have suggested that domestic carbon pricing instruments could learn from the Chinese and EU experiences and that all sides could benefit from harmonization of certain design features. This argument extends naturally to other jurisdictions in the region covered in Doda et al. (2022), particularly those where exports contribute significantly to GDP. However, it is important to ensure different positions on or varying paces of carbon pricing implementation do not precipitate disruptions in international trade.

The finalisation of the Article 6 Rulebook during COP26 will no doubt increase international dialogue and cooperation on mitigation and set the tone for coordination of carbon pricing instruments for years to come in fora like G7, G20 and ASEAN. The role of individual jurisdictions in these fora becomes significant in this context. For example, the overlap between the Indonesian presidency of the G20 and the German presidency of the G7, and given the

countries' interest in carbon pricing, has pushed the topic up the agenda for both and enhanced the opportunity for bilateral dialogue between Germany and Indonesia. In this way other G20 members in the region such as India and Russia become part of this important dialogue. At the same time, progress on carbon pricing in these fora may be stymied by unrelated geopolitical and diplomatic tensions.

The membership of both Indonesia and Vietnam in ASEAN and the countries' interest in developing domestic carbon pricing instruments has likely provided impetus for the formation of the ASEAN Climate Change and Energy Project (ACCEPT) with support from the Norwegian government. The project aims "to improve the coherence between the ASEAN energy and climate policies, contribute to more climate-friendly development of the energy sector" and has conducted workshops on carbon pricing in the region.⁷ This can help enhance the dialogue among ASEAN members. Both the case studies for Indonesia and Vietnam in this report and the factsheet analysis for other jurisdictions such as Brunei, Malaysia, Philippines and Thailand indicated room for improvement in this dialogue.

Greater involvement by multilateral development banks both in technical capacity building (e.g., World Bank support through the Partnership for Market Readiness (PMR) and more recently PMI in all case study jurisdictions), and in climate finance (e.g., Asian Development Bank support through the Energy Transition Mechanism being piloted in Indonesia, the Philippines, and Vietnam) could have significant implications for carbon pricing in the region and should be encouraged.⁸

1.6 Overcoming the main challenges to carbon pricing in the region

Section 1.1 to 1.5 reviewed the main challenges to carbon pricing in the case study countries and provided additional examples from the remaining 12 jurisdictions where similar considerations arise. The goal of this section is to provide broad recommendations that can be helpful not only in the case study jurisdictions but also more broadly in the region and, more generally, to contribute to advancing carbon pricing internationally. To do so, the analysis draws on the detailed tables that summarise the challenges and associated recommendations at the end of each case study. For ease of reference, the tables of the respective case study sections are reproduced below. The benefit of doing so is that Section 1 of this report can be read independently and, hence, offers an overview of the overall challenges and recommendations for each of the case studies. However, offering more concrete and practical recommendations requires a discussion of an individual jurisdiction's specific context, circumstances, and objectives. Indeed, a dedicated section titled "Synthesis and possible pathways to implementation" in Sections 2-4 below serves this purpose for Indonesia, Vietnam, and Pakistan.⁹

There are three recommendations relating to the political dimension of the framework that underpins this project. First, it is important to engage with all public, private sector as well as civil society stakeholders, prioritising those who stand to be the most affected by the introduction of carbon pricing. This engagement should start early, explain the rationale for carbon pricing, understand the specific concerns of the different stakeholder groups and discuss with them the pros and cons of various instruments and instrument-specific design options that

⁷ For more information, see the ACCEPT website at <https://accept.aseanenergy.org/about>.

⁸ For more information, see the PMR website at <https://www.thepmr.org/>; PMI website at <https://pmiclimate.org/>; the ETM explained at <https://www.adb.org/news/features/energy-transition-mechanism-explainer-support-climate-action-southeast-asia>.

⁹ Section 6 of the jurisdiction factsheets in Doda et al. (2022) titled "Carbon pricing readiness and options" has a similar function.

could address those concerns. A particularly important consideration in this respect is an open dialogue on how the government plans to minimise the impact on the sectors and regions where carbon intensive activities are dominant and on how to potentially support poorer segments of the population regarding price increases of energy and energy-intensive goods and services. Second, the government should support low-carbon alternatives and energy efficiency measures. For example, if sufficient renewable and other low-carbon generation capacity is in place before the carbon prices rise to drive fossil fuel generation out of the generation mix, the impact on electricity prices can be minimised. Growing importance of low-carbon activities in the economy and more businesses and workers focused on improving energy efficiency helps build a green lobby which can counter the entrenched fossil fuel interests that are dominant in many jurisdictions in the region. Finally, public awareness campaigns on why the government is pursuing carbon pricing (rather than say shutting down all coal-fired power plants), how any revenues raised will be used and what (co-)benefits are to be expected beyond emissions reductions can help enormously in raising the public acceptability of carbon pricing.

Turning to the legal dimension, it is important to have a firm legal foundation for a carbon pricing instrument. It is even better if the instrument is embedded in a flagship climate law that clearly sets out the country's climate objectives and outlines a balanced portfolio of measures to meet them. The stability and confidence that a flagship climate law provides is by itself not enough, however. Implementing regulations (such as those on the scope of coverage; a process of expansion of that scope; methods for determining caps in an ETS and the level of the tax for a carbon tax; etc.) should be developed rapidly and be sensitive to the technical and knowledge constraints of not only the public officials that will implement and oversee them but also of the entities that will be regulated by them. Furthermore, carbon pricing laws and regulations may be challenged if they are perceived to infringe on the rights of foreign investors protected under international investment agreements. It is therefore recommended to start conversations with foreign investors early to discuss any compensation that may be justified and how their involvement in clean alternatives following the introduction of carbon pricing may serve the interests of all.

Many of the challenges along the economic dimension relate to the regulation of and other policy measures in the energy sector and how they interact with carbon pricing. A first recommendation here is that fossil fuel subsidies, if any, should be largely removed freeing up fiscal resources that could be used to provide targeted support to those who need it the most. Second, few exceptions notwithstanding, jurisdictions in the region do not have liberalised electricity markets where carbon pricing instruments work the best. Many of these jurisdictions are at different stages of electricity market reforms. Reducing reliance on long-term PPAs with restrictive conditions and measures targeted at improving the financial health of the whole sector are recommended. Indeed, aligning the processes for carbon pricing instrument choice/design and electricity market reform can yield enormous benefits for both. Third, governments should incentivise the development of low carbon alternatives to fossil fuels by supporting investment in and deployment of renewable energy. Finally, even though it may take some time to introduce carbon pricing and complete electricity market reform, there is very little arguing against the immediate use of shadow carbon prices for investment planning, particularly in the electricity sector.

Even if the political will is firmly in place to introduce carbon pricing, the legal foundation and implementing regulations have been prepared, and the economic conditions are conducive for the instrument to launch, success is unlikely unless the required technical capacity is in place to operate it. Each jurisdiction's capacity and knowledge gaps will be different so a careful needs assessment per instrument type should be conducted as soon as possible. The analysis should

identify the needs of public sector bodies who will operate, as well as those who will be regulated by, the carbon pricing instrument. For the public, the delineation of responsibilities of different public authorities with respect to carbon pricing and identification of the interactions of the instrument with existing policies and measures should also be prioritised in order to spur transparency and trust. Governments are also advised to draw support from jurisdictions that have experience with similar instruments and from capacity building programmes set up by international organisations and multilateral development banks.

Finally, regional and multilateral dialogue can be very helpful when considering and designing a carbon pricing instrument as well as after its implementation. When designing one's own instrument, cooperating with jurisdictions with experience in carbon pricing will allow the initiating jurisdiction to learn from best-practices and avoid common pitfalls and, in the best case, enhance the harmonisation of design of instruments. This can reduce leakage concerns and help with linking of carbon pricing instruments in the future. During the operational phase, bilateral and multilateral dialogues in technical working groups can identify solutions to common problems more effectively and open the door to further cooperation in the future. An open and early conversation with the jurisdiction's trade partners, particularly those with whom the jurisdiction trades fossil fuels and energy intensive goods or those which have investments in carbon intensive sectors of the jurisdictions' economy, is also recommended. This allows the initiating jurisdiction to anticipate and discuss potential resistance and work on solutions for a cooperative approach when implementing a domestic carbon pricing instrument.

Carbon pricing status, challenges, and recommendations: Indonesia (reproduced from Section 2.4)

<p>Status of carbon pricing (CP):</p> <ul style="list-style-type: none"> • Legal mandate for the implementation of a “cap-trade-and-tax” system already in place; • Tax: as of 2022, tax on coal-fired power plants is planned; to work in tandem with the ETS and to be expanded to other sectors by 2024; • ETS: legal basis for ETS passed into law; secondary/implementing legislation still underway; • Pilot ETS in the power sector currently running in its second phase; transition to mandatory ETS by 2024; • Sectors to be covered: power sector; expansion to other/industrial sectors successively planned • MRV system infrastructure partly implemented/well advanced, e.g., in the power sector; MRV pilots in the cement and fertiliser sectors.

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> • Dependence on fossil fuels and resulting vested sector interests • Limited voice of green lobby • Limited public awareness of urgency for climate action 	<ul style="list-style-type: none"> • Develop an active stakeholder engagement strategy to maximise political buy-in • Implement awareness raising campaign to increase public knowledge and acceptance of, and interest in, the national climate change response • Communicate the (co-)benefits of CP, e.g., GHG emission reductions; air quality improvement; support for innovation, etc.
Legal	<ul style="list-style-type: none"> • Enhancing the established legal framework • Political decentralisation and policy coordination • Long-term PPAs between PLN and IPPs, thus hampering CP effectiveness 	<ul style="list-style-type: none"> • Establish CP implementing regulations considering specific timelines for implementation, addressing both covered companies and public institutions responsible for operation • Enhancing policy coordination and communication across government institutions, particularly regarding the various CP elements of eventual cap-tax-and-trade system • Re-negotiate long-term PPAs
Economic	<ul style="list-style-type: none"> • Level of government intervention in the energy sector • Constitutional obstacles to power market reform • Lack of opportunities for fuel switch and abatement options to be incentivised by CP; untapped RE potential 	<ul style="list-style-type: none"> • Pursuing ongoing energy subsidy reforms, including the (gradual) phase-out of fossil fuel subsidies • Consideration and/or integration of CP in the discussion on any reform of the power market architecture • Pending reform, consideration of a gradually increasing shadow carbon price in power development planning • Foster an environment conducive to investment/development, especially for RE

Dimension	Challenge	Recommendation
Technical	Refining MRV capacity in the power sector Lack of MRV in other sectors in light of future sectoral expansion Enhancement of institutional capacities in general	Expand MRV framework and build MRV capacity in industrial and other sectors Concerted effort to enhance private and public technical capacity regarding the operation of market-based mechanisms, leverage continued assistance from international capacity-building initiatives, such as the World Bank’s PMI and ICAP
Multilateral	<ul style="list-style-type: none"> • Foreign interests and geopolitical pressure in the power sector 	<ul style="list-style-type: none"> • Continue to foster the subject of climate change and market-based instruments on the regional level and in the international arena • Leverage support from, and coordination with, capacity-building initiatives as well as other CP jurisdictions, such as Germany, the UK, and other regional players, e.g., South Korea and China to draw from their design and implementation experiences • Highlight how CP contributes to climate action efforts, to attract investors in RE in the context of coal phase out and the end to Chinese foreign coal investments

Carbon pricing status, challenges, and recommendations: Vietnam (reproduced from Section 3.4)

<p>Status of carbon pricing (CP):</p> <ul style="list-style-type: none"> • Legal mandate to develop an ETS already in place; no comprehensive implementing rules in place beyond the general roadmap; unclear if ETS might be eventually accompanied by a carbon tax; • Pilot system expected to start by 2025; fully operational ETS by 2028; • Sectors planned to be covered: power sector, steel, cement, freight transport companies, commercial buildings, solid waste treatment facilities; • MRV system infrastructure largely not implemented yet; need for development, including provision of institutional capacity in the administration.

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> • Limited debate on CP in the industry sector, NGOs, and society at large. • Limited voice of green lobby in pushing for CP 	<ul style="list-style-type: none"> • Plan stakeholder engagement in the potentially covered sectors • Communicate the benefits of CP, e.g., in terms of GHG emission reductions, air quality improvement and improved innovation • Ensure social protection or compensation
Legal	<ul style="list-style-type: none"> • Legal mandate for CP and roadmap for ETS • Plausible legal framework to align CP and other instruments supporting decarbonisation 	<ul style="list-style-type: none"> • Further develop CP related regulatory framework, e.g., determination of sector quotas and an ETS cap • Provide clarity on policy mix (ETS-tax-companion policies) • Involve foreign investors in CP debate, and harness CP opportunities for clean energy
Economic	<ul style="list-style-type: none"> • Regulation of power sector, including price regulation, cross-subsidies, and regulated investments 	<ul style="list-style-type: none"> • Integrate CP in the discussion on the reform of the power market architecture • Pending reform, include a gradually increasing shadow carbon price in power development planning • Decide on just energy transition to ensure public support
Technical	<ul style="list-style-type: none"> • Limited technical and institutional capacity, e.g., on MRV • Institutional barriers to transplant of international experience, e.g., from ETS and electricity sector reform in China 	<ul style="list-style-type: none"> • Focus on capacity building, e.g., significant enhancement of MRV; approaches to cap setting and allocation of “quotas”/allowances • Increase knowledge of CP and its design options as well as interactions with sector-specific regulations • Adjust existing CP models to the specific institutional environment of Vietnam, e.g., taking into account the regulatory architecture of the different ETS sectors

Dimension	Challenge	Recommendation
Multilateral	<ul style="list-style-type: none">• Limited role of CP at ASEAN level• Risk of resistance from foreign investors, e.g., arbitration	<ul style="list-style-type: none">• Leverage support from, and coordination with, capacity-building initiatives as well as other CP jurisdictions, such as Germany, the UK, and other regional players, e.g., South Korea and China, to draw from their design and implementation experiences• Highlight the contribution of CP to climate action efforts in order to attract investors in low-carbon energy in the context of coal phase out and Chinese stop of foreign coal investments

Carbon pricing status, challenges, and recommendations: Pakistan (reproduced from Section 4.4)

Status of carbon pricing (CP):

- Carbon pricing is under serious consideration at the federal government level; no timeline for decision or implementation has been set;
- No legal groundwork for CP, which will require commitment at both federal and provincial levels;
- Capacity building efforts are underway to support public institutions as well as companies to, respectively, administer and comply with an MRV system.

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> • Joint commitment by the federal and provincial government, which is essential for the introduction of CP, not yet clearly in place • Opposition from carbon-intensive industries • Political sensitivity of energy prices 	<ul style="list-style-type: none"> • Enhance debate on CP, both within government and with relevant sectors • Improve the economic resilience of households; consider compensation and protection of households in view of energy price increases • Support the development of a green lobby • Consider a pilot ETS with freely allocated emissions allowances to start with
Legal	<ul style="list-style-type: none"> • Division of legislative powers between the National Assembly and the Senate, as well as between levels of government, may slow the adoption of CP legal framework • Division of executive powers between provincial and federal governments may hinder CP design and implementation process. • Rights of foreign investors, especially under the China-Pakistan Economic Corridor (CPEC) 	<ul style="list-style-type: none"> • Set up and empower the Pakistan Climate Change Council, Climate Change Authority and Climate Change Fund as central institutions of climate change policy • Ensure climate change policy is a key agenda item for Council of Common Interest (CCI) and National Economic Council (NEC) • Engage with foreign investors when developing CP, and highlight CP opportunities for clean energy
Economic	<ul style="list-style-type: none"> • Structural challenges in power sector, including power losses on the T&D network, costly policies and low-cost recovery • Dearth of abatement options in a growing economy; untapped RE potential 	<ul style="list-style-type: none"> • Coordinate power sector reform and introduction of carbon pricing to improve the financial health of the sector without muting the carbon price signal • Implement further de-risking measures, tax benefits and priority dispatch for RE
Technical	<ul style="list-style-type: none"> • Capacity within the public administration and private sector to implement and operate a carbon pricing instrument 	<ul style="list-style-type: none"> • Implement coordinated capacity-building strategy for government agencies and private sector • Delineate responsibilities among public bodies involved in designing and operating carbon pricing

Dimension	Challenge	Recommendation
Multilateral	<ul style="list-style-type: none">• Limited experience in CP-related capacity building• Potential opposition from foreign investors in carbon-intensive assets	<ul style="list-style-type: none">• Enhance cooperation with international carbon market facilitators such as PMI and ICAP <p>Engage in dialogue and draw lessons from experiences of jurisdictions with matured CP instruments but also with regional actors, especially China, which has its own ETS and is largely intertwined in Pakistan's power sector</p>

2 Indonesia case study

2.1 Introduction

The Republic of Indonesia is an island nation located in Southeast Asia consisting of over 17,000 islands and spanning more than 5,000 kilometres. It is a fast-growing upper-middle income country with a population of 273.5 million in 2020, making it the fourth most populous country in the world (World Bank 2020a). More than half of the population resides in the Java-Bali regions, with the remaining living across Sumatra, Sulawesi, Kalimantan, and other smaller islands. Its annual GDP was USD 3,332 billion in 2019, with a GDP per capita of USD 12,312. It is the seventh largest economy in the world by this metric (GDP using PPP adjusted figures), and the largest in the region. Indonesia is a presidential representative democratic republic with an elected legislature and is made up of 34 provinces (five of which with “special status”) with Jakarta as the capital.¹⁰

The country is heavily reliant on fossil fuels, with 83% of its total electricity generation in 2020 and almost three quarters of its total primary energy supply stemming from coal, oil, and natural gas. Over 300 coal power plants are currently in operation, under construction, or planned in the country (Global Energy Monitor 2021). Unlike comparable countries like Vietnam that have committed to phasing it out (Heo 2021), as of 2021, Indonesia has about 26 GW of coal plants at various stages of construction (Climate Transparency 2021), making up 6% of the global pipeline (Climate Analytics 2021). The national electricity development plan (RUPTL) for the period 2021-2030 states that coal-fired power plants will make up 34% of the increase in installed capacity by 2030 (Climate Action Tracker 2021). Although recent years have seen a relative stagnation in oil and gas production due to regulatory instability and an uncertain investment climate, domestic demand for power continues to grow. This raises the question of whether the development of clean energy can keep reasonable pace with rising power demand should significant coal capacity be phased out (Heo 2021).

In terms of international trade in fossil fuels too, Indonesia is a key player. In 2019, the country exported the second highest quantity of coal in the world (232.3 Mtoe) after Australia and showed the highest growth in coal exports (IEA 2021a). As for oil, Indonesia has had off and on membership to OPEC since 1961 but since 2004 is a net oil importer due to large increases in demand (Guild 2020). Although gas production has slowed in recent years, Indonesia was still eighth in the world for LNG exports in 2021 (Statista 2021a), and state oil and gas company PT Pertamina is the only Fortune 500 company in the country. Over time, the country has transitioned to an economy based upon domestic manufacturing and investment rather than oil exports, the latter of which propelled Indonesia’s growth during the 1970s and 1980s (Tharakan 2015).

Indonesian forests play a central role as carbon sinks, with peatlands such as those that make up the floor of Indonesia’s rainforests one of the world’s largest, storing approximately 35 billion tonnes of carbon (Greenpeace USA 2022). Indonesia is home to the third largest area of tropical forest coverage in the world, behind only Brazil and the Democratic Republic of Congo. Much of these forests and land is lost as it is logged and converted into palm oil plantations. 72% of intact forest is already gone (ibid), and government data reveals 119,000 hectares of annual gross forest loss from just the period June 2019-July 2020 (Utami 2021). In 2020, Indonesia exported

¹⁰ A law has been passed that lays out plans to relocate the capital of Indonesia between 2022 and 2024 to a site within the jungle of Kalimantan on Borneo Island (Da Beo Costa and Lamb 2022).

2.7 million tons of palm oil (worth USD 18.4 billion), and exports skyrocketed even higher in 2021 (Central Statistics Agency Indonesia 2021).

Policy context

Indonesia's updated NDC to the Paris Agreement submitted in 2022 ahead of COP27 lays out a greenhouse gas emissions reduction target of 31.89% below business-as-usual (BAU) levels by 2030, which could increase to 43.2% contingent on international support. The energy sector is to contribute about 40% or 314-390 MtCO₂e of annual reductions compared to BAU. The NDC mentions carbon pricing explicitly as being under preparation and as an opportunity to "mobilise climate finance and... to incentivise stakeholders' contribution to NDC achievement" (Government of Indonesia 2021c). Though the Climate Action Tracker (2021) has labelled Indonesia's updated NDC as "highly insufficient" and criticises its failure to ramp up climate ambition, it is in this context that the government of Indonesia is forging ahead with its plans for carbon pricing and other climate and energy policies.

In November 2021, as the world congregated in Glasgow for COP26, President Joko Widodo stated Indonesia's commitment to accelerating the country's (as yet unofficial) 2060 net zero ambition by spurring the adoption of renewable energy, curbing deforestation, and restoring mangroves and peatland (Nangoy 2021b).

On November 2, 2021, Indonesia added its signature alongside more than 100 other countries to the summit's pledge to "halt and reverse forest loss and land degradation" by 2030 (Glasgow Leaders' Declaration on Forests and Land Use 2021). However, shortly after, the Minister for Environment Siti Nurbaya Bakar stated that the pledge was at odds with Indonesia's development plans, and that ending deforestation by 2030 was not a promise tantamount to the government's other forestry sector goals (Guild 2021b). This sparked much media attention and vigorous online debate among activists. The minister has since clarified that any actions on deforestation would not come at the expense of economic development, but the incident clearly demonstrates the trade-off Indonesia faces in balancing environmental considerations with opportunities for economic growth.

Indonesia has been considering carbon pricing for several years. Its first experience with market-based climate action came from the UN's Clean Development Mechanism, under which it has gone on to host 153 projects to date (UNFCCC 2021a). Indonesia has also been part of the World Bank's PMR since 2013, but it is only in recent years that plans for domestic carbon pricing have rapidly become more concrete (see subsection "Status of carbon pricing developments in Indonesia" for a more detailed discussion in Section 2.1).

In 2017, Indonesia passed the "Government Regulation on Environmental Economic Instruments" that provided the initial basis for ETS implementation, setting a mandate for an emissions and/or waste permit trading system to be implemented by 2024, no later than seven years from its enactment (Peraturan Pemerintah 11/10/2017).

In 2018, a PMR-funded study examined four market-based mechanisms that the country might choose to employ: an ETS for the power and industrial sectors, an energy efficiency certificate scheme for industry, a cap-trade-and-tax system, and a carbon offset mechanism (Government of Indonesia 2018).

Developments since then have been non-linear, and communications have not always met the intended target audience. Despite losing momentum and direction at times, and mixed messages regarding instrument choice and implementation timelines, Indonesia is now firmly committed to implementing a fully operational ETS by 2024, combined with a carbon tax that was initially

planned to start in 2022 but has experienced several delays. It means to expand in its sector coverage, as outlined below.

Key building blocks for the ETS are already in place or are in progress. In 2018, the design and governance framework of an MRV system was completed and MRV guidelines for the power sector were released. An online platform for GHG reporting in the electricity sector was also established, and a pilot MRV programme was launched for the Java-Madura-Bali electricity grid. Pilot MRV programmes are also being conducted in the cement and fertiliser sectors.

More recently, a voluntary pilot ETS for the power sector was launched in 2021 (International Carbon Action Partnership 2021). Originally planned for 2020, implementation was delayed due both to the COVID-19 pandemic and market design issues. The first phase of this pilot market was voluntary and intensity-based, running from April until August 2021, though full results are yet to be released. Participants traded allowances and offset credits stemming from renewable energy generation (see “Status of carbon pricing discussions in Indonesia” for more details). Three quarters of the country’s fleet of coal-fired plants, both public and private, were invited to participate. According to government plans, the pilot programme is set to continue with new phases over the coming years, aiming to simulate a mandatory ETS. It should then transition to a full ETS, which is mandated by 2024.

As mentioned above, emissions trading is not the only carbon pricing instrument under development in Indonesia. In early October 2021 in the lead-up to COP26, parliament passed an omnibus bill: an updated tax framework law (RSM Indonesia 2021). This bill contains a carbon tax element for the first time, which was initially set to be imposed from 2022 on coal-fired power plants, with a view to gradually expanding to other sectors by 2025. Though the introduction of the tax has been delayed, its rate will eventually be related to the prices of allowances and offsets traded in the domestic carbon markets. It will work in tandem with the markets as a “cap-trade-and-tax” system (Tardif et al. 2021) once the market mechanisms are in place. Covered facilities which are unable to surrender enough allowances or offsets then to meet their obligations under the ETS will be liable to the tax.

Alongside the new tax framework bill is the “Presidential Regulation No. 98/2021 on the Instrument for the Economic Value of Carbon for Achievement of the NDC and Control of Carbon Emissions in Development” (*Instrumen Nilai Ekonomi Karbon untuk Pencapaian Kontribusi Yang Ditetapkan Secara Nasional dan Pengendalian Emisi Karbon Dalam Pembangunan*), which was signed by President Widodo in October 2021 (Government of Indonesia 2021b). This regulation extends the original “Government Regulation on Environmental Economic Instruments” from 2017, and will serve as the framework for regulating the implementation of a carbon price to meet Indonesia’s NDC target. Implementing regulation(s) are expected to be issued in late 2022.

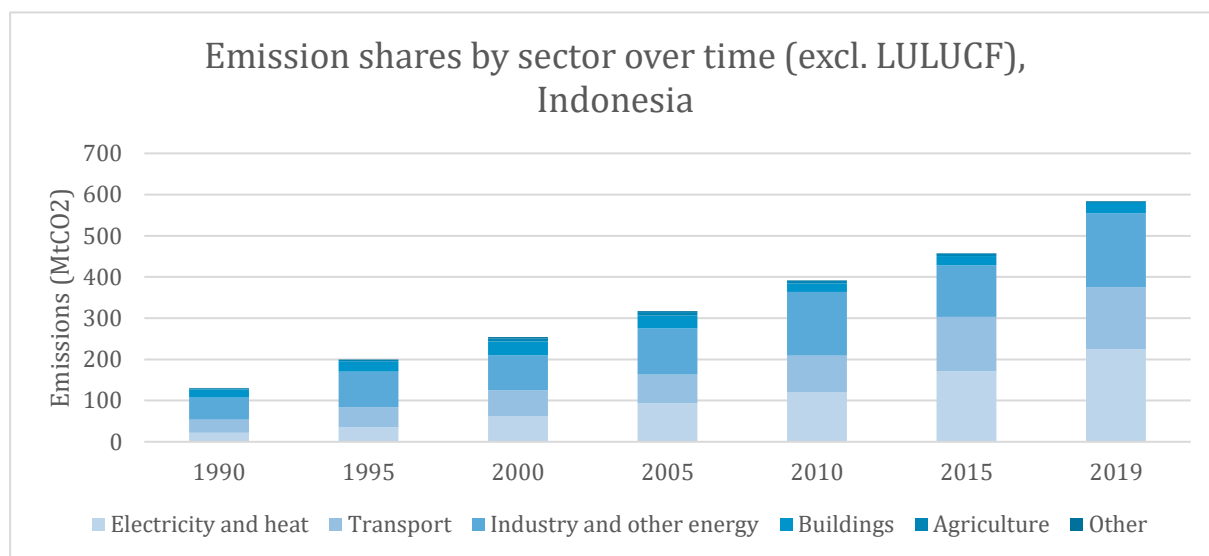
Emissions profile

Two thirds of Indonesia’s emissions stem from land use, land-use change and forestry (LULUCF) (Tacconi and Muttaqin 2019). 66.3% of the remaining third of emissions belong to electricity and heat production, industry, and energy – sectors that lend themselves well to carbon pricing approaches. The energy sector is also the fastest-growing emitter. Though LULUCF will not be a part of Indonesia’s initial carbon pricing policy, there are significant hopes associated with co-benefits for the sector from carbon pricing in other sectors, primarily through potential offset approaches as well as through national targets regarding the function of the country’s forests as a carbon sink.

Excluding LULUCF, 28.6% of emissions stem from the transport sector, with buildings, agriculture, and fishing making up the rest (World Bank 2019). Indonesia’s greenhouse gas emissions have increased fourfold since 1990, mirroring its similar upwards trajectory in

economic growth; it is now one of the top ten emitting countries in the world. The emissions-intensive industrial sector, consisting of mining and quarrying, manufacturing, construction, and public utilities, contributed to almost 40% of GDP in 2019 and 23% of total employment in 2020 (ibid). With this profile, the power and industrial sectors are clearly priorities to address through carbon pricing, and successfully tackling them could have a sizeable effect on the country's emissions – the former is indeed being targeted by current carbon pricing policy developments.

Figure 2: Emission shares by sector over time (excl. LULUCF), Indonesia



Source: IEA (2021a)

Status of carbon pricing discussions in Indonesia

As stated above, carbon pricing developments in Indonesia have recently seen much momentum. The first phase of the country's ETS "trial carbon market" ran from April until August 2021. This market was voluntary and intensity-based, with participants allocated allowances based on emissions intensity benchmarks (2019 weighted average) (Reklev 2021a). Power plants with more than 400 MW of capacity were allocated 0.918 units per MWh; those with 100-400 MW capacity received 1.013 units. Eleven "mine mouth" electricity generating plants located directly near coal plants were given 1.094 allowance units per MWh (Reklev 2021b). Participants traded allowances and offset credits stemming from renewable energy generation. 84 coal-fired power plants were invited to take part, which would have made up three quarters of the country's fleet; 20 of these owned by state-owned utility PLN and the rest owned by the private sector. In the end, only 32 took part in the full pilot. Full results are yet to be released, but preliminary documents show that 28 trades were recorded (a total 42,500 allowances at an average price of USD 2), and about 20,000 domestic offsets (predominantly from renewable energy projects) traded at USD 0.35 each (Reklev 2021b). Approximately USD 100,000 in investment costs (comprising trading and offsets) were paid (ibid).

The voluntary trial carbon market, which aims to simulate a mandatory ETS, now moves to a second pilot phase and is set to continue operation until the national ETS is implemented. The process has been orchestrated by the Coordinating Ministry of Economic Affairs but broader management of the national ETS will lie with the Ministry of Energy and Mineral Resources. Offsets will be overseen by the Ministry of Environment and Forestry.

Emissions trading is not the only carbon pricing instrument under development in Indonesia. In early October 2021 in the lead-up to COP26, the *Dewan Perwakilan Rakyat* or DPR (House of Representatives) passed an omnibus bill: an updated tax framework law entitled “Bill Concerning Harmonization of Tax Regulations” (*Rancangan Undang-Undang Tentang Harmonisasi Peraturan Perpajakan*) (RSM Indonesia 2021). This bill contains for the first time a tax on “carbon emissions that have a negative impact on the environment” which was initially set to be introduced in 2022 but has now been delayed until 2025. It will be payable on the purchase of goods containing carbon and processes that produce carbon emissions. The tax rate was initially proposed at IDR 75 per kilogram of CO₂e (approximately USD 5.24 per tonne CO₂e). However, the plan now is to eventually link it to the price of the domestic carbon market once it is in place, with a minimum price of IDR 30 per kilogram of CO₂e (approx. USD 2.09 per tonne CO₂e). Coal power plants will be the first to be included at the minimum rate.

This tax is designed to work alongside the intensity-based ETS once it has been implemented. Those participating in the ETS would be able to receive a reduction of the carbon tax, as regulated by the Ministry of Finance. This so-called “cap-trade-and-tax” system is thought of as an extension of the ETS, or a “combination mechanism”. Power facilities will be allocated allowances using the benchmark approach based on 2019 production data, and only those who do not surrender enough allowances or offsets to meet their obligations under the ETS will be liable to the tax. In this way, the tax will serve also as a price cap in the Indonesian market (Tardif 2021). The “cap-trade-and-tax” system is expected to be fully implemented by 2025 through the carbon exchange, where companies will be able to trade their emissions permits. The tax will see gradual expansion into other sectors depending on readiness and the development of carbon tax management regulations (Jakarta Globe 2021). The government also plans to gradually push down the cap once it has been set, in order to slowly hike demand for carbon credits, while ensuring the price increase does not hamper the economy before raising the tax rate (Jiao and Sihombing 2021).

An analysis of the barriers and opportunities to the introduction of carbon pricing in Indonesia is critical to the forward trajectory of its development, design, and eventual implementation. This report assesses the carbon pricing readiness of Indonesia. Initial analyses of country conditions have been expanded via in-depth review, research, and stakeholder interviews. The following section provides an overview of the key actors and stakeholders in Indonesia with respect to carbon pricing, including their interests and positions regarding the policy. The report then moves on to an in-depth evaluation of carbon pricing readiness in Indonesia, identifying enabling factors and potential barriers to the market-based mechanism viewed along the five dimensions (political, economic, legal, technical, and multilateral) identified and assembled into a framework developed under a previous report in this project.¹¹ We examine the variables and indicators identified in Doda et al. (2021) and expanded upon in Doda et al. (2022) that contribute to carbon pricing readiness. Here we also pay particular attention to the characteristics of the electricity sector, and the climate change and energy policy mix. Finally, an overall assessment of carbon pricing readiness in Indonesia is provided, with instrument-specific considerations. We discuss the role of bilateral and multilateral support for overcoming the obstacles identified in the case study and examine possible pathways to the successful implementation of a carbon price in Indonesia.

¹¹ Framework conditions shape the opportunities for carbon pricing and the likelihood of its implementation. These can be grouped under political, legal, economic, multilateral, and technical dimensions. The analytical framework can be accessed [here](#).

2.2 Stakeholder mapping

The positioning of stakeholders on carbon pricing, their economic weight, and influence on public policy decision making can make or break the success of the instrument. This section reviews the main actors and stakeholders in the carbon pricing policy domain and reviews their positions on the topic based on interviews.

Overview of main actors and stakeholders in Indonesia with respect to carbon pricing

Public sector stakeholders are key to the success of carbon pricing as they will be responsible for the smooth implementation and operation of the policy, including designing the instrument and its eventual operation, enforcement, and oversight. They also require the technical and legal capacity to fulfil these functions effectively. The main public sector actors in Indonesia with respect to carbon pricing include the **Ministry of Environment and Forestry (MoEF)**, which in 2007 launched an Action Plan to Respond to Climate Change (RANPI). It will have eventual control of the country's ETS and will oversee offsets. It also currently coordinates the monitoring, reporting and verification (MRV) of greenhouse gases, a critical backbone to robust carbon pricing policy. Thus far, it has developed MRV guidelines for the power sector but not yet for industry. The **Coordinating Ministry for Economic Affairs (CMEA)** is the line ministry responsible for climate policy coordination and setting up a carbon trading mechanism, taking over responsibilities from the now-dissolved National Council on Climate Change. It has been significantly involved in the implementation process of the ETS to be fully operational by 2024 and alongside the **Ministry of Energy and Mineral Resources (MEMR)** orchestrated the trial market that took place in 2021. The **Coordinating Ministry of Maritime and Investment Affairs (CMMIA)** is leading other government agencies as details of the key piece of legislation behind Indonesia's carbon pricing plans, the "Presidential Regulation on the Instrument for the Economic Value of Carbon", are elaborated.

The **Ministry of Finance (MoF)** is set to oversee the recently announced carbon tax. In response to significant increases in Indonesia's climate spending, the **Environmental Fund Agency** was set up in October 2019 to handle climate funding and carbon market activities. It is intended to channel funding for ramped up climate action, including any carbon credit trading with developed countries (Reklev 2019). The MoF has indicated that the agency will prioritise accountable fund management with governance comparable to international standards.

The MEMR is tasked with creating and implementing energy policy via the **Directorate General of Electricity** and the **Directorate General of New and Renewable Energy**, and **Energy** as well as with regulating Indonesia's power sector. Electricity regulation is conducted by the MEMR, but ownership of **PLN** is in the hands of the **Ministry of State-Owned Enterprises (MSOE)**. In terms of carbon pricing, broader management of the ETS will lie with the MEMR.

The emissions-intensive sectors, both public and private, are likely to be directly affected by the introduction of a carbon price and therefore will factor the policy into their business and operational plans. Power and industry as the first sectors to be targeted by carbon pricing are notable in this respect. The energy sector in Indonesia is dominated by **PT Perusahaan Listrik Negara (PLN)**, Indonesia's only state-owned electricity utility. Despite the participation of several subsidiaries such as **PT Pembangkitan Jawa-Bal (PJB)** and several **independent power plants**, PLN holds a *de facto* monopoly over generation, transmission, and distribution. PLN is no stranger to market-based mechanisms. It has previously been involved with the Clean Development Mechanism under the UNFCCC framework, has been working in voluntary carbon markets using VCS, and recently also selling renewable energy certificates. **PT Pertamina** is the national oil and gas company. It is fully state-owned and the only Fortune 500 company in Indonesia.

Support for a carbon price from civil society groups such as NGOs, political and advocacy groups, associations, research and policy institutes and the general population, alongside trust in the implementing government can be conducive to its success. Civil society is also active in Indonesia's decarbonisation process. Prominent actors include the **Indonesian Forum for the Environment (WAHLI)**, which is part of the **Friends of the Earth International** network and unites more than 600 environmental advocacy NGOs and individuals. The **Golong Hutan (Golhut) coalition** is another group made up of several others including **Greenpeace Indonesia** that works to hold political candidates accountable for environmental issues (Walton 2019). The **Indonesia Independent Power Producers Association (APLSI)** aims to voice electricity sector reform and improvement. Its almost 50 members, mostly operating coal-fired power plants, work on issues such as the renegotiation of tariffs and PPAs (APLSI 2021).

The **Indonesian Renewable Energy Society (METI-IRES)** is a venue for communication, consultation, and collaboration among renewable energy actors, with the goal of accelerating the role of renewables in meeting national energy demands. Comprised of scientists, educators, regulators, business developers, various organisations, and other stakeholders, METI-IRES works on the prevention of environmental degradation and to lessen the country's dependence on fossil fuels (METI-IRES 2022). Other important civil society actors include research and policy institutes and thinktanks working on and informing the country's decarbonisation strategies. These include the **Indonesia Research Institute for Decarbonisation, the Institute for Essential Services Reform, and World Resources Institute Indonesia**.

International actors are critical to facilitating dialogue across regions and transposing lessons from jurisdictions already with carbon pricing in place to others hoping to establish their own domestic systems. They can be essential also for capacity-building activities and financial support. In the Indonesian context, significant players include the **World Bank's PMR**, now the **Partnership for Market Implementation (PMI)**, which together with the MoEF developed a framework for market-based climate action in Indonesia beginning in 2017. **ASEAN Climate Change and Energy Project (ACCEPT)**, a regional climate policy and carbon pricing initiative funded by the Norwegian Government and whose Secretariat is in Jakarta is another relevant player. Indonesia was also involved in a study on cooperative MRV alongside other ASEAN countries as a building block for potential regional carbon market development in the future under the **UNFCCC's Collaborative Instruments for Ambitious Climate Action (CIACA)** umbrella. The **Asian Development Bank (ADB)** is supporting Indonesia's electricity market reform and the use of market mechanisms under Article 6 of the Paris Agreement. Germany's development agency **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)** has also been active in facilitating climate change policy in Indonesia.

Positions and interests vis-à-vis carbon pricing

Several key stakeholders were approached and interviewed as part of this project in order to glean first-hand insight as to their positions regarding carbon pricing. These interviewees are representatives from the public sector, private sector, civil society, and international actors. A comprehensive list of interviewees can be found in the Annex.

Carbon pricing in Indonesia is a policy pushed forward by government. It therefore continues to gain much support from public authorities and has received the official approval of the President via the signing off in late 2021 of the "Presidential Regulation on the Instrument for the Economic Value of Carbon", which is designed to underpin the country's NDC objectives.

Several interviewees noted that almost all ministries and government agencies in Indonesia are in favour of a carbon price, driven by the efforts of the MoEF, the CMMIA, and the MoF. Parliament is very much in support, as are key politicians and party members, as confirmed by

public sector representatives interviewed for this report. According to an interview conducted for the report, the only exception to ministries in support thus far has been the Ministry of Trade, where the minister has stated that carbon pricing will make Indonesian products less competitive on the international market. Though they are responsible for different aspects of the upcoming carbon pricing ecosystem, the various government ministries' priority is largely to strike the delicate balance between reducing emissions and supporting economy growth, according to a civil society interviewee who works directly with the various ministries responsible for carbon pricing.

According to a private sector climate change manager and policy officers involved in multilateral climate action initiatives, initial carbon pricing developments in Indonesia were spurred by the initiative and assistance of international organisations, notably the World Bank's PMR (now the PMI), which helped develop a framework for a market-based instrument throughout 2017. This effort was supervised by a dedicated Working Group led by the MoEF. The World Bank continues to play an important role in capacity-building regarding carbon pricing.

At the domestic level and among entities who would be most affected by a carbon price, PLN—the weightiest player in the energy sector—has not publicly expressed opposition to a carbon price, despite previously having resisted more stringent environmental policies such as the yet unimplemented regulations on SO_x and NO_x particulate matter stemming from coal-fired power plants. This is alongside its recent participation in the trial carbon market, where several of its plants opted to participate in the scheme. The recent announcement regarding the introduction of the carbon tax in Indonesia has sparked debate among and resistance from other members of the private sector, particularly from the Indonesian Chamber of Commerce, although this initial opposition was arguably also driven by the unexpected nature and relative abruptness of the announcement of the imminent carbon price. According to one of the interviewed experts on market-based mechanisms, the Chamber was not consulted in the development of this legal framework, and businesses lack a thorough understanding of the tax's implications. However, business resistance has partly lessened since this initial announcement, according to some experts in the field, with the Chamber now even aligning its own official net zero ambitions with the objectives of the carbon market. According to a private sector interviewee, an ongoing cause for concern regarding the upcoming policy is that the government has not yet made clear how exactly the instrument will be implemented, meaning that companies are unable to make concrete plans regarding compliance and development strategies. In many instances, budgets have already been drawn up for upcoming years without confirmed information on the tax that is expected to soon come into force.

Conversely, in favour of a carbon price are those businesses who already have been involved in similar mechanisms such as results-based payments (often in the forestry sector), Clean Development Mechanism projects, and those who have begun to explore voluntary carbon markets. Interview data suggests that the financial community is also largely in favour as they see a carbon market in particular as a new area to monetise and in which to become active. The renewable energy sector is also seen to be in favour of carbon pricing. An executive from the RE sector interviewed for this report reveals the view that a major obstacle for the competitiveness of renewables in Indonesia has been exactly the fact that carbon pricing is not yet in place.

There have been voices both for and against carbon pricing stemming from NGOs in Indonesia thus far, though specialists in market mechanisms and climate policy working for thinktanks have been more vocal, raising awareness and helping to build public and private sector capacity through targeted workshops and events and publishing reports and briefings. One research institute interviewee working on the topic estimates support and opposition from NGOs for carbon pricing to be roughly evenly split.

The general public is not particularly informed nor vocal about climate change and mitigation options. According to a local expert in Indonesia, political opinion stemming from the populace is focused more on health sector reform and economic recovery from the COVID-19 pandemic. Particularly in rural areas, which are many and vast, climate change is of no major concern.

2.3 Carbon pricing readiness

2.3.1 Political dimension

2.3.1.1 Core analysis

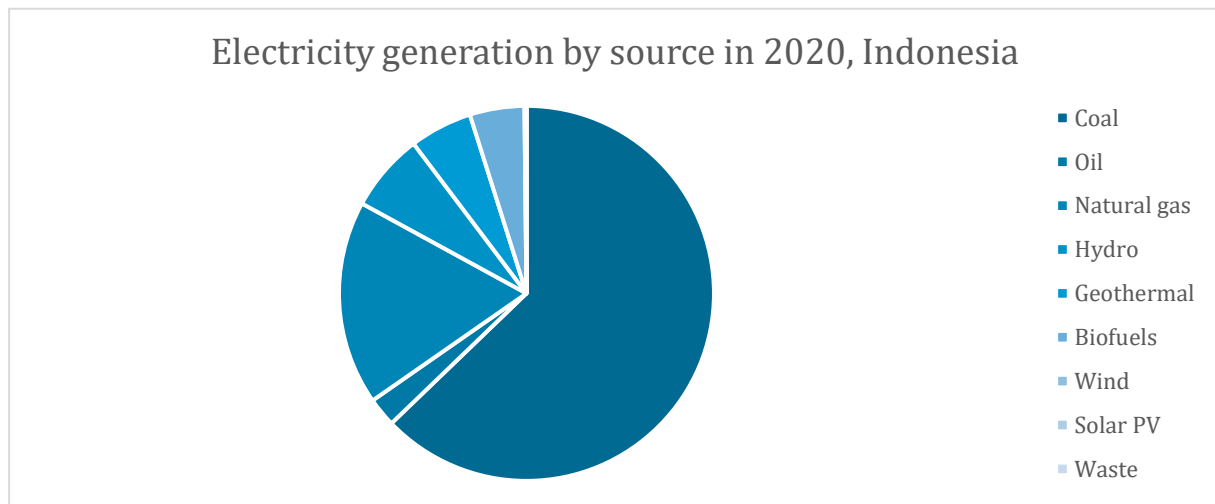
Vested interests of carbon-intensive industries (regulatory capture)

Indonesia's heavy dependence on fossil fuels means that carbon pricing developments have and likely will continue to face at least some opposition. In 2020, 83% of electricity came from fossil fuels (IEA 2021a). Coal in particular is a crucial driver of economic growth, set to contribute 30% of the total national primary energy mix by 2025 (Government of Indonesia 2014). Although recent years have seen a relative stagnation in oil and gas production due to regulatory instability and an uncertain investment climate, domestic demand for electricity continues to grow. Without concerted government effort to address them, the vested interests of these carbon-intensive industries could pose a significant political barrier to the successful introduction of carbon pricing. Politics in Indonesia is sometimes seen to be susceptible to the influence of prominent groups (Economist Intelligence Unit 2020). Regarding carbon pricing, Indonesia's Chamber of Commerce has played a big role in open resistance against it, partly due to the perceived shortcomings of the stakeholder engagement process and the contrasting views within the government. For example, the Minister for Trade has publicly indicated opposition to the instrument (the only minister to do so thus far), citing that it may make products "less competitive" on the international market; however, an interviewed expert notes that these comments may stem from his proximity to the Chamber. A heavyweight in the energy sector stated in an interview that for businesses, new developments on the policy front are naturally kept on the radar. For them, the important next steps will be to assess the emissions caps that are yet to be set and evaluate the consequences for their finances and production costs. Though they are not opposed to carbon pricing, a preference for carbon trading is clear; reasons given include flexibility over a carbon tax. The interviewee argued that revenues accrued through an ETS, if any, can be invested directly into further abatement options, whereas there is no guarantee that the money from a tax will be fed back.

There has already been criticism of the carbon tax by several of the interviewed experts from research institutes in the field, who point to the "rushed" nature of the policy's development, the lack of clarity regarding the contribution of the "cap-trade-and-tax" towards Indonesia's NDC, and the long wait for guidelines and regulations on how the instruments will be implemented. Policy analysts have also largely agreed that an upstream approach to the tax would be the least challenging option for implementation, as this could utilise existing regulatory monitoring and reporting capacities (Tardif 2021). However, the large role the government plays in the country's energy markets already via subsidies and price caps (see "Economic dimension" below for further details), means that balancing the impact of the carbon tax on the supply chain and the interests of powerful fossil fuel groups will be essential or else have resounding political implications (ibid). In addition, the question of who will bear the increased operational costs of the coal-fired power plants remains. Several interviewees also note that PPAs' mention (or lack thereof) of carbon emissions could be a significant barrier to the success of the mechanism.

