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Methodology for the assessment of policy coherence in the area of non-energy mineral resources

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Abstract

Policy coherence has become an important objective of policy making in the EU and its member states. Its growing importance stems from the increasing number of interconnections between economic, social and environmental policies (Nilsson et al. 2012; Sorrell et al. 2003) that are an inevitable result of today's complex regulatory environment. This interconnectedness can either lead to synergies between policy instruments that reinforce each other or to conflicts between policy instruments that block or even cancel each other out. Such interactions need to be taken into account during policy design, which should aim to avoid conflicts and increase the coherence of the overall policy space as much as possible, so as to reach "the synergic and systematic support towards the achievement of common objectives within and across individual policies" (Den Hertog, Stross 2012, p. 4).

There has only been very limited research on how interactions between policy instruments directly affect targeted stakeholders and how behavioral changes of these stakeholders can affect other stakeholders (Tuerk et al. 2012). Furthermore, research on interactions between environmental policies has focused primarily on climate and energy policies to date (Tuerk et al. 2012; Sorrell et al. 2003). Since a number of new political strategies and programs for non-energy mineral resources have been adopted both in Germany and on the EU level in the last few years, an analysis of this policy sector presents a valuable opportunity to advance the methodology on policy interactions.

We therefore want to adapt parts of the analytical frameworks of two prior EU projects – APRAISE and INTERACT – to create a methodology that allows us to identify possible policy interactions between the policy instruments mentioned in the German Raw Materials Strategy (BMWi 2010), the German Resource Efficiency Program (BMU 2012) and the Strategy Paper Extractive Resources in German Development Cooperation (BMZ 2011). The overall objective of this methodological approach is to enhance our understanding of how policy interactions work, while at the same time assessing the policy coherence in the German non-energy mineral resources sector and identifying possible opportunities for improvement.

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1 Introduction

Policy coherence[1] has become an important objective of policy making in the EU and its member states. Its growing importance stems from the increasing number of interconnections between economic, social and environmental policies (Nilsson et al. 2012; Sorrell et al. 2003) that are an inevitable result of today's complex regulatory environment. "As the population of policies grows relative to the size of the space, individual policies necessarily become more interdependent. The consequences produced by one policy are increasingly likely to interfere with the working of other policies" (Majone 1989, p. 159). Hence, a lack of policy coherence "can be conceptualized as a problem of policy interaction" (Nilsson et al. 2012, p. 410).

This interconnectedness can either lead to synergies between policy instruments that reinforce each other or to conflicts between policy instruments that block or even cancel each other out and ultimately reduce both effectiveness and efficiency of these instruments. Such interactions need to be taken into account at two key stages of the policy cycle (Jann, Wegrich 2003, p. 82): Ex-ante, at the policy design stage, which should aim to avoid conflicts and increase the coherence of the overall policy space[2] as much as possible, so as to reach "the synergetic and systematic support towards the achievement of common objectives within and across individual policies" (Den Hertog, Stross 2012, p. 4, 2012). Ex-post, an interaction analysis should again take place as part of the regular policy evaluation process and consider the impact of possible interactions rather than evaluate the policy instrument in isolation.

There has only been very limited research on how interactions between policy instruments directly affect targeted stakeholders and how behavioral changes of these stakeholders can affect other stakeholders (Tuerk et al. 2012). Furthermore, research on interactions between environmental policies has focused primarily on climate and energy policies to date (Tuerk et al. 2012; Sorrell et al. 2003). Since a number of new political strategies and

1 The OECD describes policy consistency and coherence as follows: "**Policy consistency** means ensuring that individual policies are not internally contradictory, and avoiding policies that conflict with reaching for a given policy objective, in this case international poverty reduction. **Policy coherence** goes further; it involves the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the defined objective" (2001, p. 90, emphasis added).

2 Defined as „a set of policies that are so closely interrelated that it is not possible to make useful descriptions of or analytic statements about one of them without taking the other elements of the set into account" Majone 1989, p. 159.

programs for non-energy mineral resources[3] have been adopted both in Germany and on the EU level in the last few years, an analysis of this policy sector presents a valuable opportunity to advance the methodology on policy interactions.

In the context of the RohPolRess project for the German Federal Environmental Agency (UBA), we therefore want to adapt parts of the analytical frameworks of two prior EU projects – APRAISE and INTERACT – to create a methodology that allows us to identify possible policy interactions between the policy instruments mentioned in the German Raw Materials Strategy (BMWi 2010), the German Resource Efficiency Program (BMU 2012) and the Strategy Paper Extractive Resources in German Development Cooperation (BMZ 2011). Our overall objective in this methodological approach is to enhance our understanding of how policy interactions work, while at the same time assessing the policy coherence in the German non-energy mineral resources sector and identifying possible opportunities for improvement. Furthermore, we believe that other scholars and politicians may also find this approach to be useful for conducting analyses in the field of raw materials policy.