It is not only the influence of the domestic brown lobby that plays a role. China, Japan, South Korea, and India rely on coal from Indonesia and surrounding countries such as Vietnam and Pakistan. They wield much geopolitical pressure on Indonesia's national decision-making, supporting the ongoing prevalence of the fossil fuel and stoking the narrative that coal is what can provide "baseload power" (Climate Analytics 2021).

Figure 3: Electricity generation by source in 2020, Indonesia



Source: IEA (2021b)

Furthermore, when the upcoming carbon price was first announced in March 2021, it was set at IDR 70 per kilogram (USD 5.4 per tonne); this was later revised to IDR 30 per kilogram (USD 2.4 per tonne). That it was revised down in part to respond to objections from the business may have emboldened the private sector and encouraged further resistance afterwards. Though in favour of implementing carbon pricing, several interviewees working with local policy institutes also posit that this initial price of IDR 30 has been set far too low. They argue that it is insufficient to change neither the preferences of economic actors nor investment patterns, and hence makes pursuing environmental goals difficult. Though Indonesia's fiscal policy chief Febrio Kacaribu stated the government's intention to start "low and slow" as a compromise to garner buy-in from lawmakers and those concerned about the tax's impact on jobs (Jiao and Sihombing 2021), interviewee responses indicate that the weak price signal from the start may jeopardise its effectiveness in the future and harm broader discussions on carbon pricing.

Public acceptability

In addition, general trust in public institutions and the population's attitude to green issues play a role in the viability of carbon pricing instruments. Indonesia's score of 37 (global mean 43) in 2020 in Transparency International's perceived corruption index (Transparency International 2021)¹² can be explained by the country's checkered history of corruption in public institutions, which has to an extent also warded off foreign investment (Cook 2019). Its coastal geography also makes it particularly vulnerable to the impacts of climate change. The country is increasingly experiencing the danger of rising sea levels and extreme natural disasters, with the MoEF urging the issue to be taken seriously (Rogova 2021). The interdependence of typhoons, tropical cyclones and climate change is long recognised at the international level (UN News 2021). Though the literature has shown a correlation between climate change risk and public acceptance of costly climate policy, this association is only moderate. Risk *perception* is a much

¹² Higher values of the index indicate lower perceived corruption. For reference, the value of the index in Germany is 80 in 2020. For details see <https://www.transparency.org/en/cpi/2020/index/nzl>.

stronger contributor to support of climate policy. The extent that the public regards climate change as able to jeopardise material well-being is what drives support for stricter measures and policies (Zahran et al. 2006; Khatibi et al. 2021). In this regard, it is noteworthy that Indonesia has the largest number of climate change deniers in the world, followed by the United States and Saudi Arabia: almost a third of Indonesians do not believe anthropogenic climate change to exist or be a problem (YouGov 2019). There has been no significant public protest against, for instance, coal thus far, due to electricity needs trumping environmental concerns (Palma 2018). The country is also keenly aware of the driving role fossil fuels play in its power supply and exports (Jiao and Sihombing 2021).

Despite these numerous obstacles, carbon pricing has been firmly on the political agenda in Indonesia since 2017. The country's tax-revenue-to-GDP ratio is just 13%.¹³ Though the Minister of Finance has indicated that the government has earmarked around 4.1% of the state budget for mitigation efforts (GGGI 2021), there are high levels of political awareness that new and additional sources of climate finance are necessary if Indonesia is to meet its climate targets in time. The participation of non-state actors must therefore be encouraged and facilitated. Carbon pricing can be a fiscal policy instrument that could meet this need by mobilising revenue for the low-carbon transition (IKI 2020). One public sector official interviewed for this report explains the keenness for carbon pricing displayed by many politicians and party members by its ability to generate revenues. According to a research institute interviewee, politics is no longer so much of a hurdle here as it may once have been. Recent developments, such as parliament agreeing to the carbon tax element of the newly updated taxation framework, the signing of the Presidential Regulation on the Economic Value of Carbon, as well as the trialled carbon market of 2021 indicate that the political will to push forward with the instrument is present. The interviewee notes, however, that new political challenges may lie ahead. For now, carbon pricing is still more of an abstract concept in the eyes of both the public and industry. Once it is more tangibly reflected in the price of goods, when fuels increase in price, for instance, people and political parties may ramp up their opposition. Another interviewee echoes this sentiment, stating that taxes especially connote higher living costs in the eyes of the public. As the chosen instruments are piloted, refined, and developed over the coming months and years, it will be critical to strategically communicate developments to all actors involved, engage stakeholders in the process, and "socialise" the carbon price. Various interviewees including from multilateral programmes working to progress carbon pricing in the region also point to the importance of making public any studies used as the basis for government decisions to ensure transparency and consequently encourage broader support.

Vested interests of green industries

Green groups can work to counteract resistance to carbon pricing. However, the green lobby has "little sway" in Indonesia (Diela and Widiyanto 2020). Environmental issues are often reported rather as social justice issues, so green NGOs' agendas struggle with being "hijacked" in the debate (Parker and Prabawa-Sear 2020). The most influential organised groups include the Indonesian Forum for the Environment (WAHLI), which is part of the Friends of the Earth International network and unites more than 600 environmental advocacy NGOs and individuals across the country. Greenpeace Indonesia is also active in the country and has clashed with government officials, but their campaigns have more prominently revolved around deforestation rather than climate change. Greenpeace is also part of the Golongan Hutan (Golhut) coalition, which works to hold political candidates accountable for environmental issues (Walton 2019). Across the board, outspoken NGO views on carbon pricing have been less pronounced, but this may in part be due to the speed of developments in this matter. One exception is the World Resources Institute (WRI) Indonesia, which focuses among other topics on climate change and in 2021 commissioned an impact assessment on the potential effects of carbon pricing on selected sectors. Outside of NGOs, research institutes and thinktanks in Indonesia have played a key role

¹³ For reference, the OECD average in 2020 was 33.8%, OECD 2021.

in developing low-carbon strategies and carbon pricing policies, both in an advisory capacity as well as through events geared towards public and private sector actors keen to learn more about the upcoming mechanisms.

2.3.1.2 Conducive factors and obstacles

Indonesia's dependence on fossil fuels means that vested brown interests will likely remain a significant obstacle to carbon pricing. However, government plans to move in the direction of an ETS that firms will be able to partake in instead of the initial tax are aligned with business preferences for the flexibility and dynamism of emissions trading. Compounding this is the lack of awareness among the public about the urgency for climate action, despite Indonesia's vulnerability to the risks imposed by climate change. Moving forward, essential will be continuous and transparent communication about developments and active engagement with stakeholders to retain maximum political and public buy-in.

Several green groups in Indonesia back the introduction of carbon pricing and are working alongside the government in its design and implementation or helping to build capacity in the private sector to comply. However, thus far, their voices have not been seen to be as loud as those of the brown lobby and have in the past shown limited influence in decision-making in the country.

2.3.2 Legal dimension

2.3.2.1 Core analysis

Legal framework development and flagship law

After a series of constitutional reforms lasting from 1999-2002, Indonesia confirmed the principle of separation of powers (Mahfud 2011). The president is both head of state and government. The executive branch consists of the government and includes a cabinet, and legislative power lies with both the government and the two People's Representative Councils (the DPR and the DPD). Commission VII of the DPR is charged with developing energy and environment regulations and approving energy-related legislation. A bill may stem from the DPR, DPD, or president to become law; however, it must be approved by both the executive and legislative branches. This means the president holds significant veto power (Sherlock 2010) and in the current context may hinder Indonesia's environmental policy developments; President Joko Widodo's campaigning and agenda have revolved much around ambitions to boost the economy through infrastructure with minimal mention of climate change until very recently.

Natural resource management and environmental considerations are devolved and are now under the remit of district governments, who may hold onto revenues accrued through this. This has been argued to have spurred the degradation of natural resources, due to short-term gains from extraction or exploitation being prioritised (Asian Development Bank 2005). Though the judiciary is independent of both the executive and the legislature, corruption is seen to be a problem (US Department of State 2020), potentially undermining the operation of the carbon pricing instrument and the rights and responsibilities of those most affected by it.

Despite this, climate action is an explicit priority for the Indonesian government, "parallel to the country's economic and poverty reduction objectives" (Asian Development Bank 2015). It was one of the first countries to ratify the UNFCCC as well as adopt the Kyoto Protocol. Indonesia has also passed "meaningful" legislation on climate change. However, key initiatives are often part of decrees and regulations passed by individual ministries rather than parliamentarians, rendering them "less effective" due to a structural hierarchy inherent in the Indonesian legal system (Nachmany et al. 2014).

In 2007, the National Action Plan to Respond to Climate Change (RANPI) was launched by the MoEF and was the country's first piece of framework climate legislation. In 2008, the National Council on Climate Change was formed of 17 Ministers with the president as presiding chair. The Council was responsible for climate policy coordination and setting up a carbon trading mechanism. However, a government reshuffle in 2015 and plans to trim the number of government agencies and ministries led to its dissolution, as the leading minister at the time was not aligned with a ruling political party, according to a former member of the Council. These tasks were thus transferred to the CMEA (PMR 2017). In 2010, the Climate Change Sectoral roadmap was published, and the Climate Change Trust Fund established linking climate finance from abroad with domestic investment (Tänzler and Maulidia 2013).

The presence of a “flagship” climate law is seen to increase the likelihood of the introduction and later success of a carbon price (Doda et al. 2021; Nachmany et al. 2015). For Indonesia, this is the 2011 Presidential Decree and National Action Plan to reduce emissions (RAN-GK). This framework document covers 70 programmes in the forestry and agriculture, energy and transportation, industry, and waste sectors and across all levels of government, the private sector, and civil society. It also serves as the basis for the country's NAMAs, which employ fiscal instruments such as taxation and guide investment policies (Nachmany et al. 2014). 34 Provincial Action Plans to Reduce Greenhouse Gas Emissions (RAD-GRK) were also introduced following the RAN-GK. Other regulations that serve as the foundation for market-based instruments also include derivatives of the laws that ratified the Kyoto Protocol and the Paris Agreement. In 2017, the Government Regulation on Environmental Economic Instruments was passed, of which Article 52 explicitly mentions emissions trading and mandates implementation of an ETS by November 2024 (Government of Indonesia 11/10/2017).

Indonesia has myriad other relevant climate and energy laws in place. The 2004 Green Energy Policy, a ministerial decree, promotes renewable energy and energy conservation across several dimensions: investment, financial incentives, energy pricing, R&D, and the institutionalisation of renewable energy. The 2007 Energy Law forms the legal basis for national energy management and the country's energy mix, emphasising the need for energy security and independence alongside sustainable energy development. The 2014 National Energy Policy also aims to gradually reduce electricity subsidies and includes a 23% renewables target in the primary energy mix by 2025 (Government of Indonesia 2014). In 2017, the General Plan for National Energy was introduced, a presidential regulation that considers the application and implementation of energy policy across sectors and their contribution to targets. This law serves as the basis for multilevel government planning documents and mandates a 1% decrease in energy intensity annually in the period 2015-2025, as well as a reduction of 17% and 29% in final energy consumption by 2025 and 2050 respectively (IEA 2021e). A revision of the 1997 Environment Law, which saw the supervision of responsibilities regarding environmental pollution handed to the MoEF and regional governments, also includes a mandate requiring the government to develop economic instruments to tackle environmental issues – a natural starting point for carbon pricing.

International climate law

These regulations and policies all work to align the country's emissions targets with its development goals, which are outlined in the country's NDC, last updated in October 2022. The NDC states a commitment to reducing GHG emissions by up to 43.2% by 2030 compared to projected BAU levels (31.89% unconditionally, with the higher target if provided support by developed countries) (Government of Indonesia 2020). According to interviewees from ASEAN who are working on the instrument internationally, carbon pricing can also be viewed as an opportunity to channel climate finance from abroad to Indonesia, to help reach the conditional target by 2030.

The previous 2020 NDC update was the culmination of more than a year of multi-stakeholder engagement and consultation led by the Directorate General of Climate Change of the MoEF (GGGI 2021). Alongside its ambitions for increased resilience against the impacts of climate change, the NDC provides further clarity on Indonesia's mitigation via the Paris Agreement rulebook (the Katowice Package) and development objectives for 2020-2024, as well as transposing the Katowice Package into the country's institutional context (ibid). These various documents circulated for many months among stakeholders as part of the government's intention to communicate progress and more transparently garner support for the country's climate action plans. Subnational engagement processes will target both public sector provincial governments and local authority offices, the private sector, civil society organisations, academic institutions, and development partners, which will be key to their acceptance as well as actors' better understanding of the role they can play. Similar processes would do well to be adopted regarding the implementation of Indonesia's carbon pricing schemes.

In accordance with Article 4 of the Paris Agreement, countries are urged to develop and communicate "mid-century long-term low GHG emissions development strategies" by 2020 (UNFCCC 2021b). Indonesia's "Long-Term Strategy on Low Carbon and Climate Resilient Development 2050" fulfils this clause. A key element of the document, submitted in July 2021, is its recognition that the forestry and land use sector in Indonesia is a major contributor towards its annual emissions (Government of Indonesia 2021a). It aims to have the forestry sector surpass net zero to be able to function as a carbon sink by 2030. This ambition—a legally binding target—was emphasised once more by President Joko Widodo during COP26 and is also part of the landmark presidential regulation he signed before setting off for Glasgow.

Foreign investment protection

Foreign direct investment (FDI), 1.8% of Indonesia's GDP in 2019, is a significant economic driver in the country (World Bank Group 2019b). However, corruption, regulatory uncertainty, ambiguous legislation concerning tax enforcement, and bureaucratic inefficiencies have been obstacles to foreign investment. The government's plans for economic reform, of which the updated tax framework that now includes a carbon tax element is part, seek to incentivise inflows of cash from abroad. What may not bode as well for environmental policy is that certain emissions-intensive sectors are targeted by these plans: export-oriented manufacturing, oil and gas refineries, and petrochemicals (US Department of State 2020). Singapore, China, Hong Kong, Japan, and Malaysia were the top sources of FDI as of the first quarter of 2020 (BKPM 2020). Among the top sectors into which FDI flowed were transportation, basic metals and non-machinery equipment, and industrial estate (ibid). The year previously, 42.9% of FDI went to the manufacturing sector, and 14.9% to mining, quarrying, electricity, gas, and water (Santander Trade 2019).

Indonesia has signed international investment agreements (IIAs) with 41 countries, several of which with other countries in the region. These include the ASEAN Economic Community in 2016; the Regional Comprehensive Economic Partnership in 2020; and a commitment to ratifying the ASEAN Comprehensive Investment Agreement (ACIA), which covers the manufacturing, agriculture, fishery, forestry, mining, and quarrying sectors (US Department of State 2020). According to one interviewee who is an expert on market-based mechanisms in the country, the topic of IIAs and their role with regard to carbon pricing is not yet openly discussed in Indonesia but the issue may become more prominent as implementation rules are announced. Furthermore, the country has also been involved in seven investor-state dispute settlement (ISDS) arbitration cases to date. Though none thus far have ruled against Indonesia, policymakers have seen the slowness and costs regarding the courts working in international arbitration. Tienhaara (2017) points to the threat of litigation via ISDSs and concerns about the risks of international arbitration and carbon trading.

Recent legal developments and government coordination

Recent legal developments regarding carbon pricing have been swift. The “Presidential Regulation on the Instrument for the Economic Value of Carbon for Achievement of the NDC and Control of Carbon Emissions in Development” (*Instrumen Nilai Ekonomi Karbon untuk Pencapaian Kontribusi Yang Ditetapkan Secara Nasional dan Pengendalian Emisi Karbon Dalam Pembangunan*), or NEK, was signed in autumn 2021 and sets the framework for the country’s domestic carbon pricing framework. Companies will be allowed to sell their carbon units if they comply with the reporting and recording procedures for inclusion under the MoEF’s national registry. Carbon trading will be done through a bourse in Indonesia, and levies will be charged on transactions. The regulation also outlines a few trading mechanisms, including the trade between two business entities through the carbon trading scheme, carbon offsets, and results-based payments. The NEK also tasks the relevant ministries with setting the cap for the ETS as well as monitoring and evaluation their implementation (Mandelli and Koh 2022).

The DPR also passed an omnibus bill in October: the “Bill Concerning Harmonisation of Tax Regulations” (*Rancangan Undang-Undang Tentang Harmonisasi Peraturan Perpajakan*). This is an updated tax framework that contains a carbon tax initially set to be imposed from 2022, though now delayed until at least 2023 (RSM Indonesia 2021).

One consequence of political decentralisation has been “confusion and even conflict” over the remit of the various institutions and levels of government (Tharakan 2015), many of whom submit proposals based on their heterogenous agendas to the president’s office without coordinating with other ministerial bodies. This view was echoed by several interviewed stakeholders. According to one who previously was part of the now dissolved National Council on Climate Change, the absence of the coordinating function of the Council is still sorely felt. With so many ministries and public bodies involved in various aspects of the carbon pricing hybrid instruments about to be implemented, policy coordination and communication across government institutions should be made a top priority, though the creation of such a coordinating body before the general election in 2024 seems unlikely, according to the same expert (ibid). Decentralisation also makes policy diffusion difficult. One interviewee remarked that especially with the myriad provinces located far from Jakarta, even policies that are enacted are not necessarily implemented to the same extent across the country.

One legal barrier that may present difficulties for the introduction of a carbon price in Indonesia is the existence of 30-year PPAs between state-owned utility PLN and IPPs. An ETS would increase the costs of generation, and IPPs have argued that PLN must adjust its purchasing price. Whether there exist clauses in these PPAs to protect PLN from this is highlighted as a significant factor to the success of carbon pricing by several interviewees (see Section 2.3.3).

2.3.2.2 Conducive factors and obstacles

The government’s high-level prioritisation of climate action is in line with its social and economic objectives. This is very conducive to carbon pricing in Indonesia and forms the backbone of recent swift developments. This prioritisation is supported further by the existence of a flagship climate law, the cross-sectoral 2011 RAN-GK, as well as the legal mandate for an ETS and the succession of various pieces of legislation that also provide the basis for a range of carbon pricing instruments. Despite the broader legal foundations in place, and preliminary decisions such as that to use benchmarking, many interviewees pointed to the necessity still of a detailed implementing regulation for the upcoming carbon pricing instruments, without which companies cannot prepare to comply nor public officials fully grasp how to operate them.

International climate law and policy on carbon pricing in Indonesia is seen to also play a facilitative role. Most interviewees referred to the presidential regulation on carbon pricing that was signed just before COP26. The perception of opportunities under Article 6 of the Paris

Agreement is also relevant to the development of a carbon market framework in the country, although concrete talks about the link between the upcoming domestic and international carbon markets are still a long way away.

Carbon pricing developments are critically linked to the ability of ministries, legislators, and the executive to align on goals and coordinate successfully across (particularly in Indonesia's case, many) institutions. Key obstacles for the country include political decentralisation and policy coordination in a fragmented institutional landscape, which is exacerbated by the dissolution of the National Council on Climate Change in 2008. Though a Steering Committee (see Section 2.3.4) is set to take a similar role, its effectiveness is still unclear. Another key legal barrier to carbon pricing mentioned several times in stakeholder interviews is the issue of long-term PPAs between PLN and IPPs, which without adequate negotiations could derail the effective operation of the carbon price signal.

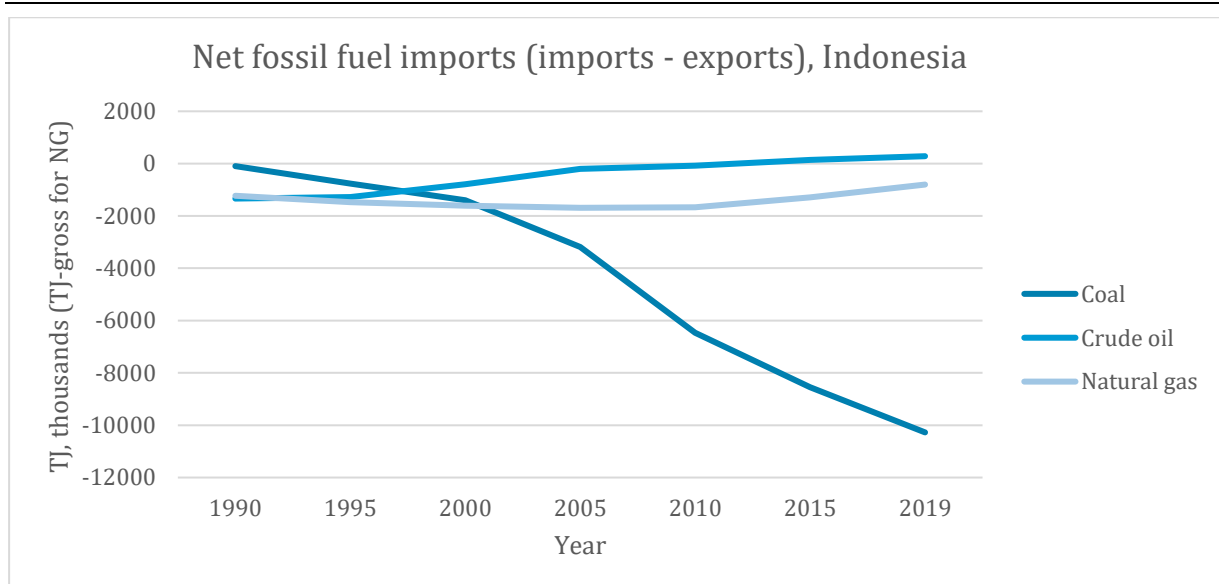
2.3.3 Economic dimension

2.3.3.1 Core analysis

Economic and energy structure

Indonesia has significant fossil fuel reserves, particularly coal, with its reserves-to-production ratio showing that coal could last for 60 years (bp 2018). The government plays a large role in the country's market economy, setting prices for basic goods like fuel, rice, and electricity. Differing from countries such as Malaysia, Singapore or Thailand, Indonesia's economy today centres much more on domestic activity than exports. What it does export—oil and gas, coal, minerals, electrical equipment, crude palm oil—goes mostly to Japan, China, India, Singapore, and South Korea, all of which exert geopolitical influence on Indonesia in this context (Asialink Business 2020; IEA 2019). Political economy factors driving support for coal in Indonesia include high demand growth in the region, large coal reserves, and significant dependency on income from exports (Climate Analytics 2021).

Figure 4: Net fossil fuel imports (imports – exports), Indonesia



Source: IEA (2021d)

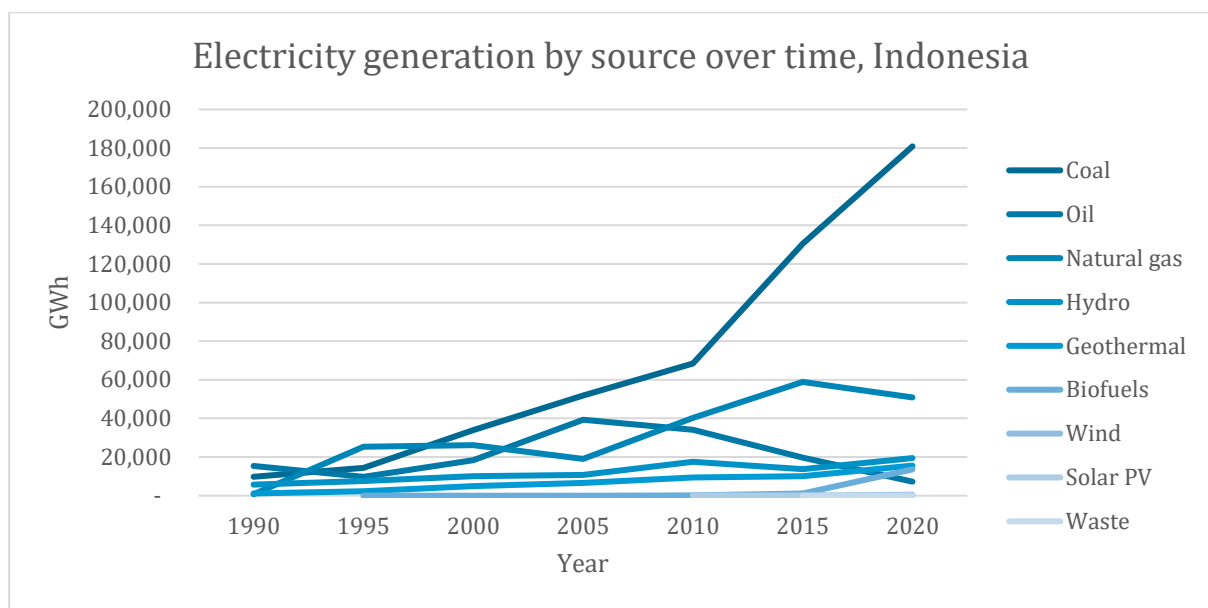
The fiscal burden of fossil fuel subsidies in Indonesia is very high: 31.6% of GDP in 2017 (IMF 2017). The government intends to phase out this “wasteful spending”, with energy subsidy reforms underway since 2015 (Ministry of Energy and Mineral Resources and Ministry of

Finance 2019). Still, in March 2021, the price of power in Indonesia remained well below the global average, at USD 0.101 per kWh for households (Global Petrol Prices 2020). Unless these fossil subsidies are scaled back, renewable energy will remain less competitive. Low-income households are also heavily subsidised, paying approximately only 30% of the average electricity supply cost in 2017 (PLN 2017). The Indonesian government has maintained the stability of fuel and electricity prices to ensure citizens' purchasing power (PwC 2018), freezing tariffs from 2017 (Ministry of Energy and Mineral Resources Indonesia 3/8/2021). This direct fiscal support leading to below-market prices for consumption means there is a widespread expectation that the public will be "shelter[ed]" from price changes (Laan and McCulloch 2019). Though perhaps not yet a cause for opposition, these prior expectations may prove challenging in terms of social acceptance of the policy if carbon price pass-through implies power price hikes for the consumer, a forecast echoed by several interviewees. Representatives from the public sector interviewed point to the importance of complementary policies that can address the regressive impacts of a carbon price, mentioning for example cash transfers to increase consumer's purchasing power and earmarking revenues accrued through carbon pricing to renewable energy development.

In addition, the importance of revenues from coal mining for the state's budget, as well as for regions and municipalities cannot be underestimated (Climate Analytics 2021). This lies alongside concerted efforts towards greater use of coal within Indonesia, considering expected downward trends in export destinations such as China (Fuentes et al. 2019). Support for coal stems therefore also from the necessity to maintain jobs; a transition away requires targeted policy support in this regard.

Indonesia's power market today is partially liberalised. In 2020, the main generation technologies were almost two thirds coal, followed by natural gas, renewables, and oil (IEA 2021b). Coal has played an increasingly important role over the last few decades. Despite Indonesia's high potential for renewables such as geothermal due to its geographical location in areas of high volcanic activity, hydropower, and biofuels, the country's energy policy has over the years very much been focused on coal as it struggles to meet growing domestic electricity needs (Statista 2021b) and as several regions still suffer from blackouts (Crispin 2019). Indeed, Indonesia relies on a very young operating fleet: 58% are less than 10 years old; 35% are 10-25 years old; and only 7% over 25 years old (Heo 2021). This means that without intervention they will likely continue operating well into the next half century given their technical lifespan of 40-50 years (ibid).

However, COP26 in Glasgow in November 2021 saw Indonesia take "significant steps" to transition away from coal. Though it excluded itself from Clause 3, which commits to the ceasing of new permits, new construction, and new direct government support for unabated coal-fired power generation (UNFCCC 2021c), the country signed onto the Global Coal to Clean Power Transition Statement and announced partnerships with the Climate Investment Fund and the Asian Development Bank to back the early retirement of coal-fired plants (Chia and Kan 2021; UNFCCC 11/14/2021). Its most recent power supply business plan (the 2021 RUPTL) published by the MEMR in October 2021 also for the first time indicates a swerve away from fossil fuels, with larger renewables capacity in the works (Lee 2021).

Figure 5: Electricity generation by source over time, Indonesia

Source: IEA (2021b)

A key player in this regard is energy supplier and subsidiary of PLN, PT Pembangkitan Jawa-Bali, or PJB. Established in 1995, PJB was initially focused on generation via six power stations across the Jawa-Bali region. Alongside managing power plants with a total capacity of 20,941 MW in 2020, the company now also develops and manages *inter alia* operation and maintenance services, procurement, power plant management and training, and renewable energy. Its goal now is to “power the nation using renewable and sustainable energy” and has put forth a detailed climate action plan explicitly aligned to Indonesia’s NDC (PT Pembangkitan Jawa-Bali 2021). It includes steps such as the prioritisation of renewables, fuel-switching (coal to biomass), and increasing the use of more efficient and low-carbon technologies such as carbon capture and storage once these are market-ready (Maryono et al. 2021).

Electricity market regulation and structure

Indonesian power market reform began in the mid-1980s. In 1985, Electricity Law No. 15 allowed for the opening up of the generation market to (limited) competition. IPPs began to build, install, and operate power plants, and then sell power to state-owned utility PT Perusahaan Listrik Negara (PLN) for distribution. The 2002 Electricity Law No. 20 introduced the Electricity Market Supervisor Agency, an independent market regulator, and expanded this competitive structure into the retail market. However, this was revoked after just two years when the Constitutional Court ruled that power is a public commodity and should therefore remain exclusively under the jurisdiction of the government; and that PLN should not be unbundled in this way. In 2009, Electricity Law No. 30 reiterated that PLN would remain vertically integrated (IEA 2015). Power in Indonesia is therefore very cheap and does not reflect the true cost of generation.

Today, PLN still dominates generation, transmission, distribution, and retail sales of power. It provides most of Indonesia’s supply, with the rest provided by IPPs and private power utilities (PPUs) but still delivered by PLN. Though legally it no longer has monopoly over the sector, it retains the right of first refusal over any activity in the sub-sector which often effectively dissuades private companies from taking part (Tharakan 2015). Despite the involvement of IPPs since 1985, they are *de facto* an “out-sourced element of the PLN monopoly supply chain”, meaning that Indonesia fits broadly into the Single Buyer Model.

PLN's revenue used to also directly be affected by regulated tariffs set (with a few exceptions) by the government and approved by parliament. If prices fell below the cost of production (often) the MoF provided PLN with compensation via a subsidy. Since 2013, however, the stabilisation of the average cost of power supply and PLN's increased ability to pass on costs to consumers have also stabilised the total subsidy outlay (Setyawan 2014; PwC 2018). The Indonesian government has also continuously subsidised fossil fuels through domestic market obligations (defined by the WTO as a subsidy) for coal, to ensure a continuous supply of coal to PLN at a price that will not increase the price of generation. Whatever the international market price for coal, the maximum price PLN pays is USD 70 per tonne. The case is similar for gas, which is capped at USD 6 per mmBtu despite gas price fluctuations (Reuters Staff 2020). PLN naturally plays a key role, therefore, in the development of carbon pricing plans and Indonesia's broader climate commitments. In summer 2021, the company stated that it would gradually retire its coal-fired power plants as part of its plan to reach carbon neutrality by 2060 (Nangoy 2021a), which holds promise for the country's climate action landscape.

However, according to an interviewed stakeholder, another issue is that the addition of a carbon pricing instrument would increase the price of power, so the carbon price would show up in PLN's balance sheets. The government may thus set a weak cap to avoid implicating PLN's financial performance, which would in turn jeopardise the environmental integrity and effectiveness of the mechanism.

The MEMR is primarily charged with creating and implementing energy policy and governing the energy sector, via the Directorates General of Electricity; New and Renewable Energy, and Energy; Oil and Gas; and Energy Conservation (Tharakan 2015). It also regulates the power sector, conducts research related to Indonesia's energy goals, and manages several activities of the state-owned utilities and energy service companies.

An non-exhaustive overview of Indonesia's legal framework and climate and energy policy mix is presented in the Table 1 below (IEA 2021e).

Table 1: Overview of Indonesia's climate change and energy policy mix

Area	Policy	Details	Year	Interaction with carbon pricing
Framework legislation/ policy	Green Energy Policy	Strategy to maximise RE potential; raise public awareness of energy efficiency; incentives for development of local RE in targeted areas	2004	Provides cleaner alternatives to be developed and deployed to switch to as carbon pricing pushes out fossil fuels
	Energy Law No. 30	Legal basis for national energy management and energy mix; emphasises need for energy security and import independence; sustainable development and resilience	2007	
	National Action Plan for Reducing GHGs (RAN-GK)	Follow up to GHG targets; provides policy framework for central and local government and private sector	2011	Flagship climate change law that establishes firm legal foundation for carbon pricing

Area	Policy	Details	Year	Interaction with carbon pricing
	Government Regulation on Environmental Economic Instruments	Sets a mandate for an emissions and/or waste permit trading system to be implemented by 2024, within seven years from its passage	2017	Provides a first basis for ETS implementation
	General Plan for National Energy (Presidential Regulation)	Application/ implementation of energy policy across sectors to achieve targets; serves as basis for multilevel government Planning; mandates -1% energy intensity reduction per year 2015-2025; -17% and -29% in final energy consumption by 2025 and 2050 respectively	2017	
	Taxation Harmonisation Law	Tax overhaul amending provisions of previous taxation regime, incl. value-added, income, carbon, excise and tax amnesty	2021	Contains carbon tax element for the first time, initially to be imposed from 2022 though now delayed
	Presidential Regulation No. 98/2021 on the Instrument for the Economic Value of Carbon	Extends the original "Government Regulation on Environmental Economic Instruments" from 2017	2021	Will serve as the framework for regulating the implementation of a carbon price to meet Indonesia's NDC target
Production	RE feed-in-tariffs	Solar, wind, biomass, hydro (20-30 years)	2011 onwards	
	Power purchase from solar photovoltaic plants	Solar auction programme (repealed as ruled unconstitutional); PLN and winning bidders sign PPAs for years	2013	
	Geothermal auctions	Plants to be commissioned 2024-2025	2016	
	RE purchase policy	Regulates power purchase by PLN from solar, wind, biomass, biogas, geothermal and hydro	2017	
	COP26 coal phase-out pledge	Though with excluded investment clauses, transition away from unabated coal power generation	2021	
Investment	VAT and import duty exemptions for RE property	Applies to taxable goods imported to develop RE projects	2010	

Area	Policy	Details	Year	Interaction with carbon pricing
	Income tax reduction for energy development projects	Adjustments to income tax incl. net income reduction, accelerated depreciation, dividends reduced for foreign investors, and compensation for losses	2010	
	Accelerated depreciation	Applies to fixed assets including in RE sector, e.g., in infrastructure and power contribution	2015	
	Sales tax exemption for “low-cost green cars”	Sales tax exemption for cars considered as low cost and green car with some conditions	2017	
Command-and-control	Green industry standards	Ministerial regulation setting mandatory minimum standards for heavy industry sectors limiting amount of energy used to produce one ton of product	2015	
	Energy efficiency regulations e.g., National Energy Efficiency Standard for Buildings	(Voluntary)	2011	

Source: Based on IEA (2021e)

Another significant economic hurdle for the introduction of a carbon price in the power sector are issues related to the long-term PPAs between the IPPs and PLN. Without negotiation with the IPPs, or reform of these contracts regarding the increased costs that carbon pricing would entail perhaps via force majeure relief, the state would simply end up bearing these and the abatement incentive would be muted. ETS for a monopolistic market structure makes little sense. An expert on market-based mechanisms in Indonesia interviewed for this report suggested that this is indeed the biggest hurdle regarding carbon pricing in the country, which even calls into question the choice of the power sector as the starting point for the policy. They suggest that the cement and steel industries are sectors where past studies have shown that a carbon price could be much more effectively passed down and therefore trigger less opposition.

Renewable energy

Indonesia has great potential for the expansion of renewables, particularly biofuels and geothermal, due to its location in areas of high volcanic activity (Pujantoro and Tampubolon 2020). Historically, investments in renewables in Indonesia has been unattractive due to poor regulation (Climate Transparency 2019). However, the latest RUPTL published by the MEMR includes a target of an additional 21 GW of capacity, a 25% increase since the RUPTL previously. Fossil fuel generation on the other hand is set to decline by half. Together, the share of planned renewable capacity additions has increased from 30% to 52% since 2019, sure sign of a change in trajectory towards renewable energy in Indonesia (Lee 2021).

Regulatory oversight in Indonesia is weak and investment uncertainty is high, however. Renewables support in the form of feed-in tariffs (FIT) for biomass, wind, and hydropower were implemented starting in 2011, with solar FITs introduced in 2016 after the 2013 solar auction programme was ruled unconstitutional by the Supreme Court (IEA 2021c). The system has been criticised due to Indonesia's constantly changing policy framework, and the existence of local content requirements which led to long court battles (Guild 2021a). The higher operating costs for utilities under a FIT also do not fit well into the government's general "dislike" for passing on such costs to consumers (ibid). For this reason, PLN absorbed most of the costs. There were limited takers, and an unpredictable regulatory climate again hindered investor confidence (Guild 2019). PLN has also repeatedly planned significant increases to renewable capacity over the last decade as seen in the regularly published RUPTL plans but has never actually achieved these targets over the longer term. The country's intentions to expand renewable energy production has been at odds with its slower performance in this regard (Asian Development Bank 2020b). Indonesia's access to and dependence on fossil fuels, the powerful brown lobby, poor regulatory quality, and the unfavourable political economic conditions of energy markets meant that renewable energy support schemes did not "jump-start" renewables growth as intended (ibid, p.1).

Further adding to the obstacles for renewables are legal requirements under the 2014 National Energy Policy which means that the renewable energy must be "economically viable" (PwC 2018). A 2017 directive also requires renewable energy producers to sell to PLN at 85% of the average generation cost in each local grid, meaning they compete directly with cheap PLN power from coal, and there is limited possibility for wider uptake (Palma 2018).

Today, industrial learning curves across the globe have led solar PV and onshore wind to be among the cheapest sources of new power generation. In Indonesia, they have seen 40-50% and 15-45% in cost reductions respectively. There is potential for this trend to continue, and the regulatory environment for renewables has seen some improvement over the last five years (Climate Action Tracker 2021).

2.3.3.2 Conducive factors and obstacles

A detailed examination of the economic structures in place in Indonesia reveals several conducive factors that lie alongside key barriers that must be overcome for a carbon price to be successful in its objective of curbing emissions. Political economy factors such as high demand growth in the region, large reserves, and significant dependency on income from exports result in strong support still for coal, which plays an important role in the country's energy mix. However, recent commitments at COP26 and proposals from the ADB suggest the country could be turning away from coal sooner than expected.

High levels of government intervention in Indonesia's economy are also an obstacle to instruments such as carbon pricing that rely on market forces. Direct fiscal support for energy leading to below-market prices for consumption has meant the public expects to be sheltered from price changes, in turn increasing the risk of opposition from below if a carbon price were indeed felt. In addition, the fiscal burden of fossil fuel subsidies in Indonesia is very high and serve essentially as negative carbon prices.

The monopolistic structure of Indonesia's power market, where PLN dominates, will also restrict the effectiveness of a carbon price. Several factors have impeded power market reform thus far. These include the constitutional roadblocks as well as disincentives to both foreign and domestic investment because power tariffs have been kept low through regulation. However, there is much potential for incremental steps to be taken to improve these incentives and allow the carbon price to send a robust economic signal. These include the removal of the fossil fuel subsidies such as the price cap on mandatory sales of domestic coal to PLN—negative carbon

prices—which would bring down the cost of generation (Purra 2010). The sentiment that this is necessary for a successful carbon pricing scheme is echoed by many of the interviewed experts from various sectors. Without a competitive mechanism to coordinate IPP and PLN generation, and alongside the legal mandate for PLN to provide energy at an affordable price (Guild 2019), there is still much to be done before wholesale and retail competition can be improved, where the carbon price signal could successfully be transmitted downstream and provide the needed abatement incentives.

Though there is high RE potential in the country, obstacles to wider deployment include legal requirements for “economic viability” and weak regulatory oversight which both deter investment. For renewables in Indonesia to improve their economic viability and for the declining technology costs to be reflected in generation costs in Indonesia, the government should foster a conducive investment and development environment, and tweak support policies so they no longer favour dirty power nor create stranded assets (Climate Analytics 2021).

2.3.4 Technical dimension

2.3.4.1 Core analysis

MRV

Indonesia already has solid, “deeply institutionalised” experience with MRV in the forest management sector, thanks to its involvement in a prominent REDD+ scheme with Norway (see Section 2.3.5), the mobilisation of new actors and resources, and the formal anchoring of MRV responsibilities in regulatory arrangements (Ochieng et al. 2018). MRV of greenhouse gases in Indonesia is currently coordinated by the MoEF and is conducted in a semi-decentralised manner with the help of several digital registry systems (Prihatno 2019a). An MRV system is already in operation for the industry and power sectors. The recent NEK presidential regulation requires that businesses must regularly submit emissions reports to the government by businesses, which are then verified by the MoEF and can be used to access green finance or take part in carbon trading. Failure to comply may result in penalties to be fleshed out in subsidiary legislation (Mandelli and Koh 2022). However, verification in particular remains another obstacle for carbon pricing in Indonesia. Even during the trial carbon market in 2021, there were limited independent verifiers, a status confirmed by interviews with the private sector and presentations made by the MoF Directorate of Taxation (Direktorat Jenderal Pajak 2021).

To further Indonesia’s technical capacity in this regard and as part of the IKI Corona Response Package for a green recovery, in late 2021 the German GIZ completed a capacity-building project on both the national and subnational levels (IKI 2021a). It was designed to help consolidate a robust MRV system by integrating the online emission reduction target monitoring tool (formerly known as PEP, now AKSARA, launched in 2019 by the Ministry of Development and Planning) with the national registry for recording mitigation and adaptation measures (*Sistem Registri Nasional Pengendalian Perubahan Iklim*, or SRN). As the ETS is eventually implemented, the government’s monitoring system will be linked to the SRN to track the emissions data annually submitted by regulated entities (Muhammad and Tan 2022). This information will form the basis for calculating the number of available allowances for initial allocation (ibid).

The above GIZ project also helped develop the climate budget labelling system (SAKTI). Twelve sectoral methodologies for calculating emissions reduction were also updated under AKSARA, including for the energy, transport, agricultural and maritime sectors. The project also assisted the Secretariat of the National Action Plan on Mitigation to collect data and establish a data management system, as well as developed guidelines, regulations, and training and

communication materials to further facilitate reporting of mitigation measures (ibid). Lacking still is governmental expertise in the energy, waste, and the industrial sectors (Prihatno 2019b).

In this context, however, Indonesia has already received support from the World Bank's PMR initiative through the period 2017-2021. Through the PMR, the MRV framework for the power sector and selected energy-intensive industries was developed and the design of governance aspects of the system mapped (PMR 2017). With the assistance of the PMR, a pilot MRV program for GHG emissions was launched in the Java-Madura-Bali grid (covering approximately 70% of power demand) in 2018 (ICAP 2021a). Capacity-building efforts for MRV targeting relevant senior government staff and private sector stakeholders have also been part of the PMR strategy, which was implemented in partnership with the UNDP and in collaboration with the CMEA (UNDP 2021). The PMR's successor programme, the Partnership for Market Implementation (PMI) is expected to continue supporting Indonesia's carbon pricing developments and the operationalisation of Article 6 of the Paris Agreement.

Government knowledge and capacity

The government benefits from a cross-ministerial technical team that has been actively working to prepare market-based instrument options for the country. It is made up of relevant ministries and associations organised into a Steering Committee and Implementing Committee, alongside several working groups including one each dedicated to Power, Industry, and Market-Based Instruments (CMEA 2/7/2019). Despite this, the Indonesian public sector's institutional capacity for policymaking has in the past been hindered by bureaucratic overlap between key stakeholders such as the MoF and MEMR, and lack of coordination, resulting in ad hoc processes and a dearth in clarity (Warburton 2020). Particularly critical therefore will be the development of a comprehensive knowledge base regarding these market mechanisms as Indonesia pushes forward with its ETS and parallel carbon tax, via the facilitation of information exchange and technical discussion (World Bank 2019).

To continue to play a key role in fostering technical capacity is the PMI and other relevant multilateral initiatives such as the Asian Development Bank's, whose objectives include to use well-designed carbon pricing as part of the policy mix for green recovery and growth across the region (Direktorat Jenderal Pajak 2021). ADB is currently working alongside the CMEA and the MoEF to support Indonesia in building readiness to operationalise Article 6 as an integral part of its national climate policy framework to achieve its NDC targets (Asian Development Bank 2021b). A key point noted by an interviewee in Indonesia working with public sector officials is a sense of public institutions' broader reservations towards international assistance. The interviewee suggests instead that priority be placed on fostering more "national champions" who can steer Indonesia's path towards carbon pricing. Important to note, on the other hand, is the current Minister of Finance. Sri Mulyani is a renowned economist who held the position from 2005 to 2010, then was appointed Managing Director of the World Bank Group. She resumed her Minister position in 2016, but her history here indicates—at least for the MoF—a willingness to work extensively with large multilateral organisations' initiatives. Regardless, Indonesia's pathway towards net zero will hinge on the smooth operation of its numerous climate and energy policies against its political economic backdrop, but importantly the ability of government officials and facilities covered under a carbon pricing instrument to keep pace with the technical and administrative requirements of such a policy.

Business knowledge and capacity

Hand in hand with the government's ability to technically operate a carbon pricing instrument is the knowledge of the private sector on the matter. Large multinationals that actively factor carbon pricing into their growth strategies operate out of Indonesia, including Shell, BP, and

ExxonMobil; the former two have announced 2050 net zero targets and ExxonMobil “respects and supports society’s ambition” to reach net zero by mid-century (ExxonMobil 2021). Such multinationals also have experience operating in jurisdictions around the world with carbon pricing policies already in place. State-owned power company PJB, for instance, is preparing with a strategy regarding carbon trading and offsets and partaking in the 2021 ETS pilot (Maryono et al. 2021). Other companies would benefit from undergoing similar planning in the lead up to the introduction of Indonesia’s carbon price. Indonesia already has strong activity in voluntary carbon markets; the country has the highest number of non-retired voluntary credits at 42 million (comparable to 2.1 million Thailand, and 1.6 million in Vietnam) (Manuell, Garside 2/18/2022). This experience can only be valuable once a mandatory carbon price is in place.

However, in 2019, the WEF Global Competitiveness Index ranked Indonesia 74th in the world for strength of auditing and reporting standards within corporate governance (Schwab 2019), indicating the private sector’s perhaps weaker capacity to comply with a carbon price. To address these gaps, initiatives such as the German government’s International Climate Initiative (IKI) have been working across public and private sector lines via workshops and exchange forums to spur discussion on how green fiscal policy and carbon pricing mechanisms can incentivise private investment in low-carbon alternatives and mobilise domestic revenue (IKI 2021b). To further support Indonesian private sector knowledge, in autumn 2021 Berlin-based thinktank and policy consultancy adelphi implemented a virtual capacity building course targeted to sector representatives (alongside a similar course for the public sector) as part of the German Federal Ministry of the Environment’s (BMU) Capacity Building ETS programme. The German Emissions Trading Authority (DEHSt) at the German Environment Agency also contributed its practical experience in implementing the ETS in Germany to this course.

An important step towards the potential success of the upcoming mandatory ETS in Indonesia has been concerted efforts to study and test various options prior. After a study and stakeholder consultation on four market-based instruments were conducted in 2018, a pilot ETS was chosen for further development. The voluntary ETS pilot ran from April to August 2021 (see subsection “Status of carbon pricing developments in Indonesia” in Section 2.1). It served to familiarise stakeholders with compliance and offset mechanisms and provide the relevant technical exposure to such a system (ICAP 2021b). Though results from the trial phase have not yet been released, as the system transitions to the mandatory phase over the next few years, an interviewee from an Indonesian thinktank notes that several open questions remain. These include how the eventual cap will be set, unforeseen challenges with MRV, and whether all generators will be included. The latter point will be demonstrative, as many power plants declined participation in the voluntary trial run, and as no regulation is currently in place that can force participation. Despite ongoing efforts to build up these functions, the expert points to technical capacity as still being one of the greatest obstacles to carbon pricing in the country. The readiness of businesses to comply is yet insufficient, as is the ability to measure and report emissions. The necessary transparency surrounding these issues is still lacking and without continued and targeted capacity-building efforts could prove problematic as policy development progresses (ibid).

2.3.4.2 Conducive factors and obstacles

MRV in Indonesia is “deeply institutionalised”, particularly in the forestry sector. It is also already in operation for the industry and power sectors, enshrined in law by the recent presidential regulation on carbon pricing. In this regard, the establishment of robust MRV is already firmly on track.

However, technical capacity remains a major obstacle to carbon pricing in Indonesia, a sentiment brought to light by many interviewees. Important will be fostering a comprehensive knowledge base both in the public and private sector regarding the upcoming carbon pricing instruments, via the facilitation of information exchange and technical discussion. Multilateral initiatives offering capacity-building are also expected to continue to play a key role.

2.3.5 Multilateral dimension

2.3.5.1 Core analysis

Trade and commercial integration

In terms of regional ties, Indonesia is one of the original five ASEAN member states. Its position here has had much impact on its foreign and security policy, but it has been argued that Indonesia has shown “inert attitudes” towards extending its regional economic integration much further under ASEAN due to competitiveness concerns, particularly since 2019 and the dawn of the Jokowi administration (Artner 2017; Heiduk 2016). In terms of environment, the ASEAN states have agreed on several targets, including a 30% reduction in energy intensity and an increase in the share of renewables in the energy mix to 23% by 2025 (compared to 2005 levels) (ASEAN 2019). This is also expected to become increasingly ambitious (Phoumin et al. 2021).

Despite its economic and trade hesitations under the ASEAN framework, in 2020, Indonesia became a signatory of the Asia-Pacific’s Regional Comprehensive Economic Partnership and is thus now a player in the largest world trade bloc in history. Beyond Asia, Indonesia has been a member of the WTO since 1995 and is also part of the G20, giving it firm standing in terms of global economic cooperation. In fact, Germany has signalled interest to work on carbon pricing in Indonesia, using the strategic opportunity provided by Germany’s G7 presidency and Indonesia’s G20 Presidency which both fall in 2022. This may be particularly pertinent, as this phasing in approach of carbon pricing via an initial tax element is not dissimilar to Germany’s national fuels ETS, which begins with a “fixed-price” mechanism (ICAP 2021a). Both Indonesia’s G20 Presidency 2022 and upcoming ASEAN Chair 2023 roles were in part brought about by international expectations regarding climate action; multilateral factors have indeed served as a lever for Indonesia in this respect. In addition, an upcoming UK government-funded three-year project under UK PACT is expected to support the Coordinating Ministry of Maritime and Investment Affairs in preparing to implement the Presidential Regulation on Carbon Pricing, including in relation to this carbon tax, and also support the MoF’s Fiscal Policy Agency and Director General for Taxation to design and prepare its implementation plan (UK PACT 2021). Multilateral banks also have a stake in Indonesia’s green transition and thus may help spur the implementation and effects of a carbon price. One such organisation is the Asian Development Bank, which reported in the lead-up to COP26 in 2021 on its proposed plan, the Energy Transition Mechanism, to buy up coal-fired power plants in Asian countries, including in Indonesia and to close them early – within 15 years (Denina 2021).

Furthermore, pressure from buyers of Indonesian products has spurred carbon pricing developments, according to the chairperson of the Indonesia Solar Energy Association (ISEA). Even without direct mention of the carbon border adjustment mechanisms being hotly debated in Europe and further afield, questions of products’ carbon footprint arise from the demand side. While the EU has already set such standards, a similar pattern is arising for jurisdictions who export to the United States, for example, and Indonesia is seeing increased competition with Vietnam, China, and Turkey regarding the carbon-intensity of several products (ibid).

Carbon pricing in other jurisdictions

Indonesia's main trade partners include China, Japan, the United States, Singapore, and India (WITS 2021). Of these jurisdictions, three already have a carbon pricing mechanism in place: China launched its national ETS covering the power sector in 2021 on top of its several provincial pilot systems that cover industrial emitters; Singapore has had a carbon tax imposed since January 2019; and Japan has both a carbon tax, two subnational ETSs and is considering further national carbon pricing policy (World Bank 2021a). Indonesia's relations with these jurisdictions play an important role in the country's trajectory towards its own carbon pricing instrument and hold potential for symbiotic carbon market exchanges.

Lessons from other jurisdictions also embarking on implementing a carbon price can be relevant to Indonesia. The country is involved in the ASEAN Climate Change and Energy Project (ACCEPT) a regional climate policy and carbon pricing initiative funded by the Norwegian Government whose Secretariat is in Jakarta. The project is hosted by the ASEAN Center for Energy (ACE), which represents the Member States' interests in the energy sector. Interviewed experts from the organisation working on Indonesia's climate change and carbon pricing strategies suggest Singapore as a key jurisdiction from which to take pointers. The development of Singapore's carbon tax, in place since 2019, holds relevance to Indonesia, and several events between the two jurisdictions have already taken place to exchange views and lessons on policy design and effective stakeholder engagement, as reported by interviewees from ASEAN ACCEPT. Though perspectives on the starting price of carbon differ, some benefits of starting small similarly to Singapore include allowing industry to adapt before ramping up the price mechanism. South Korea, with its maturing national ETS, is another jurisdiction to look towards as Indonesia develops its domestic scheme, according to one of the experts interviewed.

Other climate action work under the ASEAN framework includes a UNFCCC CIACA study on cooperative MRV alongside other ASEAN states as a building block for potential regional carbon market development in the future (Alelula 2019). These lessons and cooperative activities transposed across borders can facilitate the more extensive use of carbon pricing in Indonesia and lay the foundations for future transnational cooperation.

Prior experience in environmental cooperation

It is also conducive to fruitful future symbiotic carbon market exchanges if a jurisdiction has experience in multilateral environmental cooperation more generally. Indonesia has taken membership actions to 297 multilateral environment-related treaties (IEA 2020), including regional treaties such as the ASEAN Agreement on Transboundary Haze. In November 2021, Indonesia and Germany published a joint statement on their ambitions to tackle climate change together through the further expansion of the "Green Infrastructure Initiative" currently operating in four provinces, where the objective is to promote the development of climate-relevant infrastructure in the waste management, water management and urban public transport sectors (Coordinating Ministry of Economic Affairs and Investment 2021).

More narrowly, prior experience with international market-based mechanisms facilitates the introduction and eventual smooth functioning of national carbon pricing policy (Doda et al. 2021), as this creates regulatory familiarity and vested interests (Paterson 2012). Indonesia has been the highest project-yielding partner country of the Japanese Joint Crediting Mechanism, with 23 registered projects to date (Japanese Government 2021), an active host country as part of the UN's Clean Development Mechanism, with 153 projects registered (UNFCCC 2021a) and a participant of the Verified Carbon Standard programme.

Potential for future symbiotic carbon market exchanges

International and private-sector financing will also be essential to Indonesia meeting its climate targets. In terms of transnational cooperation, the government has stated that it is considering opening its market to global carbon trading, provided countries settle on the ground rules (Jiao and Sihombing 2021). COP26 in November 2021 saw a broad framework laid out for bilateral emissions trading and in a marketplace overseen by the UN. The Indonesia Stock Exchange and its London counterpart have announced they will work together on a carbon bourse (ibid). In this context, the Asian Development Bank has set up the Article 6 Support Facility to provide “technical assistance, capacity building, policy development support, and piloting opportunities” to its member countries, of which Indonesia is one (Direktorat Jenderal Pajak 2021). The facility facilitates jurisdictions’ ability to establish cross-border and, where appropriate, integrated carbon markets to ratchet up climate ambition and help achieve mitigation targets laid out in their NDCs (ibid).

Indonesian officials have been considering whether to include forestry (the largest source of emissions in the country) in the domestic market. The country’s ETS may expand to this sector in the future, which would open the door to other countries using offsets from the archipelago’s expansive mangroves and rainforests to meet their own compliance obligations (Bloomberg 2021). Some headway has in fact already been made in this regard. In November 2021, Australia released a financial framework for an Indo-Pacific carbon market after agreeing with Indonesia to cooperate on offsets. The Australian government is set to operate this scheme, with the private sector to be the main buyers of credits (Australian Government 12/16/2021). Currently in Indonesia, forestry projects either sell units to international buyers under the UN-backed REDD+ programme, or the country receives result-based payments through a bilateral result-based payment agreement with Norway. Under this cooperation scheme with Norway in place since 2010, Indonesia receives USD 5 per tonne of CO_{2e} avoided through reduced deforestation. These forestry offset credits can then be counted towards Norway’s emissions targets. In 2020, the first USD 56 million result-based payment was made (Oktavianti 2020). However, according to an interviewee from a forestry sector expert working in Indonesia, the programme can also be seen as less than successful, in part due to the rigidity of Norway’s expectations and thus limited incentive for Indonesia to meet them; the size of the 2020 payment was not commensurate to the scale of the task at hand.

2.3.5.2 Conducive factors and obstacles

Indonesia has firm standing in terms of global economic cooperation. Its 2022 G20 Presidency and upcoming 2023 ASEAN Chair role were tacitly established via international expectations regarding increased climate action. Indonesia’s relations with several jurisdictions already with a carbon price in place also impact the country’s path towards its own carbon pricing instruments, holding promise for symbiotic carbon market exchanges. Indonesia has also long-standing experience in multilateral environmental cooperation as well as international market-based mechanisms such as the CDM, JCM, and results-based payment schemes, which will serve well its technical capacity.

In terms of barriers, foreign interests, and geopolitical pressure in Indonesia’s carbon-intensive assets, particularly coal, may hinder the stringency of the carbon pricing instruments. However, Indonesia is one of several countries using carbon pricing to decarbonise its energy despite its young coal fleets. The evolving experiences in China, Vietnam, Pakistan, and the Philippines may well help inform its domestic policy needs in this respect. Interviewees have also pointed to the cases of South Korea and Singapore as jurisdictions to look towards for key lessons.

2.4 Synthesis and possible pathways to implementation

The potential for carbon pricing in Indonesia is significant. The development of concrete policies—both emissions trading and carbon taxation—is already well underway. The various dimensions of the Indonesian landscape analysed in this report have shown several indications that carbon pricing is a cost-effective instrument that has potential for much success in reducing the country's emissions. This has global significance in that Indonesia is among the top ten emitting countries in the world. Climate change legislation has taken shape over many years and lays the groundwork for economic instruments to be used to address environmental problems. The recently signed presidential regulation lays out a carbon pricing framework, as well as a broader legal framework for responding to challenges raised by climate change. An ETS is enshrined in law to be fully operational by 2024. Implementing regulations for these instruments are expected in the coming months, due in late 2022.

In terms of concrete developments, a voluntary trial carbon market completed its first phase in 2021, though results are yet to be made public. This is cause for concern for facilities to be covered by the mechanism, according to a key private sector representative. A “cap-trade-and-tax” system was announced the same year, initially to be imposed from 2022, but delayed further. Though the brown lobby in Indonesia is powerful, the country has long experience with market-based mechanisms to address environmental issues as well as international cooperation, which interviewees from international carbon pricing initiatives have confirmed also lay good foundations for carbon pricing. Indonesia has established an MRV infrastructure in several sectors and has received assistance from relevant multilateral initiatives such as the World Bank's PMR and PMI as well as the German GIZ and will continue to do so. The German BMU has also implemented several capacity-building activities under a dedicated programme, where the national emissions trading authority, DEHSt, was also involved in engaging with Indonesian actors on technical aspects of carbon pricing readiness, instrument design and implementation. This holds promise for the smooth functioning of its upcoming carbon pricing policy. Despite big industry players initially opposing the carbon price, several private sector and civil society interviewees have indicated that many have now begun to warm to the instrument and view it instead as an opportunity.

Indonesia has been quite active regarding multilateral engagement, signalling the intent to push forward with climate action, for example via its G20 presidency. It continues to receive assistance from capacity-building initiatives such as the World Bank's PMI, the German GIZ, and UK PACT and is making efforts to work alongside other jurisdictions in the region, both under the ASEAN umbrella and beyond, to learn about and establish the relevant infrastructure for carbon trading and other market-based instruments.

However, several key barriers that may yet impede the efficacy of such a market-based policy instrument remain. Indonesia's economy is dominated by fossil fuel extraction and use, and the lobby efforts that surround this. Energy markets are only partially liberalised and exposed to government intervention in the form of subsidies and regulations in the form of price caps, and domestic market obligations. The state-owned utility PLN holds a virtual monopoly over generation, transmission, and distribution. Without reform, these conditions could mute additional downstream abatement due to the limited scope for a carbon price to be passed down to industry and consumers. However, past constitutional hurdles have blocked progress in this regard and make a market structure overhaul challenging. To ensure carbon pricing reaches its full potential in terms of effectiveness, a carbon price to reduce emissions in the power sector—its initial sector of implementation—it should be accompanied by power market reform, incremental if need be. A gradual phase out of subsidies to PLN will also be essential to the success of the carbon price.

Existing PPAs and monopolistic power market structure remain obstacles to carbon pricing. Aside from this, however, and despite the relative ease of MRV in the power sector and the large

share of emissions originating from it, several interviewees from climate policy research institutes on the ground have questioned the choice of the sector as a starting point for carbon pricing in the first instance. They pointed out that plans are already in place for the power sector such as the phase-out of coal and the increased renewables penetration, so the sector as the only starting point for carbon pricing should perhaps not be the priority. One stakeholder stated the difficulty to abate instead in industrial sectors; for this reason, carbon pricing could provide a significant push to sectors other than power towards decarbonisation, an “effective stick” of sorts.

Low carbon alternatives must also become readily available to allow for a transition away from fossil fuels. Indonesia’s significant renewable energy potential should be exploited for this purpose. However, past efforts to boost renewables have seen little success due to political economic conditions, corruption, regulatory instability, and poor coordination between key stakeholders and consequently lack of confidence from investors.

Moving forward, several factors could help Indonesia overcome these obstacles and ensure a smooth start to its carbon pricing policy. Table 2 below lays out the main challenges to the successful implementation of carbon pricing, and recommendations as to how to address these. These would help foster a context in which addressing climate change—with carbon pricing as an important tool in the box—takes priority.

Table 2: Main challenges and recommendations, Indonesia

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> • Dependence on fossil fuels and resulting vested sector interests • Limited voice of green lobby • Limited public awareness of urgency for climate action 	<ul style="list-style-type: none"> • Develop an active stakeholder engagement strategy to maximise political buy-in • Implement awareness raising campaign to increase public knowledge and acceptance of, and interest in, the national climate change response • Communicate the (co-)benefits of CP, e.g., GHG emission reductions; air quality improvement; support for innovation, etc.
Legal	<ul style="list-style-type: none"> • Enhancing the established legal framework • Political decentralisation and policy coordination • Long-term PPAs between PLN and IPPs, thus hampering CP effectiveness 	<ul style="list-style-type: none"> • Establish CP implementing regulations considering specific timelines for implementation, addressing both covered companies and public institutions responsible for operation • Enhancing policy coordination and communication across government institutions, particularly regarding the various CP elements of eventual cap-tax-and-trade system • Re-negotiate long-term PPAs

Dimension	Challenge	Recommendation
Economic	<ul style="list-style-type: none"> • Level of government intervention in the energy sector • Constitutional obstacles to power market reform • Lack of opportunities for fuel switch and abatement options to be incentivised by CP; untapped RE potential 	<ul style="list-style-type: none"> • Pursuing ongoing energy subsidy reforms, including the (gradual) phase-out of fossil fuel subsidies • Consideration and/or integration of CP in the discussion on any reform of the power market architecture • Pending reform, consideration of a gradually increasing shadow carbon price in power development planning • Foster an environment conducive to investment/development, especially for RE
Technical	<ul style="list-style-type: none"> • Refining MRV capacity in the power sector • Lack of MRV in other sectors in light of future sectoral expansion • Enhancement of institutional capacities in general 	<ul style="list-style-type: none"> • Expand MRV framework and build MRV capacity in industrial and other sectors • Concerted effort to enhance private and public technical capacity regarding the operation of market-based mechanisms, leverage continued assistance from international capacity-building initiatives, such as the World Bank's PMI and ICAP
Multilateral	<ul style="list-style-type: none"> • Foreign interests and geopolitical pressure in the power sector 	<ul style="list-style-type: none"> • Continue to foster the subject of climate change and market-based instruments on the regional level and in the international arena • Leverage support from, and coordination with, capacity-building initiatives as well as other CP jurisdictions, such as Germany, the UK, and other regional players, e.g., South Korea and China to draw from their design and implementation experiences • Highlight how CP contributes to climate action efforts, to attract investors in RE in the context of coal phase out and the end to Chinese foreign coal investments

A Appendix: Indonesia interviews

Name	Position	Affiliation	Experience	Date	
1	Fabby Tumiwa	Energy transition strategist and Executive Director (IESR) Founder, Chairman (ISEA)	Institute for Essential Services Reform (IESR), Indonesia think tank in energy policy and environment Indonesia Solar Energy Association (ISEA) Indonesia Energy Efficiency and Energy Conservation Society	Working in energy policy and regulation for over 20 years, advising various Indonesian government agencies, business, NGOs and multilateral development organisations in power regulation, renewable energy and energy efficiency policy and regulation, and climate change policy. 2006-2017: Member of Indonesia's negotiating team on climate change. Founded ISEA in 2016, now chairs. With the executive committee on institutional cooperation of Indonesia Energy Efficiency and Energy Conservation Society.	6 Nov. 2021
2	Monika Merdekawati Zulfikar Yurnaidi	Researcher Senior Research Analyst	ASEAN Centre for Energy ASEAN Climate Change and Energy Project (ACCEPT)	MM: Researcher with a focus on energy policy, renewable energy technology, climate change mitigation and energy economics. Also supports ASEAN ACCEPT, a project to synergise energy and climate policy in the region, ensuring a coherent approach that is in accordance with Paris Agreement commitments. ZY: Senior Research Analyst at ACE. An energy scientist with comprehensive knowledge and experience of economics and engineering.	9 Dec. 2021
3	Paul Butarbutar	Co-founder (IRID)	Indonesia Research Institute for Decarbonisation (IRID)	Over 20 years working in climate and environment, including under the CDM, VCS, Social Carbon. He also worked in an advisory capacity for the government on the national and subnational levels regarding climate and fiscal policy, energy, MRV, carbon pricing, and REDD+. Worked with international organisations such as the ADB, UNDP, GIZ, JICA, APEC, and the WWF; also with the private sector in the fields of renewable energy and sustainability.	13 Dec. 2021
4	Private sector representative	Manager of Climate Change	Energy sector		7 Jan. 2022

Name	Position	Affiliation	Experience	Date	
5	Ari Adipratomo	Project Coordinator	World Resources Institute Indonesia	Eight years working on climate change issues, including for government agencies, NGOs and intergovernmental organisations. Coordinating regulatory impact assessment on carbon pricing for CMEA and other ministries such as MoF, MoEF. Formerly on the National Council on Climate Change of Indonesia, WWF Indonesia, WWF Australia, UN Migration (IOM) and UNDP.	11 Jan. 2022
6	James Askew	Asian Programme Associate	Wildlife Works Carbon Indonesia	Conservation biologist working to mitigate climate change, protect biodiversity, and support local communities develop sustainable livelihoods across southeast Asia. Experiences include in landscape conservation, REDD+, Nature Based Solutions, forest carbon mapping and modelling.	14 Jan. 2022
7	Public sector representative	Anonymous	Anonymous		21 Jan. 2022
8	Public sector representatives (x2)	Anonymous	Anonymous		31 Jan. 2022

3 Vietnam case study

3.1 Introduction

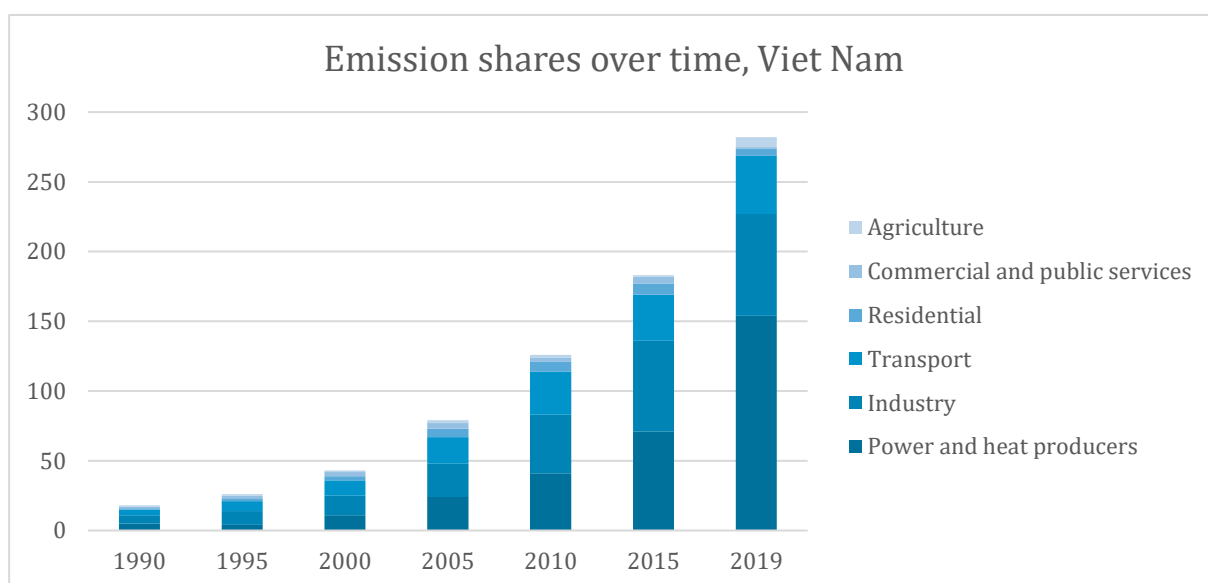
Vietnam, a developing country with the population of 97.3 million in Southeast Asia, has experienced fast economic growth before the Covid-19 pandemic (World Bank 2020a; World Bank Group 2020c, 2020d; World Economic Forum 2019).¹⁴ The economy has been transformed gradually into a socialist-oriented market economy, enabling the country to successfully transition to lower middle-income country status in 2009. Vietnam's fast economic growth has caused energy demand to increase rapidly, driving the consumption of fuel fossils and thus GHG emissions up. Shortages in power production capacity have been met by expanding Vietnam's fleet of coal-fired power plants, and in recent decades the country has emerged as an important oil and gas producer in Southeast Asia (EIA 2017). As a result, in 2018 fossil fuels contributed 80% to the country's TPES, and 65% of power generation, causing Vietnam's per-capita greenhouse gas emission to grow at the fastest rate in the world (IEA 2021d). Vietnam is currently developing two liquefied natural gas (LNG) terminals in the south of the country to help satisfy growing demand, with both terminals expected to come online in 2023. Vietnam also produces coal (EIA 2017), but as of 2015 became a net coal importer, receiving 45% of Southeast Asia's thermal coal imports in 2019.

In September 2021, the revised draft national power development plan of Vietnam considered the doubling of the amount of installed coal power capacity by 2030, an announcement that generated important concerns on the further carbonization of the Vietnam economy. However, the government radically changed its policy by pledging at COP26, under the Global coal to Clean Power Transition Statement, to transition away from coal by 2040 and stop building new plants (Anh 2021). Vietnam that is already a leader in renewable energy investment now plans to scale up the development of clean energy, with the objective of increasing the share of solar capacity to 18.6 GW and wind capacity to 18.0 GW by 2030 (EIA 2021). Increasing the share of renewable sources in the country's total energy is part of Vietnam's ambition, also announced at COP26, to reach net-zero by 2050, with international support (Vietnam News 2021). Before this announcement, Vietnam's climate change mitigation target was still considered to be "unambitious" (Do and Burke 2021).

Emissions profile

Vietnam's industry, which includes construction, utilities and mining as per World Bank definition of the sector, generated approximately 76.5% of the country's CO₂ emissions in 2018 (IEA 2021d); contributed 34.5% of GDP in 2019 and provided 28% of total employment in 2020 (World Bank Group 2021a, 2021b; World Bank 2020a). Power consumption in Vietnam has tripled over the past decade, and the power sector itself accounts for nearly two-thirds of the country's greenhouse gas emissions (IEA 2021d). This is due to a rapidly growing population, increased speed of development, and the government's decision to rely on coal as a primary energy source for Vietnam's power supply (Dang, L.N. & Farhad Taghizadeh-Hesary, F. 2019).

¹⁴ The Covid-19 pandemic has reduced Vietnam's estimated gross domestic product (GDP) growth to between 3 and 3.5 percent in 2021, which is far below the 6 percent target set by the National Assembly (Xinhua 2021).

Figure 6: Emission shares over time, Vietnam

Source : IEA (2021d)

The energy sector is the “pioneer” in the path towards a low-carbon economy in Vietnam (PMI 2021). Given Vietnam’s heavy reliance on coal in the power production sector, the transition away from coal could generate significant GHG emission reductions in the electricity sector. However, the role that carbon pricing has to play in this transition will depend on the development of Vietnam’s power market regulation, and the reform of the power market architecture (see Section 3.3.3). At the moment, the top-down regulation of the sector limits market-based transactions and thus the impact of carbon pricing on operational and investment decisions. Similarly, the role of carbon pricing in promoting the deployment of clean energy sources will depend on the extent to which the government decides to expose renewable energy installations to market forces instead of regulated support.

Carbon pricing also has a role to play in decarbonising the industrial sector, e.g., the cement, steel, and waste. The government of Vietnam chose the solid waste sector as pilot for the 2023-2024 phase of its national crediting program, under the PMI (PMI 2021), in view of generating credits with landfill gas recovery projects. Steel, cement and thermal power are sectors subject to the GHG inventory mechanism , “receive special attention from the government ... to reduce GHG emissions” and are thus expected to be part of the pilot ETS from 2025 (PMI 2021). Internalizing carbon externalities in the cost of domestic production is likely to be increasingly important if Vietnam’s trading partners implement carbon border adjustment mechanisms, although this consideration has not yet played a determining role in the development of Vietnam’s carbon pricing policy (see Section 3.3.5).

In the agricultural and forestry sector, the implementation of emission reduction and carbon sequestration projects could benefit from carbon financing, under the offset mechanism foreseen in the Law on Environmental Protection.

Status of carbon pricing discussions in Vietnam

Carbon pricing is part of the policy mix that Vietnam is considering in order to achieve GHG emission reductions. Already in 2012, Vietnam’s “Green Growth Strategy” (Green Growth Strategy 2012) (replaced with the 2021 Green Growth Strategy) endorsed the use of market-based instruments as an avenue to achieving a low-carbon economy (Green Growth Strategy 2021). Vietnam’s NDC referred to the application of “market instruments to promote structural

change and improve energy efficiency; encourage the use of clean fuels; support the development of renewable energy; [and] implement the roadmap to phase out subsidies for fossil fuels” (Government of Vietnam 2020b). The updated NDC mentioned a conditional contribution of 27% by 2030, with international support including the implementation of market mechanisms under Article 6 of the Paris Agreement (Government of Vietnam 2020c). Vietnam has experience with the implementation of CDM projects (with more than 270 projects registered) and Japan’s JCM projects (14 projects registered) (PMI 2021). With the support of the World Bank’s PMR and other development partners, Vietnam worked on a national MRV, including sectoral MRV systems (steel & waste). More importantly, the revised Law on Environmental Protection adopted by Vietnam’s National Assembly (Congress) in November 2020 established a clear legal mandate for the Ministry of Natural Resources and Environment (MONRE) and the MoF to design a domestic emissions trading scheme and a crediting mechanism. The scheme is expected to be launched on a pilot basis in 2025 and to be fully operational in 2028 (Government of Vietnam 2022b). On this basis, the PMI (PMI 2021) concludes that “Vietnamese key stakeholders have thus recognised the potential benefits of carbon pricing instruments. They are recently interested in developing domestic carbon ones that can bring about GHG mitigation benefits (for contribution to NDC) and other environmental, economic, and fiscal positive impacts.”

In parallel to official support for carbon pricing and a legal mandate to develop an ETS, Vietnam is engaged in the reform of its power market architecture, a development that could potentially reinforce the introduction of carbon pricing in the power sector (Pham 2021). Vietnam has also promoted the development of clean energy with feed-in-tariffs, a policy that was detrimental in attracting investments, but has since been interrupted for solar energy and on-land wind. In principle, the ETS with power market reform can contribute to the deployment of clean energy sources and the decarbonisation of power supply (Acworth et al. 2020; Acworth et al. 2021).

The following analysis is based on 13 semi-structured interviews with stakeholders involved with carbon pricing, climate change mitigation and/or power regulation in Vietnam. These interviews complement the analysis of data from primary and secondary sources for the factsheet analysis conducted for a previous report under this project (Doda et al. 2022). The goal of these interviews is to tap into local knowledge and expertise about the barriers and opportunities that exist for carbon pricing along any of the project’s five dimensions of focus—political, legal, economic, technical, and transnational—that we may not have been able to identify or expand upon based on desk research. We also aim to better understand the pathways towards implementation deemed feasible or preferred by the stakeholders and explore if there is a tendency towards an ETS or a carbon tax. Finally, we aim to further refine the set of stakeholders who would be impacted if carbon pricing in the jurisdiction were to proceed, as well as gauge their perceptions and reactions to the instrument.

This analysis starts by mapping the key stakeholders of relevance for carbon pricing in Vietnam, before examining the political, legal, economic, technical, and multilateral dimensions of carbon pricing in Vietnam, following the structure of the interim report (Doda et al. 2021).

3.2 Stakeholder mapping

The positioning of stakeholders on carbon pricing, their economic weight, and influence on public policy decision making can make or break the success of the instrument. This section reviews the main actors and stakeholders in the carbon pricing policy domain and reviews their positions on the topic based on interviews.

Overview of main actors and stakeholders with respect to carbon pricing

The main actors in Vietnam with respect to carbon pricing include **the Central Committee of the Communist Party of Vietnam**, and the **National Assembly**, which is the highest organ of the people and State power and appoints the **President** (the Head of State, responsible for representing Vietnam internally and externally) and the **Prime Minister** (Embassy of the Socialist Republic of Vietnam in the USA, 2021). Under the Prime Minister, the **National Committee for Climate Change (NCCC)**, an inter-ministerial committee established in 2012 to formulate and implement climate policies following the National Climate Change Strategy, is the highest-level institutional body responsible for climate change policy (Strauch et al. 2018). Chaired by the Prime Minister and two vice chairmen (the **Deputy Prime Minister** and the Minister of the **Ministry of Natural Resources and Environment (MONRE)**), the Committee coordinates the development and implementation of the country's climate policies and has authority to issue directions to all relevant line ministries and the People's Committees of all 63 provinces (Nachmany et al. 2015; McKinley et al. 2015).

The **Department of Climate Change** under MONRE hosts the **Standing of Office** of the NCCC. It is among others responsible for reviewing and planning climate budgets and setting up timeline for ETS. MONRE acts as the national focal point to the UNFCCC and is responsible for reviewing and planning climate budgets in conjunction with the **Ministry of Planning and Investment (MPI)** and the **Ministry of Finance (MOF)**.

MPI coordinates the country's development strategies, planning, and national investments, including mobilising and managing ODA and climate finance. The MPI is also responsible for the National Green Growth Strategy and oversees related policy development and implementation. Other ministries are responsible for mainstreaming climate change issues and Vietnam's climate policy framework into their strategies and plans, including the **Ministry of Agriculture and Rural Development (MARD)**, the **Ministry of Industry and Trade**, the **Ministry of Construction**, the **Ministry of Transport (MOT)**, the **Ministry of Foreign Affairs**, the **Ministry of Science and Technology (MOST)**, and the **Ministry of Education and Training** (Strauch et al. 2018).

The energy sector is dominated by state-owned enterprises of which the **Viet Nam Electricity (EVN)**, the **Vietnam Oil and Gas Group (PetroVietnam)** and the **Vietnam National Coal and Mineral Industries Group (Vinacomin)** are the most important. EVN, which was formed as a vertically integrated entity responsible for Vietnam's power sector under the supervision of the MOIT, was transformed into a holding group with subsidiaries in charge of power generation (the **GENCOs**), the **National Power Transmission Corporation (NPT)** and distribution (**Hanoi Power Corporation**, **Northern Power Corporation**, **Central Power Corporation**, **Southern Power Corporation**, and **Ho Chi Minh City Power Corporation**). EVN also controls the **National Load Dispatch Center** and remained the majority shareholder of the partially privatised power plant **GENCO 3** (Asian Development Bank 2015). PetroVietnam is the key company in the oil and natural gas sectors and serves as the primary operator and regulator of the industry. Oil and natural gas production are either undertaken by PetroVietnam's upstream subsidiary or through PetroVietnam's joint venture with other companies, including international oil companies such as **ExxonMobil**, **Chevron**, **BP**, and **Zarubezhneft**, as well as several Asian national oil companies that have formed partnerships with PetroVietnam. All of the country's production is consumed domestically, and Vietnam does not import or export natural gas (EIA 2017).

Despite EVN's monopoly, private, including foreign enterprises, have started to participate in the power sector. These investments include projects in coal-fired power generation, e.g., by Chinese companies, based on build-operate-transfer contracts, and in renewable energy production based on Vietnam's support mechanism for renewable energy (Vu 2020). Approximately 6.2% of

the country's GDP is generated by foreign investments, a portion of which is attributed to investments from China, Japan, and South Korea in 15 planned Vietnamese coal plants (Tatarski 2020).

Civil society is also involved in supporting the decarbonisation transition, and the main actors include the **Vietnamese Business Council for Sustainable Development (VBCSD)**, **Vietnam Green Building Council (VGCB)**, the **Vietnam Clean Energy Association (VCEA)**, and the **Vietnam Initiative for Energy Transition (VIET SE)**.

International actors involved in supporting decarbonisation in Vietnam include the **World Bank's PMR**, the **Energy support programme** under the Vietnamese-German cooperation between Vietnam's Ministry of Industry and Trade and the **Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH**, the **Asian Development Bank**, the **Japan International Cooperation Agency**, the **Friedrich-Ebert-Stiftung Vietnam (FES institute)**, as well as **WWF**. The **UNDP** and **USAID** funded a study on "Opportunities for Carbon Pricing in Vietnam", with the objective of "identifying a viable option for introducing the carbon tax in Vietnam and to define procedures to ensure that the revenues generated by the tax can be allocated to specific environment and climate-related activities" (Michaelowa 2018). With the support of the PMR, Vietnam has been developing an MRV in conjunction with policy proposals for national carbon pricing and market-based instruments since 2013. Additionally, the PMR has also supported Vietnam in developing feasibility studies for credited NAMAs focused on proposing carbon pricing instruments and a roadmap for applications of market-based instruments for the solid waste and steel production industry sectors (PMR 2019; PMI 2021). These actions underpin the further development of the national ETS. The ADB is supporting Vietnam's power market reform and the use of market mechanisms under Article 6 of the Paris Agreement.

Positions and interests vis-à-vis carbon pricing.

The introduction of carbon pricing in Vietnam is a government initiative, and our interviewees emphasised how most support for carbon pricing continues to come from the public authorities. According to an expert on carbon pricing in Vietnam interviewed for this study and who wished to remain anonymous, the government, Prime Minister, Communist Party and MONRE are committed to carbon pricing.

International organisations, and most notably the World Bank's PMR, provided important support to the development of carbon pricing in Vietnam. Dr. Nguyen Sy Linh, Head of Department of Climate Change at the Institute of Strategy and Policy on Natural Resources and Environment, Vietnam (ISPONRE) emphasised the role of the World Bank in supporting the Ministry of Environment in relation to carbon pricing, and Dr. Nguyen Nam, CEO & Climate Advisor at Climate Innovation Consulting & Services JSC. (KLINOVA) referred to the work of the ADB in capacity-building in the ASEAN region, including Vietnam, regarding the use of market mechanisms under Article 6 of the Paris Agreement. According to an international energy expert involved in the Vietnam energy reforms, carbon pricing has an important role to play in reaching Vietnam's 2050 carbon neutrality target, besides the support for renewable energy.

At the domestic level, however, there is little support or resistance that is voiced by the industry and other stakeholders, in the absence of a real debate on carbon pricing. Active support by the private sector for carbon pricing, including the renewable energy industry, has so far been limited, although it is easy to see how renewable energy would benefit from carbon pricing, according to Dr. Nguyen Hoai Nam, Energy and Climate Expert at VUSTA Center for Energy and Green Growth Research. A possible reason for the limited support so far by the renewable energy industry in Vietnam might relate to the limited awareness of carbon pricing. According to Dr. Nguyen Hoai Nam, carbon pricing is far from common knowledge in the country. Lack of

awareness also affects the development of the voluntary carbon market, as project developers wait for guidance and control by the government, according to Thomas Giglione, Managing Director of the Carbon Credits Group.

The carbon-intensive industry (e.g., cement, steel, waste, and power) seems so far to be neutral to the introduction of carbon pricing in Vietnam. Consultations were held with some of the key stakeholders, but according to Dr. Nguyen Hoai Nam not much resistance was voiced, as the industry has not yet fully measured the impact that carbon pricing will have, and the mitigation strategies that will have to be implemented.

As foreign investors are active in both carbon intensive energy production and clean energy, the introduction of carbon pricing could find support and resistance, depending on the interests at stake. This was reflected in our interviews that emphasise the risk of arbitration proceedings if carbon pricing affects the price and volume guarantees to which the government of Vietnam committed in its agreements with foreign companies (see Section 3.3.2). At the same time, our interviewees referred to the benefits that carbon pricing, as driver of the clean transition, could have for foreign investors in the renewable energy sector.

Green NGOs and think tanks generally support carbon pricing, but their role in the debate on carbon pricing has so far been limited, according to our interviewees (e.g., Dr. Nguyen Hoai Nam; Dr. Nguyen Nam).

The general public seems to be neutral to carbon pricing. According to an expert on carbon pricing in Vietnam (anonymous), this can be explained based on the complexity of the mechanisms and their novelty for most people in Vietnam who simply do not know what exactly to expect. For Dr. Nguyen Nam, CEO & Climate Advisor at KLINOVA, the market, and more generally society, are not ready for the introduction of carbon pricing in Vietnam before 2025, as there is insufficient knowledge and understanding of the mechanism, outside of the government that strongly supports carbon pricing. For Dr. Minh Ha Duong, the perception is that carbon pricing is a measure for the next development plan, i.e. the Power Development Plan VIII revision which will define the sector's policy for the 2025-2030 horizon.

3.3 Carbon pricing readiness

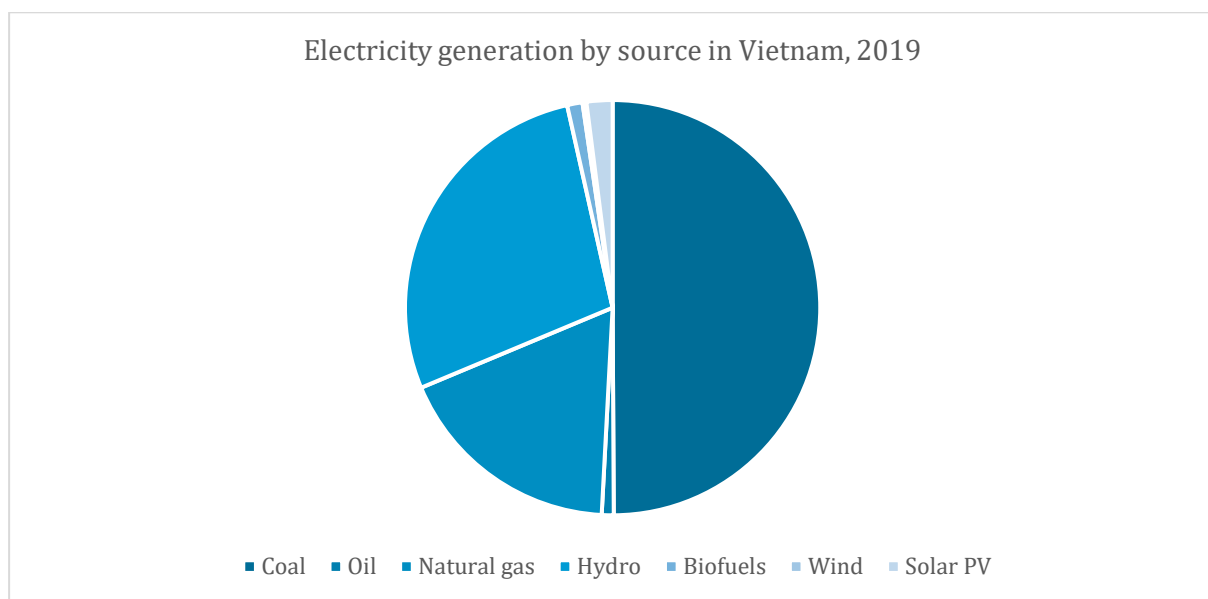
3.3.1 Political dimension

3.3.1.1 Core analysis

Vested interests of carbon-intensive industries (regulatory capture)

In principle, based on the literature, the high share of fossil fuels in Vietnam's energy mix, and in particular in the power fuel mix, would indicate low support for carbon pricing in Vietnam. Our previous analysis concluded on this basis that the support for low-carbon development in Vietnam would be expected to be tempered by interests in coal power, in particular by foreign investments, and the government's commitment to using coal power to address security of supply challenges (Doda et al. 2021).

However, it appears from our interviews that the active opposition to carbon pricing from the industry is limited, including the power monopoly EVN that has significant interests in coal-fired power generation. Our interviewees (e.g., Thomas Giglione; Nguyen Hoai Nam; Dr. Nguyen Hoang Nam) explain this limited resistance based on the limited awareness and understanding of carbon pricing and its possible impact on the carbon-intensive industry, as well as limited information available on the details of the government's plans. According to Do and Burke (Do and Burke 2021), "a lack of information is an important constraint in ongoing carbon pricing discussions in Vietnam."

Figure 7: Electricity generation by source in Vietnam, 2019

Source: IEA (2021d)

The power monopoly EVN has shared concerns about the mechanism but does not seem to have actively opposed the measure. For Dr. Minh Ha Duong, EVN's position towards carbon pricing remains unclear at the moment. The limited resistance by the actor that is likely to be most severely affected by carbon pricing can be explained by the fact that EVN is a state-owned entity and remains subject to strict government control and supervision. At the same time, in the context of heavy government regulation of the sector, it is not unreasonable to assume that EVN expects to be protected in one way or another from the impact of carbon pricing. According to Ngo Thi To Nhien, Executive Director of the Vietnam Initiative for Energy Transition, EVN's limited resistance could also be explained by the fact that it controls a significant share of hydropower, in addition to its coal-fired power plants.

For Dr. Nguyen Hoang Nam, an Expert on Environmental Economics involved in the drafting of the revised Environmental Law and the Carbon Pricing Decree, the industry would in fact support carbon pricing, based on the flexibility it offers. According to Do and Burke (Do and Burke 2021), to date, performance-based and technology-based "regulations have been used as the main instrument for GHG emission reductions in Vietnam", e.g., emission standards and energy efficiency targets. This would seem to confirm the theory according to which carbon pricing is preferred by the industry in jurisdictions characterised with rigid command and control.

Public acceptability

In the absence of a real debate about carbon pricing in Vietnam and with limited awareness of the mechanism and its potential impact on consumers, it is difficult to assess the public acceptability of the policy. According to Thomas Giglione, the social impact of carbon pricing does not immediately appear to be a barrier to the creation of a carbon market in Vietnam. Similarly, Do and Burke (Do and Burke 2021) consider in their analysis of Carbon Pricing in Vietnam, based on interviews of 15 policy experts, that "social impacts associated with increasing energy prices due to carbon prices will likely not be highly significant." In fact, their interviewees considered that "by improving environmental conditions, carbon pricing would help to reduce social pressures in Vietnam, where concern over pollution is mounting. Climate change mitigation efforts (including carbon pricing) may even lead to increase employment in the short-term" (Do and Burke 2021). In the same vein, Thomas Giglione perceives a readiness

of young people in Vietnam to offset their carbon footprint, and on this basis advocates the incentivization of grassroots movements and the integration of smaller initiatives with international carbon markets.

Vietnam's choice for an ETS could contribute to public acceptability, by comparison to a tax. According to Do and Burke (Do and Burke 2021), an ETS is the preferred option from the perspective of public acceptability, "as in Vietnamese 'ETS' sounds like routine commodity market transactions rather than a new impost."

At the same time, our interviews indicate that there could be resistance if carbon pricing would result in increased power prices. For energy and climate expert Nguyen Hoai Nam, tariff increases are needed for the development of the power sector, but higher power prices are politically and socially difficult to implement. Appropriate communication is necessary to explain the importance of price reforms to the population. Similarly, another interviewee (anonymous) emphasised the sensitivity of power price increases. The population may support carbon pricing, but public acceptability is likely to depend on the impact that the ETS will have on electricity prices. Dr. Minh Ha Duong of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, explains the sensitivity of price increases based on the use of power pricing by the government to control poverty and subsidise the population.

According to an international energy expert interviewed for this report, the affordability of power supply, and the impact of power prices on the competitiveness of the energy-intensive industry, is a possible obstacle to power market reform, and the transition to cost-recovery prices. Pricing is a key concern for the government. Vietnam's electricity prices for residential consumers remain at relatively low levels, but price increases are a sensitive issue. Even small increases have been found difficult to implement (Khanh 2012).

Dr. Nguyen Hoang Nam, who was involved in the drafting of the revised Law on Environmental Protection, confirms the sensitivity of power price increases in the context of the introduction of carbon pricing. A key challenge will be to reduce the economic and social impact in the sectors that will be covered by the ETS, and in the first place, power. Similarly, Dr. Nguyen Hoai Nam emphasises the importance of designing carbon pricing in a way that ensures the recycling of carbon revenues to reduce the impact of the ETS on households. For Dr. Nguyen Sy Linh, Head of Climate Department at ISPONRE, carbon pricing in the power sector could have a positive effect in the long-term by incentivising consumers to improve their energy efficiency.

For Professor Nguyen Hong Quan, Director of the Institute for Circular Economy Development, at Vietnam National University, carbon pricing, and in particular offset projects can contribute to improving social conditions for vulnerable people in rural areas. Dr. Nguyen Sy Linh (ISPONRE) also emphasises the role carbon offsets can play in improving the livelihood of people in rural areas, based on the financing it could provide to the forestry and agriculture sectors.

Vested interests of green industries

Following the theory on the role of green industries for the adoption of carbon pricing, it would be reasonable to expect strong support for carbon pricing by the renewable energy industry in Vietnam that has boomed based on the government's support policy. We expected on this basis the government's efforts to have been buttressed by a strong push for clean energy programmes from Vietnam's green lobby.

However, it appears from our interviews that the role of the renewable energy industry and green NGOs and think tanks has been limited in relation to carbon pricing in Vietnam. Limited engagement of the clean energy industry with carbon pricing can first be explained by the fact that lobbying is not a common practice in Vietnam. Furthermore, there appears to be limited

awareness of carbon pricing within the renewable energy industry, according to Dr. Nguyen Nam of KLINOVA.

The lack of active support by the renewable energy industry to integrate carbon pricing in the reform of the power market could possibly be explained based on the regulatory preferences they have benefited from, until relatively recent changes to the subsidy regime. Investors in renewable energy received attractive feed-in tariffs and thus did not need carbon pricing to build their business case. By contrast to the limited debate on carbon pricing, there has been a relatively active debate on the reform of the renewable energy support scheme (and in particular the replacement of feed-in tariffs with auctioning), according to energy and climate expert Nguyen Hoai Nam, and Professor Nguyen Hong Quan. The renewable energy industry is playing an important role in this discussion, according to an expert on carbon pricing in Vietnam (anonymous). However, most attention focuses on the role of renewable energy support mechanisms, and increasingly auctioning, instead of promoting carbon pricing. In addition, according to Dr. Minh Ha Duong, the voice of the renewable energy sector is limited as a result of the lack of unity of the industry that consists of a number of relatively small players, with the exception of offshore wind.

Similarly, civil society is not yet taking any notice of carbon pricing, according to Dr. Minh Ha Duong. By contrast to the significant work that has been done to research the deployment of renewable energy, e.g., by the Vietnam Initiative for Energy Transition, the design and implementation of carbon pricing has benefited from less attention. Ngo Thi To Nhien, of the Vietnam Initiative for Energy Transition, emphasised that there is an increasing realization of the importance of carbon pricing as part of the Initiative's work on renewable energy. For instance, the Initiative's forthcoming report on coal abatement scenarios advocates carbon pricing as an efficient tool to mobilise finance in new power plant investments. According to Ngo Thi To Nhien, carbon pricing can increase the competitiveness of renewable energy in the wholesale power market.

Institutional environment

In line with the literature on the role of a strong executive for the adoption of carbon pricing, the adoption of carbon pricing in Vietnam seems to be primarily due to the support by the government. Our interviews largely confirm our expectation in the Vietnam factsheet of Doda et al. (2022) that the majority of Vietnam's policy efforts regarding carbon pricing are government driven. A key driver is the implementation of the revised Environmental Law that will enter into force in January 2022. The importance of the government must be understood based on Vietnam's structure as a one-party socialist republic, and the top-down approach to policymaking in the country, enabling the government to introduce the policy measures it considers necessary.

3.3.1.2 Conducive factors and obstacles

Given the crucial importance of the institutional environment governing carbon pricing in Vietnam, the implementation of carbon pricing will to an important extent depend on continued government support. This support seems stronger than ever following the commitments made at COP26 on carbon neutrality and the gradual phase down of coal. Dr. Nguyen Sy Linh, for instance, expects the carbon market to operate sooner than the deadline of 2028 announced by the government. The consultation that the government organised on carbon pricing did not seem to have generated strong opposition from the industry. However, in the absence of sufficiently detailed and broad knowledge on carbon pricing, and its potential economic and social implications, it is too early to discount possible resistance from the carbon-intensive industry and the population, in particular if carbon pricing generates an increase in power prices.

In this context, building awareness on the benefits of carbon pricing and its role in the decarbonisation and energy transition of Vietnam seems a priority to ensure support by the population and the industry. This conclusion is in line with Do and Burke's 2021 analysis of Carbon Pricing in Vietnam. The 15 policy experts that they interviewed for their analysis "generally believe that a carbon price that starts at a low level and increases at about 10% per year would be feasible provided that communication on carbon pricing is conducted effectively." "Communicating the benefits of carbon pricing is essential for gaining political and social support" (Doda et al. 2021).

Similarly, Thomas Giglione and Professor Nguyen Hong Quan advocate for the gradual implementation of carbon pricing, starting with low prices to slowly build awareness and momentum. To support awareness-raising and engage in proper communication further studies are needed to understand the impact of carbon pricing on GHG emission reduction and competitiveness, according to Dr. Nguyen Sy Linh (ISPONRE). It is necessary to clearly identify, and then communicate, the benefits of carbon pricing in terms of GHG emission reductions, air quality improvement and improved innovation.

3.3.2 Legal dimension

3.3.2.1 Core analysis

Flagship law

Vietnam has adopted several legal and policy documents that have contributed to the momentum for carbon pricing mechanisms. Vietnam's actions to mitigate emissions are captured in the country's NDC which makes specific reference to carbon markets.¹⁵ Besides Vietnam's Green Growth Strategies (2012, (Green Growth Strategy 2021) that set the objective of a low-carbon economy, Decision 1775/QD-TTg in 2012 approved a national program for GHG emission management and international carbon credit activities (Prime Minister of the Socialist Republic of Vietnam, 2012). In 2015 Vietnam adopted the Renewable Energy Development Strategy 2016 – 2030, outlining a plan to reduce coal and oil imports and increase the number of renewable energy sources and renewable energy-based grid-connected power plants, including hydropower, wind power solar power, biomass, and solar power (Thuc 2016). Renewable energy sector development was further supported by the 2016 revision of the Vietnam Power Development Plan VII for 2011 -2020 Period with the Vision to 2030 (PDP VII). Energy efficiency targets are supported by the National Energy Efficiency Programme 2019 – 2030.

Most notably, in November 2020, Vietnam's National Assembly adopted the revised Law on Environmental Protection, which establishes a mandate for the MONRE and the MOF to design a domestic emissions trading scheme and a crediting mechanism. The framework legislation gives MONRE a legal mandate to establish an emissions trading scheme, set a cap, and determine the method of allowance allocation, and allows for the inclusion of domestic and international offsets. The Law on Environmental Protection will enter into force on 1 January 2022. MOF and MONRE are considering a timeline for ETS implementation; a pilot system is expected to start by 2025 and to become fully operational by 2028 (ICAP 2021a; Government of Vietnam 2022a).

¹⁵ Vietnam's main climate change policies include the Resolution of Viet Nam's Central Committee of the Communist Party of Viet Nam on proactively responding to climate change, strengthening natural resources management and environmental protection (Vietnam Central Executive Committee 2013), the Conclusion of the Politburo on promoting active climate change response, strengthening natural resources management and environmental protection (2019), and the Resolution of the Politburo of the Central Committee of the Communist Party of Viet Nam on the orientation for the National Energy Development Strategy to 2030 with a vision to 2045 (Central Committee of the Communist Party of Vietnam 2020).

The 2021 Green Growth Strategy (Decision 1658/QĐ-TTĐ dated 1 Oct 2021) sets the objective of a carbon-neutral economy.

Our interviews confirm the importance of the Law on Environmental Protection for Vietnam's carbon pricing policy, in line with the literature on the role of a flagship climate law for the adoption and implementation of carbon pricing mechanisms. For Dr. Nguyen Sy Linh, Head of Climate Department at ISPONRE, an important driver of Vietnam's carbon pricing policy today is the requirement under the revised Environmental Law to adopt the necessary documents for the implementation of carbon pricing.

However, Dr. Nguyen Nam (KLINOVA) warns that there can be an important gap between the law as adopted and its implementation. A strong regulatory framework must be in place to enable the functioning of the market and attract private investment. Similarly, Dr. Minh Ha Duong, of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, considers that there is an important gap to fill between the adoption of ETS in the Law on Environmental Protection and its implementation. For Professor Nguyen Hong Quan, Director of the Institute for Circular Economy Development, at Vietnam National University, one of the priorities is to develop the regulatory framework necessary to the functioning of the pilot ETS. These statements are in line with the emphasis that the PMI (PMI 2021) puts on the development of the regulatory framework governing the ETS in Vietnam: "bylaw documents by the Prime Ministers and line ministries in the forms of decrees and circulars in the period of 2021-2025 ... will be crucial for creating a legal enabling environment to develop the carbon market in Vietnam and employ other carbon pricing instruments."

In January 2022, the Government adopted Decree no.06/22/ND-CP on Greenhouse Gas Reduction and Ozone Layer Protection. The Decree applies to facilities emitting more than 3,000 tCO₂e or belonging to one of the following categories:

- ▶ thermal power plants, industrial facilities with annual energy consumption from 1,000 TOE and above;
- ▶ freight transport companies with annual energy consumption from 1,000 TOE and above;
- ▶ commercial buildings with energy consumption from 1,000 TOE and above; or
- ▶ solid waste treatment facilities with annual throughput of 65,000 t and above;

These facilities have to implement MRV procedures and will have to limit their emissions based on annual quotas likely to be set by Decision of the Prime Minister. A number of allowances is likely to be allocated for free in the first phases of the system.

According to Dr. Nguyen Hoang Nam, further regulation is necessary to set the limit of GHG emissions under the ETS. According to Ngo Thi To Nhien, Executive Director of the Vietnam Initiative for Energy Transition, the government is likely to first determine Vietnam's national emission reduction target (to be determined based on the revised NDC), before determining quotas per sector.

Integration into existing fiscal laws

The legal mandate for the creation of an ETS does not mean that a carbon tax could not play an additional role, in particular for sectors that are not covered by the ETS. The experts interviewed by Do and Burke (Do and Burke 2021) for their analysis on Carbon Pricing in Vietnam "agreed that, if introduced, a carbon tax would be simpler to administer than an ETS given that it does not involve permit trading or allocations and could simply involve an increase in existing environmental protection taxes for fossil fuels. A carbon tax would fit within Vietnam's revenue-collection architecture". In the same vein, Dr. Nguyen Hoang Nam considers that, although more

sensitive, a carbon tax would be easier to implement than an ETS as Vietnam already has a relatively robust fiscal system in place. Dr. Nguyen Hoai Nam (VUSTA Center for Energy) agrees that a carbon tax would be easier to implement from a technical perspective but would be much more challenging to introduce from a political perspective.

In 2012, the National Assembly of Vietnam passed an Environmental Protection Tax that entered into force in 2012 to tax the production and importation of certain goods deemed detrimental to the environment. The EPT Law imposes a tax on petrol, diesel, grease, coal, HCFCS, plastic bags, and restricted use chemicals (PwC 2019). With the introduction of the new law on environmental protection EPT rates are expected to be maintained (PwC 2019). In his UNDP report on “Opportunities for Carbon Pricing in Vietnam”, Michaelowa (Michaelowa 2018) argues that Vietnam’s “Environmental Protection Tax offers a tax regime that can incorporate a price of GHG emissions associated with the use fuels (oil, coal).” Along similar lines, the 2014 PMR Proposal for Vietnam considered that “the introduction of the concept of an environmental tax could be important in the future as an instrument to reduce GHG emissions, e.g., in the form of a carbon tax.” However, for Dr. Nam Nguyen (KLINOVA), the rigidity of the taxation system, where all revenues go to the national budget and cannot easily be reallocated to green projects, reduces the relevance of this mechanism for decarbonisation.¹⁶

Dr. Nguyen Hoang Nam considers it possible that Vietnam could use both ETS and carbon tax, building on Vietnam’s successful experience with Payment for Ecosystem Services. According to Article 138 of the Law on Environmental Protection, “Payments for ecosystem services occur when a user of an ecosystem service makes a payment to the provider of environmental and landscape values created by the ecosystem to protect, maintain and develop the ecosystem.” The system applies to forests, wetland and marine ecosystems, as well as “ecosystem services serving the purposes of carbon sequestration and storage”. For instance, entities (e.g., operators of hydropower plants) must make “payments for ecosystem services” when they extract and use water. Users of these ecosystem services, e.g., lumber companies and, must make “payments for ecosystem services”. These payments for ecosystem services shall be included in the prices of finished products or services of users of ecosystem services and offset the costs of protecting, maintaining and developing ecosystems. Ecosystem service providers must use payments for ecosystem services to protect, maintain and develop ecosystems.

Our interviewees confirm the relevance of the payment for ecosystem services for carbon pricing in Vietnam. According to Dr. Nguyen Sy Linh (ISPONRE) the mechanism of payment for ecosystem services provides an important precedent of environmental taxation. Dr. Le Quang Dung and Dr. Minh Tu Nguyen of the Institute for Circular Economy Development at Vietnam National University emphasise the importance of the mechanism for the protection of forests. A draft Decree has been prepared with the objective of further elaborating how the mechanism will apply to carbon sequestration. The experience with payment for ecosystem services also illustrates how the government can overcome the resistance by some of the stakeholders (e.g., in the hydropower sector), and impose fiscal tools for environmental protection purposes.

Although a tax would fit well with the existing environmental tools used in Vietnam, the combined use of an ETS and a tax could result in some confusion on these different payment obligations. Under the Law on Environmental Protection, large GHG emitters are part of the forthcoming carbon market. Forestry can be an important provider of carbon credits, according to Dr. Nguyen Sy Linh (ISPONRE). Carbon pricing could help to reinvest revenues in forests. At the same time, the Law requires “the production and business operations that emit GHGs [to] use carbon sequestration and storage services provided by ecosystems to reduce GHG

¹⁶ According to Michaelowa 2018), “100% of the revenue from Environmental Protection Tax from crude oil, natural gas and coal gas import will be allocated to the national budget.”

emissions.” It remains unclear how this overlap of GHG payment obligations (under the ETS and the payment for ecosystem services mechanism) will be overcome. For Dr. Nguyen Hoang Nam there is a risk that if market participants have the right to choose to participate in the ETS or the payment of ecosystem services, one of both mechanisms could collapse.

Foreign investment protection

Approximately 6.2% of the country’s GDP is generated by foreign investments, a portion of which was attributed to investments in coal-fired power generation, e.g., by Chinese companies until recently (Tatarski 2020).

Our interviewees confirm that the share of foreign direct investment in Vietnam’s carbon-intensive industries, including coal-fired power generation by Chinese companies, could present a risk for Vietnam’s carbon pricing policy. According to Dr. Minh Ha Duong, there is a risk that foreign companies could go to arbitration to oppose the introduction of carbon pricing. Early drafts of the Renewable Portfolio Mandate exempted the installations built based on Build-Operate-Transfer agreements from the regulation. An international energy expert involved in the Vietnam energy reforms emphasised that the foreign investments in coal power operate outside of the power market, in accordance with the Build-Operate-Transfer agreements signed with the government and are protected by state guarantees.

An expert on carbon pricing in Vietnam (anonymous) does not expect strong opposition, as the home countries of these investors implement similar mechanisms as part of their own energy transition. In fact, foreign investors could benefit from investments in the renewable energy sector. This assessment finds support in Vietnam’s updated NDC (Government of Vietnam 2020c) that explicitly refers to the formulation of “mechanisms, policies and approaches to encourage and attract domestic and foreign investments and mobilise the participation of enterprises”. Similarly, Dr. Nam Nguyen (KLINOVA) argues that carbon pricing could mainly attract investments from international companies, in particular following Vietnam’s commitments at COP26. At the moment, uncertainty regarding Vietnam’s climate policy creates an investment risk for companies and undermines the international competitiveness of the country. The absence of carbon price signals, and standards on the carbon intensity of products, is making it more difficult to invest. Accordingly, the creation of a mature market environment could contribute to improving the investment attractiveness of the country.

International climate law

Released in 2020, Vietnam’s updated NDC highlights an increase in its unconditional emission reduction target to 9% by 2030 relative to the BAU scenario. The NDC also includes a conditional target whereby Vietnam commits to reducing emissions by 27% by 2030 with international support through bilateral/multilateral cooperation as well as through the implementation of market and non-market mechanisms under Article 6 of the Paris Agreement (Government of Vietnam 2020c). International engagement efforts are further supported by an International Cooperation Department at the MONRE.

Most interviewees emphasised the importance of international climate law as a driver of Vietnam’s carbon pricing policy. Thomas Giglione referred to the potential offered by Article 6 of the Paris Agreement, and COP26 as a key moment for Vietnam’s decarbonisation policy. The importance of Article 6 of the Paris Agreement is also reflected in Vietnam’s NDC. For Dr. Nam Nguyen (KLINOVA), COP26, and in particular the 2050 carbon neutrality announcement by Vietnam’s Prime Minister, provided a major impulse to decarbonisation and strengthen the commitment of the government to carbon pricing. Before COP26, coal remained a significant part of the proposed Power Development Plan. After COP26, the role of renewable energy to replace coal is now at the centre of the discussion on the revised draft development plan.

According to Mr. Nam, this focus on clean energy is also starting to feed into the debate on the reform of the power market structure.

According to Dr. Nguyen Hoang Nam, who was involved in the drafting of the revised Law on Environmental Protection, participation in international climate change mitigation efforts is the most important element influencing the development of carbon pricing in Vietnam today, in the context of the strong increase of domestic GHG emissions. Similarly, Dr. Nguyen Hoai Nam, emphasised the importance for Vietnam of international developments, as Vietnam seeks to follow the international practice and contribute to international climate change mitigation efforts. Dr. Nguyen Sy Linh (ISPONRE) emphasised the importance of COP26, besides the support of international donors, and the role of Article 6 of the Paris Agreement.

3.3.2.2 Conducive factors and obstacles

The legal mandate for carbon pricing under the “flagship” Law on Environmental Protection is a major driver for the establishment of an ETS in Vietnam. However, our interviewees point out that there can be a significant gap between the law in theory and the law in practice. The adoption of the Government Decree on Greenhouse Gas Reduction and Ozone Layer Protection is a first step, but will have to be followed by further decisions on the determination of the quotas, and ETS cap.

Based on Vietnam’s successful experience with payment for ecosystem services, Vietnam could combine an ETS with a carbon tax. There is however an important risk that the use of a mix of instruments risks could create unnecessary complexity, and regulatory overlap. According to Dr. Nguyen Hoang Nam, there is already a certain degree of confusion regarding the different payment obligations that result from the revised Law on Environmental Protection. For instance, the Law includes carbon sequestration by forests in the mechanism of Payment for Ecosystem Services, and at the same time includes offsets (possibly including carbon sequestration by forests) in the legal architecture governing the carbon market.

Foreign investment protection could be a potential barrier to carbon pricing, if it interferes with the guarantees given by the state in the long-term agreements governing investments in coal-fired power generation. At the same time, carbon pricing is seen as an important measure to attract foreign investments in the low-carbon industry by creating certainty on Vietnam’s decarbonisation ambition.

The impact of international climate law and policy on carbon pricing in Vietnam appears to have been significant. Most interviewees referred to the announcements made by Vietnam at COP26, based on the bottom-up approach of the Paris Agreement, as a major driver for the carbon pricing and energy transition again. The perception of opportunities under Article 6 of the Paris Agreement also seems to be key to the development of a carbon market framework in the country, although the interviewees did not clearly outline the link between the domestic and international carbon markets.

3.3.3 Economic dimension

3.3.3.1 Core analysis

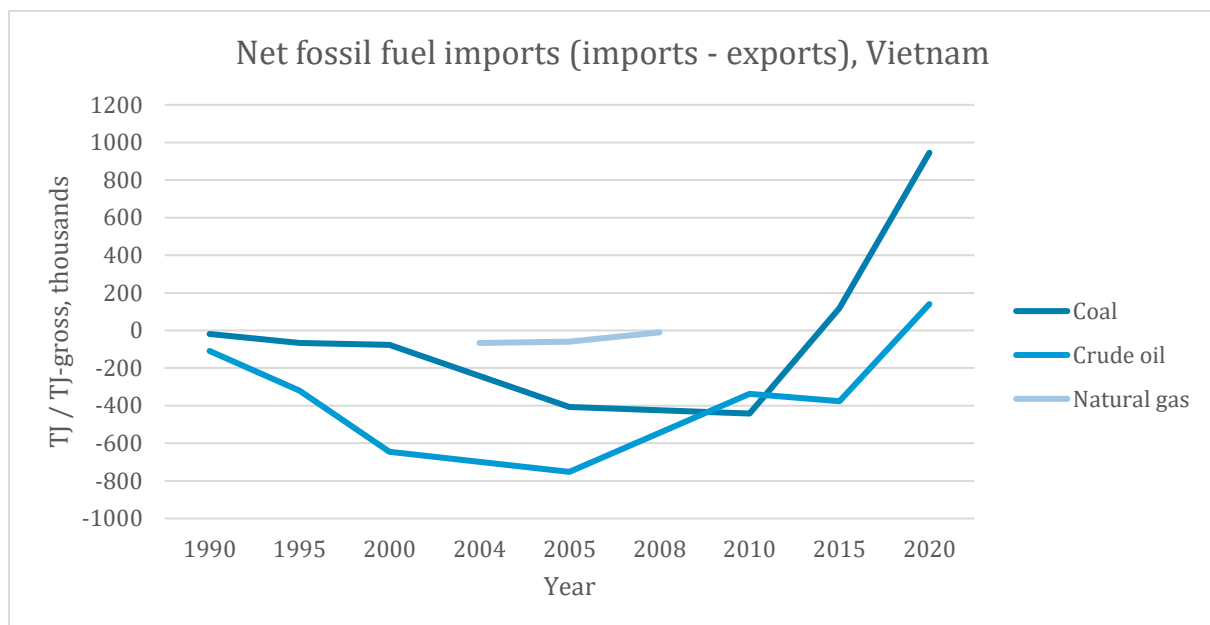
Economic and energy structure

Vietnam scores well on the Global Competitiveness Index, demonstrating strong macro-economic stability (World Economic Forum 2019). Vietnam has also improved its trade costs in recent years, though has untapped potential in leveraging international goods exchange, as well as regional value chain trade (Shepherd 2017). But the measures adopted to confront the COVID-19 pandemic in Vietnam and across the world are currently affecting Vietnam’s economic

performance, as limited use of domestic goods and services, stalled production in countries that serve Vietnam's production processes, and diminished consumption of imported goods in Asia, the U.S. and the EU have all taken a toll on Vietnam's economic performance (ILO 2020).

Rapid economic growth has made Vietnam increasingly dependent on fossil fuels, as the country's energy system "carbonised" even faster than China's (Zimmer et al. 2015). According to Do and Burke (Do and Burke 2021), "Vietnam has a high CO₂ intensity of energy ... (which) primarily reflects heavy reliance on coal." Power consumption in Vietnam has tripled over the past decade, and the power sector itself accounts for nearly two-thirds of the country's greenhouse gas emissions (IEA 2021d). This is due to a rapidly growing population, increased speed of development, and the government's decision to rely on coal as a primary energy source for Vietnam in the PDP VII (Dang, L.N. & Farhad Taghizadeh-Hesary, F. 2019). Fossil fuels make up 65% of Vietnam's power supply in 2018 (IEA 2021d) and are heavily subsidised, which the IMF estimates to amount to 9.9% of GDP (IMF 2021a).

Figure 8: Net fossil fuel imports (imports - exports), Vietnam



Source: IEA (2021d)

Vietnam has emerged in recent years as a key oil and natural gas producer in the region, boosting exploration activities and allowing for increased foreign investment in the oil and gas sectors (EIA 2017). In terms of crude oil, Vietnam has the third-largest reserves in Asia, following only China and India. It has thus historically been a significant exporter of such fuel, which it mostly exports to other jurisdictions in the region (EIA 2017). More recently, rapid economic growth, industrialisation, and expansion of merchandise exports have increased domestic consumption of oil resulting in net imports of crude oil.

Coal has in the past mostly been consumed by industry, though the power sector is recently also ramping up its demand, due to government plans to use the coal as the cheapest way to combat power shortages and volatility issues (Vu 2022). As seen in Figure 8, coal exports began slowing post 2009, and the country became a net coal importer in 2015, buying predominantly from Australia and neighbouring Indonesia. The country is currently seeking to import more coal from Australia to avert imminent power shortages (ibid). The country's Ministry of Industry and Trade has in fact indicated that this is "not a good sign" as it reflects a decrease in supply diversification and heightened coal dependence and thus increased emissions (Bang 2022). As a net fossil fuel importer, Vietnam now faces increased energy security concerns. Rapid

deployment of renewable energy production capacity is needed to ensure energy security and avoid jeopardising Vietnam's ambition to phase out coal by 2040 and achieve net-zero emissions in 2050.

Vietnam's heavy reliance on coal stems from difficulties in meeting a soaring energy demand as well as a non-competitive energy market and coal prices below international levels. According to Do and Burke (Do and Burke 2021), "efforts to keep the price of domestic coal below international market prices" are one of the key explanations as to how "coal has become the largest contributor to the power mix" in Vietnam. These issues are reflected in Vietnam's updated NDC, which commits the country to developing hydropower, co-generated biomass, and gas power to address these challenges, as well as prioritizing wind and solar development in line with the ability to ensure system safety at reasonable prices (Government of Vietnam 2020c). The NDC also anticipates the development of coal-fired power at an appropriate level with large-capacity and high-efficiency turbines using advanced technologies (Government of Vietnam 2020c). Vietnam's NDC is reflective of Resolution No. 55 NQ/TW, which was released by the Politburo in February 2020, and outlines the National Development Strategy of Vietnam to 2030, with a vision to 2045, and gives direction to reduce the proportion of fossil energy in a reasonable way in favour of clean energy alternatives (MDI 2020).

By contrast to liberalised markets, government plans guide the development of Vietnam's power sector, and are considered to be of great importance for the decarbonisation of Vietnam's power system. The experts that Do and Burke (Do and Burke 2021) interviewed for analysis of Carbon Pricing in Vietnam "held that the transition pace (to low-carbon energy) would mostly depend on other energy policies such as the National Power Development Plan for 2021-2030 to be issued in 2021 rather than carbon pricing."

The tensions between securing power supply following the traditional fossil-intensive approach and the necessity to transition towards clean energy for decarbonisation purposes are apparent in the development of the Power Development Plan VIII. Dr. Minh Ha Duong, of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, points out that the draft plan was already rejected three times. In September 2021, a draft plan was released, proposing to double the existing amount of installed coal power capacity by 2030 (Reuters 10/15/2021; Tachev 2021). At COP26, the government seems to have again changed course by pledging to stop building new coal plants, phase out coal by 2040, and instead rapidly increase the deployment of renewable energy to reach the net-zero commitment by 2050 (Anh 2021).

The carbon intensity of power makes it an obvious target sector for carbon pricing, although there are significant regulatory barriers to overcome (see next section). Besides power, Dr. Nam Nguyen (KLINOVA) points to the role of cement, steel, fertiliser, and waste sectors. Dr. Nam also emphasises the role of forestry as a potential major sector for carbon offsets. This view is shared by Dr. Nguyen Sy Linh, Head of Climate Department at ISPONRE, who emphasised the role of carbon pricing instruments to reflect the carbon value of forests and Ngo Thi To Nhien, Executive Director of the Vietnam Initiative for Energy Transition, who emphasised the role of carbon credits in the sector. For Professor Nguyen Hong Quan, Director of the Institute for Circular Economy Development at Vietnam National University, carbon pricing should be integrated in different sectoral policies and planning, e.g., biodiversity and the circular economy, as it has a role to play in incentivizing low-carbon investments and carbon offset projects in forestry. Dr. Le Quang Dung and Dr. Minh Tu Nguyen of the same institute emphasise the role of carbon pricing in the waste management sector that is responsible for a significant share of Vietnam's GHG emissions.

Power is within the scope of the Government Decree on Greenhouse Gas Reduction and Ozone Layer Protection, implementing the carbon pricing provisions of the revised Law on Environmental Protection (Aoki 2021).

Table 3: Overview of Vietnam’s climate change and energy policy mix

Area	Policy	Definition	Target	Interaction with carbon pricing
Production / Investment (Technology promotion)	RE FiP	Guaranteed tariff, likely to be reformed based on auctioning	Solar capacity to 18.6 GW and wind capacity to 18.0 GW by 2030 (EIA 2021) 30 percent RE of total energy fuel mix by 2045	Experience with low-carbon regulation Contribution to development of green industry, and thus green lobby But support of low-carbon investments outside of market
Investment (Technology promotion)	Import duties exemptions	RE projects exempt “from import tax for goods forming fixed assets and import tax for domestically unavailable materials within five years” Teo & Tan Tai (Teo and Tan Tai 2020)		Contributes to low-carbon investments, e.g., as offsets
Command-and-control	Phase out policies	Transition away from coal, and cease issuance of new permits for new unabated coal-fired plants	Transition away from coal by 2040	Contributes to addressing vested interests in carbon-intensive energy production Uncertainty on use of market-based or traditional regulation approach to closure of coal plants

Area	Policy	Definition	Target	Interaction with carbon pricing
Command-and-control	National Energy Efficiency Programme	performance-based and technology-based “regulations	2019 – 2030	Experience with low-carbon regulation Contribution to development of green industry, and thus green lobby
Fiscal	Environmental Protection Tax and payment for ecosystem services	Tax goods deemed detrimental to the environment use payments for ecosystem services to protect, maintain and develop ecosystems.	Improve environmental protection, remunerate ecosystem services	Legal framework in which carbon price could be integrated, but less flexibility for use of revenues

Source: Based on IEA (2021e)

Power market regulation

Vietnam’s power sector has developed around stable state-centric institutions and companies implementing the government’s sector reform agenda gradually. To date, state owned entities dominate the power sector, but the private sector participates in some power generation. However, most private sector generation and all entities involved in transmission, system operation and distribution are affiliated with the state-owned corporate group, Electricity Vietnam (EVN) (Lee and Gerner 2020). Though the Prime Minister has set principles for unbundling generation with EVN by 2014, financial stress due to the 2008 financial crisis slowed the implementation of the plans, leaving the sector largely unchanged by 2018 when EVN’s power plants accounted for 59% of total installed generation capacity (Lee and Gerner 2020). To date low power prices have led to insufficient investment in new power plants, straining the generation capacity as the country grew (EIA 2017). A Vietnamese Wholesale Electricity Market (VWEM), designed for publicly owned distribution companies to negotiate and contract directly with public and private generators to stimulate competition, is running in pilot phase (Lee and Gerner 2020). Moreover, the government plans to establish an independent System and Market Operator (SMO), and competitive bidding for new generation capacity, though distribution companies will remain under full public ownership. The Prime Minister has also instructed EVN to review private sector participation opportunities in network infrastructure development (Lee and Gerner 2020) and in February 2021 the Politburo issued Resolution 55, recommending amendments to the Electricity Law to allow for private sector investment in power infrastructure (Ha 2021). The development of the ETS could be impeded by the country’s regulation of the power market, as the state-owned utility EVN holds a virtual monopoly over transmission and distribution, as well as owning a substantial portion of generation entities.

Our interviews confirmed the importance of Vietnam’s power market reform for the establishment of an effective carbon price. According to Dr. Nam Nguyen (KLINOVA), power is an important sector for carbon pricing, but its inclusion in the system depends on the creation of a competitive market and thus regulatory reform. At the same time, the reform of the sector is unlikely to happen soon (probably not within the next 10 years), considering significant technical barriers and existing concerns about the ability of the reformed system to deliver security of supply.

For another expert on carbon pricing in Vietnam (anonymous), the regulation of the power sector is a significant obstacle to the introduction of the ETS. The reform of the power market architecture is necessary for the proper functioning of the ETS, and in particular the pass through of the carbon cost. At the same time, reform is needed to phase out fossil fuel subsidies, and in particular the artificially low prices for coal. Do and Burke (Do and Burke 2021) conclude their analysis of Carbon Pricing in Vietnam by advocating “continued progress in the development of a competitive wholesale power market ... to ensure that low-carbon generation sources are genuinely prioritised in the dispatch order.” Ngo Thi To Nhien, Executive Director of the Vietnam Initiative for Energy Transition, agrees that the reform of the power market is an essential precondition to the introduction of carbon pricing in Vietnam.

According to an international energy expert involved in the Vietnam energy reforms, the major driver of the reform process has so far been to ensure affordable and secure power supply. The focus has been on setting up wholesale market rules to gradually move towards the introduction of competition and the organisation of the sector based on market forces. The reform process has been affected by delays. EVN that dominates power generation also acts as single buyer for all PPAs. IPPs operate based on agreements and are thus largely shielded from the transition to competition on the wholesale power market structure. An important obstacle to the implementation of this reform process, and the transition to cost-recovery prices, is the concern for affordable power supply that is currently ensured through strict government control of the wholesale and retail prices. Based on its control over all segments of the power system, EVN is currently in a position to manage the differences between cost and revenues, by recovering lost revenues through later tariff increases. Various indirect and cross subsidies (between commercial and residential consumers, and between regions) are embedded in Vietnam’s current power market structure. Increased private participation (in the form of IPPs and renewable energy investments) complicates this cost recovery process.

According to the same expert, carbon pricing is not yet part of Vietnam’s power market reform process and the thinking on the design of the power market architecture. However, carbon pricing is already to some extent considered in the making of the power development plan. Dr. Minh Ha Duong of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition points out that a shadow carbon price was part of the cost benefit assessment of the different investment options. In the technical study underlying the Power Development Plan VIII draft, a price of USD 5/tCO₂ was included in the baseline evaluation for the period 2021-2025, increasing to USD 8/tCO₂ for 2026-2030, and to UED 10/tCO₂ for 2031-2045.

International experts consulted for this report confirm that when a carbon price is introduced, wholesale prices and retail prices should reflect the cost of carbon and pass it through to end consumers. The reasoning is that this push carbon intensive generators up the merit-order. A sufficiently high price of carbon can lead to the retirement of carbon-intensive sources and increase the attractiveness of low carbon sources. This approach could in principle be applied to Vietnam. However, in its current design the VWEM is organised as a cost-based pool, with tight controls on pricing. As a result, generators’ bids are capped based on their short-run marginal costs, which does not enable the recovery of carbon prices. A similar obstacle to the recovery/pass through of the carbon cost characterises the PPAs. Furthermore, at the retail market level, power tariffs are not set to factor in carbon prices.

Despite these delays and difficulties, the government seems committed to reorganise the sector based on competition and unbundling. Vietnam’s updated NDC (Government of Vietnam 2020c) commits to “accelerating the roadmap for the implementation of a competitive power market” in addition to “policies on energy prices to mobilise resources from the business sector, including FDI and investments in climate change response and green growth.

The top-down approach of policymaking and implementation could generate rapid changes in the organisation of the sector. However, the role of IPPs, and their long-term PPAs, present challenges for the integration of the cost of carbon into the power market architecture. According to the international experts consulted for this report, power purchase costs are limited by restrictions on contract and spot market prices, complicating the introduction of carbon pricing for the following reasons. First, if price caps are raised to reflect carbon prices, retail prices could increase, without necessarily changing the operation of power plants. Second, if contract and spot market price caps are not raised, existing generators are likely to be affected, in the absence of an immediate opportunity to replace coal-fired power generation with clean energy. Third, customers are unlikely to participate in the competitive segment of the market if regulated retail tariffs do not include the cost of carbon, but unregulated prices do.

In this context, how can the objective of consumer protection and affordability be reconciled with carbon pricing? The international experts consulted for this report advocate a gradual approach to the introduction of the ETS in order to reconcile carbon pricing and consumer protection and allow sufficient time for the market to adjust by substituting carbon-intensive production with clean energy and phasing out cross-subsidies.

Although most interviewees acknowledged the regulatory obstacles to the introduction of carbon pricing, not all were confident about the possibility of reform and the timing of its implementation. For instance, Dr. Nguyen Hoai Nam (VUSTA Centre for Energy) warned about the difficulty of power market reform in Vietnam and the risks that reform could present to the security of the system, referring to international liberalisation experience. China's experience with the reform of its power market is relevant for Vietnam, but the liberalization model does not work in all power systems. For Dr. Minh Ha Duong, if power market reform is to be seen as a prerequisite to the introduction of carbon pricing, the latter is unlikely to materialise soon in the power sector. The risk of manipulation of the market, following liberalization, must be avoided.

Renewable energy

Renewable energy development is supported by power sector policies designed to guarantee investment in renewable technologies. These include feed-in-tariffs applicable to renewable energy projects, prioritising connecting renewable energy projects to the national power system, and a net-metering mechanism (Thuc 2016). The introduction of feed-in tariffs for solar power in 2017 in addition to those already existing for onshore wind projects since 2011 altered the renewable generation landscape in Vietnam significantly (Prime Minister of the Socialist Republic of Vietnam; Prime Minister of the Socialist Republic of Vietnam). The country overachieved its solar generation targets, as it went from negligible installed capacity in 2017 to 4.5 GW installed in 2019, meeting the revised Power Development Plan VII solar targets five years early (Climate Action Tracker 2020a). A solar auctioning pilot programme supported by the World Bank began in November 2020 (Martin 2020). Steps towards full auctioning continue, as in early 2021, the Electricity and Renewable Energy Authority of Vietnam (EREA) submitted a report requesting MOIT's internal approval of the selection mechanism for project bidders (Nguyen and Burke 2021).

An international energy expert interviewed for this report confirms the importance of renewable energy in the development of Vietnam's power sector. Renewables do not only provide a clean source of production, but also require less construction time, enabling them to contribute to the security of supply in a relatively short-term period. The government's targets have been relatively modest so far, but the policy has been successful in attracting investments. However, renewable energy generators faced curtailment, forcing them to interrupt production and supply to the grid, indicating the challenges ahead with the clean energy transition.

Energy security is thus part of the concerns that are associated with decarbonisation. For instance, Dr. Nguyen Hoang Nam, who was involved in the drafting of the revised Law on Environmental Protection, emphasised the perception that carbon pricing could present a risk for energy security, as a result of higher tariffs and insufficient power generation, resulting in possible blackouts. Similarly, Dr. Nguyen Hoai Nam, referred to the interruptions of power supply in China, and their impact on the perception of energy security risks associated with the carbon pricing and the energy transition.

The international experts consulted for this report question the direct relevance at this stage of carbon pricing for the achievement of Vietnam's renewable energy policy, taking into account that renewable energy investments are currently supported outside of the power market. The argument goes as follows. Renewable energy does currently not participate in the power market, and the auctioning reform will not change this. At the moment, there is therefore no direct link between carbon pricing and renewable energy production. As mentioned above, this reasoning is also helpful to explain the limited involvement of the renewable energy industry in the debate on Vietnam's carbon pricing policy.

The reform of Vietnam's renewable energy support scheme, following the interruption of the feed-in tariff regime, presents an opportunity for new support measures, but carbon pricing does not seem to be part of the discussion. Dr. Nguyen Hoai Nam (VUSTA Centre for Energy) confirms that at the moment the focus is on auctioning for renewable energy capacity. Dr. Minh Ha Duong of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition supports the case of complementary instruments, in particular direct PPAs and auctioning. Ngo Thi To Nhien (Vietnam Initiative for Energy Transition) emphasised how carbon offsets could be used to support the development of renewable energy. The combined use of auctions and carbon pricing will depend on when the carbon pricing is in place and the timing of the other relevant sector-specific reforms.

For Thomas Giglione of the Carbon Credits Group and Srikanth M of Global Green Solutionz, there is significant potential and "low hanging fruit" for emission reductions in Vietnam, including in the renewable energy sector (see also (Giglione 1/14/2021). Carbon markets, including voluntary mechanisms, international trading under Article 6 of the Paris Agreement and offset projects under a domestic system, have an important role to play in financing and achieving these emission reductions.

Dr. Nguyen Hoang Nam also confirms the significant opportunities that are associated with the reduction of GHG emission reductions in Vietnam, and the importance that grasping the opportunities presented by the decarbonisation of production patterns plays in the national policymaking.

3.3.3.2 Conducive factors and obstacles

There is significant potential for a carbon pricing mechanism to drive abatement in Vietnam. Carbon pricing would level the playing field in the power sector, given coal projects have long benefited from attractive contract terms relative to the high cost of equity for renewable power projects (Breu et al. 2019), but this would require reform of the power market architecture. Carbon pricing also has a role to play in other sectors, including cement, steel, fertilisers, and waste. Furthermore, our interviewees emphasise the role of carbon offsets under the Law on Environmental Protection to finance forestry projects, and thereby contribute to addressing poverty in rural areas and a just transition.

In the renewable energy sector, the government's feed-in tariff policy has generated substantial foreign direct investment, helping to develop low carbon alternatives to coal (Government of Vietnam 2020a). The interruption of feed-in tariffs has created a regulatory gap for the

deployment of low-carbon alternatives. Given the importance of clean energy following the announced carbon neutrality target and coal phase out, new support measures are being discussed, but carbon pricing is not part of the debate, with most focus being on auctioning. Our interviewees indicate the potential of carbon offsets under the Law on Environmental Protection as an alternative support mechanism.

Given the importance of coal in Vietnam's power fuel mix, Vietnam's power sector regulations are key to establishing an effective carbon price. Carbon pricing is already being considered in the existing power development planning. While the "shadow" carbon price in Vietnam remains significantly below the current prices in the EU, it indicates that carbon pricing can be integrated into the architecture of the regulated power market. Considering the difficulties facing power market liberalisation in Vietnam, integrating carbon prices in the regulated market is an important first step towards the gradual decarbonisation of the sector based on price signals.

The liberalisation reform of Vietnam's power present opportunities for carbon pricing, not least by exposing coal-fired power generation to the cost of carbon and helping renewable generation to become cost competitive. However, our interviewees emphasise the time it will take to create a functioning liberalised market environment, some even questioning the feasibility of reform. Carbon pricing is not yet part of the discussion on the power market reform in Vietnam. In this context, a priority seems to integrate carbon pricing within the debate on the reform of the power market so as to ensure synergies in market design and enhance the effectiveness of both the ETS and the reformed power market Vietnam is developing.

3.3.4 Technical dimension

3.3.4.1 Core analysis

MRV

Vietnam has demonstrated its ability to report and measure emissions through efforts to meet its Paris Agreement commitments. Vietnam submitted the first National Communication in 2000 and the third Biennial Updated Report (BUR3) to the UNFCCC in 2021. The BUR3 highlights the arrangements made for the 2016 National GHG Inventory and outlines the Department of Climate Change's role in establishing and executing a plan to create the inventory. In its 2016 Plan to Implement the Paris Agreement, Vietnam identifies its commitment to establishing an MRV system for national and sectoral emissions (Socialist Republic of Vietnam 2016). Vietnam has been developing an MRV in conjunction with policy proposals for national carbon pricing and market-based instruments since 2013. NAMAs are being implemented in the agriculture, forestry, waste, industry (steel, cement, chemical), and power sectors. These actions underpin the further development of the national ETS. In its revised NDC of 2020, the Vietnamese government (Government of Vietnam 2020c) identifies the lack of an MRV as an important challenge in its effort to reduce GHG emissions. The revised Law on Environmental Protection sets the legal basis for covered entities (to be determined by the decision of the Prime Minister) to report their emissions every two years, as well as produce annual greenhouse gas reduction plans, and for the MONRE to design an MRV system (ICAP 2020b).

For an expert on carbon pricing in Vietnam interviewed for this study and who wished to remain anonymous, the main obstacle facing the introduction and implementation of carbon pricing in Vietnam is technical. A key difficulty is to have a proper MRV system in place. Another technical difficulty relates to the allocation of allowances and the design and operation of the market. International experience can help overcome these technical difficulties but cannot be replicated without proper adjustments to the specific institutional environment of Vietnam. Focusing on one industry, for instance power, could help address the technical difficulties facing the introduction of carbon pricing.

According to Dr. Nguyen Hoang Nam, who was involved in the drafting of the revised Law on Environmental Protection and the implementing Decree, a key obstacle to the implementation of Vietnam's ETS is the absence of a sufficiently robust monitoring system and data. The large number of entities concerned complicates the collection of credible data on their emissions. An option would be to reduce the number of entities covered, in a first phase. The focus of the government is now on MRV, with the support of the World Bank, and significant progress remains to be achieved.

Dr. Nam Nguyen (KLINOVA) confirms that the PMR made a significant contribution to carbon pricing in Vietnam by improving the knowledge of policymakers. However, Mr. Nam warns that, although the PMR made a significant contribution in terms of capacity building, a lot remains to be done before carbon pricing can be implemented in Vietnam.

Government knowledge and capacity

Vietnam has demonstrated institutional capacity as inter-ministerial coordination and stakeholder engagement effort are interwoven throughout various UNFCCC outputs. Vietnam's second BUR to the UNFCCC designates the Department of Climate Change at MONRE as the entity responsible for cooperating with related agencies in developing the National GHG Inventory System and associated technical reports. It also articulates the respective ministries responsible for developing sectoral MRV systems. In reviewing and updating Vietnam's NDC in 2020, MONRE established an inter-sectoral working group consisting of representatives from the Advisory Council of NCCC and various relevant ministries and sectors and is further supported by an expert group and additional key stakeholders who participate in working sessions and consultation workshops (Government of Vietnam 2020c). The government of Vietnam has also created the Support Programme to Respond to Climate Change (SP-RCC) initiative to spur policy exchange between government agencies and international development partners on climate change-related issues in Vietnam.

However, for Dr. Nguyen Hoai Nam (VUSTA Center for Energy), technical capacity remains one of the key barriers to the implementation of carbon pricing, depending on the design option chosen. Professor Nguyen Hong Quan (Vietnam National University) emphasised the significant capacity gap that exists in Vietnam, in particular the limited number of trained experts on MRV. Similarly, Dr. Minh Ha Duong, of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, pointed out limited institutional capacity, e.g., regarding monitoring, reporting and verification, as a key obstacle to carbon pricing. In the absence of sufficient institutional capacity, the risk of cheating in the reporting of emissions is significant.

A lack of in-depth knowledge and expertise on carbon pricing contributes to the limited institutional capacity in the field. For instance, an expert on carbon pricing in Vietnam (anonymous) emphasised the lack of real pre-existing expertise at the domestic level. Capacity has to be developed almost from scratch. According to Dr. Nguyen Hoang Nam, a significant barrier to the ETS is the lack of capacity and human resources to monitor emissions and determine the relevant quotas on this basis. A carbon tax would be easier to implement from a technical perspective as Vietnam already has a relatively robust fiscal system in place, but it would be more sensitive to introduce.

According to an international energy expert interviewed for this report, to address the limited awareness and understanding of carbon pricing in Vietnam it is necessary to provide international support to MONRE and MOIT on carbon pricing design and implementation options. Capacity-building at government agencies, and increased awareness of carbon pricing by the main stakeholders, is necessary to facilitate the introduction and implementation of carbon pricing. At the sector-specific level, and in particular in the power sector, the interactions

with carbon pricing need to be better understood. For Dr. Nguyen Sy Linh (ISPONRE) it is important to ensure proper coordination between the different ministries, in particular MONRE in charge of the environment and MOIT in charge of power, in the design and operation of the carbon market.

Business knowledge and capacity

Most interviewees confirmed limited awareness of carbon pricing in both the carbon-intensive and the low-carbon industries, undermining the debate on the design of carbon pricing options in the country.

In addition, the perception of renewable energy as an intermittent energy source is another technical obstacle to the deployment of clean energy through carbon pricing in Vietnam. Thomas Giglione of the Carbon Credits Group pointed out the criticism that was expressed against the limited efficiency of solar energy, in the context of the increasing competition of renewables with EVN's power production capacity. The international energy expert consulted for this report pointed to the curtailment that affected renewable energy producers in Vietnam.

3.3.4.2 Conducive factors and obstacles

A major obstacle to carbon pricing in Vietnam is the limited awareness of carbon pricing within the business community and the limited technical expertise within the government. Our interviewees expressed most concerns with regards to MRV, although the World Bank PMR contributed to a degree of capacity building. At the sector-specific level, the lack of understanding on the interactions of carbon pricing and power market regulation undermines the integration of carbon pricing in the power market, and the debate on the power market reform as well as on the reform of the renewable energy subsidy mechanism. The limited awareness on carbon pricing within the industry is a problem as it undermines the participation of the relevant stakeholders in a debate on carbon pricing and thus affects the transparency that is needed for the development of a carbon market.

3.3.5 Multilateral dimension

3.3.5.1 Core analysis

Trade and commercial integration

As a rapidly growing and open lower-middle income country, trade made up 210% of Vietnam's GDP in 2019 (World Bank Group 2021c). Vietnam has achieved this economic openness through removing tariff and non-tariff barriers and participating in several international trade agreements. These include the Association of South-East Asian Nations (ASEAN), which it became a member of in 1995 and was chair of in 2020; the Bilateral Trade Agreement between the United States and Vietnam (US-BTA) in 2000; the Asia Pacific Economic Cooperation (APEC) starting in 2008; the World Trade Organisation (WTO) starting in 2007; and most recently the Regional Economic Partnership in 2020. (Strauch et al. 2018). Major trade partners are located mostly in East Asia, North America and Europe, where Vietnam recently signed the EU-Vietnam trade agreement which eliminates duties on 99% of goods traded between the two jurisdictions and sets high standards for labour, environmental and consumer protection, commits to effectively implementing the Paris Agreement and other international environmental agreements, and acting in favour of conservation and sustainable wildlife management (European Commission 2020). Trade with bordering neighbours is limited except for China, as trade between the two nations has increased in recent years (World Bank Group 2019a).

In their 2021 article on Carbon Pricing in Vietnam, Do and Burke (Do and Burke 2021) argue that "Vietnam may need to enhance its commitments to climate change mitigation to reap

maximum benefits from free trade agreements such as the EU-Vietnam Free Trade Agreement”. According to their analysis, “exports may also face the risk of carbon border levies.” For Dr. Minh Ha Duong of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, the influence of the EU CBAM has so far been limited. However, with the adoption of the EU-Vietnam Free Trade Agreement, it makes sense to start carbon pricing in the internationally exposed sectors of Vietnam’s economy. Another expert on carbon pricing (anonymous) confirms that international factors are a relevant driver of carbon pricing in Vietnam, but not the most important driver. Vietnam is an open economy and is therefore preparing for the possible introduction of CBAM.

Learning about designs pursued elsewhere

Many of the countries Vietnam engages with through trade agreements, including Indonesia, Thailand, and the Philippines, and Japan are currently considering or developing carbon pricing mechanisms, and several others, including New Zealand, the EU, China, and South Korea have established carbon markets (ICAP 2020a). China, now the world’s largest carbon market, shares a border with Vietnam. Further regional carbon pricing efforts have been facilitated by the UNFCCC CIACA project, which focused on assessing the status of MRV systems in ASEAN member states, reviewing carbon pricing instrument adoption, and identifying commonalities and differences between countries’ respective approaches to carbon pricing (Aleluia et al. 2019). Lessons learned through CI-ACA were presented at a UNFCCC Regional Dialogue on Carbon Pricing (RediCAP) in 2020 as part of the Plan of Action of the AWGCC (ASEAN Working Group on Climate Change) and the ASEAN-UN Plan of Action (2016-2020) (UNFCCC/IGES Regional Collaboration Centre 2020).

Of all these developments, our interviewees emphasised the importance of the Chinese ETS, and China’s commitment to stop financing coal-fired power plant abroad, as the most significant drivers for carbon pricing and the energy transition in Vietnam. For Thomas Giglione, Vietnam’s policies are affected by China. China’s announcement that it would stop funding investments in coal-fired power generation abroad had an important impact on Vietnam. The absence of Chinese investments creates a gap in production capacity that offers an opportunity for renewable energy investments, and possibly also for the carbon market, in particular if offset projects are integrated in the market architecture. China also plays a role as one of the biggest carbon markets.

Dr. Nam Nguyen (KLINOVA) emphasised the relevance of the Chinese experience with ETS, based on similarities in terms of organisation of the political system and China’s experience with the implementation of pilot schemes. However, Dr. Nam warns that reproducing China’s pilot system approach is less likely to work in Vietnam, considering that Vietnam’s political structure does not have the same level of decentralization. The EU approach is also influential, but its transplant could result in greater gaps between the theory and practice of law.

According to Dr. Nguyen Hoang Nam, who was involved in the drafting of the revised Law on Environmental Protection, the Chinese experience, as well as the EU ETS and the Australian carbon tax, has been considered in the underlying analysis to Vietnam’s carbon pricing Decree. Similarly, Dr. Nguyen Hoai Nam (VUSTA Center for Energy) emphasised the importance of China as influence for political and regulatory reforms, including in the field of carbon pricing. For Dr. Minh Ha Duong of the French National Centre for Scientific Research and the Vietnam Initiative for Energy Transition, the fact that China has an ETS is important for the prospects of carbon pricing in Vietnam. Vietnam studies international practices in the field, but China’s experience is of greater influence than other countries in the region. According to an anonymous expert on carbon pricing in Vietnam, the influence of ASEAN is not yet significant in the field of carbon pricing.

The ADB is likely to play an important role in the decarbonisation of the Vietnam power sector, based on its involvement in financing the closure of coal-fired power plants, starting with feasibility studies to assess the costs of early retirement and identify assets to be acquired (BBC 2021).

Transparency and capacity building

As mentioned above, our interviewees emphasised the importance of the assistance by the World Bank of MONRE on MRV as part of the PMR. The government has also enhanced its capacity for climate finance, appointing the Ministry of Planning and Investment (MPI) as the National Designated Authority for the Green Climate Fund, establishing a Climate Finance Task Force to guide the preparation of financing mechanisms, and signing a Memorandum of Understanding on Green Finance Cooperation between the MOF and the GGGI (Strauch et al. 2018; GGGI 2020). Vietnam has also engaged with a range of international consultants on emission reductions projects, including the World Bank, GIZ, BMU, UNDP, and others. Additional multilateral cooperation on climate change took place through the planning and implementation phases of Vietnam's NAMA's. From 2014 – 2018, the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU), in conjunction with the German Society for International Cooperation (GIZ), implemented an International Climate Initiative (IKI) project in Vietnam. The project supported Vietnam in enhancing institutional and personnel capacities to develop and implement NAMAs, including setting up coordinated structures for NAMAs with MONRE, developing central elements of the MRV system, and advising MONRE on implementing the Paris Agreement and the review process of the Vietnamese NDC (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of Germany 2021). Vietnam and the MONRE also received NAMA support from the Japanese International Cooperation Agency 2015-2020 to build the capacity of MONRE to develop and implement NAMAs, and to develop the capacity of line ministries and local governments to plan and implement NAMAs by piloting the NAMA 'Low Carbon City' in selected Vietnamese municipalities (JICA 2014). Finally, additional opportunities for multilateral cooperation stem from established domestic and international think tanks, including the Vietnam Institute of Energy, the Vietnam Initiative for Energy Transition (VIET), the Vietnam Institute of Meteorology, Hydrology, and Climate Change (IMHEN), and the Asia Society Policy Institute (ASPI).

3.3.5.2 Conducive factors and obstacles

The Chinese ETS seems to be the most important regional factor influencing Vietnam's carbon pricing agenda. Similarities in the political system facilitates the learning and transplant of regulatory tools from China to Vietnam. At the same time, China's announcement to stop financing coal-fired power plants abroad matters for Vietnam's clean transition, including carbon pricing, as it creates an investment gap that has to be bridged through cleaner alternatives. Although the influence of the EU CBAM on Vietnam's carbon pricing policy seems to have been limited so far, the EU-Vietnam Free Trade Agreement played a role in driving the green agenda, including carbon pricing. However, ASEAN's influence on carbon pricing in Vietnam seems limited. International assistance, in particular by the World Bank PMR contributed to awareness on carbon pricing and capacity building, demonstrating the relevance of international support for the development of carbon pricing.

3.4 Synthesis and possible pathways to implementation

Increasing climate ambition, in particular following the announcement of carbon neutrality at COP26, and a 2020 legal mandate to establish an emissions trading scheme demonstrate that Vietnam is committed to carbon pricing. The country plans to implement a pilot system by 2025

that will in turn become fully operation by 2028. Vietnam's readiness is also demonstrated through its work with the PMR to develop an MRV infrastructure for the ETS and its efforts to pilot the system in the steel and waste-to-power sectors through its declared NAMAs. However, there is a significant gap between the law in theory and its implementation. The adoption of Decree no.06/22/ND-CP on Greenhouse Gas Reduction and Ozone Layer Protection is a first step in bridging that gap. Further decisions are needed on the determination of sector quotas and an ETS cap – crucial steps towards the implementation of carbon pricing. Another fundamental question to be answered concerns the mix of instruments (ETS, crediting mechanism, tax, auctioning for renewable energy) to be used to drive Vietnam's decarbonisation efforts, and the risk of confusion that surrounds the use of different carbon payment obligations.

Limited resistance from the carbon intensive industry could be interpreted as a positive signal for the establishment of Vietnam's ETS. However, the lack of opposition could also be explained by limited awareness. The latter undermines the emergence of a real debate on carbon pricing in the country, affects the transparency that is needed for the development of a carbon market, and presents an important barrier to the functioning of the ETS if the industry does not acquire sufficient capacity to actively engage with the mechanism.

The low carbon industry has not yet actively supported carbon pricing but expects government support instead in the form of auctioning for renewable energy. Civil society (e.g., green NGOs and think tanks) has also not engaged in a particularly active way in the promotion of an ETS or carbon tax in Vietnam. By contrast to carbon pricing, there is an active debate on the reform of Vietnam's renewable energy mechanism. The interruption of feed-in tariffs has created a regulatory gap for the deployment of low-carbon alternatives. Carbon pricing has a role to play in filling this gap and should be part of the discussion on the design of the future regulatory environment governing clean energy investments. Security of supply arguments could be a key challenge in the debate on the further deployment of clean energies and carbon pricing. However, these could be met by a concerted effort from the domestic and international green lobby to raise awareness that a commitment to coal generation can at best be transitional. Limited support by the low carbon industry and civil society means that carbon pricing in Vietnam depends almost entirely on the commitment by the government. Although this commitment seems strong, particularly after COP26, international experience shows that support from industry and civil society is important for the implementation of carbon pricing mechanisms.

Increasing awareness of the mechanism, and its international practice, can play a role in starting a debate beyond government circles. Vietnam's updated NDC (Government of Vietnam 2020c) commits to "Disseminating information and communicating on mass media to raise public awareness of climate change adaptation and mitigation" and "encouraging and providing technical support to people and communities to deploy and scale up economical, safe, environmentally friendly and low-carbon production and consumption models." This could be extended to explicitly include communication around the role of carbon pricing in the low-carbon development path of Vietnam, including the benefits of carbon pricing in terms of GHG emission reductions, air quality improvement and improved innovation.

The population has not yet voiced opposition to the mechanism, but future resistance is not to be excluded if carbon pricing impacts on end-user prices, in particular of power. Besides communication on the role of carbon pricing in the low-carbon transition, social protection mechanisms are necessary to facilitate the popular acceptability of the mechanism.

Foreign energy investors have a role to play in the debate on carbon pricing given their participation in both carbon-intensive and low-carbon energy production in Vietnam. A carbon

price, in conjunction with renewable energy targets and support, has the potential to make renewable energy a more profitable generation choice in the long run.

Development of the ETS could be impeded by the country's partially liberalised power market, as the state-owned utility EVN holds a virtual monopoly over transmission and distribution, as well as owning a substantial portion of generation entities. This could limit the carbon price being passed on to covered entities, which could in turn undermine the system's ability to incentivise abatement and low-carbon investment. However, long-awaited power market reforms, including the establishment of an independent System and Market Operator (SMO) and a wholesale market, are expected to be developed along the same timeline as the ETS. The implementation of these reforms faces significant challenges. A common obstacle to ETS and the power market reform is the impact these measures will have on end-user prices. Adjustments to ensure a just energy transition will have to be in place, in order to ensure the public acceptability of decarbonisation through market price signals.

Given the importance of power to achieve Vietnam's announced carbon neutrality target, carbon pricing should be integrated in the discussion on the reform of the power market architecture. Pending the opening of the market to competition—a process that is expected to take time given the institutional barriers to reform—carbon pricing should be considered in the power development planning, following the existing practice of factoring in a “shadow” carbon price, but with gradually increasing price levels.

At the technical level, Vietnam demonstrated its ability to report and measure emissions through efforts to meet its Paris Agreement commitments, but there is still insufficient technical and institutional capacity (including on MRV) to implement an ETS. Capacity-building and further work on MRV is essential to address these remaining technical and institutional barriers and develop the necessary knowledge and expertise on carbon pricing that should also contribute to a more active debate on this issue.

International support has an important role to play in addressing the technical barriers to carbon pricing in Vietnam, as illustrated for instance by the contribution of the PMR to awareness on carbon pricing and capacity building on MRV. Learning from the international experience with ETS and other carbon pricing instruments can play a relevant role in this process, but international models will have to be adjusted to the specific institutional environment of Vietnam and the regulatory architecture of the different sectors in which Vietnam's ETS will be introduced. Besides the relevance of the EU ETS, the Chinese ETS has is likely to have an important influence on the development of carbon pricing in Vietnam. From an institutional perspective, similar political systems facilitate the transfer of regulatory approaches. China's announcement to stop financing coal-fired power plants abroad is another incentive for Vietnam to create an investment environment favourable for cleaner alternatives in which carbon pricing has a role to play.

Table 4 provides an overview of the main challenges Vietnam faces and a number of recommendations that can help overcome them to lay the groundwork for the successful implementation of carbon pricing in the country.

Table 4: Main challenges and recommendations, Vietnam

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> Limited debate on CP in the industry sector, NGOs, and society at large. Limited voice of green lobby in pushing for CP 	<ul style="list-style-type: none"> Plan stakeholder engagement in the potentially covered sectors Communicate the benefits of CP, e.g., in terms of GHG emission reductions, air quality improvement and improved innovation Ensure social protection or compensation
Legal	<ul style="list-style-type: none"> Legal mandate for CP and roadmap for ETS Plausible legal framework to align CP and other instruments supporting decarbonisation 	<ul style="list-style-type: none"> Further develop CP related regulatory framework, e.g., determination of sector quotas and an ETS cap Provide clarity on policy mix (ETS-tax-companion policies) Involve foreign investors in CP debate, and harness CP opportunities for clean energy
Economic	<ul style="list-style-type: none"> Regulation of power sector, including price regulation, cross-subsidies and regulated investments 	<ul style="list-style-type: none"> Integrate CP in the discussion on the reform of the power market architecture Pending reform, include a gradually increasing shadow carbon price in power development planning Make arrangements on just energy transition to ensure public support
Technical	<ul style="list-style-type: none"> Limited technical and institutional capacity, e.g., on MRV Institutional barriers to transplant of international experience, e.g., from ETS and electricity sector reform in China 	<ul style="list-style-type: none"> Focus on capacity building, e.g., significant enhancement of MRV; approaches to cap setting and allocation of “quotas”/allowances Increase knowledge on CP and its design options as well as interactions with sector-specific regulations Adjust existing CP models to the specific institutional environment of Vietnam, e.g., considering the regulatory architecture of the different ETS sectors

Dimension	Challenge	Recommendation
Multi-lateral	<ul style="list-style-type: none">• Limited role of CP at ASEAN level• Risk of resistance from foreign investors, e.g., arbitration	<ul style="list-style-type: none">• Leverage support from, and coordination with, capacity-building initiatives as well as other CP jurisdictions, such as Germany, the UK, and other regional players, e.g., South Korea and China, to draw from their design and implementation experiences• Highlight the contribution of CP to climate action efforts in order to attract investors in low-carbon energy in the context of coal phase out and Chinese stop of foreign coal investments

B Appendix: Vietnam interviews

Name	Position	Affiliation	Experience	Date
Expert on carbon pricing (anonymous)				3 Nov. 2021
Dr. Nguyen Hoai Nam	Energy and Climate Expert (Clean Energy Unit, Manager)	VUSTA Center for Energy and Green Growth Research	Expert in power, energy planning and policy, involved in consultancy on energy and climate in Vietnam (including for the WB PMR)	11 Nov. 2021
Prof. Nguyen Hong Quan	Director	Institute for Circular Economy Development, Vietnam National University	Worked on climate change related topics in Vietnam for the last 10 years	15 Nov. 2021
Dr. Minh Ha Duong	Senior Scientist	French National Centre for Scientific Research, Centre International de Recherche sur l'Environnement et le Développement And Vietnam Initiative for Energy Transition	Lead IPCC expert, founder of Vietnam Initiative for Energy Transition, involved in research, consultancy and advocacy on clean energy and power market reform in Vietnam	15 Nov. 2021
International energy expert (anonymous)				19 Nov. 2021
Dr. Nguyen Nam	CEO & Climate Advisor	Climate Innovation Consulting & Services JSC. (KLINOVA)	13 years working experience with CDM and carbon pricing in Vietnam and Germany, 6 years working experience within the Department of Climate Change under MONRE, 3 years working experience with international NGO, climate advisor and founder and CEO of KLINOVA.	23 Nov. 2021

Name	Position	Affiliation	Experience	Date
Dr. Nguyen Hoang Nam	Project Coordinator	Mobilizing private sector resources toward GHG mitigation Project And Faculty of Environment, Climate Change and Urban Studies, National Economics University, Vietnam	Expert on environmental economics, involved in revision of Environmental Law (and in particular the inclusion of carbon pricing), and decree on carbon pricing	23 Nov. 2021
Dr. Minh Tu Nguyen		Circular Economy Unit, Vietnam National University	Involved in climate change adaptation issues in Vietnam	26 Nov. 2021
Dr. Le Quang Dung	Senior Expert	Circular Economy Unit, Vietnam National University	Involved in climate change adaptation issues in Vietnam	26 Nov. 2021
Ngo Thi To Nhien	Executive Director	Vietnam Initiative for Energy Transition	Executive Director of independent think tank involved in accelerating the energy transition in Vietnam through research and consultancy (e.g., on renewable energy development, finance, power market reform)	30 Nov. 2021
Dr. Nguyen Sy Linh	Head of department of climate change	Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE) under Ministry of Natural Resources and Environment of Vietnam	Involved in providing support to Vietnam's policy and strategy on climate change, including carbon pricing	8 Dec. 2021
Thomas Giglione	Managing Director	Carbon Credits Group	Involved in the implementation of voluntary emission reduction projects in Vietnam, including under the Joint Credit Mechanism of Japan	8 Dec. 2021
Srikanth M		Global Green Solutionz	Involved in GHG mitigation projects under CDM and JCM mechanisms during the past 10 years	8 Dec. 2021

4 Pakistan case study

4.1 Introduction

The Islamic Republic of Pakistan is a lower-middle income country with a population of well over 220 million inhabitants. It is a federal parliamentary republic with four provinces: Balochistan, Punjab, Sindh, and Khyber Pakhtunkhwa, plus two autonomous regions — Gilgit-Baltistan and Kashmir. It shares borders with Iran, Afghanistan, China, and India, thus connecting multiple Asian regions. Pakistan has experienced fluctuating economic growth rates over the past decade, ranging from 0.5% to 5.8% (REF WB). The government of Pakistan aims to usher in a new decade of growth and reach upper middle-income status as soon as 2025 (Ministry of Planning, Development & Reform 2014). Sustained economic growth will be crucial to addressing the country's structural fiscal challenges, reducing economic vulnerabilities of the population, and meeting sizeable investment needs. For it to be in line with the country's climate commitments, the envisaged economic thrust must be embedded in a robust low-carbon policy framework. The government is considering introducing a carbon pricing instrument to its evolving policy mix. Doing so would help it unlock emissions abatement opportunities and create certainty on its emissions trajectory. Earlier work under this project provided an overview analysis of the potential for introducing carbon pricing in Pakistan (Doda et al. 2022), on which this section builds and expands.

Pakistan has enormous renewable energy potential thanks to the presence of wind corridors, ample sun radiation, and (untapped) water resources for hydropower. It also has a nuclear energy fleet. While output from low-carbon energy sources has increased over the years, it pales in comparison to the supply of fossil fuels which have soared in the last two decades to meet Pakistan's rapidly growing energy needs. Total energy consumption nearly tripled between 1990-2019 rising from 43 Ktoe to 110 Ktoe (Enerdata n.d.). Over the same period, the share of low-carbon sources in the country's overall energy supply¹⁷ dropped from 47% to 38% (IEA 2022). As a result, Pakistan's GHG emissions have increased considerably over the past years reaching 489 MtCO₂ by 2018. Roughly half of these originate from the energy (including transport) and industry sectors and are rising rapidly. The government projects emissions to swell to 1603 MtCO₂ by 2030 in a business-as-usual (BAU) scenario (Government of Pakistan 2021), which would amount to roughly 5% of global emissions consistent with a 1.5 scenario (IPCC 2018) turning Pakistan into a significant contributor to anthropogenic emissions.

Policy context

Pakistan submitted its updated NDC (2021) ahead of COP26 in Glasgow and committed to reducing emissions growth towards 2030 by 15% to 50% subject to external financial support. The government has taken promising steps that would help it meet its upper range target. First, it intends to increase clean energy production in the country to 60% of total primary energy supply (TPES) by 2030, up from 38% in 2019.¹⁸ The government placed a moratorium on additional investments in coal-fired power plants in 2021 and has banned power imports originating from coal plants abroad. Electric vehicles (EVs) must reach a market share of 30% of new car sales by 2030. And the government has turned to nature-based solutions to meet part of its unconditional 2030 target (15%) through initiatives such as the Tsunami Programme (TBTP) and the Billion Tree Afforestation Programme (BTAP).

¹⁷ Including biofuels and waste.

¹⁸ Including biomass, hydro, and nuclear power.

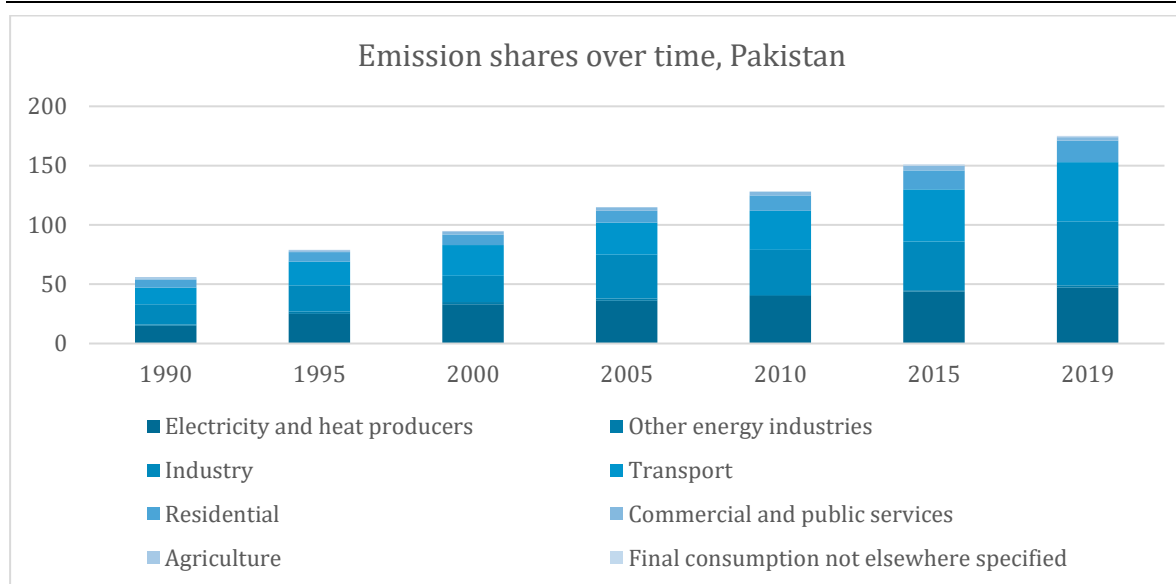
The government has also put in place a consolidated framework for RE development in recent years that includes feed-in tariffs, guaranteed RE offtake, tax exemptions, net-metering for prosumers, and competitive tenders for large-scale investments (Government of Pakistan 2019). These policies will help it accelerate the uptake of low-carbon technologies and decrease the share of fossil-based power generation, which stood at 68% in 2019 (IEA 2022). Despite the recent progress, Pakistan is facing soaring energy demand, energy security concerns, as well as calls for low-cost service provisions, compounding its decarbonisation challenge. Nine coal power plant projects that were already in the pipeline before the announced moratorium have recently been completed or approved for construction, together adding 8.2GW of generation capacity to the power grid in the next few years.

Emissions profile

The long-term success of Pakistan's mitigation efforts will hinge on the transformation of its energy and industry sectors which constitute more than half of current CO₂ emissions. In 2019, approximately 29% of emissions stemmed from the transport sector, 27% from the power sector, and 31% from the industrial sectors, with the residential, commercial, agriculture, and other energy sectors making up the rest (IEA 2021a).

The share of fossil fuels in the country's total energy consumption has increased from below 59% in 2000 to about 62% in 2019. For power generation, oil and gas are currently the predominant fuels used. Although the use of coal in power production was historically low, Pakistan is currently expanding its power generation capacity significantly to meet growing demand, with the aim of expanding coal capacity to reduce dependence on imported fossil fuels (NEPRA 2020).

Figure 9: Emission shares over time, Pakistan



Source: IEA (2021a)

Status of carbon pricing discussions in Pakistan

The government is considering introducing a domestic carbon pricing instrument to align production activities and investments with a low-carbon development pathway. As of 2022, an ETS is under consideration, though the government has not yet ruled out other instrument types. The government first stated the ambition to introduce a carbon tax for the power sector in the National Climate Change Policy 2012. It subsequently adopted the Pakistan Climate Change Act in 2017, which consolidated the legal and institutional framework for climate policy

development in Pakistan. The Act provides a mandate for the creation of the Pakistan Climate Change Authority whose tasks will include coordinating the development of carbon markets.

The UNFCCC's Collaborative Instruments for Ambitious Climate Action (CIACA) initiative has supported Pakistan in the preparations for developing carbon pricing through capacity building activities, national consultation, and the funding of supporting studies and experts. Under this framework, a 2019 report explored carbon pricing options for Pakistan and recommended that the government introduce an ETS over the medium to long term covering the energy and industry sectors comprising about 27% of national emissions (Aleluia et al. 2019). As a short-term option, the report underlined the opportunity for introducing a carbon tax pegged to Pakistan's fuel tax, the Petroleum Development Levy. It further underscored opportunities for the generation of carbon credits in the land use, agriculture, and waste sectors. Consequently, the government established a task force for the duration of one year, the National Committee on the Establishment of Carbon Markets (NCEC), to coordinate ministerial activities aiming to prepare the ground for a domestic ETS and participation in international markets. A communication strategy for the implementation of carbon pricing is expected to be released in 2022 under guidance of CIACA. The World Bank's Partnership for Market Implementation (PMI) is also active in the country. At the time of writing, Pakistan is considering applying for funding under the PMI program.

Pakistan engages actively with international partners and experts to inform its carbon pricing strategy. There is political will within the upper echelons of the government and momentum among policymakers to make headway with carbon pricing, and an institutional bedrock for its implementation is in place. Pakistan is also richly endowed with renewable energy potential that a carbon price could help unlock, while its power sector is seemingly well placed to integrate a carbon price signal if reforms are introduced. On the other hand, Pakistan is facing technical, political, and economic challenges that may well delay efforts for carbon pricing if left unaddressed. Foremost, technical capacity has been a bottleneck. The creation of emissions monitoring, verification, and reporting (MRV) systems and accompanying institutions to manage emissions registries and markets call for administrative resources and funding, which are spread thinly over the multiple development objectives the government is seeking to achieve. While the political will within the federal government bodes well for the development of a carbon pricing instrument, adoption and implementation are not possible thereafter without the support of the provincial governments. This necessity for backing by the multiple tiers of government presents political risks. Moreover, the majority of the population and some of the most exposed sectors are not yet prepared to bear additional costs. Acceptance by civil society and industry will therefore prove crucial to the success of carbon pricing in Pakistan. The potential implications of a growing fossil fuel industry, sensitivity around price increases, and differing interpretations and awareness among key stakeholders about the costs and benefits of carbon pricing must be carefully navigated in the early stages of the instrument's development.

An analysis of the barriers and opportunities to the introduction of carbon pricing helps inform the design of a carbon pricing policy and identify pathways for its implementation. This report aims to do that by assessing the potential for carbon pricing in Pakistan. The analysis is based on an analytical framework previously developed under this research project (Doda et al. 2021). It expands on prior country-level analyses (Doda et al. 2022) by means of an in-depth review of a set of variables that yield insight into carbon pricing readiness complemented by stakeholder interviews. The report is structured as follows. Section 4.2 details the constellation of stakeholder groups and actors, and their respective positions within the domestic debate on carbon pricing. Section 4.3 provides an assessment of Pakistan's carbon pricing readiness considering political, legal, economic, multilateral, and technical dimensions. Here we pay particular attention to interactions with power market regulations and additional policies.

Section 4.4 synthesises the main findings across the respective components and identifies possible pathways for the implementation of a carbon pricing policy in Pakistan.

4.2 Stakeholder mapping

The positioning of stakeholders on carbon pricing, their economic weight, and influence on public policy decision making can make or break the success of the instrument. This section reviews the main actors and stakeholders in the carbon pricing policy domain and reviews their positions on the topic based on interviews.

Overview of main actors and stakeholders in Pakistan with respect to carbon pricing

Carbon-intensive industries are likely to be directly affected by the introduction of a carbon price. Industry stakeholders would have to factor the carbon pricing component into their future business and operational decisions. The relevance of private sector stakeholders generally increases with their (sector's) share of overall emissions, while their economic weight and strategic relevance may indicate potential influence over the decision-making process. Relevant actors from the upstream fossil fuel industry include **Pakistan Petroleum Limited (PPL)**, **Mari Gas Company Limited (MGCL)**, **Pakistan State Oil (PSO)**, and **Asia Petroleum Limited**. International energy companies such as **Shell**, **Eni**, and **United Energy Group** are also active in Pakistan working through concession contracts and joint ventures with Pakistan's state-owned oil companies. Key actors in the power sector include the **National Transmission and Despatch Company (NTDC)**, **GENCO Holding company limited (GHCL)**—state-owned power generation, and **independent power producers** represented by the **Private Power and Infrastructure Board (PPIB)**.

The government and its ministries are responsible for the smooth implementation and operation of a carbon price, including designing the instrument and its eventual operation, enforcement, and oversight. The ministries and regulators must have the technical and legal capacity to fulfil these functions effectively. The **Ministry of Climate Change (MOCC)** oversees the development of climate policy in Pakistan. The **Ministry of Energy (Petroleum Division, MPNR; Power Division, MOWP)** sets the long-term direction of the country's energy sectors; the policies it implements will interact with a carbon price. It also owns a sizable amount of assets through its **state-owned enterprises** such as in upstream fossil fuel production and the power sector. The **Ministry of Industries and Production (MoI&P)** regulates both state-owned and private industry stakeholders that would be covered by a carbon pricing instrument. The government's **Finance Division** would likely be involved in managing and collecting carbon revenues. Equally relevant are the respective provincial ministries whose backing is required for the formal adoption and implementation of carbon pricing. Additionally, the **National Electric Power Regulatory Authority (NEPRA)** regulates the power sector. It grants licences, oversees investment programmes, and determines market rules and provisions. Any adjustments to the power market necessary to integrate a carbon price would fall under its responsibility.

Civil society and politically engaged actors inform the debate around carbon pricing. In general, the presence of a network of NGOs, political and advocacy groups, associations, and research or policy institutes that support carbon pricing is key to its success. While civil society actors with a specific carbon pricing mandate are not yet broadly represented in Pakistan, multiple organisations do contribute to advancing climate policy in the country. These include the **Sustainable Development Policy Institute (SDPI)**, the **Civil Society Coalition for Climate Change (CSCCC)**, the **Renewable and Alternative Energy Association of Pakistan**, the **Pakistan Green Party**, and the **Pakistan Tehreek-e-Insaf (PTI)**, Pakistan's ruling party whose government has initiated plans for carbon pricing.

International actors facilitate dialogue across regions and transpose lessons learned from jurisdictions that have developed relevant experience with carbon pricing. Their role is furthermore essential for capacity-building activities and financial support, which may considerably speed up the implementation of the instrument. The **UNFCCC** has directly supported Pakistan's carbon pricing strategy through the **CI-ACA initiative**. The **German GIZ** has a considerable presence in the country with a team of over 350 employees —of which 26 are international experts— focussed largely on climate & energy alongside two separate workstreams (GIZ 2022). The **World Bank** is a major player supporting Pakistan's economic transition across the board. It committed USD 400 million in 2021 for the Pakistan Program for Affordable and Clean Energy (PACE) programme, which aims at reforming the power sector to address prevailing financial woes and increase the uptake of clean energies. The **International Monetary Fund (IMF)** has also advised the government to that end. **China** is the largest foreign actor in economic terms with an investment portfolio in Pakistan that accounted for 41% of overall FDI in 2021 (Invest Pakistan 2022), at least quadruple the size of any other partner country. Pakistan and China signed a multiyear bilateral infrastructure development programme in 2015, the China-Pakistan Economic Corridor (CPEC), a component of the Belt and Road Initiative (BRI). The USD 46 billion project has been the main driver behind the surge of coal power in Pakistan, but it has also financed low-carbon energy projects (CPEC Authority 2022).

Eight stakeholders from the public, private, and civil society sectors were approached and interviewed as part of this project. The list of interviewees is included in the Annex. In order to ensure an anonymised approach, "interviewees" are cited as such and without individual reference.

Positions and interests vis-à-vis carbon pricing

The federal government is exploring the potential future role of a carbon pricing instrument in its evolving policy mix and has so far driven efforts for it with support of international actors such as CIACA. The Ministry of Climate Change is at the helm of climate policy development and the most vocal supporter of carbon pricing. According to our interviewees, ambitions for carbon pricing may not be widely shared across the federal ministries. Some considered it likely that the Ministry of Energy would oppose the introduction of a carbon price, particularly if it were to impose costs on its industries given prevailing financial challenges. The provincial governments are seen to focus predominantly on economic development priorities and do not yet have carbon pricing on their radars. Therefore, they may potentially resist the policy.

Support among industry is mixed. Carbon-intensive producers are most likely to oppose carbon pricing, but our interviews indicate support for the policy even within that group. A carbon pricing policy would benefit low-carbon producers, such as forestry and renewable power producers, and these are most likely to support it. Overall, the interviews suggest that stakeholders do share a concern about the effects of potential cost increases that may arise from carbon pricing seen against the background of sector specific challenges and Pakistan's macroeconomic environment, both of which are covered in greater detail in the economic section (Section 4.3.3). Consumers may oppose carbon pricing based on common but differentiated responsibilities, given that Pakistan faces disproportionate climate risks relative to its emissions. Environmental NGOs and civil society generally support carbon pricing, although the policy is not yet central to the debate on climate.

4.3 Carbon pricing readiness

4.3.1 Political dimension

4.3.1.1 Core analysis

Institutional environment

As a federal parliamentary republic, executive decision-making power in Pakistan is carefully balanced across the levels of government. Pakistan reverted to a federal system in 2010 that rearranged the constitutional division of powers between the tiers of government and vested the provinces with greater regulatory, fiscal, and administrative autonomy. The constitutional amendment, the implications of which are explained in greater detail under the legal dimension (Section 4.3.2), devolved environmental affairs to the provincial level. Climate change, however, has remained an area of shared competence where the federal government has been in the driving seat but whose initiated project and policies do require the support of the provinces. Interviewees considered the frequency of coordination between the tiers of government to be a bottleneck to climate policy implementation. The federal government established the Ministry of Climate Change in 2012 signaling climate change being elevated on the political agenda to a national issue. The MOCC has since been responsible for setting Pakistan's policy direction on climate adaptation and mitigation. The National Climate Change Policy (2012), the Framework for Implementation of Climate Change Policy 2014-2013 (2013), and Pakistan's NDCs (2016, 2021) are major policy documents in this respect.

The National Climate Change Policy raised the option of introducing a carbon tax on power generation. Discussions on carbon pricing policies continued internally until the release of the scoping report on carbon pricing developed with support from CIACA in 2019 (ref). In response, the government set up the NCEC and listed carbon pricing as one of the main mitigation instruments in its NDC of 2021. Despite the high-level commitment to climate change and the increased momentum on carbon pricing in recent years, the stakeholder interviews suggest that climate policy has so far remained a residual area in the policymaking domain. The MOCC, as a relative newcomer and without critical industries under its supervision, has less resources at hand to move its policies forward compared to influential ministries such as of energy or finance. Moreover, the government has prioritised climate adaptation over a mitigation response rationalised by the disproportionate climate impact it is facing relative to its global emissions share. Pakistan ranks eighth on an assessment by Germanwatch of countries most heavily affected by climate change (Eckstein et al. 2021), while it accounted for about 1% of global GHG emissions in 2018. Given the resource constraints, climate finance in particular has been a key priority of the government to address unfolding climate risks and more recently to curtail its emissions growth (Government of Pakistan 2021).

Public acceptability

Garnering public support for carbon pricing is critical to the success of the instrument as end-consumers must be able or willing to pay for emission costs passed on to them through increased product prices. There are potential barriers to carbon pricing in Pakistan in this respect that require consideration, the most pertinent being the cost of energy, especially of power. In 2021, the final power tariffs in Pakistan ranged from PKR 4 to 26 (EUR 0.02-0.13) per kWh depending on the level of consumption and consumer group (NEPRA 2021). All but the smallest consumers paid at least PKR 21 (EUR 0.11) per kWh of electricity on average. This compares to retail tariffs in the EU in the order of EUR 0.10-0.32 per kWh where the average per capita income is about ten times greater in PPP terms (EC 2022; World Bank 2022c). The actual cost of power generation and transmission in Pakistan is higher than the above rates suggest. Consumer subsidies amounted to PKR 236 billion (EUR 1.2 billion) in 2021, a decrease from

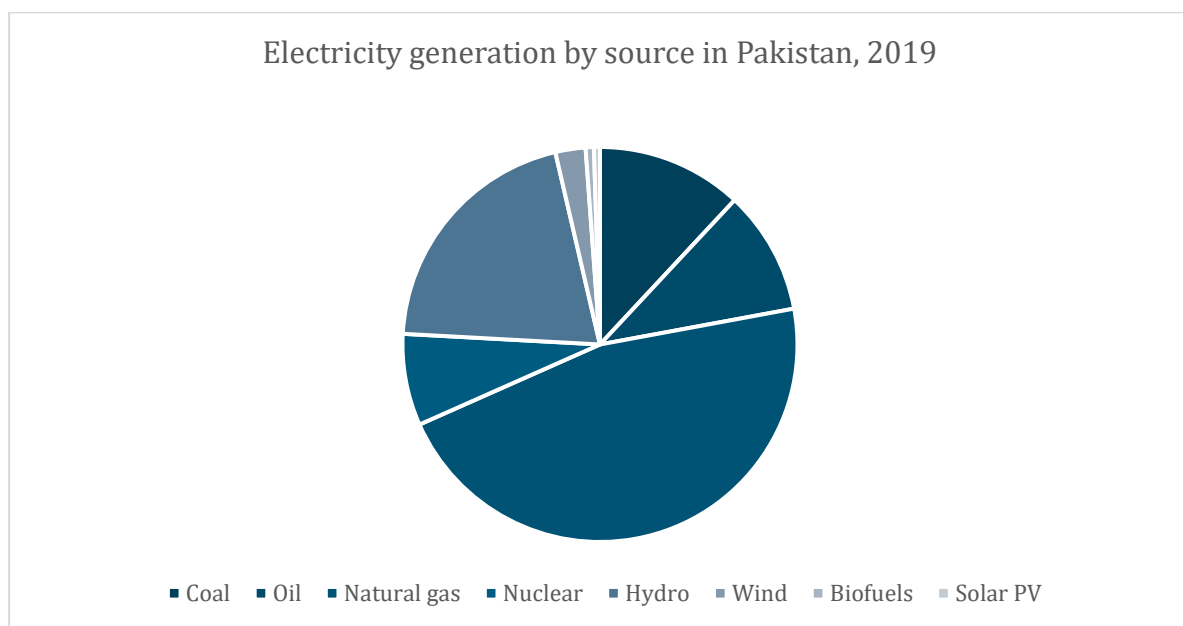
prior years when they surpassed PKR 300 billion (NEPRA 2021). Electricity tariffs will likely need to increase in the coming years to approximate cost recovery levels while surging inflation has escalated the overall cost of energy for Pakistani citizens (Section 4.3.3). Hence, the outlook on energy costs, at least in the short term, is bleak. The relatively large share of household income spent on energy consumption decreases the likelihood of support for a carbon pricing instrument that adds further costs to the household bill. Nearly all interviewed stakeholders raised this as a key concern to the introduction of carbon pricing.

The low economic resilience of the population at large to shoulder the costs of a carbon pricing instrument also formed the key rationale whereby several interviewees considered it likely that provincial governments would oppose carbon pricing in their respective jurisdictions. Provincial governments are seen to have overriding economic development priorities that make carbon pricing a hard sell unless it yields direct benefits for the population or supports government programmes. At the minimum, carbon revenues could be recycled to support low-income households to effectively cancel out any net carbon costs passed on to them. Yet interviewed experts hinted that this approach would not be without risk given prevailing challenges with revenue collection in the power sector, an issue to which we return in Section 4.3.3. Other flexible approaches thus may need to be considered. An ETS that starts out with freely allocated emissions certificates is likely to encounter least resistance.

Vested interests in carbon-intensive assets

In Doda et al (2022) we noted that the presence of vested interests in carbon-intensive production may pose a barrier to introducing carbon pricing in Pakistan. Indeed, the economy gradually has become more reliant on fossil fuels during the past decades. The government has also pushed for greater investment in the exploitation of the country's fossil fuel reserves as to secure cheaper domestic supplies for its growing energy needs. Besides state-owned and international energy companies, the influential Pakistani military has moved into oil and gas through its commercial wing whose value has been estimated at roughly USD 100 billion (Business Standard 2019). Still, Pakistan's upstream hydrocarbon industry has not developed on par with energy demand the majority of which has been met through energy imports (Section 4.3.3).

Several interviewees perceived vested interests in carbon-intensive industries to weigh heavily in the political decision-making process. Yet the interviews also indicated a willingness on the part of industry stakeholders to decarbonise given that supporting measures to offset cost increases are available. Opposition to carbon pricing could emerge in the transport, mining, manufacturing, and power sectors but will be contingent on the extent to which a carbon pricing instrument affects businesses' competitiveness. The interview data confirmed that the presence of coal-fired power generation increases opposition to carbon pricing. Coal power output rose to 20% of total power generation in FY2021 whereas it was essentially absent from the generation mix six years prior (NEPRA 2021).

Figure 10: Electricity generation by source in Pakistan, 2019

Source: IEA (2022)

Industry stakeholders expressed concern about the potential impact of a carbon pricing policy on the performance of firms and the implications of cost increases to end-consumers. One expert recommended that the government coordinates a broad consultation process including ministries, chambers of commerce, and both large and small industry firms to gauge the concerns of each group and raise awareness about various policy design types. Specifically, it should frame carbon pricing in terms of economic costs and benefits to ‘speak the language’ of businesses and facilitate an informed discussion by which to move its climate strategy forward.

Green lobby

A willing coalition formed of industry, civil society, and public sector stakeholders can mitigate concerns about carbon pricing, generate the required political support, and inform the design of the instrument (Doda et al. 2021). Pakistan has a sizeable low-carbon production base concentrated in the power sector. In 2021, the installed capacity of power generation consisted for 28% of hydropower, 7% of nuclear power, and 6% of variable renewable energies (VREs). Both public and private investors have a large stake in the country’s clean generation sources. The Water & Power Development Authority (WAPDA), a previously integrated public utility, owns most of Pakistan’s hydropower assets. The Pakistan Atomic Energy Commission (PAEC) owns and operates the country’s nuclear fleet. And investment in wind and solar is dominated by private and foreign investors (NEPRA 2021). Power sector authorities have prioritised ramping up investment in VREs. Doing so is widely considered a win-win option for addressing Pakistan’s energy security challenges and climate commitments. A carbon pricing instrument can support such a strategy by increasing the relative competitiveness of low-carbon generation technologies. It would also yield higher profit margins to low-carbon assets if prices are determined by wholesale energy markets. The introduction of carbon pricing would hence benefit Pakistan’s low-carbon producers, more so once market reforms in the power sector are introduced (see Section 4.3.3).

Civil society groups and organisations have become more numerous and active in the policy domain since Pakistan’s return to a democratic system in 2008. They tend to operate at distinct levels (local, provincial, and federal). Public discussion on climate policy shapes up at the federal level, and this is where the corresponding NGOs and think tanks have traditionally been most

active. One interviewee did point out that discussions on international carbon markets have more closely involved provincial stakeholders in the wake of COP26 given heightened interest in crediting opportunities from companies, international and domestic actors.

International development partners, civil society organisations, and academia generally are supportive of a domestic instrument. The influence of civil society actors in the policy domain has fluctuated with the years. According to one interviewee, there has been greater scope for the involvement of domestic climate experts in policy discussions since the 2018 elections. The Sustainable Development Policy Institute, for example, has worked closely with the MOCC in recent years and coordinated Pakistan's delegation to COP26. Despite such positive trends, carbon pricing has not yet featured prominently in the public debate. There is hence a key role for Pakistan's environmental, climate, and energy institutes to fill the void and ignite a broader discussion on how carbon pricing, specifically compliance instruments, may advance the country's long-term development objectives.

4.3.1.2 Conducive factors and obstacles

The federal government of Pakistan is considering introducing a carbon pricing instrument into its evolving policy mix. The MOCC is firmly committed to delivering on that objective, but resource constraints and the prioritisation of climate adaptation may delay efforts for it. Fortunately, Pakistan engages actively with a host of international actors whose continued support would help mitigate potential resource driven delays. Opposition to carbon pricing from carbon-intensive industries is likely and may find backing by other ministries, but so is support for the instrument by Pakistan's low-carbon producers that would stand to benefit from it. The major challenge to be addressed is the potential impact of a compliance instrument on energy prices and corresponding energy bills; the economic resilience of the population at large to bear additional costs is low. The introduction of a carbon price, particularly a carbon tax, could thereby entail a political risk that the government may seek to avoid ahead of the general elections scheduled for 2023.

A carbon pricing instrument that is tailored to Pakistan's development context would likely allay emergent concerns of industry and dampen the impact to vulnerable consumers allowing the government to proceed without delay. An ETS that starts out with freely allocated emissions allowances would face least resistance from either group while providing the policy infrastructure whereby to ratchet up climate ambition in the subsequent phases. Even so, the provincial governments must be on board with the policy and have sufficient capacity to implement it.

4.3.2 Legal dimension

4.3.2.1 Core analysis

Constitutional powers

In federal systems, the fiscal and regulatory autonomy accrued to sub-national governments may benefit carbon pricing potential by enabling bottom-up approaches to the initiation and implementation of carbon pricing instruments. The garnered experience at state level with carbon pricing may subsequently inform policy needs and encourage the implementation of the instrument elsewhere in the jurisdiction, also dubbed 'iterative federalism'.¹⁹ For such opportunities to arise, climate policy must be firmly on the agenda of sub-national governments. In Pakistan, climate mitigation policy is driven by the federal government and is unlikely to be initiated by provincial counterparts (Section 4.3.1). Yet, the support of the provincial

¹⁹ See Doda et al. 2021 for further details on and a definition iterative federalism,

governments will be needed for a nation-wide instrument. The constitutional division of powers are hence important to consider for identifying opportunities to carbon pricing as well as potential risks to its implementation.

Pakistan is a federal parliamentary republic. It has four provinces: Balochistan, Punjab, Sindh, and Khyber Pakhtunkhwa, plus two autonomous regions—Gilgit-Baltistan; Azad Jammu and Kashmir—while Islamabad is government by the federal government. The provinces are equally represented in the Senate (upper house) whose 104 seats are filled by provincial assemblies for six-year terms. Representation in the National Assembly (lower house) is determined by a province's population size. The public directly elects the 342 representatives seated in the lower house for five-year terms. The Pakistan Tehreek-e-Insaf (PTI) party has been in power since its landslide victory in the general elections of 2018 whence it secured 156 seats. It has been in a majority coalition government with five small parties of less than 8 seats each.

Pakistan experienced alternating periods of civilian and military governments between 1958 and 2008 accompanied by a centralisation of the decision-making process that concentrated powers with the executive. Two years after the reinstatement of the democratic government, the National Assembly passed the Eighteenth Amendment of the Constitution of Pakistan (2010) reverting previously attained presidential powers to the parliament and the prime minister's office. The constitutional amendment formally turned Pakistan from a semi-presidential republic into a federal parliamentary republic devolving a host of fiscal and administrative functions to the provinces. As outlined in Doda et al. (2022), the Eighteenth Amendment Act “vested substantial autonomy with the provinces modelled on the principle of dual federalism. 17 ministries (including planning, industry, food, agriculture, education, rural development, and social services) were devolved to the provincial level accompanied by fiscal decentralisation and an expanded tax base including environmental charges (Shah 2012).” The federal environment ministry was abolished in 2011 and transferred to the provincial level where the fiscal authority to collect environmental taxes has since formally resided. However, the division of responsibilities is not altogether clear with several environmental issues having remained under federal jurisdiction (Pastakia 2012). The provincial governments have also been empowered to enact energy policy in their respective jurisdictions although in practice they share decision making power in this area with other provinces and the federal government.

Alongside the new division of responsibilities between the federal and provincial governments, the 18th Constitutional Amendment that came into force in 2010 delineated areas that concern the federation at large and would require the involvement of both tiers of government. An overview of these is provided in Table 5 below.

The Council of Common Interest (CCI) was designated as the main decision-making body on the policy areas listed in the Federal legislative List (Part II) (Table 5). The CCI was established under the Constitution of 1973 to consult the provinces in federal decisions, but it remained dormant until the passing of the 18th Amendment which reinvigorated it with a new set of rules and responsibilities (IPC 2021; Shah 2012). The secretariat of the Council was transferred from the Cabinet Division to the Inter-Provincial Coordination Division in 2010. The CCI has since been responsible for high level policy formulation on joint federal-provincial matters, has an oversight role, and has the final say on matters within its domain. It also functions as arbiter on disputes among governments where they arise (e.g., electricity policy). The Council is formed of the prime minister, the four provincial chief ministers, and three federal nominees.²⁰ It must meet at least once every 90 days, although that requirement is not always met (IPC 2021). Its decisions are majority based and can be appealed in the joint session of the parliament. Another

²⁰ In 2019-2021 these were the ministers for Planning, Development & Special Initiatives, Inter-Provincial Coordination, and the Power Division, IPC 2021.

high-level intergovernmental authority that became relevant with the 18th Amendment is the National Economic Council (NEC). The NEC was reformed to allow for greater representation of the provincial governments and is tasked with coordinating nation-wide economic policies. It convenes less frequently than the CCI, officially every semester, and brings together the four chief ministers of the provinces, four provincial nominees, and four cabinet ministers. It is headed by the prime minister. Both bodies are accountable to parliament.

Table 5: Shared competencies under the 18th Amendment

Joint Federal-Provincial competencies (Federal Legislative List, Part II)		
Electricity	Public debt	Census
Minerals, oil, and natural gas	Federal corporate entities (incl. WAPDA)	Legal, medical and other professions
Railways	Industrial policy	Standards in higher education and research, scientific and technical institutions
Major Ports	National planning and economic coordination	Coordination of scientific and technological research
Regulatory authorities operating under federal law	Inter-provincial police operations	Inter-provincial matters and coordination

Source: IPC (2021)

Before the introduction of the 18th Amendment, matters concerning environmental pollution and ecology were on the ‘Concurrent List’ which denoted areas of common competencies among the national and provincial legislatures. Federal law, in the form of the Pakistan Environmental Act (PEPA) 1997, had overriding effect when conflicting provisions arose. Since 2010, provincial authorities have exclusive jurisdiction over environmental matters barring environmental impacts of sectors that have remained under federal jurisdiction (e.g., shipping, oil and gas, mining, and nuclear energy) (Pastakia 2012). In line with the constitutional revisions, the implementation of climate policy such as carbon pricing has become a responsibility of the provinces (Aleluia et al. 2019). Nonetheless, the federal government remains at the helm of the country’s policy course on climate change and of overseeing implementation efforts across the country as several of the interviewees underscored. This partly stems from its retaining exclusive authority on external affairs. The federal government is the sole Pakistani authority that can negotiate and sign on to international treaties and agreements including those concerning the environment and climate. As signatory to the Paris Agreement, it is the federal government that bears the responsibility for delivering on Pakistan’s stated ambitions. The continued role of the federal government also stems from pragmatic necessity: the transboundary nature of environmental challenges such as emissions require a coordinated approach to avoid duplication, enforce common standards, and avoid a potential risk of leakage once climate instruments become more stringent. Additionally, attracting external funding for Pakistan’s climate programmes has remained a federal matter. The shared responsibility on climate change mitigation is further evident from the list of joint competencies in Table 5. In addressing a transboundary issue, climate mitigation policies could be discussed as inter-provincial matter. Carbon pricing also pertains to power and industrial policy given its wide sectoral scope and will likely require the CCI’s approval before being introduced.

In short, climate change policy in Pakistan shapes-up in a multi-level governance framework where the federal government initiates and develops nation-wide policies but support from the provinces is required for their adoption and implementation. Multiple interviewees expressed

that alignment between the provinces and the federal government on policy decisions is more likely when they share the same ruling party. There could hence be a political-legal risk to the implementation of a carbon pricing instrument born out of the greater autonomy of the provinces through the 18th Constitutional Amendment. At the same time, the multi-level governance framework may well ensure that carbon pricing, once introduced, enjoys wide support among key public sector stakeholders across the tiers of government.

Climate and low-carbon laws

A carbon pricing instrument must be embedded in a sound legal framework to ensure its long-term viability. It requires governments to pass acts and effectuating decrees for establishing and operating the instrument, but it cannot be implemented from scratch. The introduction of carbon pricing builds on a previously established and broader legal framework for climate change mitigation. The latter may define long-term climate targets, delineate responsibilities across government agencies, and set mandates for new institutions to be developed as necessary. The presence of existing high-profile legislation on climate change illustrates the headway a jurisdiction has made in this respect and indicates its legal readiness to pass and implement legislation on carbon pricing. In addition, the scope of low-carbon laws such as on renewable energy and energy efficiency approximate the regulatory expertise on the part of the government that is required for the implementation of a carbon pricing instrument.

Pakistan has several pieces of flagship legislation that have spawned an array of low-carbon energy supporting measures and instruments, an overview of which is provided in Table 10 in Section 4.3.3. The major legislative acts are the following:

- ▶ Alternative Energy Development Board Act (2010)
- ▶ The Pakistan Council of Renewable Technologies Act (2010)
- ▶ National Energy Efficiency and Conservation Act (2011); (2016)

Interviewees confirm the legal capacity and expertise on the part of the government to enact low-carbon policies and laws, signalling legal readiness to introduce carbon pricing.

Environmental legislation in Pakistan dates to the 1980s and was institutionalised through the passing of the Pakistan Environmental Act in 1997. Amongst others, the Act set a mandate for the creation of a federal environment protection agency which started operating the following year. The Pakistan Environmental Protection Agency (PEPA) establishes and enforces environmental policies and standards, monitors the state of the environment, and it also coordinates environmental programmes internationally (National Assembly of Pakistan 1997). It is part of the MOCC and since the constitutional amendment has been complemented by provincial environmental protection agencies (EPAs). The authors of the scoping report on carbon pricing in Pakistan developed under the CIACA initiative see a major role for the EPAs of both levels of government. PEPA would be well placed to support the MOCC with technical, regulatory, and operational support, whereas EPAs could be made responsible for ensuring compliance by industry and for setting up the MRV infrastructure in their respective provinces (Aleluia et al. 2019).

The federal government established the MOCC in 2012 after having devolved the environment ministry to the provinces. The MOCC released its blue-print climate policy document, the National Climate Change Policy, shortly thereafter. The major executive and *legislative* pieces on climate change (mitigation) introduced since the MOCC's inception are the following:

- ▶ National Climate Change Policy (2012)

- ▶ Framework For Implementation of Climate Change Policy 2014-2013 (2013)
- ▶ Pakistan Vision 2025 (2014)
- ▶ Pakistan INDC (2016)
- ▶ *Pakistan Climate Change Act (2017)*
- ▶ *Global Change Impact Studies Centre Act, 2013 (2018)*
- ▶ Pakistan updated NDC (2021)

The Pakistan Climate Change Act was a milestone document as it enshrined into law the creation of a climate change governance framework with accompanying institutions. Namely, the Act provides a mandate for three governing bodies: 1) the Pakistan Climate Change Council, an executive decision-making body to be chaired by the prime minister and formed of federal ministers, provincial ministers, the provincial chief ministers, and appointed non-officials. The Council will be responsible for monitoring the implementation of international climate agreements, high-level supervision of mainstreaming climate change into decision-making processes across federal and provincial ministries and approving and monitoring the implementation of mitigation policies and strategies, amongst others. 2) the Pakistan Climate Change Authority, a high-level authority that will be responsible for developing national policy plans, climate policy instruments, programmes, and projects to meet the country's obligations under international agreements. Its chair and members are to be appointed by the prime minister and will have portfolios covering either adaptation, mitigation, climate finance, or coordination. The provinces can also nominate one member each, the chair will also participate in the Council. The 'Authority' will comprise high-level technical experts to push Pakistan's climate ambitions forward. Its members can be scientists, high-level technocrats, industrialists, and agriculturists. It will also be tasked with promoting REs, energy conservation, awareness-raising and coordinating capacity building programmes. 3) the Pakistan Climate Change Fund, a central depository to manage climate finance as received through donations, endowments, grants, and gifts. It will be managed by the Authority once set up. The MOCC expects to complete establishing the above three institutions by the end of 2022 (Government of Pakistan 2021).

The new climate governance framework underscores that the topic is high on the government's agenda and is likely to streamline climate policy development going forward. The Authority will strengthen the MOCC with a technical arm and may support it in designing a carbon pricing instrument, while the Council acting as executive oversight body could speed up the implementation of climate policies including carbon pricing. In addition, as (Aleluia et al. 2019) note, the Fund would be well placed to act as the manager and distributor of carbon revenues. As such, the Pakistan Climate Change Act provides an institutional bedrock with a clearer delineation of responsibilities that can facilitate the introduction of a carbon pricing instrument. New legislation could soon be added to this list above. One interviewee flagged that the government is working on a bill, "declaring carbon as a national asset", which has received support from provincial governments and would provide the legal base for the development of carbon markets and subsequent regulations.

Foreign investment protection

Investment relations are equally relevant to the introduction of carbon pricing. International investment treaties facilitate FDI inflows that can mobilise much needed capital for low-carbon infrastructure on the back of corrected market incentives brought about by a carbon price. At the same time, investment treaties may offer those foreign investors with a stake in carbon-intensive production separate legal avenues to move against the instrument should it affect their

businesses. The potential risk of investment arbitration challenges thus requires consideration. Pakistan and Germany signed the world's first bilateral investment treaty (BIT) in 1959. Pakistan has since signed BITs with 45+ countries. China is by a large margin the biggest investment partner to Pakistan.

Chinese FDI has skyrocketed since the launch of CPEC in 2015. The prospects for low-carbon investment under the multibillion-dollar investment programme greatly improved with the government's moratorium on coal investments as well as China's pledge to halt overseas coal finance, which it announced at 76th Session of the UN General Assembly in 2021. That said, Pakistan's coal fleet has been financed almost entirely through CPEC based on build-own-operate conditions backed up by guaranteed returns on investment. While future coal projects are halted for the time being, about 3.6 GW of additional capacity is still under construction or being considered (CPEC Authority 2022). With the right market adjustments (see Section 4.3.3), a carbon price would affect the returns on coal-fired power generation. This could imply a breach of contract by the government in light of its commitments under CPEC and would likely provoke a legal response. This theoretical scenario is unlikely to come to pass: coal power has become a critical fuel source for Pakistan's energy security, and the government will seek to better utilise existing capacity to reduce the cost of power (see Section 4.3.3). Still, the safeguarded interests of Chinese investors form a backstop against a more stringent carbon pricing instrument if it were considered and diminish the opportunities for an early coal phase out that is driven by market signals. This holds unless the government is willing to compensate coal-fired plants for foregone revenues, which could tie up revenues generated from the instrument and likely require additional financing.

4.3.2.2 Conducive factor and obstacles

The government of Pakistan has not yet effectuated a decree or introduced a bill for carbon pricing but is exploring the role of a carbon pricing instruments in its policy landscape. The existing low-carbon legislative framework mirrors the legal capacity and experience of the government in enacting related policies, while the emerging climate governance framework is set to facilitate their implementation. Taken together, these two factors signal legal readiness on the part of the government to press ahead with carbon pricing.

Pakistan's federal system vests substantial autonomy and decision-making power with the provinces. The provinces have equal representation in the Senate of Pakistan most of whose members the provincial assemblies elect. Were a bill for carbon pricing to be introduced at the federal level, it would have to pass both the National Assembly and the Senate and thereby be subject to the interests of the provinces. With the devolution of powers following the 18th Constitutional Amendment, it is not ruled out that legislative procedures for carbon pricing would involve the provincial assemblies themselves. Either way, the required legislation for carbon pricing cannot be enacted without backing from subnational actors. The same goes for the design and implementation of the instrument involving the executive branches of both layers of government such as the CCI, the Climate Change Council, and the Climate Change Authority. These legal realities create both opportunities and risks. On the one hand, the requisite support of a diverse group of public stakeholders representing different layers of administration could ensure the long-term durability of a carbon pricing instrument once introduced. On the other hand, it may delay the process of adoption and involve political trade-offs to reach consensus that could affect the scope and stringency of the instrument. The nature of these dynamics will depend on political realities. Alignment of the provinces with the federal government on policies concerning the federation is more likely when they share the same ruling party.

The ruling party of the federal government, PTI, lost the provincial election of 2021 in its traditional stronghold Khyber Pakhtunkhwa. As of early 2022, PTI is in government in Punjab as

the largest party and in Balochistan where it secured seven seats in 2018. The political landscape is set to evolve further over the next year: Provincial elections in Punjab are scheduled for 2022, in Balochistan and Sindh for 2023, and the general elections will take place in 2023 as well. The potential for introducing carbon pricing will be contingent on the constellation of federal and provincial government coalitions that emerge by then.

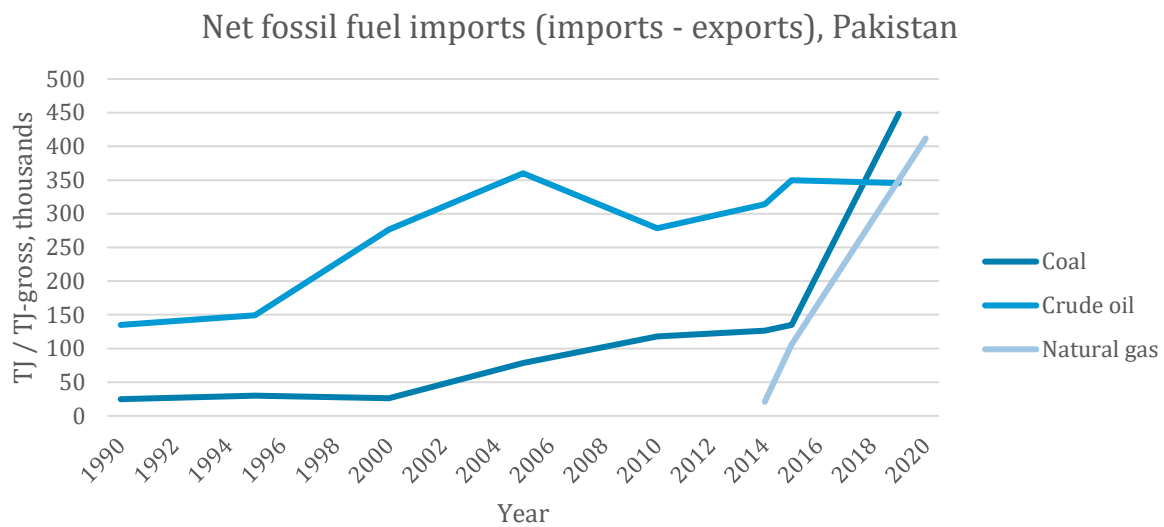
The multi-level decision making process in which a multitude of interests ought to be considered points to the introduction of an ETS over a carbon tax given the broader choice of design elements it offers decision makers to suit the country's needs.

4.3.3 Economic dimension

4.3.3.1 Core analysis

Economic structure and development

Pakistan is a lower-middle income country with a GDP of USD 320 billion (in constant 2015 US\$) in 2020. It has a large services sector that accounted for 61.4% of GDP in 2019-2020, whereas agriculture and industry comprised 19.4% and 19.2% respectively. Within industry, the manufacturing sector accounted for 12.2% and construction activities for 2.5% of GDP (see Table 6). Taken together, these industries made up 13.5% of GHG emissions and a quarter of non-agriculture related emissions in 2017-18 according to Pakistan's NDC of 2021. Energy industries (i.e., largely power generation) were estimated at 20% of non-agriculture GHG emissions (see Figure 12 below). The energy sector at large is responsible for about half of Pakistan's total GHG emissions, a share that it set to increase further in the BAU scenario. The economy's sectoral composition provides an initial indication of the potential economic impact of a carbon pricing instrument including leakage risks. Pakistan does not have sizeable export-oriented heavy industry; chemicals, engineering goods, and cement constituted 6.5% of the total export volume in 2020-21 (Finance Division 2021b). These industries are protected from external competition by import tariffs that the (World Bank 2021b) has classified as among the highest in the world. There is high growth potential in these sectors; the government forecasts cement production (a major source of coal demand) to increase by 10-15% annually (Government of Pakistan 2021). Hence their growth and abatement potential should be considered in the design of the instrument. Textile manufactures make up the greater part of exports, about 61%, and are by far the largest manufacturing sector (GoP - Finance Division 2021). Under a fully operational carbon price, it would face indirect carbon costs from power consumption and be covered directly insofar stationary combustion sources are used in the production process. The expected surge in energy-related emissions as Pakistan's industries grow makes the introduction of a carbon price timely and imperative.

Figure 11: Net fossil fuel imports (imports - exports), Pakistan²¹

Source: IEA (2022)

In terms of the trade of fossil fuels, Pakistan imports nearly a third of its energy as coal, oil, and recently also LNG (Malik et al. 2019). As local gas reserves deplete, these numbers are expected to increase further, as seen by the general trend in increasing fossil fuel imports of recent years (ibid). Heavy reliance in fossil fuel imports exposes Pakistan to international price shocks and inflation. These inflationary pressures in turn can negatively impact Pakistan's export competitiveness, further "constraining the economy's capacity to pay for energy imports" (ibid p. 1). Energy security is thus an increasing challenge for Pakistan, also in terms of geopolitics, given its growing economy and large population; these issues may be addressed by the further deployment of renewable energy and energy efficiency measures.

Production in Pakistan is labour intensive. In agriculture, the ratio between the employment share of the total labour force and contribution to GDP is 2 to 1. In other words, the agriculture sectors employ twice the percentage of the total labour force compared to what they contribute to the overall GDP. For industry, the share of total employment is 1.2 times the contribution to GDP reflecting the prominent role of labour-intensive manufacturing sectors such as the textile industry. An overview of the sectoral composition of employment is provided in Table 9. Pakistan has a large working age population which totalled 153.5 million in 2018-19. (The total population in 2019 was 217 million and grew to 221 million in 2020). The total labour force numbered 68.8 million individuals in 2019, 4.7 million (6.9%) of which were unemployed. Pakistan has a large informal economy that provided jobs to about 27.3 million people, or 72.4% of the non-agriculture workers, in the same year (PBS 2019).

Pakistan's GDP per capita (constant 2015 US\$) stood at USD 1466 in 2020, less than 1/20th of the EU average. In terms of purchasing power parity (PPP), Pakistan's GDP per capita amounted USD 4811 in 2020, about one-tenth of the EU's. Income inequality in Pakistan is moderate with an estimated GINI coefficient of 31.6 in 2018 (World Bank 2022b). A government report from 2016 indicated 24.3% of the population to be living below the poverty line of PKR 3250/month (USD 31/month)²² for that year. This significant share obscures the notable progress that had

²¹ No export data for natural gas available from the IEA.

²² Based on the average exchange rate of USD to PKR for 2016: 104.7111.

been made in the decade prior: 50.4% of the Pakistanis were living below the poverty line in 2005-06 with a quarter of the overall population being lifted from it over the ten years that followed (Ministry of Planning, Development & Reform 2016). The government has had to deal with high price inflation over the past years, which often has moved into the double digits closing at 12% in December 2021 (Trading Economics 2022). Inflation is typically driven by increasing costs of basic services (e.g., electricity) and imported commodities such as food and energy, and it may therefore disproportionately affect the poor who tend to spend a larger share of their income on primary goods and services. The distributional impact of carbon pricing should hence receive close attention in the Pakistani context.

Table 6: Pakistan's GHG emissions by sector (2017-2018)

Sector	Sub-sector	Emissions (Mt CO ₂ e)	Total Emissions (Mt CO ₂ e)
Energy	Energy industries	53.40	218.94
	Manufacturing and Construction	66.20	
	Transport	51.34	
	Other	44.06	
	Fugitive fuel emissions	3.94	
Industrial processes and product use	Mineral industry	22.75	25.76
	Chemical industry	2.71	
	Non-energy fuel and solvents	0.10	
	Other (paper, pulp, food & Bever.)	0.20	
Agriculture, forestry, and other land use	Livestock	109.12	223.45
	Land	31.52	
	Managed soils	74.98	
	Rice cultivation	7.83	
Waste	Solid waste disposal	10.23	21.72
	Waste incineration	0.9	
	Wastewater treatment	11.90	
Total emissions			489.87

Source: Government of Pakistan (2021)

Table 7: Sectoral composition of Pakistan's GDP and employment (in %)

Sector	GDP (2019-2020)	Employment (2018-2019)
Agriculture	19.4	39.2
Industry	19.2	23.0
Mining	2.6	<0.5
Manufacturing	12.2	15.0
Power generation & distribution; Gas distribution	1.8	<0.5
Construction	2.5	8.0
Services	61.4	37.8

Source: PBS (2019, 2021)

Macroeconomic outlook

Pakistan's economy has grown continuously albeit affected by recurrent business cycles: since the turn of the century, GDP growth has ranged from 1.1% (2019) to 7.5% (2004). The economy contracted by 0.9% in 2020—a first for the country for decades—triggered by reduced demand and investment as a result of the COVID-19 pandemic. Particularly hard-hit were the labour-intensive manufacturing sectors that were disproportionately impacted by distancing and mobility restrictions. Additionally, the depreciation of the Pakistani Rupee (PKR) drove up import costs while a high interest rate (at 13.3% early in the year decreasing to 8% later on) discouraged investment (Finance Division 2021b). The economy rebounded in 2021 on the back of renewed economic activity following the easing of general lockdown measures, high remittance inflows, a fiscal stimulus package of PKR 1.2 trillion (EUR 6.4 billion)²³, and accommodative monetary policy (GoP - Finance Division 2021). Pakistan's GDP grew by 3.9% in FY2021 (i.e., until end of June) (ibid) outperforming both the government's target and projections by the IMF, which estimates growth to carry on at 4-5% per annum during 2022-2026 (IMF 2021b).

Several structural challenges have troubled Pakistan's economic performance and may affect its otherwise stable growth outlook. Pakistan has had a persistent twin deficit, on the current account and the fiscal budget, that has put a strain on its foreign reserves while driving up public debt. The total public debt of Pakistan surpassed PKR 50 trillion towards the end of 2021 (Rana 2021), a doubling since 2018 (GoP - Finance Division 2021). The fiscal deficit increased to 9.1% of GDP in 2019-2020, which the government intends to decrease to 4.8% by 2023 (Finance Division). Interest payments and defence spending combined constituted 78% of federal tax revenues in FY2020-21 (Finance Division 2021a), underscoring the need for additional resources and fiscal consolidation.²⁴ A relatively small export base and widening trade deficit (to USD 30 billion in FY2021) lie at the root of Pakistan's weak external position,²⁵ which in turn has

²³ Based on the average exchange rate of EUR to PKR for 2021: 192.5988

²⁴ Tax revenues from the FBR totalled PKR 5,464 billion and non-tax revenues PKR 1,109 billion complemented by government borrowing. Interest payments amounted PKR 2,946 billion for that year; defence spending PKR 1,289 billion, Finance Division 2021a.

²⁵ This can be attributed to limited export capacity dominated by smaller firms, a reliance on low value-added goods (textiles and foods), limited access to potential export markets, inadequate supporting services (long-term financing, market intelligence), and relatively low productivity of Pakistani firms, World Bank 2021b. Furthermore, import tariffs aimed at import substitution have had the unintended

largely driven the depreciation of the Pakistani Rupee against the U.S. Dollar raising the costs of key commodities such as energy imports (World Bank 2021b).²⁶

Reforms have been underway to improve the tax-GDP ratio (currently at 10%) and strengthen Pakistan's external position, with the support of international creditors such as the IMF, World Bank, and ADB (FBR 2021; World Bank 2021b; IMF 2019). The IMF approved a bailout in 2019 coupling short-term balance of payments relief with a reform package aimed at consolidating Pakistan's external position in the long-term.²⁷ This includes reforms to the power sector to address accumulated arrears, an issue that is also central to the World Bank's PACE programme and to which we return below.

Macroeconomic dynamics in Pakistan may affect the stringency of a prospective carbon pricing instrument. The global energy crunch compounded with a weakened currency drove inflation in Pakistan into double digits towards the end of 2021 greatly increasing the costs of imported energy to industries and the population. This may render a carbon pricing instrument that adds additional costs on (carbon-intensive) energy a tough sell, a remark that interviewed stakeholders repeatedly underscored. An expansion of Pakistan's export base is likely going to be a condition for macroeconomic stability in the years ahead. Therefore, design options must be considered that encourage emissions abatement but do not affect sorely needed improvements in the international competitiveness of Pakistan's export industries. One way to manage potentially adverse economic impacts is to align the instrument with ongoing fiscal reforms to offset net carbon cost increases to key industries while keeping the price signal intact. Alternatively, transitional measures can be provided to trade exposed sectors, for instance by granting free emissions allowances based on efficiency benchmarks. In the long-term, e.g., a carbon price may well support Pakistan's macroeconomic outlook through a lower energy import bill, reduced exposure to volatile energy markets, and the efficient utilisation of its vast domestic low-carbon energy resources.

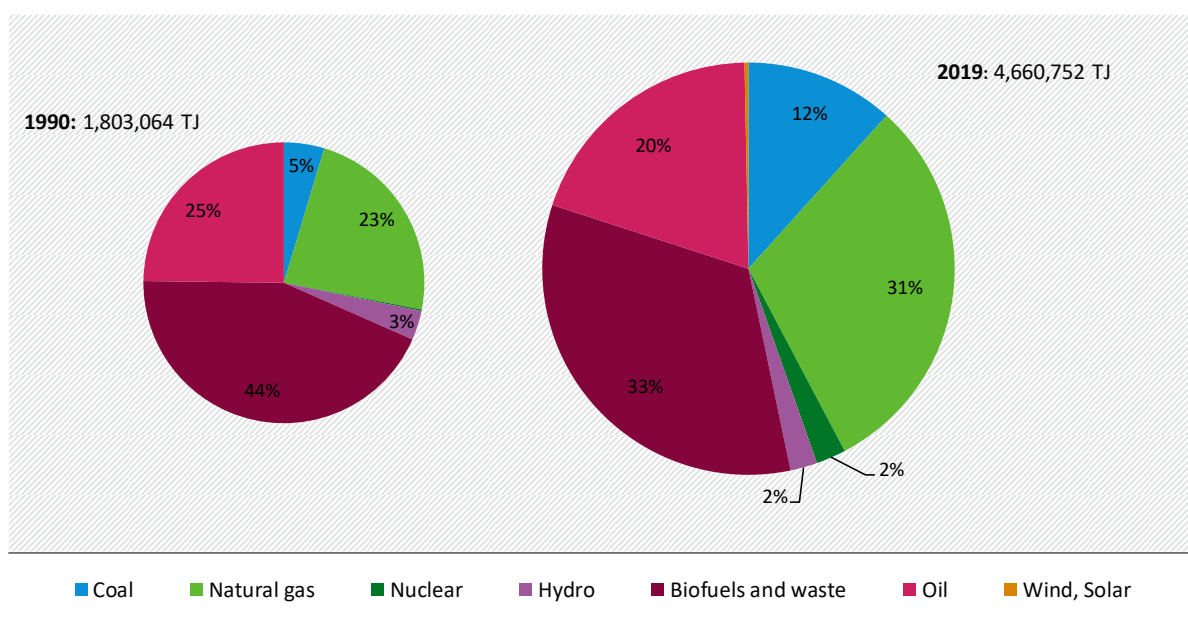
Energy sector characteristics

The population of Pakistan nearly quintupled in size between 1960 and 2020, while the GDP (in PPP, current international \$) quadrupled over the past three decades (World Bank 2022b). The country's sustained economic and population growth have come with a rapid increase in energy use across the board. Total energy consumption almost tripled between 1990-2019 rising from 43 Ktoe to 110 Ktoe (Enerdata n.d.). While low-carbon energy sources have grown considerably, the mounting energy needs have been met mostly through fossil fuels. Figure 12 below provides an overview of the Pakistan's energy mix in 1990 and 2019.

effect of crowding out potential exports for instance in key sectors such as textile manufactures. Tariff reforms are underway and expected to ameliorate export competitiveness, World Bank 2021b.

²⁶ The PKR started its ascent against the USD from about 104 PKR/USD late 2017 to 152PKR/USD in May 2021 up to a peak of 179 PKR/USD in December 2021. Other currency drivers were the Morgan Stanley's downgrade of the PKR late 2021 and the prospect of higher interest rates in developed economies shifting to monetary policy tightening, World Bank 2021b. To some extent, the depreciated PKR reflects market corrections to what was previously considered an overvalued currency.

²⁷ The IMF approved a USD 6 billion Extended Fund Facility Arrangement (EFF) for Pakistan in 2019. The 39-month program aims to address the structural challenges to Pakistan's balance of payments. It targets five key areas for reform: i) fiscal consolidation through increased revenue mobilization by 4-5% of GDP; ii) an expansion of social spending and social safety nets; iii) the restoring of competitiveness and monetary stability through a flexible, market-determined exchange rate; iv) electricity sector reforms to eliminate "quasi-fiscal" losses and boost investment; v) institutional reform to improve governance, transparency, and the investment climate, IMF 2019. The programme leverages additional financial assistance from Pakistan's international partners such as the ADB, World Bank and bilateral creditors (China, the UAE, Qatar, and Saudi Arabia) in the order of USD 38 billion.

Figure 12: Pakistan's energy mix in 1990 and 2019

Source: IEA (2022)

Total primary energy supply (TPES) reached 4.7 million terajoule (TJ) in 2019, 38% of which originated from low-carbon sources (compared to 47% of 1.8 TJ in 1990). The bulk of Pakistan's low carbon energy supply comes from biofuels and waste which constituted one-third of its overall energy supply in 2019. Biomass is mostly used as a direct heating source by households and to a lesser degree as input source for power generation. It has been heralded as an environmentally friendly energy source that given its domestic abundancy could help mitigate Pakistan's energy security challenges (Iqbal et al. 2018; Mirza et al. 2008; Tareen et al. 2020). Nuclear energy, hydropower, and variable renewable energy (VRE; solar, wind) constituted 2.3%, 2.1%, and 0.3% of the primary energy mix in 2019 bringing the share of clean energies to approximately 5%. These sources will form the foothold of Pakistan's low-carbon energy future. Their supply has increased substantially over the past decades (VREs notably entered the energy mix from 2015 onwards), but there is vast untapped potential for their scaled-up deployment required to meet Paris goals. Installed hydropower capacity amounted to 9698 MW in 2021 out of an estimated potential of 60,000 MW. This number roughly equals the expected the total installed generation capacity (of all sources combined) by 2030 (IHA 2020; NTDC 2021). Pakistan belongs to the group of countries with the greatest solar power potential, exceeding 4.5 kWh/kWp (ESMAP 2020). In theory, only a fraction of Pakistan's surface area (<0.1%) would be needed for solar power to meet the aggregate demand for power (World Bank 2020b). The country is also endowed with several wind corridors in the south that provide excellent sites for large-scale wind projects (World Bank 2021c). One study estimates the aggregate wind power potential in Pakistan at 346,000 MW (Shami et al. 2016) far outpacing current and projected power needs. The high latent potential for renewable energy augurs well for carbon pricing in Pakistan.

As evident from Figure 12, the Pakistani economy has become more reliant on coal and natural gas. The share of coal in the TPES remained relatively stable until 2015 and rapidly increased in the years following from about 5% to 12% in 2019 (IEA 2022). In absolute terms, the energy supplied from coal roughly tripled in a timeframe of five years which can be attributed mainly to FDI inflows under CPEC that started in 2015. Only a small share of overall coal demand is

produced domestically leading to an import dependency of 82% in 2019. This is set to change given Pakistan’s massive lignite reserves and growing coal demand for power generation. Most of the imported coal is used in industry, largely the cement sector which is forecast to grow by 10-15% annually towards 2030 (Government of Pakistan 2021). Besides industry, increased demand for coal is also likely to come from the power sector as the remaining coal-fired power plant projects come to grid in the next few years. Natural gas comprised 31% of the energy mix in 2019, up from 23% in 1990. In absolute terms, the supply of natural gas more than tripled over that timeframe. Domestic production of natural gas is significantly higher than that of coal. The import dependency of natural gas was 22% in 2019 with imports consisting mostly of LNG. The share of oil in the energy mix declined from 25% in 1990 to 20% in 2020 while the overall supply doubled. Oil is predominantly used in the transport sector; the import dependency was 78% in 2019.

The government of Pakistan has aimed to boost domestic production of hydrocarbons to mitigate its energy security challenges and reduce the import bill, an ambition that has received new impetus more recently. Pakistan has ample coal resources overall but limited hard coal — an important fuel source for energy-intensive industries such as the cement sector. Pakistan’s current reserves of natural gas may not last longer than a decade. However, ongoing exploration activities could alter the outlook for domestic gas in the coming years. Table 8 provides an overview of Pakistan’s coal and gas reserves.

Table 8: Proved reserves at end 2020

Source	Proven reserves	Share of global reserves	R/P ratio
Coal	3064 million tonnes	0.3%	396
Anthracite & bituminous	207		
Sub-bituminous & lignite	2857		
Natural gas	13.6 trillion cubic metres	0.2%	12.6

Source: bp (2021)

The (EIA 2016) reports that oil production in Pakistan had been sustained by additional oil discoveries in the years prior to 2015. One estimate puts Pakistan’s crude oil reserves at 540 million barrels for 2021, up from 371 million in 2015 (Country Economy 2022). This yields a r/p ratio of 17.8 years based on daily average production levels of 2021 (83,000 barrels/day) (Trading Economics 2021). In the country assessment of WP2, we identified future growth of the hydrocarbon industry in Pakistan as a potential barrier to carbon pricing (Doda et al. 2022). However, Pakistan’s limited reserves effectively cap the growth of its (domestic) upstream fossil fuel sector. The interviews furthermore suggest that key players in Pakistan’s upstream hydrocarbon industries generally are supportive of carbon pricing and do not see their business models directly affected by it. This is partly based on the assumption that carbon costs would be passed on to the end-consumer whose demand for fossil fuels is inelastic given scarcely available alternatives. A carbon price may therefore not yet yield the desired outcomes in those sectors. Interviewed experts did underline the presence of information asymmetries about carbon pricing where stakeholders from the fossil fuel industry are seen to be better organised with resources at hand to act against policies that could affect their business models.

Power sector

The power sector would likely be among the first sectors in Pakistan to be covered by a carbon price. Covering emissions from power generation is sensible given relatively straightforward MRV requirements, limited (although not absent) leakage risks, and the presence of market-ready low-carbon technologies that a carbon price can support. The structure of the power sector, market regulations, and additional policies determine the effectiveness and role of a carbon pricing instrument in achieving mitigation outcomes and must therefore be considered when assessing carbon pricing potential (Acworth et al. 2021).

According to official estimates, the power sector accounted for less than 11% of overall GHG emissions in 2017-18. This share is considerably lower compared to other emerging markets owing to Pakistan's below average CO₂ intensity of power generation (IEA 2022), its smaller industrial base, and large agriculture sector which accounts for about half of the country's GHG emissions. According to IEA estimates, the power sector comprised 27% of CO₂ emissions in 2019, a similar share as in 1990 and down from a peak of 35% in 2000. Electricity demand in Pakistan has soared: consumption increased from 29.9 TWh in 1990 to 116.4 TWh in 2019 translating into a compounded average growth rate of 7.4% per year over that period (IEA 2022). The trend of rising power demand is set to continue as the economy grows, the share of power in total final energy consumption increases, and the remaining quarter of the population gains access to power. The National Transmission & Dispatch Company forecasts power demand to grow by 5.3% per year on average towards 2030, with steeper growth rates to be expected in the short term (NTDC 2021). Extensive investment will be required to meet Pakistan's power demand growth in the years to come. In this market environment, the key challenge is not so much to reduce as to avoid additional emissions.

Pakistan has experienced surging investment in coal power since 2015 following the start of CPEC. The national grid operator projects coal power capacity to nearly double between 2021 and 2024, with no further additions beyond that. Table 9 summarises the projected capacity changes over the coming decade. Except for coal, the most sizable contributions are from low-carbon technologies while oil- and gas-fired fleets are set to become smaller as older plants are decommissioned. Overall, the projected fuel mix would reduce the average emissions intensity of power generation from 0.356 kg-CO₂/kWh in 2021 to 0.198 kg-CO₂/kWh by 2030 (NTDC 2021). Given the young age of the coal fleet and yet approved projects coming to grid in the next few years, the potential to decommission coal assets early is low. Pakistan has had to deal with structural capacity shortages in past years that the additions of baseload coal power alleviated. However, the rapid additions in coal power turned the shortage into a surplus by 2020. Installed capacity in coal is set to increase towards 2023, resulting in higher power costs from underutilised but remunerated generation sources. Meanwhile power shortages have still occurred because of network constraints (Mangi 2021).

The government aims to rely by and large on its massive domestic lignite reserves to fuel the coal fleet, a cheaper but also more emissions-intensive fuel input source than hard coal. Coal plants have guaranteed PPAs of up to 30 years that the government cannot renegotiate. Decommissioning plants early would impose hefty costs on the system already riven by financial challenges (explained in more detail below). Even so, a carbon pricing instrument, perhaps starting with shadow carbon prices, could preclude additional investments in coal power and encourage the phase out of heavy fuel oil power plants, which are older on average and anticipated to be decommissioned in the coming decade. Pakistan's diversified fuel mix would also enable fuel switch effects given sufficiently high carbon prices.

Table 9: Installed capacity (MW)

Fuel-technology / year	2021	2030	Change
Local coal	660	3630	450%
Imported coal	3960	4920	24%
Fuel oil	6506	1220	-81%
Natural gas	3427	2582	-25%
RLNG	5839	6786	16%
Hydro	9698	23653	144%
Nuclear	2490	3635	46%
RE	1995	13685	586%
Cross border	0	1000	N/A
Total capacity	34575	61112	77%

Source: NTDC (2021)

Power market regulations

Two market conditions must be met for a carbon price to function as intended: 1) carbon costs are reflected in producers' power bids or prices; 2) carbon costs are considered in the dispatch formula. Both conditions are generally met in liberalised power sectors but may need to be introduced separately through additional regulations in sectors characterised by high degrees of state intervention (Acworth et al. 2021). Pakistan's power sector features a hybrid market design based on a single-buyer model with regulated competition in wholesale power generation. While a least-cost dispatch mechanism has been in place, wholesale power prices are administered by the government. Within the current market design, administrative adjustments to wholesale and retail tariffs would be required to ensure carbon costs can be passed on. The need for regulatory tweaks is contingent on the pace of ongoing power market reforms that will eventually fulfil both conditions for carbon pricing. The latest set of proposals aim to introduce bilateral trading through competitive markets as soon as 2022 (NEPRA 2021). One stakeholder interviewed for this study anticipated the structural overhaul required for a far-reaching liberalization of the sector to take longer than the above timeline suggests. This view finds confirmation in official reporting by the national regulator (NEPRA 2021). Another interviewee stressed that the liquidity of the forthcoming wholesale market will likely be low in the years following its introduction as most producers would still be regulated by PPAs —which are then to become legacy contracts. Additional measures will hence be needed to make carbon pricing work in Pakistan's power sector.

Liberalisation of the country's power sector started in the 1990s. The authorities decided to unbundle the vertically integrated utility, the Water & Power Development Authority (WAPDA), in 1992. The WAPDA Amendment Act (1994) prepared the ground for the utility's subsequent unbundling by 1998²⁸ into several generation companies, regional distribution companies (DISCOs), and the National Transmission & Despatch Company. A separate utility has served the metropolitan area of Karachi: The Karachi Electric Supply Company (KESC). It was privatised, but not unbundled, in 2005 and later rebranded as K-Electric. Two organisations were established under the auspices of the Ministry of Energy to facilitate the national unbundling

²⁸ WAPDA Ordinance (1998)

process: The Pakistan Electric Power Company Limited (PEPCO) (1998) oversaw the unbundling of WAPDA, and the Private Power and Infrastructure Board (PPIB) (1994) facilitated the entry of IPPs by providing guarantees to private investors, negotiating PPAs, and related advisory services (Bacon 2019). Both organisations still operate today. Furthermore, WAPDA has retained its hydropower assets and remains an important state-owned producer. In conjunction with the unbundling process the government established an independent regulatory agency, the National Electricity Regulatory Authority, through the NEPRA Act of 1997. The mandate of NEPRA ranges from determining tariff structures, setting procedures and standards for investment programmes, and enforcing performance standards for power generators to settling disputes, and issuing guidelines and procedures for the transition to market trading (NEPRA 2022). Its mandate was revised in 2018 through an amendment of the NEPRA Act requiring it to align its functions with government policy, such as the National Electricity Policy and Plan, which is subject to the CCI's approval (Tetra Tech 2018).

The NTDC is the national transmission network operator (TNO) and the system operator (SO). As the grid owner, it is also responsible for maintaining the network. Market operations fell under the responsibility of the NTDC up to 2015 but have since been moved to the Central Power Purchasing Agency (CPPA-G)—Pakistan's market operator (MO). The CPPA-G is in charge of procuring energy on behalf of DISCOs (including imported energy), settling payments along the value chain (producers, suppliers, consumers), and of managing the transition to a competitive trading bilateral contract market (CTBCM) (CPPA 2016). The latter entails a shift away from the single buyer system towards direct bilateral trading (with DISCOs acting as suppliers of last resort) complemented by a balancing mechanism. The CPPA-G is responsible for establishing the corresponding market rules which will require approval by the CCI (Tetra Tech 2018). The regulatory authority has been monitoring progress by means of quarterly meetings with the relevant public stakeholders (DISCOs, NTDC, CPPA-G, KE, PPIB) (NEPRA 2021).

Until the above market reforms are in effect and a liquid wholesale market takes shape, additional market regulations would be required if a carbon pricing instrument is introduced. In the current single-buyer system, power producers' offtake of power is arranged through PPAs with the NTDC or, since recently, with the CCPA-G. The pricing structure of a PPA comprises three main elements: a capacity purchase price (CPP), energy purchase price (EPP), and supplementary charges. The *CPP* covers a producer's monthly fixed costs (e.g., Return on Equity (ROE), capital cost, fixed operation & maintenance cost, insurances) and is disbursed irrespective of the actual output generated. The *EPP* covers a producer's variable operation & maintenance cost and fuel cost. It is disbursed monthly based on the amount of dispatched energy (kWh * energy tariff) and typically forms the largest cash flow component. The PPA further reimburses the producer for certain charges or taxes incurred and compensates it for foregone revenue (e.g., curtailment compensation) (CPPA 2018). The NTDC and CPPA jointly prepare the merit order twice a month based on the variable cost of each individual installation (or group of installations) per fuel-technology, accounting for fluctuating fuel prices (the greatest variable cost component) and the combustion efficiency of generation sources (NTDC 2022).

A carbon price increases fuel costs for conventional thermal generation plants commensurate with their emissions-intensity of power generation. The authorities could enable cost pass-through conditions by incorporating the carbon cost component in the recurrent fuel cost revision process. This would allow merit order effects and ensure a better utilization of the existing low-carbon capacity. However, a carbon pricing instrument would likely fall short of incentivising the full scope of abatement opportunities in the existing market set-up. The capacity payment provides a remuneration stream for operating and idle generation sources alike that is unaffected by the merit order and would diminish the strength of the

(dis)investment signal of a carbon price. The national regulator has recently converted the tariff structure of old state-owned assets (GENCOs) from take-or-pay to take-and-pay contracts rendering capacity payments conditional on their utilization (NEPRA 2021). This reform reduces the cost of power and would also safeguard the incentive for decommissioning carbon-intensive assets and low-carbon investment under carbon pricing. It would have to be extended to all conventional generation assets to increase the instrument's effectiveness. In like manner, the structure of differential tariffs complemented by capacity payments would forego the opportunity of increased margins for low-carbon generation sources under a carbon price as seen in systems with uniform marginal pricing. Absent tariff reforms, a carbon price would not increase the revenues of renewable assets, but it may still promote their business case given deteriorating market conditions for carbon-intensive generation technologies assuming a credible carbon price signal.

Renewable energy policy

The role of a carbon pricing instrument in delivering mitigation outcomes further hinges on the existing set of policies that regulates the power sector. The authorities have developed an elaborate policy framework through the years, a selected overview of which is provided in Table 13. Several policy instruments would positively interact with the instrument reinforcing the effect of the price signal. These include tax exemptions on the import of RE equipment, guaranteed (priority) dispatch of RE sources, and financial de-risking measures by means of subsidised loans for renewables at a rate of 6% (SBP 2016). The long-term feed-in-tariff for REs provides investment certainty but foregoes market-driven corrections to enhance their competitiveness, as a carbon pricing instrument can deliver under the right conditions. Several interviewees furthermore highlighted the government's recent markup to import tariffs on solar PV, aimed at boosting the domestic solar industry, to disincentives greater investment in the technology. At the same time, the use of auctions for new capacity additions from 2019 aligns well with carbon pricing as it allows market corrections to be reflected in investment decisions in support of the RE target of 30% (excluding hydropower) by 2030.

A non-exhaustive overview of Pakistan's legal framework and climate and energy policy mix is presented in Table 10.

Table 10: Pakistan's energy policy mix

Area	Policy	Details	Year	Interaction with carbon pricing
Production	Framework for Power Cogeneration 2013 Bagasse and Biomass	Upfront tariff for bagasse/biomass-based cogeneration projects determined by NEPRA. Producers can offer power to the respective distribution companies (DISCOs) or Central Power Purchase Agency (CPPA), provided that the cost of interconnection, grid station upgrades, etc. is incurred by the respective DISCOs.	2013	Increases investment in and deployment of cleaner alternatives as carbon pricing pushes out fossil fuels (hereafter "Supports ARE investment and deployment")
	Upfront Generation Tariff (FiT) for Solar PV Power Plants	NEPRA approved upfront tariff for solar generation (up to 100 MW and >1 MW). Tariff depends on differences in solar irradiation. Valid for 25 years.	2014	Supports ARE investment and deployment

Area	Policy	Details	Year	Interaction with carbon pricing
	Pakistan net metering policy for solar PV and wind projects	Solar PV and wind generators under 1 MW of capacity are allowed to sell back produced power to the national grid.	2015	Supports ARE investment and deployment
	Upfront Generation Tariff (FiT) for wind power plants	NEPRA provides an upfront tariff for wind generation. Valid for 20 years.	2015	Supports ARE investment and deployment
	Upfront Generation Tariff (FiT) for Bagasse and small hydro (<25MW) power plants	NEPRA provides an upfront tariff for generation. Valid for 30 years.	2017	Supports ARE investment and deployment
	Alternative and Renewable Energy	Seeks to increase the deployment of ARE technologies (ARETs) in Pakistan. ARE Projects benefit from: Competitive bidding in annual auctions; Tariffs: Energy purchase price only (no capacity payments). No Upfront or cost-plus tariffs for mature technologies, incl. wind and solar; Some corporate tax exemptions and waivers on customs duty on the import of equipment/machinery.	2019	Supports ARE investment and deployment
	National Electric Vehicle Policy	EVs manufactured in Pakistan sold with lower VAT for the next 7 years.	2019	
	National Electric Vehicle Policy	EVs are exempted from registration fees and annual token tax (7 years for Pakistan manufactured EVs, 5 years for imported EVs).	2019	
Investment	Sindh Land Grant Policy for Renewable Energy Projects	Fast-track access to land for investors in RE projects by offering lease agreements for up to 30 years at favourable terms in the Sindh region.	2015	Supports ARE investment and deployment
	SBP Finance scheme for Renewable Energy	Concessional loans for ARE projects up to 50 MW. Private banks in Pakistan can use funds allocated by the State Bank of Pakistan at favourable rates.	2019 (since 2009)	Supports ARE investment and deployment
	NDC (2021)	Moratorium on additional investments in coal power	2021	Moderates vested interests of the brown lobby
Command-and-Control	Building Code of Pakistan Energy Provisions (2011)	Purpose is to provide minimum requirements for energy-efficient design and construction of buildings.	2011	

Area	Policy	Details	Year	Interaction with carbon pricing
	MEPS for Window Type & Split Air Conditioners with Cooling Capacity under: 14000 W (12000 - 48000 BTU/hr)	Regulation sets energy efficiency standards and rating criteria for Single Phase, 220/240V split and window type Air Conditioners with a cooling capacity under 14000 Watt.	2014	
	Pakistan Minimum Energy Performance Standard (MEPS) MEPS and labelling for electric fans	Manufacturers or importers of appliances/products apply to NEECA for registration of their products to get permission to use/affix "Pakistan Energy Label" on the specified product.	2016	

Source: Based on IEA (2021e)

Structural challenges

Notwithstanding the significant potential for carbon pricing in Pakistan's power sector, the authorities have had to deal with a range of structural challenges that multiple interviewees voiced must be addressed before a carbon price is introduced. Electricity costs in Pakistan are high, load shedding frequent, and price hikes a sensitive issue. Structural inefficiencies in the sector have inflated the overall cost of power and hampered the security of power supply, risking putting brakes on the economy whose continued growth depends on the availability of reliable and affordable power. The high-cost environment has necessitated a continued need for subsidies where arrears have built up resulting in Pakistan's notorious circular debt that grew to a staggering 5.2% of GDP towards the end of 2020 (IMF 2021b). At the heart of the issue are network capacity constraints that have resulted in output losses, power theft, a legacy of costly policies whereby the government assumes market risk of private investments, and retail tariffs set below cost recovery levels (NEPRA 2021). The recent overcapacity attributable to the rapid addition of coal power has also increased power costs as unused power plants continue to receive capacity payments (Mangi 2021). As a result of these intertwined factors, DISCOs have struggled to recoup the full cost of power generation and transmission at the end-consumer. Debt has accumulated at the distribution level cascading upstream to CPPA/NTDC, power producers, and eventually to fuel suppliers who have had to cut deliveries to state-owned generators in certain cases. Delays by the government in the payment of subsidies and increased energy imports over the years have aggravated the issue (Tauhidi and Chohan 2020). The power sector's financial health has received wide attention both in the government and by international partners such as the IMF, World Bank, and ADB, who are supporting it through reform packages (Asian Development Bank 2021a; World Bank 2022a; IMF 2019). The government increased the power tariffs in early 2021 (IMF 2021b), but the energy inflation that followed —caused by tight international markets and a weakened PKR— placed it in a difficult position as the costs to households heightened. Against this background, several of the interviewed stakeholders expressed their concern about an explicit carbon price adding financial stress to the sector and voiced a preference for instruments that mobilise climate finance.

4.3.3.2 Conducive factors and obstacles

Close examination of the economic aspects shaping carbon pricing potential in Pakistan reveals a mixed picture. The country is richly endowed with renewable energy potential with vast untapped sources yet to be commercialised—a process that a carbon price can expedite at least cost. The government has put in place an elaborate framework to promote the development of renewable energy, which has become a strategic priority for reducing its dependency on volatile energy markets and cutting back on soaring energy costs alongside meeting environmental objectives. De-risking measures, tax benefits, priority dispatch for REs, and the recent shift to using auctions for capacity additions provide the bedrock of the investment framework for low carbon technologies. These policies would strengthen the impact of a carbon price in triggering abatement outcomes. From a regulatory perspective, the potential for carbon pricing in the power sector is significant. The instrument can be integrated into the existing market design with few additional reforms: An expansion of fuel cost adjustments to include carbon costs coupled with a broader use of take-and-pay contracts. The prospect of deeper market reforms aimed at establishing competitive trading in the years to come bode well for the sector's carbon pricing readiness.

Yet, carbon pricing may have little chance of success before the structural financial woes of the power sector have been addressed. Power losses on the T&D network, costly policies (such as take-or-pay provisions), and particularly the low-cost recovery by DISCOs foreshadow the risk of passing through carbon costs down to the end-consumer. Failing to do so would require the government to step in and subsidise carbon costs, which could worsen its circular debt. Pakistan's macroeconomic outlook is important to consider in this respect. Increased cost of production stemming from cost-push inflation have put the country's industries in a tight position, while the economic resilience of the population at large to shoulder additional cost increases following rising energy and food prices is likely to be low. Despite such challenges, the long-term economic benefits of a carbon price in Pakistan are significant. The current barriers do not so much coalesce around the incompatibility of carbon pricing but underscore the difficulty of imposing net costs in current economic conditions. An ETS can tackle these by granting free emissions allowances to producers in the first stages of the instrument until the macroeconomic outlook improves and ongoing reforms to the power sector bear effect.

4.3.4 Technical dimension

4.3.4.1 Core analysis

Ability to measure and report emissions

As observed in Doda et al. (2022), the government identified the development of an MRV system as a priority in the 2013 implementation framework for climate change (Government of Pakistan 2013) and listed it as a short-term priority in 2018 through its second national communication on climate change to the UNFCCC (MOCC 2018). The government published the 2018 GHG inventory in its updated NDC of 2021, prepared by Global Change Impact Studies Centre (GCISC) and based on IPCC 2006 guidelines. Experts interviewed for this study further pointed out that with the MRV roadmap in place, work has since shifted to the implementation phase. In September 2021, for example, the Global Change Impact Studies Centre (GCISC), the research arm of the MOCC, organised a workshop on MRV systems in collaboration with the French Interprofessional Technical Centre for Atmospheric Pollution Studies (CITEPA) (GCISC 2021). The workshop was a part of the ongoing effort to build transparent mechanisms in preparation for the UNFCCC Enhanced Transparency Framework scheduled for 2024 (APP 2021).

Since an actual monitoring and reporting system is not yet operational, emissions are estimated using emissions factors. Progress on this front is underway, the (Government of Pakistan 2021) states the following:

... a broader GHG MRV system has been developed to establish historical baselines, validate data quality, analysis of mitigation policies implementation, and reporting compliance. An overarching objective for mitigation MRV is to ensure that estimates are consistent and captured within the national inventory, BTR [Biennial Transparency Reports] reporting, and feed into the Paris Agreement's global stocktake. Therefore, a broader GHG MRV system, RISQ—a web platform for the compilation of the national MRV system database, has been developed. It will be used by entering into agreements with the key data providing national agencies. Similarly, efforts are underway to develop the national adaptation M&E [Monitoring & Evaluation] system by developing a roadmap for its future setup, based on pilot experimentation in the agriculture sector (p.74-75).

The large informal economy and the great number of small firms in Pakistan has been identified as a potential challenge to developing a comprehensive MRV infrastructure.

Government knowledge and capacity

Beyond developing the infrastructure to monitor and report emissions, government knowledge and capacity are crucial for informing the design of the instrument and ensuring its smooth operation. Previous experience with market-based instruments provides an indication of existing know-how within government ministries. Pakistan has been working on establishing monitoring activities for REDD+, using international carbon crediting mechanisms for low-carbon projects. It also gained experience with procuring renewable energy through competitive tenders (Doda et al. 2021). By the end of 2018, the government had approved 76 host country projects, 36 of which have been registered by the CDM Executive Board (Ayaz n.d.). Projects registered by the Voluntary Carbon Standard and Gold Standard are fewer compared to projects under the CDM framework. Furthermore, Pakistan participates in the NAMA programme of the UNFCCC, though interest in it has waned given funding constraints (Aleluia et al. 2019).

Regular reporting on development statistics and the publication of in-depth economic analyses (for instance by the Bureau of Statistics and the Finance Division) underscore the government's significant knowledge base and capacity that it can draw on were a carbon pricing instrument introduced. Interviewees emphasised the high level of technical expertise of the civil service in Pakistan. As for carbon pricing, several voiced that a shared understanding about the associated costs and benefits of the instruments has so far been lacking. Knowledge of carbon pricing is currently concentrated within certain teams of the federal government (climate, energy) and in large industry players while the provincial governments and smaller enterprises do not have the issue firmly on their radars.

Government capacity would need to be ramped up in the coming years. Expertise is at hand at the federal level, but resource constraints may form a barrier to the implementation of a carbon pricing instrument. This also applies to the provincial governments who would share the responsibility of administering the instrument but lack technical capacity and expertise. Interviewees underlined that coordination between the federal and provincial governments must improve to ensure a smooth implementation of climate policies in the years to come. A firmly embedded capacity-building strategy will be needed to train officials building on Pakistan's well-established bureaucracy. Pakistan has received support under the CIACA initiative and is working with GIZ to bring its climate ambitions into practice. Furthermore, given the country's interest in carbon pricing, Pakistan participation in the PMI is expected through the development of a readiness support plan. A coordinated and robust capacity-building strategy that involves key international partners such as the PMI and ICAP along with

those already active in the country could support the government in developing the requisite infrastructure for carbon pricing.

Business knowledge

Businesses will need to be included in such a strategy to develop know-how and smoothen compliance with monitoring, reporting, and compliance obligations. Companies would also need to develop environmental strategies to manage (allowance) price risk and integrate it into operational and investment decisions. Interviewees indicate industry capacity to be limited mainly due to a lack of technical expertise on carbon pricing (barring industrial majors) and data constraints. However, there is a strong willingness to understand carbon pricing recently ignited by new international developments such as the proposal for the introduction of a CBAM in the EU, and the recently agreed rules on Article 6 of the Paris Agreement. There are limited positive spill overs from other carbon pricing initiatives: only two companies based in Pakistan currently have internal carbon pricing policies in place, compared to 608 companies in the EU (CDP 2021). Pakistan has less experience with international carbon markets compared to neighbours such as India or China. An industry stakeholder indicated that Pakistan's participation in the CDM was limited by costly registration processes involving extensive baseline requirements and second- and third-party international audits, amongst others.

Institutional capacity

Government departments may need to perform new functions and create new institutions for the implementation of carbon pricing instruments (Doda et al. 2021). The creation of the NCEC in 2019 was a promising step in this direction. The Committee encompassed different ministries (Industry, Finance, Foreign Affairs, Climate, and Energy) and was responsible for coordinating activities among them. Its oversight role focused on five key deliverables: 1) prepare the ground for participation in international carbon markets (ITMOs and Article 6.2), 2) establish governance structures for a domestic ETS, 3) set up an MRV roadmap, 4) establish a communication strategy on carbon pricing, and 5) explore the role of the private sector in carbon markets. Work on each of the first four aforementioned aspects has been well underway supported by the UNFCCC, GIZ, and external consultants. The government had set up the NCEC for the duration of one year with a view to converting it into a permanent secretariat thereafter. Funding constraints put that objective to a halt although one interviewee indicated the prospect of external financial support in the short term. Parallel initiatives may also buttress the government's institutional capacity for carbon pricing. Pakistan's fiscal deficit is to be addressed through improved tax policy and administration efforts which are ongoing (Asian Development Bank 2020a). Such reforms would help improve the government capacity to collect data and revenues, and enforce compliance, and could yield positive spill overs for the operation of a carbon pricing instrument.

4.3.4.2 Conducive factors and obstacles

Progress on creating the requisite technical framework for carbon pricing has been gradual, but the renewed focus on developing an MRV infrastructure bodes well for its implementation. Government capacity to implement and operate a carbon pricing instrument currently poses a barrier. Businesses of all sizes will also need to acquire the required knowledge and technical capacity to comply with their carbon pricing obligations. However, these challenges can be addressed effectively through a coordinated capacity-building strategy aimed at bolstering the technical readiness of the involved government agencies. Given Pakistan's significant human capital, such an approach is likely to yield desired outcomes but does require resources be made available to move forward with carbon pricing. In parallel, the government should delineate the responsibilities among government agencies that would be involved in designing and operating the carbon pricing policy.

4.3.5 Multilateral dimension

4.3.5.1 Core analysis

Trade and commercial integration

Pakistan's total trade volume equaled 27% of its GDP in 2020, a number that varied from 25% to 32% in prior years (World Bank 2022c). Pakistan's relatively low trade volume partly stems from its large domestic market but also from barriers to trade—such as those explained in Section 4.3.3—and a relatively restrictive trade policy despite substantial tariff reductions over the past years. In terms of merchandise trade, its biggest export markets in 2020 were the EU, US, China, and the UK, while imports originated mostly from China, the UAE, the EU, and the US, in that order (WTO 2021). Textile manufactures made up 61% of Pakistan's exports in FY 2021, followed by food products (18%), and other manufactures (14%) (Finance Division 2021b).

Preferential trade agreements (PTAs) take economic integration between economies a step further than merely reducing tariff barriers by harmonizing customs, product standards, and investment policies. They have become increasingly important for countries' gaining access to foreign markets. Any country is signatory to 13 PTAs on average (World Bank 2021b); Pakistan has signed on to four with several more being under discussion. The China-Pakistan Free Trade Agreement (CPFTA) is currently the greatest in scope and volume and has been fully implemented to date. Pakistan is signatory to the South Asia Free Trade Agreement (SAFTA) that encompasses Afghanistan, Bangladesh, Bhutan, India, Nepal, Sri Lanka, and the Maldives. SAFTA holds an export potential for Pakistan estimated at USD 12 billion/year but it has only partially come into effect due to geopolitical challenges (World Bank 2021b). Pakistan signed a PTA with Afghanistan in 2010, and one with Indonesia that took effect in 2012. Trade agreements with Turkey, Uzbekistan, Iran, and Korea are underway.

Pakistan has bilateral trade arrangements with major trading partners like the EU and US that assuage its presently limited access to foreign markets. The EU was Pakistan's largest export market in 2020, consuming 28% of its exports, and second largest trading partner overall. Trade relations between the EU and Pakistan are discussed in the designated Sub-Group on Trade established under the EU-Pakistan Joint Commission. Pakistan benefits from GSP+²⁹ provisions since 2014 to the effect that 78% of its exports to the EU are free from custom duties (EC 2021b). The US applies GSP provisions to over 3,500 products from Pakistan. Both have held regular consultations on trade through the US-Pakistan Trade and Investment Framework Agreement that took effect in 2003. A preferential trade agreement is still under discussion (PBC 2019).

Pakistan's trade relations are relevant to consider in light of ongoing discussions about the introduction of CBAMs aimed at supporting the decarbonisation of energy-intensive industries. These could have implications for Pakistan's export dominant textile industry, which accounted for about 80% of exports to the EU where a proposed CBAM is in the legislative process. The anticipation of the introduction of BCAs in jurisdictions with mature carbon pricing instruments in place may provide external incentives for carbon pricing. According to several interviewees, the textile industry is largely supportive of carbon pricing based on the view that it would spur the ongoing transition in the sector and help producers retain their position in important export

²⁹ Under the Generalised Scheme of Preferences (GSP) is a trade preference program through which industrialized countries reduce tariff barriers for lower income countries in support of their economic growth. In the EU context, standard GSP conditions entail "a partial or full removal of customs duties on two third of tariff lines" whereas GSP+ "slashes these same tariffs to 0% for vulnerable low and lower-middle income countries that implement 27 international conventions related to human rights, labour rights, protection of the environment and good governance." (EC 2021a.)

markets. However, it is not a given that an EU CBAM would heavily affect Pakistan's textile industry which is not emissions intensive given low direct and indirect emissions in the production process. Moreover, the current CBAM proposal under consideration does not prioritise the textile industry.

International environment and experiences

Several interviewees considered progress on carbon pricing in the broader Asian context to be crucial for Pakistan's ambition to implement a carbon price. The evolving experiences with carbon pricing in Vietnam, Indonesia, and the Philippines may inform the design and implementation of Pakistan's prospective instrument. While the national contexts in these jurisdictions differ, information sharing about common challenges—such as establishing an MRV infrastructure, managing compliance, and tackling pressing issues including price increases—would support Pakistan in advancing the implementation of a domestic instrument. The experience of Korea may also prove informative. It is the only Asian jurisdiction with a mature ETS in place, and it has been a frontrunner in exploring adjustments to ETS design and power sector regulations to better integrate the carbon price signal in a regulated market environment. With China being Pakistan's biggest trading partner, the operational launch of the China ETS in 2021 has provided additional external impetus for the introduction of carbon pricing. Two distinct factors may beget alignment of Pakistan's prospective instrument with the China ETS. First, China's carbon market offers Pakistan a major potential off-taker of carbon credits whereby Pakistan could secure climate finance. Opportunities for carbon crediting opportunities have received much attention in the domestic debate as Pakistan aims to rely partly on nature-based solutions to mobilise external climate finance while addressing its climate adaptation needs. One interviewee suggested that the revenues of a carbon offset deal could also be used to address Pakistan's surging debt under CPEC. Second, China's heavy presence in Pakistan's emergent coal industry may lead it to push for an instrument comparable to its own in which coal-fired power producers receive transitional allocation support that limit net carbon cost increases and leave gross margins intact. Informed by the China ETS and considering Pakistan's rapidly rising emissions, an ETS with an output-based emissions cap has also been suggested (Aleluia et al. 2019).

Pakistan's institutional relations may further facilitate the introduction of carbon pricing in Pakistan. The government has leveraged international expertise and finance to meet its domestic development challenges. It maintains good relations with international actors such as the IMF, World Bank, UN, and GIZ whose presence may form an external support base for the introduction of advanced climate policies such as carbon pricing. The involvement of carbon market facilitators such as PMI and ICAP would expand it further. Deeper economic integration with Korea, the so far only Asian jurisdiction with a mature ETS in place, as well as Turkey, another aspirant carbon pricing jurisdiction, may provide additional rationale for carbon pricing in Pakistan.

4.3.5.2 Conducive factors and obstacles

External pressures and interests shape domestic policy developments. Opportunities for carbon pricing arise out of the anticipation of border carbon adjustments imposed by its major trading partner(s)—although the impact of such measures on its export industries is debatable. Ongoing economic integration with jurisdictions that use carbon pricing to decarbonise their industries or are likely to do so may also increase external demands on Pakistan to align its domestic policy mix accordingly. On the other hand, foreign interests in Pakistan's carbon-intensive assets may pose a barrier to the stringency of the instrument. Pakistan is not unique in considering carbon pricing to decarbonise its energy supply in the face of young coal fleets. The

evolving experiences in China, Indonesia, Vietnam, and the Philippines will inform its domestic policy needs in this respect.

4.4 Synthesis and possible pathways to implementation

The government of Pakistan is considering introducing a carbon pricing instrument into its evolving policy mix. The creation of the National Committee on Establishing Carbon Markets in late 2019 signified the commitment of the government to that end. Pakistan is collaborating with international stakeholders such as CIACA that can support it in preparing the ground for a prospective instrument. These efforts are taking shape during a critical window for Pakistan if it is to avoid becoming a major contributor to anthropogenic emissions. A well-designed carbon pricing instrument would correct distorted market signals at a time when the country transitions from lower to upper middle-income status and as sizeable long-term investments materialise. A credible carbon price signal can ensure that investments of today align with climate considerations throughout their lifespan. An analysis of framework conditions for carbon pricing in Pakistan reveals high latent potential for carbon pricing alongside several intertwined challenges —many of them shared by other emerging markets—that must be considered for the instrument to be introduced and yield the desired outcomes.

First, resistance to carbon pricing is likely to gain strength and efforts should therefore focus on ensuring that a prospective policy instrument is embedded in broad support. Pakistan is richly endowed with renewable energy potential but has largely relied on additions of baseload coal capacity to meet its rising power demand. Vested interests in these carbon-intensive assets owned by domestic and international actors and which feature a long lifecycle may pose a challenge to carbon pricing. Potential resistance should also be anticipated from consumer groups given rising energy costs and their high share of the average household income. The scope for participation of civil society actors in the policy cycle has improved considerably but carbon pricing is not yet a mainstream consideration in the debate on energy and climate. Greater involvement of national experts and consultants could spark a broader debate on carbon pricing and form the basis of a willing coalition spanning the federal government, think tanks and policy institutes, and Pakistan's low-carbon producers. In parallel, the initiation of broad stakeholder consultations would allow concerns to be voiced and addressed in the eventual design of the instrument. Such an approach was recommended by multiple stakeholders interviewed for this report.

Second, provincial governments are decisive actors for the successful introduction of a carbon pricing instrument, but their administrative capacity and potential opposition are limiting factors. Pakistan has a federal decision-making structure involving multiple layers of government. Climate change policy in Pakistan is embedded in a multi-level governance framework where the federal government initiates and develops nation-wide policies but support from the provinces is required for their adoption and implementation. Provincial governments may resist the introduction of carbon pricing on the grounds that their citizens cannot shoulder cost increases or administrative capacity is insufficient. For the instrument to be introduced successfully, provincial governments should be the focus of attention in capacity building efforts aiming to develop technical expertise on carbon pricing and increase capacity for its implementation. A better understanding across the tiers of government about the long-term benefits of the instrument and the short-term flexibility options it offers would likely allay concerns and increase support for it. There is considerable scope for international actors to support Pakistan in this effort that ideally also involves its civil society actors. Pakistan's significant human capital and well-established civil service bode well for the impact of a coordinated capacity building approach.

Third, while the potential for carbon pricing is greatest in the power sector, so are the challenges that must be overcome if the policy instrument is to be introduced. Market liberalisation is ongoing and competitive markets could be established as soon as 2022. Nonetheless, long-term PPAs will continue to dominate power supply for years to come and transitional measures will be required along with a carbon price. To that end, the NTDC must include a carbon cost component in the regularly updated fuel costs, which feed into the merit order, as to ensure pass through conditions.

Moreover, “take-or-pay” approach to compensation of generators should be replaced with “take-and-pay” provisions to fully retain the investment incentive of the carbon price while supporting broader sectoral reforms. Finally, retail tariffs must reflect the carbon cost increase to enable cost recovery at the end-consumer. However, prevailing structural challenges in the power sector have so far jeopardised full cost recovery. The cost of power generation, transmission and distribution in Pakistan is high due to network losses, generous PPAs, and subsidised power tariffs where arrears have accumulated. While reforms have been underway, a carbon price that would add further costs may risk aggravating the existing financial woes of the sector. A carefully designed carbon pricing instrument can mitigate such risks.

Introducing carbon pricing is no easy endeavour. Foremost it requires technical capacity to monitor emissions, determine ambitious but realistic emissions trajectories, and enforce compliance. It necessitates sectoral market conditions that allow a price signal to be transmitted. It also calls for political aptitude to build consensus among influential stakeholders and potentially divergent interests in the existing productive activities of the economy. Addressing these challenges takes time, while the investment decisions reached today may lock in otherwise avoidable emissions for the future. Given these realities, our analysis points to the potential of a two-track strategy for the roll out of carbon pricing in Pakistan.

Along the first track the government can start with introducing a shadow carbon price to help steer investments away from carbon-intensive assets and towards low-carbon alternatives compatible with Pakistan’s international commitments under the Paris Agreement. The introduction of a shadow carbon price in government procurement and industry planning decisions is the least technically and administratively complex option for introducing carbon pricing and one that would yield direct results. Pakistan’s economic growth outlook is dependent on massive increases in investment, especially in the energy sector, which provides it with an opportunity to expand its low-carbon infrastructure and avoid further reliance on fossil-based assets.

In parallel the government could forge ahead along the second track with laying the groundwork for the introduction of an ETS. This could commence with a pilot system comprising the power and heavy industry sectors. A pilot ETS that starts out with freely allocated emissions allowances would face least resistance and avoid the additional cost burden imposed on end-consumers. Yet, it would steer emissions outcomes in critical emitting sectors and provide the policy infrastructure to ratchet up ambition as experience with the instrument evolves, ongoing reforms in the power sector bear effect, and net carbon costs become politically acceptable. Meanwhile, the shadow carbon price operating alongside the ETS would mitigate potentially adverse effects of a free allocation-based system by ensuring that investments are commensurate with a low-carbon energy future.

As experience with emissions trading in the broader Asian context evolves, Pakistan stands to benefit from novel approaches to ETS design that will prove instructive to the country’s policy needs. Given close ties, China in particular is a likely partner for Pakistan in advancing its emerging ambitions for carbon pricing, while the Korean experience can help inform design choices to gradually integrate a carbon price signal in Pakistan’s regulated market context.

Moreover, progress in Vietnam, Indonesia, and the Philippines on establishing regulatory frameworks and garnering support for emissions trading may serve as a roadmap for implementation in Pakistan given shared challenges typical to emerging market contexts. Their experiences would ideally feature in a coordinated capacity building approach facilitated by international actors such as the PMI, ICAP, and CIACA.

With an outlook to the future, there are several key areas where careful interventions have a high potential to assist Pakistan in overcoming the obstacles outlined in this report and facilitate a successful establishment of its carbon pricing policy. Each of these would help to lay the foundation for carbon pricing as a viable tool in Pakistan's transition to a low carbon economy. Table 11 summarises the core challenges that remain in Pakistan as well as the corresponding recommendations as to how to overcome each of these.

Table 11: Main challenges and recommendations, Pakistan

Dimension	Challenge	Recommendation
Political	<ul style="list-style-type: none"> Joint commitment by the federal and provincial government, which is essential for the introduction of CP, not yet clearly in place Opposition from carbon-intensive industries Political sensitivity of energy prices 	<ul style="list-style-type: none"> Enhance debate on CP, both within government and with relevant sectors Improve the economic resilience of households; consider compensation and protection of households in view of energy price increases Support the development of a green lobby Consider a pilot ETS with freely allocated emissions allowances to start with
Legal	<ul style="list-style-type: none"> Division of legislative powers between the National Assembly and the Senate, as well as between levels of government, may slow the adoption of CP legal framework Division of executive powers between provincial and federal governments may hinder CP design and implementation process. Rights of foreign investors, especially under the China-Pakistan Economic Corridor (CPEC) 	<ul style="list-style-type: none"> Set up and empower the Pakistan Climate Change Council, Climate Change Authority and Climate Change Fund as central institutions of climate change policy Ensure climate change policy is a key agenda item for Council of Common Interest (CCI) and National Economic Council (NEC) Engage with foreign investors when developing CP, and highlight CP opportunities for clean energy
Economic	<ul style="list-style-type: none"> Structural challenges in power sector, including power losses on the T&D network, costly policies, and low-cost recovery Dearth of abatement options in a growing economy; untapped RE potential 	<ul style="list-style-type: none"> Coordinate power sector reform and introduction of carbon pricing to improve the financial health of the sector without muting the carbon price signal Implement further de-risking measures, tax benefits and priority dispatch for RE

Dimension	Challenge	Recommendation
Technical	<ul style="list-style-type: none"> Capacity within the public administration and private sector to implement and operate a carbon pricing instrument 	<ul style="list-style-type: none"> Implement coordinated capacity-building strategy for government agencies and private sector Delineate responsibilities among public bodies involved in designing and operating carbon pricing
Multilateral	<ul style="list-style-type: none"> Limited experience in CP-related capacity building Potential opposition from foreign investors in carbon-intensive assets 	<ul style="list-style-type: none"> Enhance cooperation with international carbon market facilitators such as PMI and ICAP Engage in dialogue and draw lessons from experiences of jurisdictions with matured CP instruments but also with regional actors, especially China, which has its own ETS and is largely intertwined in Pakistan's power sector

C Appendix: Pakistan interviews

Name	Position	Affiliation	Sector	Date
Syeda Hadika Jamshaid	Climate Change Specialist	Ministry of Climate Change	Government	December 2021
Mohsin Ali Mangi	Chief Strategy Officer	Pakistan State Oil	Industry	December 2021
Liaquat Shaikh	Chairperson	Green Party Pakistan	Civil Society	December 2021
Dr Sajid Amin Dr Hina Aslam	Research Fellow Research Fellow, Lead Energy, and Head of China Study Center	Sustainable Development Policy Institute (SDPI)	Civil Society	January 2022
The Hub Power Company (HUBCO)			Industry	January 2022
Prof. Mushtaq Mirani	Executive Trustee	Sindh Rural Support Programme (SRSP)	Civil Society	January 2022
MJ Rikard Liden	Team Lead of Pakistan Program for Affordable and Clean Energy (PACE)	World Bank	International	January 2022

5 List of references

Acworth, W.; Kuneman, E.; Boute, B.; Betz, R. (2021): Emissions trading in pursuit of electricity decarbonisation - market structures and regulations matter. German Environment Agency (Climate Change, 38/2021). Available online at https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-05_20_cc_38-2021_electricity_decarbonisation_bf.pdf, checked on 11/1/2022.

Acworth, W.; Montes de Oca, M.; Boute, A.; Piantieri, C.; Matthes, F. (2020): Emissions trading in regulated electricity markets. In *Climate Policy* 20 (1), pp. 60–70. DOI: 10.1080/14693062.2019.1682491.

Aleluia, J.; Jamshaid, S. H.; Muller, N. (2019): Study on the Introduction of Carbon Pricing Instruments in Pakistan. UNFCCC Regional Collaboration Centre, checked on 4/1/2022.

Alelula, J. (2019): Carbon pricing in Southeast Asia - current status and future perspectives. Technical workshop on climate finances in ASEAN. UNFCCC/IGES Regional Collaboration Centre. Bangkok. Available online at <https://unfccc.int/sites/default/files/resource/Session%20%20Joao%20Aleluia.pdf>.

Anh, P. (2021): Vietnam pledges to phase out coal power. In *VnExpress*, 11/4/2021. Available online at <https://e.vnexpress.net/news/news/vietnam-pledges-to-phase-out-coal-power-4381543.html>.

Aoki, K. (2021): "Vietnam drafting new governmental decree on GHG reduction". *Envilience ASIA*. Available online at https://envilience.com/regions/southeast-asia/vn/report_3333.

APLSI (2021): The Independent Power Producers Association of Indonesia (APLSI) – Asosiasi Produsen Listrik Swasta Indonesia. With assistance of The Energy Boardroom. Available online at <http://www.energyboardroom.com/oilandgasdirectory/the-independent-power-producers-association-of-indonesia-aplsi-asosiasi-produsen-listrik-swasta-indonesia/>, updated on 1/12/2011, checked on 1/13/2022.

APP (2021): Pakistan to prepare South Asia's first ever advanced MRV system. In *The News International*, 9/21/2021. Available online at <https://www.thenews.com.pk/print/894119-pakistan-to-prepare-south-asia-s-first-ever-advanced-mrv-system>, checked on 1/14/2022.

Artner, Annamaria (2017): Role of Indonesia in the Evolution of ASEAN. In *The Journal of East Asian Affairs* 31 (1), pp. 1–38. Available online at <http://www.jstor.org/stable/44321271>.

ASEAN (2019): Asian Joint Statement to the United Nations Climate Action Summit 2019. New York. Available online at <https://asean.org/storage/2019/09/AJSCC-to-UN-Climate-Action-Summit-2019-ADOPTED.pdf>.

Asialink Business (2020): Getting Started in Indonesia. Available online at <https://asialinkbusiness.com.au/indonesia/getting-started-in-indonesia>.

Asian Development Bank (2005): Country Environmental Analysis - Indonesia. Available online at <https://www.adb.org/sites/default/files/institutional-document/32184/ino-cea-aug2005.pdf>, checked on 2/11/2022.

Asian Development Bank (2015): Assessment of Power Sector Reforms in Viet Nam: Country Report. Available online at <https://www.adb.org/sites/default/files/institutional-document/173769/vie-power-sector-reforms.pdf>.

Asian Development Bank (2020a): Pakistan, 2021–2025—Lifting Growth, Building Resilience, Increasing Competitiveness. Asian Development Bank (Country Partnership Strategy). Available online at <https://www.adb.org/sites/default/files/institutional-document/674016/pak-cps-2021-2025.pdf>, checked on 1/14/2022.

Asian Development Bank (2020b): Renewable Energy Tariffs and Incentives in Indonesia. Asian Development Bank. Manila, Philippines. Available online at <https://www.adb.org/sites/default/files/publication/635886/renewable-energy-tariffs-incentives-indonesia.pdf>, checked on 12/16/2021.

Asian Development Bank (2021a): \$300 Million ADB Loan to Strengthen Pakistan's Energy Sector. Asian Development Bank. Available online at <https://www.adb.org/news/300-million-adb-loan-strengthen-pakistan-energy-sector>, updated on 12/14/2021, checked on 1/13/2022.

Asian Development Bank (2021b): Operationalizing Article 6 of the Paris Agreement for a More Ambitious GHG Emission Reduction Target. Indonesia Pavilion. With assistance of Coordinating Ministry of Economic Affairs, Ministry of Environment and Forestry. Available online at <https://www.adb.org/sites/default/files/event/737901/files/5nov-cop26-article6.pdf>, checked on 12/1/2022.

Ayaz, S. (n.d.): Status of CDM in Pakistan and Institutional arrangements. Ministry of Climate Change, n.d. Available online at https://unfccc.int/sites/default/files/03._saadullah_ayaz_cdm_presentation.pdf, checked on 1/14/2022.

Bacon, R. (2019): Learning from Power Sector Reform: The Case of Pakistan. World Bank Group (Policy Research Working Paper, 8842). Available online at <https://openknowledge.worldbank.org/bitstream/handle/10986/31667/WPS8842.pdf?sequence=4&isAllowed=y>, checked on 11/1/2022.

Bang, L. (2022): Vietnam becomes an energy importer: Not a good sign. Available online at <https://vietnamnet.vn/en/vietnam-becomes-an-energy-importer-not-a-good-sign-814623.html>, updated on 1/11/2022, checked on 1/11/2022.

BBC (2021): Finance firms plan to close coal plants in Asia. In BBC, 8/3/2021. Available online at <https://www.bbc.com/news/business-58066660>.

BKPM (2020): Here are 5 Countries with Biggest Foreign Direct Investment in Indonesia. Invest Indonesia. Available online at <https://www3.investindonesia.go.id/en/article-investment/detail/here-are-5-countries-with-biggest-foreign-direct-investment-in-indonesia>, updated on 12/14/2021, checked on 12/14/2021.

bp (2018): BP statistical review of world energy. Available online at <https://www.bp.com/en/global/corporate/>.

bp (2021): Statistical Review of World Energy 2021. 70th edition. Available online at <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2021-full-report.pdf>, checked on 9/1/2022.

Breu, M.; Castellano, A.; Frankel, D.; Rogers, M. (2019): Exploring an alternative pathway for Vietnam's energy future. McKinsey & Company. Available online at <https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Asia%20Pacific/Exploring%20an%20alternative%20pathway%20for%20Vietnam%20energy%20future/Exploring-an-alternative-pathway-for-Vietnam-energy-future-vF.pdf>.

Business Standard (2019): Pakistani Army invests in oil business. In Business Standard, 3/8/2019. Available online at https://www.business-standard.com/article/news-ani/pakistani-army-invests-in-oil-business-119030900112_1.html, checked on 1/22/2022.

CDP (2021): Carbon pricing connect. Available online at <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>, updated on 1/14/2022, checked on 1/14/2022.

Central Committee of the Communist Party of Vietnam (2020): Ref. 55-NQ/TW Resolution of the politburo on orientations of the Viet Nam's national energy development strategy to 2030 and outlook to 2045. Available online at <http://vepg.vn/wp-content/uploads/2020/03/CPCs-Resolution-55.NQ-TW-on-Energy-Development-Strategy-to-2030-and-outlook-to-2045.pdf>.

Central Statistics Agency Indonesia (2021): Statistics Indonesia. 2021. Available online at <https://www.bps.go.id/>, updated on 12/14/2021, checked on 12/14/2021.

Chia, Krystal; Kan, Karoline (2021): Indonesia and Philippines Join Plan to Shut Coal Plants Early. In Bloomberg, 11/3/2021. Available online at <https://www.bloomberg.com/news/articles/2021-11-03/indonesia-and-philippines-join-plan-to-shut-coal-plants-early>, checked on 12/14/2021.

Climate Action Tracker (2020a): Vietnam: current policy projections. Available online at <https://climateactiontracker.org/countries/vietnam/current-policy-projections/>.

Climate Action Tracker (2021): Indonesia. Available online at <https://climateactiontracker.org/countries/indonesia/>, updated on 12/10/2021, checked on 12/10/2021.

Climate Analytics (2021): Coal phase out and energy transition pathwas for Asia and the Pacific. With assistance of UN ESCAP. Available online at <https://climateanalytics.org/media/coal-phase-out-and-energy-transition-pathways-25-feb-2021.pdf>, checked on 10/12/2021.

Climate Transparency (2019): Brown to Green: The G20 Transition towards a Net-Zero Emissions Economy – Indonesia. Available online at https://www.climate-transparency.org/wp-content/uploads/2019/11/B2G_2019_Indonesia.pdf, checked on 2/11/2022.

Climate Transparency (2021): Indonesia. Climate Transparency Report: 2021. Available online at <https://www.climate-transparency.org/wp-content/uploads/2021/10/CT2021Indonesia.pdf>, checked on 2/12/2021.

CMEA (2019): Exploring Market-Based Mechanisms for Low Carbon Business in indonesia. Coordinating Ministry of Economic Affairs. Jakarta, 2/7/2019.

Cook, Erin (2019): Is Indonesia Losing Its War on Corruption Under Jokowi? The Diplomat. Available online at <https://thediplomat.com/2019/09/is-indonesia-losing-its-war-on-corruption-under-jokowi/>, updated on 11/2/2022, checked on 11/2/2022.

Country Economy (2022): Pakistan - Crude Oil Reserves 2021. Available online at <https://countryeconomy.com/energy-and-environment/crude-oil/reserves/pakistan>, updated on 1/9/2022, checked on 1/9/2022.

CPEC Authority (2022): Energy Projects Under CPEC. China-Pakistan Economic Corridor (CPEC) Authority Official Website. Ministry of Planning, Development, & Special Initiative. Available online at <http://cpec.gov.pk/energy>, updated on 1/8/2022, checked on 1/8/2022.

CPPA (2016): About CPPA. Business Profile. Central Power Purchasing Agency. Available online at <https://www.cppa.gov.pk/Home/CompanyProfile>, updated on 1/12/2022, checked on 1/12/2022.

CPPA (2018): Contractual Framework and Commercial Concepts of PPAs in Pakistan Power Market, 2018. Available online at <https://www.cppa.gov.pk/DownloadFiles/Other/Commercial%20Provisions%20of%20PPA%20-%20Assad%20Ch.%20CPPA.pdf-180724034741414.pdf>, checked on 1/13/2022.

Crispin, Shawn W. (2019): Why Indonesia can't keep the lights on. In Asia Times, 8/21/2019. Available online at <https://asiatimes.com/2019/08/why-indonesia-cant-keep-the-lights-on/>, checked on 12/14/2021.

Da Beo Costa, Agustinus; Lamb, Kate (2022): Indonesia passes law to relocate capital to Borneo jungle. World Economic Forum. Available online at <https://www.weforum.org/agenda/2022/01/indonesia-relocate-capital-borneo-jungle-cities-island-asia/>, updated on 4/6/2022, checked on 4/6/2022.

Dang, L.N. & Farhad Taghizadeh-Hesary, F. (2019): Avoiding Energy Insecurity by Promoting Private Investment—The Case of the Vietnamese Power Sector. Available online at <https://www.adb.org/sites/default/files/publication/539741/adb-wp1038.pdf>.

Diela, Tabita; Widianto, Stanley (2020): After Indonesia's deadly floods, few hear climate 'wake up call'. In Reuters Media, 1/4/2020. Available online at <https://www.reuters.com/article/us-indonesia-floods-climate-change/after-indonesias-deadly-floods-few-hear-climate-wake-up-call-idUSKBN1Z305X>, checked on 11/2/2022.

Direktorat Jenderal Pajak (2021): Indonesia Carbon Pricing. Presidential Decree Number 98 of 2021. Government of Indonesia, 2021. Available online at <https://www.adb.org/sites/default/files/publication/746511/carbon-pricing-green-recovery-growth.pdf>, checked on 12/1/2022.

Do, T. N.; Burke, P. (2021): Carbon pricing in Vietnam: options for adoption, energy and climate change 2 (100058). Available online at <https://www.sciencedirect.com/science/article/abs/pii/S2666278721000350>.

Doda, Baran; Acworth, William; Kuneman, Ernst; Krause, Emma; Boute, Anatole; Ewing, Jackson (2021): Carbon Pricing Potential in East and South Asia. Interim Report. Edited by Nadine Pauly, Claudia Gibis. adelphi; CUHK; Duke University; German Environment Agency. Berlin, Hong Kong, North Carolina (Climate Change 40/2021, FB000509/ZW,ENG). Available online at <https://www.adelphi.de/en/publication/carbon-pricing-potential-east-and-south-asia>.

Doda, Baran; Hall, Maia; Krause, Emma; Kuneman, Ernst; Li, Lina; Boute, Anatole; Elbrecht, Jana (2022): Carbon Pricing Potential in East and South Asia. Jurisdiction factsheets and clusters. Edited by Nadine Pauly, Claudia Gibis. German Environment Agency. Available online at <https://www.adelphi.de/en/publication/carbon-pricing-potential-east-and-south-asia-0>.

EC (2021a): Generalised Scheme of Preferences (GSP) - Trade. European Commission. Available online at <https://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/>, updated on 9/22/2021, checked on 1/24/2022.

EC (2021b): Pakistan - Trade. European Commission. Available online at <https://ec.europa.eu/trade/policy/countries-and-regions/countries/pakistan/>, updated on 6/3/2021, checked on 1/24/2022.

EC (2022): Electricity price statistics. European Commission. Available online at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics, updated on 11/11/2021, checked on 1/21/2022.

Eckstein, D.; Künzel, V.; Schäfer, L. (2021): GLOBAL CLIMATE RISK INDEX 2021. Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2019 and 2000-2019. Germanwatch (Briefing paper). Available online at https://germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_1.pdf, checked on 1/20/2022.

Economist Intelligence Unit (2020): Democracy Index 2020. Economist Intelligence Unit. Available online at <https://www.eiu.com/n/campaigns/democracy-index-2020/>, updated on 2/10/2022, checked on 11/2/2022.

EIA (2016): Pakistan: Analysis. U.S. Energy Information Administration. Available online at <https://www.eia.gov/international/analysis/country/PAK>, updated on 1/9/2022, checked on 1/9/2022.

EIA (2017): Vietnam. Available online at <https://www.eia.gov/international/analysis/country/VNM>.

EIA (2021): Vietnam's latest power development plan focuses on expanding renewable source. Available online at www.eia.gov/todayinenergy/detail.php?id=48176.

Enerdata (n.d.): Pakistan Energy Information. Available online at <https://www.enerdata.net/estore/energy-market/pakistan/>, updated on 1/4/2022, checked on 1/4/2022.

ESMAP (2020): Global Photovoltaic Power Potential by Country. World Bank. Washington, DC. Available online at <https://openknowledge.worldbank.org/bitstream/handle/10986/34102/Global-Photovoltaic-Power-Potential-by-Country.pdf?sequence=4&isAllowed=y>, checked on 9/1/2022.

European Commission (2020): EU-Vietnam trade agreement enters into force. Available online at https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1412.

ExxonMobil (2021): 2021 Energy & Carbon Summary - Apr 2021. Available online at <https://corporate.exxonmobil.com/-/media/Global/Files/energy-and-carbon-summary/Energy-and-carbon-summary.pdf>, checked on 11/12/2021.

FBR (2021): Evidence-Based Revenue Forecasting FY 2021-22. Federal Board of Revenue, Government of Pakistan. Available online at http://www.finance.gov.pk/budget/Budget_2021_22/Evidence_Based_Revenue_Forecasting_FY_2021_22.pdf, checked on 4/1/2022.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of Germany (2021): Creation of a comprehensive framework for NAMAs and MRV in Viet Nam. Available online at https://www.international-climate-initiative.com/en/details/project/creation-of-a-comprehensive-framework-for-namas-and-mrv-in-viet-nam-13_l+_027-357.

Finance Division: Medium Term Budgetary Statement 2020-21 to 2022-23. Government of Pakistan. Available online at https://www.finance.gov.pk/budget/Statement_MTBS_2020_23.pdf, checked on 4/1/2022.

Finance Division (2021a): Federal Budget 2020-21. Budget in Brief. Government of Pakistan. Available online at https://www.finance.gov.pk/budget/Budget_in_Brief_2020_21_English.pdf, checked on 4/1/2022.

Finance Division (2021b): Pakistan Economic Survey 2020-21. Government of Pakistan. Available online at https://www.finance.gov.pk/survey_2021.html, updated on 1/2/2022, checked on 1/4/2022.

Fuentes, U.; Urme, T.; Muir, C.; Hasnat, M.; Bhuyan, M.; Chapman, A. (2019): Energy Transition to Renewable Energies Opportunities for Australian cooperation with Indonesia. With assistance of Murdoch University. Available online at https://www.energy-transition-hub.org/files/article/attachment/energy_transition_to_renewable_energies_-_opportunities_for_austalian_cooperation_with_indonesia.pdf, checked on 12/14/2021.

GCISC (2021): National Training Workshop 20-21 September 2021. Global Change Impact Studies Centre. Available online at <http://www.gcisc.org.pk/21sep.php>, updated on 1/14/2022, checked on 1/14/2022.

GGGI (2020): Viet Nam's Ministry of Finance and GGGI sign a Memorandum of Understanding on green finance cooperation. Available online at <https://gggi.org/viet-nams-ministry-of-finance-and-gggi-sign-a-memorandum-of-understanding-on-green-finance-cooperation/>.

GGGI (2021): Indonesia's Updated NDC for a Climate Resilient Future. Global Green Growth Institute. Available online at <https://gggi.org/indonesias-updated-ndc-for-a-climate-resilient-future/>, updated on 12/14/2021, checked on 12/14/2021.

Giglione, T. (1/14/2021): New technological trends for carbon credit investors. Vietnam Investment Review. Available online at <https://vir.com.vn/new-technological-trends-for-carbon-credit-investors-82002.html>.

GIZ (2022): Pakistan Project Data. Deutsche Gesellschaft für Internationale Zusammenarbeit. Available online at <https://www.giz.de/en/worldwide/362.html>, updated on 5/1/2022, checked on 5/1/2022.

Glasgow Leaders' Declaration on Forests and Land Use. UN Climate Change Conference (COP26) at the SEC - Glasgow 2021 (2021). Available online at <https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/>, updated on 11/12/2021, checked on 12/2/2021.

Global Energy Monitor (2021): Coal Plant Tracker Map. Global Energy Monitor. Available online at <https://globalenergymonitor.org/projects/global-coal-plant-tracker/tracker/>, updated on 1/7/2021, checked on 12/7/2021.

Global Petrol Prices (2020): Indonesia Electricity Prices. Available online at https://www.globalpetrolprices.com/Indonesia/electricity_prices/.

GoP - Finance Division (2021): Pakistan Economic Survey 2020-21. Available online at https://www.finance.gov.pk/survey_2021.html, updated on 1/2/2022, checked on 1/4/2022.

Government of Indonesia (2014): Government Regulation of the Republic of Indonesia, Number 29 of 2014 on National Energy Policy. NEP 29. Available online at <https://policy.asiapacificenergy.org/sites/default/files/Government%20Regulation%20No.%2079%3A2014%20of%202014%20%28EN%29.pdf>, checked on 2/11/2022.

Government of Indonesia (11/10/2017): PP No. 46 Tahun 2017 tentang Instrumen Ekonomi Lingkungan Hidup [JDIH BPK RI]. LN.2017/No. 228, TLN NO.6134, LL SETNEG : 38 HLM. Available online at <https://peraturan.bpk.go.id/Home/Details/64701>, checked on 12/14/2021.

Government of Indonesia (2018): Market Readiness Proposal: Indonesia. Identifying Suitable Market Instruments. Available online at <https://www.thepmr.org/system/files/documents/Indonesia%20MRP%20Final-September29.pdf>, checked on 2/12/2021.

Government of Indonesia (2020): Nationally Determined Contribution: Indonesia. Available online at <https://unfccc.int/NDCREG>, updated on 11/2/2022, checked on 11/2/2022.

Government of Indonesia (2021a): Indonesia: Long-Term Strategy for Low Carbon and Climate Resilience 2050. (Indonesia LTS-LCCR 2050). Jakarta. Available online at https://unfccc.int/sites/default/files/resource/Indonesia_LTS-LCCR_2021.pdf.

Government of Indonesia (2021b): Peraturan Pemerintah Republik Indonesia; Nomor 98 Tahun 2021; Penggabungan Erusahaan Perseroan (Persero) PT Pertani KE DALAM PERUSAHAAN PERSEROAN (PERSERO) PT SANG HYANG SERI (98/2021).

Government of Indonesia (2021c): Updated NDC Indonesia 2021 - corrected version. Available online at <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Indonesia%20First/Updated%20NDC%20Indonesia%202021%20-%20corrected%20version.pdf>, checked on 12/14/2021.

Government of Pakistan (2013): Framework for Implementation of Climate Change Policy. Climate Change Division. Available online at <http://www.gcisc.org.pk/Framework%20for%20Implementation%20of%20CC%20Policy.pdf>, checked on 1/14/2022.

Government of Pakistan (2019): Alternative and Renewable Energy Policy 2019. Available online at https://www.aedb.org/images/Draft_ARE_Policy_2019_-_Version_2_July_21_2019.pdf, checked on 4/1/2022.

Government of Pakistan (2021): Pakistan: Updated Nationally Determined Contributions 2021. Available online at <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pakistan%20Updated%20NDC%202021.pdf>, checked on 4/1/2022.

Government of Vietnam (2020a): Decision No. 13/2020/QĐ-TTg on mechanisms to promote the development of solar power projects in Viet Nam. Available online at https://policy.asiapacificenergy.org/sites/default/files/Decision_13_2020_on_Solar-FiT-2_EN.pdf.

Government of Vietnam (2020b): Nationally Determined Contribution: Vietnam. UNFCCC. Available online at https://unfccc.int/sites/default/files/NDC/2022-06/Viet%20Nam_NDC_2020_Eng.pdf, checked on 2/11/2022.

Government of Vietnam (2020c): Updated Nationally Determined Contribution. Available online at <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Viet%20Nam%20First/VIETNAM%27S%20INDC.pdf>.

Government of Vietnam (2022a): Decree No. 06/2022/ND-CP Regulations for reducing GHG emissions and protection of the ozone layer. Available online at <https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Nghi-dinh-06-2022-ND-CP-giam-nhe-phat-thai-khi-nha-kinh-va-bao-ve-tang-o-don-500104.aspx>, updated on 1/11/2022, checked on 1/11/2022.

Government of Vietnam (2022b): Decree no.06/22/ND-CP of 7 Jan 2022 on Greenhouse Gas Reduction, and Ozone layer protection. Available online at <https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Nghi-dinh-06-2022-ND-CP-giam-nhe-phan-thai-khi-nha-kinh-va-bao-ve-tang-o-don-500104.aspx>, checked on 11/2/2022.

Green Growth Strategy (2012). Available online at <https://www.giz.de/de/downloads/VietNam-GreenGrowth-Strategy.pdf>.

Green Growth Strategy (2021). Available online at http://www2.chinhphu.vn/portal/page/portal/chinhphu/noidungchienluocphattrienkinhtexahoi?_piref33_14725_33_14721_14721.strutsAction=ViewDetailAction.do&_piref33_14725_33_14721_14721.docid=5138&_piref33_14725_33_14721_14721.substract=.

Greenpeace USA (2022): Indonesia Forests. Greenpeace USA. Available online at <https://www.greenpeace.org/usa/forests/Indonesia/>, updated on 1/12/2022, checked on 1/12/2022.

Guild, James (2019): Feed-in-tariffs and the politics of renewable energy in Indonesia and the Philippines. In *Asia Pac Policy Stud* 6 (3), pp. 417–431. DOI: 10.1002/app5.288.

Guild, James (2020): Indonesia's energy dilemma. Inside Indonesia: The peoples and cultures of Indonesia. Inside Indonesia. Available online at <https://www.insideindonesia.org/indonesia-s-energy-dilemma>, updated on 11/2/2022, checked on 11/2/2022.

Guild, James (2021a): Did Indonesia Dodge a Bullet With Its Renewable Energy Feed-in-Tariffs? In *The Diplomat*, 09/2021. Available online at <https://thediplomat.com/2021/09/did-indonesia-dodge-a-bullet-with-its-renewable-energy-feed-in-tariffs/>, checked on 12/15/2021.

Guild, James (2021b): Indonesia's COP26 Deforestation Pledge Kerfuffle, Explained. The Indonesian environment minister's real misstep was that she punctured the illusion of progress by saying the quiet part out loud. In *The Diplomat*, 12/2/2021. Available online at <https://thediplomat.com/2021/11/indonesias-cop26-deforestation-pledge-kerfuffle-explained/>, checked on 12/2/2021.

Ha, T. (2021): Renewables are booming in Vietnam. Will the upswing last?, 4/13/2021. Available online at <https://www.eco-business.com/news/renewables-are-booming-in-vietnam-will-the-upswing-last/>.

Heiduk, Felix (2016): Indonesia in ASEAN. Regional Leadership between Ambition and Ambiguity. Stiftung Wissenschaft und Politik (SWP) (2016/RP 06). Available online at <https://www.swp-berlin.org/en/publication/indonesia-in-asean/>, checked on 11/2/2022.

Heo, V. (2021): Asia's pledge on coal phaseout: a thorny problem of retiring young fleets. IHS Markit. Available online at <https://ihsmarkit.com/research-analysis/asias-pledge-on-coal-phaseout-a-thorny-problem-of-retiring-you.html>, updated on 11/29/2021, checked on 12/10/2021.

ICAP (2020a): Emissions Trading Worldwide: Status Report 2020. Available online at https://icapcarbonaction.com/en/?option=com_attach&task=download&id=677.

ICAP (2020b): New law in Vietnam creates mandate for ETS. Available online at <https://icapcarbonaction.com/en/news-archive/730-new-law-in-vietnam-creates-mandate-for-ets>.

ICAP (2021a): Emissions Trading Worldwide: Status Report 2021. Available online at https://icapcarbonaction.com/en/?option=com_attach&task=download&id=723.

ICAP (2021b): Indonesia launches voluntary ETS trial for power sector. International Carbon Action Partnership. Available online at <https://icapcarbonaction.com/en/news/indonesia-launches-voluntary-ets-trial-power-sector>, updated on 11/2/2022, checked on 11/2/2022.

IEA (2015): Electricity Law (No. 30/2009). International Energy Agency. Available online at <https://www.iea.org/policies/5683-electricity-law-no-302009?country=Indonesia&page=2&q=indon>, updated on 12/15/2021, checked on 12/15/2021.

IEA (2019): IEA Atlas of Energy: Coal. International Energy Agency. Available online at <http://energyatlas.iea.org/#!/tellmap/2020991907/1>.

IEA (2020): IEA Database Project: MEAs to which Indonesia has taken membership actions. International Energy Agency. Available online at <https://iea.uoregon.edu/country-members/Indonesia>.

IEA (2021a): Data & Statistics. Indonesia. International Energy Agency. Available online at <https://www.iea.org/data-and-statistics/data-browser?country=INDONESIA&fuel=Electricity%20and%20heat&indicator=ElecGenByFuel>, updated on 12/2/2021, checked on 12/2/2021.

IEA (2021b): Electricity Information - Data product - IEA. International Energy Agency. Available online at <https://www.iea.org/data-and-statistics/data-product/electricity-information>, updated on 12/14/2021, checked on 12/14/2021.

IEA (2021c): Solar Feed-In Tariff of Indonesia (2016). International Energy Agency. Available online at <https://www.iea.org/policies/6335-solar-feed-in-tariff-of-indonesia-2016>, updated on 12/15/2021, checked on 12/15/2021.

IEA (2021d): Viet Nam. Available online at <https://www.iea.org/countries/viet-nam>.

IEA (2021e): Policies database. With assistance of IEA/IRENA Renewable Energy Policies and Measures Database, IEA Energy Efficiency Database, Addressing Climate Change database, Building Energy Efficiency Policies (BEEP) database. Available online at <https://www.iea.org/policies/about>, updated on 12/15/2021, checked on 12/15/2021.

IEA (2022): Pakistan - Countries & Regions - IEA. Available online at <https://www.iea.org/countries/pakistan>, updated on 1/4/2022, checked on 1/4/2022.

IHA (2020): Country Profile: Pakistan. International Hydropower Association. Available online at <https://www.hydropower.org/country-profiles/pakistan>, updated on 1/9/2022, checked on 1/9/2022.

IKI (2020): Building up green fiscal policy in Indonesia. International Climate Initiative, Federal Ministry of the Environment, Nature Conservation and Nuclear Safety. Available online at https://www.international-climate-initiative.com/en/news/article/building_up_green_fiscal_policy_in_indonesia, updated on 12/2/2021, checked on 12/2/2021.

IKI (2021a): MRV system for mitigation actions in Indonesia - Internationale Climate Initiative (IKI). Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU). Available online at https://www.international-climate-initiative.com/en/details/project/mrv-system-for-mitigation-actions-in-indonesia-18_I_307-2946, updated on 12/14/2021, checked on 12/14/2021.

IKI (2021b): Building up green fiscal policy in Indonesia. Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU). Available online at https://www.international-climate-initiative.com/en/news/article/building_up_green_fiscal_policy_in_indonesia, updated on 12/11/2021, checked on 12/11/2021.

ILO (2020): COVID-19 and the labour market in Viet Nam. Available online at https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---ilo-hanoi/documents/briefingnote/wcms_742134.pdf.

IMF (2019): Pakistan: Request for an Extended Arrangement Under the Extended Fund Facility-Press Release; Staff Report; and Statement by the Executive Director for Pakistan. IMF Country Report No. 19/212; June 20, 2019, checked on 7/1/2022.

IMF (2021a): Country-level energy subsidy estimates. Available online at <https://www.imf.org/en/Topics/climate-change/energy-subsidies#The%20Benefits%20of%20Subsidy%20Reform>.

IMF (2021b): Pakistan: Second, Third, Fourth, and Fifth Reviews Under the Extended Arrangement Under the Extended Fund Facility and Request for Rephasing of Access-Press Release; Staff Report; Staff Supplement, and Statement by the Executive Director for Pakistan. IMF (IMF Country Report, No. 21/73), checked on 4/1/2022.

International Carbon Action Partnership (2021): Indonesia launches voluntary ETS trial for power sector. International Carbon Action Partnership. Available online at <https://icapcarbonaction.com/en/news-archive/764-indonesia-launches-voluntary-ets-trial-for-power-sector>, updated on 1/13/2022, checked on 1/13/2022.

Invest Pakistan (2022): Pakistan at a Glance. Invest Pakistan. Available online at <https://invest.gov.pk/pakistan-at-a-glance>, updated on 3/1/2022, checked on 5/1/2022.

IPC (2021): Council of Common Interests. Inter Provincial Coordination Division. Available online at http://www.ipc.gov.pk/SiteImage/Misc/files/CCI/Brief%20on%20CCI%20%5BUpdated%20%206_9_2021.pdf, checked on 1/16/2022.

IPCC (2018): Summary for Policymakers. Global Warming of 1.5°C. Available online at https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf, checked on 1/14/2022.

Iqbal, Tahir; Dong, Chang-qing; Lu, Qiang; Ali, Zulfiqar; Khan, Idris; Hussain, Zafar; Abbas, Adnan (2018): Sketching Pakistan's energy dynamics: Prospects of biomass energy. In *Journal of Renewable and Sustainable Energy* 10 (2), p. 23101. DOI: 10.1063/1.5010393.

Jakarta Globe (2021): Indonesia to Impose Carbon Tax in April 2022, Starting With Coal Power Plants. In *Jakarta Globe*, 12/14/2021. Available online at <https://jakartaglobe.id/business/indonesia-to-impose-carbon-tax-in-april-2022-starting-with-coal-power-plants>, checked on 12/14/2021.

Jiao, Claire; Sihombing, Grace (2021): Indonesia Takes 'Low and Slow' Path to Carbon Tax and Trade. In *Bloomberg*, 11/15/2021. Available online at <https://www.bloomberg.com/news/articles/2021-11-14/indonesia-takes-low-and-slow-path-to-carbon-tax-and-trade>, checked on 12/2/2021.

JICA (2014): Project to Support the Planning and Implementation of NAMAs in a MRV Manner (SPI-NAMA). Available online at <https://www.jica.go.jp/project/english/vietnam/036/outline/index.html>.

Khanh, N. Q. (2012): Study on the Impacts of Electricity Tariff Increase on the National Economy of Vietnam. Available online at <https://www.eria.org/Chapter%2010-Study%20on%20the%20Impacts%20of%20Electricity%20Tariff%20Increase%20on%20the%20National%20Economy%20of%20Vietnam.pdf>.

Khatibi, Farzaneh Shaikh; Dedekorkut-Howes, Aysin; Howes, Michael; Torabi, Elnaz (2021): Can public awareness, knowledge and engagement improve climate change adaptation policies? In *Discover Sustainability* 2 (1), pp. 1–24. DOI: 10.1007/s43621-021-00024-z.

Laan, T.; McCulloch, N. (2019): Energy Transition in Support of the Low-Carbon Development Initiative in Indonesia: Transport Sector. IISD & Global Subsidies Initiative.

Lee, A. D.; Gerner, F. (2020): Learning for Power Sector Reform Experiences: The Case of Vietnam. World Bank Group (9169). Available online at <http://documents1.worldbank.org/curated/en/757761583166223011/pdf/Learning-from-Power-Sector-Reform-Experiences-The-Case-of-Vietnam.pdf>.

Lee, Joo Yeow (2021): Indonesia's greener electricity supply business plan—2021 RUPTL. IHS Markit. Available online at <https://ihsmarkit.com/research-analysis/indonesias-greener-electricity-supply-business-plan2021-ruptl.html>, updated on 10/22/2021, checked on 12/14/2021.

- Mahfud (2011): Separation of powers and independence of constitutional court in Indonesia. Source: The Constitutional Court of the Republic of Indonesia. Available online at https://www.venice.coe.int/WCCJ/Rio/Papers/INA_Mahfud_E.pdf, checked on 2/11/2022.
- Malik, Sadia; Qasim, Maha; Saeed, Hasan; Chang, Youngho; Taghizadeh-Hesary, Farhad (2019): Energy Security in Pakistan. A Quantitative Approach to a Sustainable Energy Policy. With assistance of ADBI Working Paper. Asian Development Bank Institute. Tokyo (ADBI Working Paper, 1024). Available online at <https://www.adb.org/sites/default/files/publication/535821/adbi-wp1024.pdf>, checked on 3/11/2022.
- Mandelli, Jean-Louis Neves; Koh, Kyle (2022): Committing to a Greener Future. Indonesia Embraces the Use of Carbon Economic Value. Shearman & Sterling. Available online at <https://www.shearman.com/perspectives/2022/01/committing-to-a-greener-future--indonesia-embraces-the-use-of-carbon-economic-value>, updated on 1/12/2022, checked on 1/12/2022.
- Mangi, Faseeh (2021): Nation Plagued by Power Shortages Suddenly Has Too Much Electricity. In Bloomberg, 1/27/2021. Available online at <https://www.bloomberg.com/news/articles/2021-01-27/pakistan-struggles-to-tackle-an-unfamiliar-glut-of-electricity>, checked on 1/18/2022.
- Manuell, Roy; Garside, Ben (2/18/2022): Cambodia emerges as SE Asian frontrunner on Paris-adjusted carbon credits. Carbon Pulse. Available online at <https://carbon-pulse.com/151370/>, checked on 2/23/2022.
- Martin, J. R. (2020): Vietnam sets long-term renewable energy goals as solar auctions beckon. In PVTECH, 2/24/2020. Available online at <https://www.pv-tech.org/vietnam-sets-long-term-renewable-goals-as-solar-auctions-beckon/>.
- Maryono; Wahdaniah, G.; Adhiyoso, A. (2021): Decarbonization for the Future Economy. PT PJB, 2021.
- McKinley, J.; Adaro, C.; Pede, V. O.; Setiyono, T.; Thang, T. C.; Huong, D. L. et al. (2015): The Current State of Climate Change Perceptions and Policies in Vietnam: 2014 Report. Available online at <https://ccafs.cgiar.org/resources/publications/current-state-climate-change-perceptions-and-policies-vietnam-2014>.
- MDI (2020): Vietnam Energy Update Report 2020. Available online at <http://www.mdi.edu.vn/wp-content/uploads/2020/09/ENERGY-UPDATE-REPORT-2020.pdf>.
- METI-IRES (2022): Indonesian Renewable Energy Society (METI-IRES) | Devex. Available online at <https://www.devex.com/organizations/indonesian-renewable-energy-society-meti-ires-55932>, updated on 1/13/2022, checked on 1/13/2022.
- Michaelowa, A. (2018): Opportunities for Carbon Pricing in Vietnam. Publication part of the Project "Strengthening Capacity and Institutional Reform for Green Growth and Sustainable Development in Viet Nam". UNDP & USAID.
- Ministry of Energy and Mineral Resources; Ministry of Finance (2019): Indonesia's Effort to Phase Out and Rationalise Its Fossil Fuel Subsidies. G20, 2019 Japan. Available online at <https://www.oecd.org/fossil-fuels/publication/Indonesia%20G20%20Self-Report%20IFFS.pdf>.
- Ministry of Energy and Mineral Resources Indonesia (3/8/2021): Electricity Tariffs for April-June 2021 Remain Unchanged. Available online at <https://www.esdm.go.id/en/media-center/news-archives/electricity-tariffs-for-april-june-2021-remain-unchanged>, checked on 12/14/2021.
- Ministry of Planning, Development & Reform (2014): Pakistan Vision 2025. Government of Pakistan. Available online at <https://www.pc.gov.pk/uploads/vision2025/Pakistan-Vision-2025.pdf>, checked on 4/1/2022.
- Ministry of Planning, Development & Reform (2016): National Poverty Report. 2015-2016. Government of Pakistan. Available online at https://www.sdgpakistan.pk/uploads/pub/National_Poverty_Report_2015_16.pdf, checked on 7/1/2022.

- Mirza, Umar K.; Ahmad, Nasir; Majeed, Tariq (2008): An overview of biomass energy utilization in Pakistan. In *Renewable and Sustainable Energy Reviews* 12 (7), pp. 1988–1996. DOI: 10.1016/j.rser.2007.04.001.
- MOCC (2018): PAKISTAN'S SECOND NATIONAL COMMUNICATION ON CLIMATE CHANGE. Ministry of Climate Change; Government of Pakistan. Available online at http://www.gcisc.org.pk/SNC_Pakistan.pdf, checked on 1/14/2022.
- Muhammad, Fikri; Tan, Mei Zi (2022): Indonesia is set to launch its pilot emissions trading scheme. Here's what we know. *The Conversation*. Available online at <https://theconversation.com/indonesia-is-set-to-launch-its-pilot-emissions-trading-scheme-heres-what-we-know-179968>, updated on 9/13/2022, checked on 9/23/2022.
- Nachmany, M.; Fankhauser, S.; Davidová, J.; Kingsmill, N.; Landesman, T.; Roppongi, H. et al. (2015): Climate Change Legislation in Thailand. Grantham Research Institute on Climate; GLOBE - The Global Legislators Organisation; IPU (The 2015 Global Climate Legislation Study: A Review of Climate Change Legislation in 99 Countries). Available online at <https://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/THAILAND.pdf>.
- Nachmany, M.; Fankhauser, S.; Townshend, T.; Collins, M. Landesman, T; Matthews, A.; Pavese, C.; Rietig, K. (2014): The GLOBE Climate Legislation Study. A Review of Climate Change Legislation in 66 Countries. Fourth edition. GLOBE International and the Grantham Research Institute, London. London. Available online at <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2014/03/Globe2014.pdf>, checked on 2/11/2022.
- Nangoy, Fransiska (2021a): Renewables to make up at least 48% of Indonesia's 2021-2030 electricity plan. In *Reuters Media*, 6/4/2021. Available online at <https://www.reuters.com/business/energy/renewables-make-up-least-48-indonesias-2021-2030-electricity-plan-2021-06-04/>, checked on 12/14/2021.
- Nangoy, Fransiska (2021b): Indonesia optimistic of reaching net zero emissions by 2060 or earlier. In *Reuters Media*, 7/27/2021. Available online at <https://www.reuters.com/business/environment/indonesia-optimistic-reaching-net-zero-emissions-by-2060-or-earlier-2021-07-27/>, checked on 12/14/2021.
- National Assembly of Pakistan (1997): Pakistan Environmental Protection Act. (PEPA), 1997. Available online at <https://www.elaw.org/system/files/Law-PEPA-1997.pdf>, checked on 1/18/2022.
- NEPRA (2021): State of Industry Report 2021. National Electric Power Regulatory Authority. Available online at <https://nepra.org.pk/publications/State%20of%20Industry%20Reports/State%20of%20Industry%20Report%202021.pdf>, checked on 3/1/2022.
- NEPRA (2022): About Us. National Electric Power Regulatory Authority. Available online at <https://nepra.org.pk/About.php>, updated on 1/12/2022, checked on 1/12/2022.
- Nguyen, T.; Burke, F. (2021): Vietnam: New draft decision on future Solar Auction Program. Available online at <https://www.lexology.com/library/detail.aspx?g=e6993262-9cc6-4a53-bdca-83fc84ab0cf9>.
- NTDC (2021): Indicative Generation Capacity Expansion Plan (IGCEP) 2021-30. Load Forecast and Generation Planning, Power System Planning. National Transmission and Despatch Company, checked on 9/1/2022.
- NTDC (2022): MERIT ORDER. National Transmission and Despatch Company. Available online at <https://ntdc.gov.pk/merit-order>, updated on 1/10/2022, checked on 1/13/2022.
- Ochieng, Robert M.; Arts, Bas; Brockhaus, Maria; Visseren-Hamakers, Ingrid J. (2018): Institutionalization of REDD+ MRV in Indonesia, Peru, and Tanzania: progress and implications. In *E&S* 23 (2). DOI: 10.5751/ES-09967-230208.
- OECD (2021): Revenue Statistics in Asia and the Pacific: Key findings for Indonesia. Available online at <https://www.oecd.org/tax/tax-policy/revenue-statistics-asia-and-pacific-indonesia.pdf>, checked on 6/4/2022.

Oktavianti, Tri Indah (2020): Indonesia speeds up regulation on global carbon trading. In The Jakarta Post, 2020. Available online at <https://www.thejakartapost.com/news/2020/07/07/indonesia-speeds-up-regulation-on-global-carbon-trading.html>, checked on 11/2/2022.

Palma, Stefania (2018): Indonesia keeps faith with coal to meet growing energy demand. In Financial Times, 7/31/2018. Available online at <https://www.ft.com/content/0fd3ed3e-89b9-11e8-affd-da9960227309>, checked on 11/2/2022.

Parker, Lyn; Prabawa-Sear, Kelsie (2020): Environmental Education in Indonesia. Creating Responsible Citizens in the Global South? New York: Routledge (Routledge Explorations in Environmental Science).

Pastakia, Firuza (2012): Environmental Protection and The Eighteenth Amendment. Impact of Constitutional Amendments on Environmental Protection Legislation, Analysis of Laws in Force, and Assessment of Implementation Issues. Available online at https://www.iucn.org/sites/dev/files/import/downloads/pk_niap_impact_of_18th_amd___final_draft__19_may_2012__formatted.pdf, checked on 1/14/2022.

PBC (2019): Potential for a Pakistan – U.S. Free Trade Agreement | Pakistan Business Council. Pakistan Business Council. Available online at <https://www.pbc.org.pk/research/potential-for-a-pakistan-us-free-trade-agreement/>, updated on 1/24/2022, checked on 1/24/2022.

PBS (2019): Pakistan Labour Force Survey. 2018-19. Ministry of Planning, Development & Special Initiatives. Pakistan Bureau of Statistics. Available online at https://www.pbs.gov.pk/sites/default/files//Labour%20Force/publications/lfs2018_19/lfs_2018_19_final_report.pdf, checked on 6/1/2022.

PBS (2021): Sectoral Shares in GDP (at constant basic prices) | Pakistan Bureau of Statistics. Pakistan Bureau of Statistics. Available online at <https://www.pbs.gov.pk/content/table-7-sectoral-shares-gdp-constant-basic-prices>, updated on 1/14/2022, checked on 1/14/2022.

Peraturan Pemerintah (11/10/2017): PP No. 46 Tahun 2017 tentang Instrumen Ekonomi Lingkungan Hidup [JDIH BPK RI]. LN.2017/No. 228, TLN NO.6134, LL SETNEG : 38 HLM. Available online at <https://peraturan.bpk.go.id/Home/Details/64701>, checked on 1/13/2022.

Pham, L. (2021): "Vietnam to launch competitive retail electricity market in 2023". In Hanoi Times, 1/12/2021. Available online at <http://hanoitimes.vn/vietnam-attempts-to-launch-competitive-retail-electricity-market-by-2023-315862.html>.

Phoumin, Han; Kimura, Fukunari; Arima, Jun (2021): ASEAN's Energy Transition towards Cleaner Energy System: Energy Modelling Scenarios and Policy Implications. In Sustainability 13 (5), p. 2819. DOI: 10.3390/su13052819.

PLN (2017): Annual Report 2017: Inspiring Journey of Transformation. Available online at <https://web.pln.co.id/statics/uploads/2019/11/AR-PLN-2017-Final.pdf>.

PMI (2021): Terms of Reference for Consulting Services to Assist the Government of Vietnam in the Preparation of its Implementation Support Plan in the Framework of Partnership for Market Implementation. Available online at <https://www.projproc.com/tender/37116-beo-consulting-services-assist-government-vietnam-prepare-its-implementation-support-plan>.

PMR (2017): PMR Project Implementation Status Report: Indonesia. World Bank. Available online at https://www.thepmr.org/system/files/documents/Indonesia%20ISR_final%20October%202017.pdf, checked on 2/11/2022.

PMR (2019): PMR Project Implementation Status Report (ISR). Available online at <https://www.thepmr.org/system/files/documents/2019%20Vietnam%20PMR%20Project%20Implementation%20Status%20Report.pdf>.

Prihatno, J. (Ed.) (2019a): Institutionalizing Data Management System [Sign Smart and National Registry System] – Indonesia. 2nd CGE pilot informal forum. Madrid, Spain. UNFCCC. Available online at https://unfccc.int/sites/default/files/resource/CGE_informal%20forum_data%20management%20system_Indo

Prihatno, J. (2019b): Lessons Learned and Experiences from Existing MRV Arrangements in Indonesia. UNFCCC. Available online at <https://unfccc.int/sites/default/files/resource/LESSON%20LEARN%20AND%20EXPERIENCE%20MRV%20%20IN>.

Prime Minister of the Socialist Republic of Vietnam: Decision No. 37/2011/QD-TTg of the Prime Minister on Mechanisms to Support the Development of Wind Power Projects in Vietnam. Available online at http://vepg.vn/wp-content/uploads/2018/10/39_2018_QD-TTg_1009188_CP_New-Wind-FIT_Unofficial-EN-Transl.pdf.

Prime Minister of the Socialist Republic of Vietnam: Decision No. 11/2017/QD-TTg of 2017 on the Mechanism for Encouragement of the Development of Solar Power Projects in Vietnam. Available online at <https://policy.asiapacificenergy.org/node/3446>.

PT Pembangkitan Jawa-Bali (2021): Home - English - PT Pembangkitan Jawa-Bali. Available online at <https://www.ptpjb.com/en/home-english/>, updated on 1/10/2021, checked on 12/14/2021.

Pujantoro, M.; Tampubolon, A. (2020): How renewables can power Indonesia? Webinar series. Berlin, Jakarta. Available online at https://static.agora-energiwende.de/fileadmin2/Projekte/2020/VAs_sonstige/2020-04_Webinar-Reihe/2020-04-23_RE_Indonesia_MP/Presentation_Pujantoro_Tampubolon_Agora-Webinar_23042020.pdf.

Purra, M. (2010): The Indonesian Electricity Sector: Institutional Transition, Regulatory Capacity and Outcomes.

PwC (2018): Power in Indonesia: Investment and Taxation Guide. Available online at <https://www.pwc.com/id/en/publications/assets/eumpublications/utilities/power-guide-2018.pdf>.

PwC (2019): Vietnam. Corporate - Other taxes (Worldwide Tax Summaries). Available online at <https://taxsummaries.pwc.com/vietnam/corporate/other-taxes>.

Rana, S. (2021): Pakistan's debt, liabilities cross Rs50tr. In The Express Tribune, 11/25/2021. Available online at <https://tribune.com.pk/story/2330983/pakistans-debt-liabilities-cross-rs50tr>, checked on 1/4/2022.

Reklev, S. (2019): Indonesia sets up agency to deal with climate funding, carbon markets. In Carbon Pulse, 10/9/2019. Available online at <https://carbon-pulse.com/83953/>, checked on 12/14/2021.

Reklev, S. (2021a): BRIEFING: Indonesia's carbon trading plans. In Carbon Pulse, 12/14/2021. Available online at <https://carbon-pulse.com/88530/>, checked on 12/14/2021.

Reklev, S. (2021b): Indonesia launches trial carbon market for coal-fired power plants. In Carbon Pulse, 12/14/2021. Available online at <https://carbon-pulse.com/125117/>, checked on 12/14/2021.

Reuters (10/15/2021): Vietnam's coal-fired power may double by 2030 under draft energy plan. Available online at <https://www.reuters.com/business/energy/vietnams-coal-fired-power-may-double-by-2030-under-draft-energy-plan-2021-10-15/>.

Reuters Staff (2020): Indonesia to cap gas prices for PLN at \$6/mmBtu to cut subsidies. In Reuters Media, 3/6/2020. Available online at <https://www.reuters.com/article/indonesia-electricity-idUSL4N2AZ24V>, checked on 12/14/2021.

Rogova, Valeria (2021): Climate Change in Indonesia: Denial and Disasters. In New Bloom Magazine, 7/4/2021. Available online at <https://newbloommag.net/2021/07/04/indonesia-climate-change/>, checked on 12/2/2021.

RSM Indonesia (2021): Key Points from Law to Harmonize Tax Regulations. Available online at <https://www.rsm.global/indonesia/en/news/key-points-law-harmonize-tax-regulations>, updated on 10/28/2021, checked on 12/2/2021.

- Santander Trade (2019): Indonesia: Foreign Investment. Available online at https://santandertrade.com/en/portal/establish-overseas/indonesia/foreign-investment?url_de_la_page=%2Fen%2Fportal%2Festablish-overseas%2Findonesia%2Fforeign-investment&&actualiser_id_banque=oui&id_banque=0&memoriser_choix=memoriser.
- SBP (2016): SBP Financing Scheme for Renewable Energy. State Bank of Pakistan. Available online at <https://www.sbp.org.pk/smefd/circulars/2019/C10-Annex-I.pdf>, checked on 1/13/2022.
- Schwab, K. (2019): The Global Competitiveness Report, Insight Report. World Economic Forum.
- Setyawan, Dhani (2014): Assessing The Current Indonesia's Electricity Market Arrangements and The Opportunities to Reform. In *International Journal of Renewable Energy Development* 3 (1), pp. 55–64. DOI: 10.14710/ijred.3.1.55-64.
- Shah, A. (2012): Making Federalism Work - The 18th Constitutional Amendment. World Bank (World Bank Policy Series on Pakistan PK 03/12). Available online at <https://openknowledge.worldbank.org/bitstream/handle/10986/18703/871020NWP0Box30ing0Federalism0Work.pdf?sequence=1&isAllowed=y>, checked on 5/1/2022.
- Shami, Sajjad Haider; Ahmad, Jameel; Zafar, Raheel; Haris, Muhammad; Bashir, Sajid (2016): Evaluating wind energy potential in Pakistan's three provinces, with proposal for integration into national power grid. In *Renewable and Sustainable Energy Reviews* 53, pp. 408–421. DOI: 10.1016/j.rser.2015.08.052.
- Shepherd, B. (2017): Connectivity for Growth: Vietnam's Performance and Prospects. Edited by World Bank Group (Vietnam at a Crossroads: Engaging in the Next Generation of Global Value Chains). Available online at https://doi.org/10.1596/978-1-4648-0996-5_ch4.
- Sherlock, S. (2010): The parliament in Indonesia's decade of democracy. People's forum or chamber of cronies? Problems of Democratisation in Indonesia. With assistance of E. Aspinall, M. Mietzner. Singapore.
- Socialist Republic of Vietnam (2016): Plan for Implementation of the Paris Agreement. AUSCHAM Vietnam. Available online at <https://auschamvn.org/wp-content/uploads/2016/10/Plan-for-implementation-of-Paris-Agreement-in-Vietnam-Eng.pdf>.
- Statista (2021a): Countries with largest liquefied natural gas (LNG) export capacity in operation worldwide as of 2021. Available online at <https://www.statista.com/statistics/1262074/global-lng-export-capacity-by-country/>, updated on 12/2/2021, checked on 12/2/2021.
- Statista (2021b): Indonesia: electricity generation capacity 2020 | Statista. Total electricity generation capacity in Indonesia from 2013 to 2020. Statista. Available online at <https://www.statista.com/statistics/865232/indonesia-electricity-generation-capacity/>, updated on 12/14/2021, checked on 12/14/2021.
- Strauch, L.; Du Robiou Pont, Y.; Balanowski, J. (2018): Multi-level Climate Governance in Vietnam: Bridging national planning and local climate action. adelphi. Available online at <https://www.adelphi.de/de/system/files/mediathek/bilder/Multi-level%20climate%20governance%20in%20Vietnam%20-%20adelphi.pdf>.
- Tacconi, Luca; Muttaqin, Muhammad Zahrul (2019): Reducing emissions from land use change in Indonesia: An overview. In *Forest Policy and Economics* 108, p. 101979. DOI: 10.1016/j.forpol.2019.101979.
- Tachev, V. (2021): The Proposed Vietnam PDP8 Update and the Risks From the Coal Pivot. Energy Tracker Asia. Available online at <https://energytracker.asia/the-proposed-vietnam-pdp8-update-and-the-risks-from-the-coal-pivot/>.
- Tänzler, D.; Maulidia, M. (2013): Status of Climate Finance in Indonesia: Country Assessment Report. With assistance of adelphi, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Available online at

https://www.adelphi.de/de/system/files/mediathek/bilder/indonesia_climate-finance-report_giz-adelphi_1.pdf, checked on 2/11/2022.

Tardif, Michael (2021): Indonesia introduces carbon tax and cap and trade system. Allen Overy. Available online at <https://www.allenoverly.com/en-gb/global/blogs/countdown-to-cop/indonesia-introduces-carbon-tax-and-cap-and-trade-system>, updated on 10/26/2021, checked on 12/2/2021.

Tardif, Michael; Bessendorf, Ari; Widiyanto, Deska (2021): Indonesia introduces carbon tax and cap and trade system. Allen & Overy. Available online at <https://www.allenoverly.com/en-gb/global/blogs/countdown-to-cop/indonesia-introduces-carbon-tax-and-cap-and-trade-system>, updated on 10/26/2021, checked on 12/14/2021.

Tareen, Wajahat Ullah Khan; Dilbar, Muhammad Tariq; Farhan, Muhammad; Ali Nawaz, Muhammad; Durrani, Ali Waqar; Memon, Kamran Ali et al. (2020): Present Status and Potential of Biomass Energy in Pakistan Based on Existing and Future Renewable Resources. In *Sustainability* 12 (1), p. 249. DOI: 10.3390/su12010249.

Tatarski, M. (2020): Will Vietnam's new energy policy mark a turning point for coal? *China Dialogue*. Available online at <https://chinadialogue.net/en/climate/will-vietnams-new-energy-policy-mark-a-turning-point-for-coal/>.

Tauhidi, Amna; Chohan, Usman W. (2020): The Conundrum of Circular Debt. In *SSRN Journal*. DOI: 10.2139/ssrn.3513225.

Teo, V.; Tan Tai, N. (2020): Tax Incentives for Renewable Energy in Vietnam. *Bloomberg Tax*. Available online at <https://news.bloombergtax.com/daily-tax-report-international/tax-incentives-for-renewable-energy-in-vietnam>.

Tetra Tech (2018): Review of Amended NEPRA ACT, 2018. Final Report. USAID. Available online at https://pdf.usaid.gov/pdf_docs/PA00WK7D.pdf, checked on 12/1/2022.

Tharakan, Pradeep (2015): Summary of Indonesia's Energy Sector Assessment. Asian Development Bank. Manila, Philippines (ADB Papers on Indonesia, 09). Available online at <https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf>, checked on 2/12/2021.

Thuc, P. T. (2016): Vietnam Renewable Energy development project to 2030 with outlook to 2050. UNDP. Available online at <https://www.undp.org/content/dam/vietnam/docs/Publications/Mr%20Thuc.pdf>.

Trading Economics (2021): Pakistan Crude Oil Production. Available online at <https://tradingeconomics.com/pakistan/crude-oil-production>, checked on 1/9/2022.

Trading Economics (2022): Pakistan Inflation Rate. Available online at <https://tradingeconomics.com/pakistan/inflation-cpi>, checked on 1/7/2022.

Transparency International (2021): 2020 Corruption Perceptions Index. Transparency International. Available online at <https://www.transparency.org/en/cpi/2020/index/nzl>, updated on 12/14/2021, checked on 12/14/2021.

UN News (2021): Climate change increasing threats in southwest Pacific: WMO report. In *UN News*, 11/12/2021. Available online at <https://news.un.org/en/story/2021/11/1105482>, checked on 12/2/2021.

UNDP (2021): Partnership for Market Readiness | UNDP in Indonesia. World Bank. Available online at <https://www.id.undp.org/content/indonesia/en/home/projects/Partnership-for-Market-Readiness.html>, updated on 12/14/2021, checked on 12/14/2021.

UNFCCC (2021a): CDM: CDM Registry. United Nations Framework Convention on Climate Change. Available online at <https://cdm.unfccc.int/Registry/index.html>, updated on 12/14/2021, checked on 12/14/2021.

UNFCCC (2021b): Communication of long-term strategies | UNFCCC. United Nations Framework Convention on Climate Change. Available online at <https://unfccc.int/process/the-paris-agreement/long-term-strategies>, updated on 12/15/2021, checked on 12/15/2021.

UNFCCC (2021c): Global Coal to Clean Power Transition Statement - UN Climate Change Conference (COP26) at the SEC – Glasgow 2021. Available online at <https://ukcop26.org/global-coal-to-clean-power-transition-statement/>, updated on 11/9/2021, checked on 12/14/2021.

UNFCCC (11/14/2021): End of Coal in Sight at COP26. Press release issued on behalf of the UK COP26 Presidency and the COP25 and COP26 High-Level Climate Champions. Jessica Ware. Available online at <https://unfccc.int/news/end-of-coal-in-sight-at-cop26>, checked on 12/14/2021.

UNFCCC/IGES Regional Collaboration Centre (2020): 28 to 29 September - ASEAN Countries Meet for the Regional Dialogue on Carbon Pricing. Available online at <https://unfccc.int/about-us/regional-collaboration-centres/rcc-bangkok/28-to-29-september-asean-countries-meet-for-the-regional-dialogue-on-carbon-pricing>.

Utami, Larasati Dyah (2021): Bantah Adanya Peningkatan Kerusakan Hutan, KLHK: Deforestasi Indonesia Turun 75 Persen. In *Tribunnews*, 3/3/2021. Available online at <https://www.tribunnews.com/nasional/2021/03/03/bantah-adanya-peningkatan-kerusakan-hutan-klhk-deforestasi-indonesia-turun-75-persen>, checked on 1/12/2022.

Vietnam Central Executive Committee (2013): Resolution No. 24-NQ/TW Active in response to climate change, improvement of natural resource management and environmental protection. Available online at <https://storage.googleapis.com/cclow-staging/d50zj8ocec8g3zy42fzo0bdbfgc?GoogleAccessId=laws-and-pathways-staging%40soy-truth-247515.iam.gserviceaccount.com&Expires=1667311131&Signature=Bt9pRAN7tDK2AyIPlwv%2FVf8CSsgDtcTVg8SDKRa0BNXadvGNOi7KAljQAhxu3tLQMwSKWUQH7pmtH1hr8ZnwnuWeijyxmxpdPLsFeebJixZpGrsXgcROsuo7oDsgLlIbuHb2Xo2fWPIVPHeo8amOfOellaib5I1M7jx1%2F5gusz9woNWh1tH9I6t7IL6u%2BFwHq%2BwdWitS0JVPvSt%2BLMe7K7gNtuL%2F0b9RPzHycHRBcyysv2cIBYdBGhH6tQbn%2BasaCXylesyvWaqucF6MOvehlUnxhdF2SzqxdW9lw%2FRHCHzkD7fxsxroKvK0MYXzpRdzBdJIHCYFruFQs3H1WdVag%3D%3D&response-content-disposition=inline%3B+filename%3D%221792+English.pdf%22%3B+filename%2A%3DUTF-8%27%271792%2520English.pdf&response-content-type=application%2Fpdf>, checked on 1/11/2022.

Vietnam News (2021): Việt Nam strives to achieve ‘net zero’ by 2050, with international support: PM. Available online at <https://vietnamnews.vn/environment/1071075/viet-nam-strives-to-achieve-net-zero-by-2050-with-international-support-pm.html>.

Vu, K. (2022): Vietnam seeks to import more coal from Australia to avert power shortage. In *Reuters Media*, 2022. Available online at <https://www.reuters.com/business/energy/vietnam-seeks-import-more-coal-australia-avert-power-shortage-2022-04-01/>.

Vu, T. (2020): New Regulations Threaten Vietnam’s Remaining Coal Pipeline. Foreign Investors Will Need Special Treatment To Avoid New PPP Law. Institute for Energy Economics and Financial Analysis. Available online at https://ieefa.org/wp-content/uploads/2020/10/New-Regulations-Threaten-Vietnams-Remaining-Coal-Pipeline_November-2020.pdf.

Walton, Kate (2019): Environment a missing topic as Indonesia election looms. In *Al Jazeera*, 4/15/2019. Available online at <https://www.aljazeera.com/news/2019/4/15/environment-a-missing-topic-as-indonesia-election-looms>, checked on 11/2/2022.

Warburton, Eve (2020): Deepening Polarization and Democratic Decline in Indonesia - Political Polarization in South and Southeast Asia: Old Divisions, New Dangers. Carnegie Endowment for International Peace. Available online at <https://carnegieendowment.org/2020/08/18/deepening-polarisation-and-democratic-decline-in-indonesia-pub-82435>, checked on 11/2/2022.

World Bank (2020a): The World Bank in Vietnam. Available online at <https://www.worldbank.org/en/country/vietnam/overview>.

World Bank (2019): Partnership for Market Implementation: Brief. Available online at <https://www.worldbank.org/en/topic/climatechange/brief/partnership-for-market-implementation>, updated on 12/14/2021, checked on 12/14/2021.

World Bank (2020a): Indonesia | Data. With assistance of IBRD, IDA. World Bank. Available online at <https://data.worldbank.org/country/ID>, updated on 12/14/2021, checked on 12/14/2021.

World Bank (2020b): Expanding Renewable Energy in Pakistan's Electricity Mix, 11/10/2020. Available online at <https://www.worldbank.org/en/news/feature/2020/11/09/a-renewable-energy-future-for-pakistans-power-system>, checked on 1/9/2022.

World Bank (2021a): Carbon Pricing Dashboard. Up-to-date overview of carbon pricing initiatives. With assistance of IBRD, IDA. World Bank. Available online at <https://carbonpricingdashboard.worldbank.org/>, updated on 12/14/2021, checked on 12/14/2021.

World Bank (2021b): Pakistan Development Update. Reviving Exports. October 2021. IBRD IDA World Bank Group. Available online at <https://thedocs.worldbank.org/en/doc/4fe3cf6ba63e2d9af67a7890d018a59b-0310062021/original/PDU-Oct-2021-Final-Public.pdf>, checked on 5/1/2022.

World Bank (2021c): Variable Renewable Energy Locational Study. Washington, DC: World Bank (Pakistan Sustainable Energy Series). Available online at <https://documents1.worldbank.org/curated/en/883241610741226840/pdf/Main-Report.pdf>, checked on 9/1/2022.

World Bank (2022a): Development Projects : Pakistan Program for Affordable and Clean Energy (PACE) - P174553. Available online at <https://projects.worldbank.org/en/projects-operations/project-detail/P174553>, updated on 1/13/2022, checked on 1/13/2022.

World Bank (2022b): World Bank Data - Pakistan. World Bank. Available online at <https://data.worldbank.org/country/pakistan>, updated on 4/1/2022, checked on 4/1/2022.

World Bank (2022c): World Bank Open Data. Available online at <https://data.worldbank.org/>, updated on 1/4/2022, checked on 1/4/2022.

World Bank Group (2021b): Employment in industry (% of total employment) (modeled ILO estimate). Available online at <https://data.worldbank.org/indicator/SL.IND.EMPL.ZS>.

World Bank Group (2020d): GDP growth (annual %) - Vietnam. Available online at <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=VN>.

World Bank Group (2021a): Industry (including construction), value added (% of GDP). Available online at <https://data.worldbank.org/indicator/NV.IND.TOTL.ZS>.

World Bank Group (2020c): Population, total - Vietnam. Available online at <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=VN>.

World Bank Group (2021c): Trade (% of GDP). Available online at <https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS>.

World Bank Group (2019a): Vietnam Development for Report 2019: Connecting Vietnam for Growth and Shared Prosperity. With assistance of J. E. Oh, B. G. Mtonya, C. Kunaka, M. S. Lebrand, O. Pimhidzai, P. M. Đức et al. Available online at <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/590451578409008253/vietnam-development-report-2019-connecting-vietnam-for-growth-and-shared-prosperity>.

World Bank Group (2019b): Worldwide Governance Indicators. Available online at <http://info.worldbank.org/governance/wgi/Home/Reports>.

World Economic Forum (2019): Global Competitiveness Report 2019. Available online at https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

WTO (2021): Pakistan. Trade profile. World Trade Organization. Available online at https://www.wto.org/english/res_e/statis_e/daily_update_e/trade_profiles/PK_e.pdf, checked on 1/23/2022.

YouGov (2019): The YouGov Globalism Project. YouGov. Available online at <https://yougov.co.uk/topics/yougov-cambridge/globalism-project>, updated on 11/2/2022, checked on 11/2/2022.

Zahran, Sammy; Brody, Samuel D.; Grover, Himanshu; Verlitz, Arnold (2006): Climate Change Vulnerability and Policy Support. In *Society and Natural Resources* 19 (9), pp. 771–789, checked on 12/14/2021.

Zimmer, A.; Jakob, M.; Steckel, J. C. (2015): What motivates Vietnam to strive for a low-carbon economy? — On the drivers of climate policy in a developing country. In *Energy for Sustainable Development* 24, pp. 19–32. Available online at <https://doi.org/10.1016/j.esd.2014.10.003>.