2 Challenges for non-energy mineral resources policy

The non-energy mineral resources sector includes industrial minerals, construction minerals and metallic ores, and is characterized by a number of factors that make it particularly challenging to regulate. In the following sections we will first briefly describe some fundamental facts that characterize the situation of this sector before looking more specifically at Germany's natural resources policies.

2.1 Basic characteristics of the global non-energy mineral resources sector

The lead time for opening a new mine can be lengthy, with 10 to 20 years being the norm, depending on the size of the project (Tiess 2009, p. 10). Due to short-run capacity constraints, the price elasticity of supply is low for many minerals, making it difficult for these markets to react quickly to unexpected increases in demand. Thus, many minerals markets are susceptible to a significant degree of price volatility. New exploration projects

3 In this paper, the terms "resources" or "natural resources" will be used synonymously, referring to non-energy mineral resources unless otherwise noted.

are, moreover, also associated with risks due to the political and economic instability that characterize many resource-rich countries. These risks affect not only the decision to invest in a mine, but also the purchase of natural resources further upstream in the supply chain.

Since the extraction, refining and smelting processes vary from one resource to the next, each of them is associated with its own set of social and environmental problems. The quality and enforcement of social, environmental and governance standards during these processes varies not only across countries, but also between individual mines and smelters, and between the large- and small-scale mining sectors. The negative external effects that are often caused by the mining industry render political regulation necessary to ensure a reduction of the social and environmental burden caused in resource-rich countries.

However, most products contain multiple different natural resources that change hands many times before being manufactured into a final product, leading to enormously complex global supply chains. This complexity, combined with lacking transparency and the transnational character of these value chains, poses great challenges to effective political regulation (Gandenberger et al. 2012), not only in the countries where mining takes place, but also in Germany, whose industry is dependent upon the secure and continuous supply of resources. Moreover, as an importer of these natural resources, Germany also bears a joint responsibility – shared both with resource-rich countries themselves and other resource-importing countries – for the improvement of the social and environmental conditions that characterize the non-energy mineral resources sector. Both of these facts need to be reflected in Germany's policies.

2.2 Germany's non-energy mineral resources policy

Looking at current political, economic and civil society debates regarding Germany's natural resource policies, it quickly becomes evident that they must cater to a large number of different interest groups and aim to satisfy a great variety of objectives. The primary goals of Germany's natural resource policies can be summarized as follows (based on Gandenberger et al. 2012, p. 40):

- Supply security
- Price stability
- Transparency of natural resource markets
- Non-discrimination
- Increase in resource efficiency

- Improvement of social and environmental conditions in developing countries (extraction, refining and recycling)
- Fulfillment of Germany's joint responsibility for the continuing political and economic development in resource-rich developing countries

Germany's natural resources policies thus touch on many different political fields: domestic and foreign affairs, economics and industrial affairs, the environment, climate policy and international development. No single governmental entity has jurisdiction over all of these fields, making natural resources policy a political field that involves a variety of separate ministries, including the Federal Ministries for Economic Affairs and Energy (BMWi), for Economic Cooperation and Development (BMZ), and for the Environment, Nature Conservation, Building and Nuclear Safety (BMU). Other entities, such as the Federal Environment Agency (UBA), the Federal Institute for Geosciences and Natural Resources (BGR) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, must likewise be included in consultations, as they ultimately implement the policies in practice.

There are also a number of other issues that further complicate the process of establishing coherent natural resources policies. First, in Germany's case, in addition to the many foreign countries that can act as suppliers of natural resources, there are also some resources that can be extracted domestically, as well as many resources that re-enter the supply chain after being recycled. There are therefore four separate categories of resources that must all be taken into consideration: domestic, foreign, primary and secondary. Furthermore, all activities that take place outside of Germany or the EU cannot be regulated directly by the German government. Nor are import regulations always possible, as natural resources are often imported as parts of complex technologies, making taxation or other forms of regulation quite burdensome.

Nevertheless, through the cooperation of many governmental actors, along with industry and civil society representatives, three key documents have emerged that frame Germany's current natural resources policy: the German Raw Materials Strategy (BMWi 2010), the German Resource Efficiency Program (BMU 2012) and the Strategy Paper Extractive Resources in German Development Cooperation (BMZ 2011). Between them, these three documents establish or incorporate well over 50 different policy instruments, aiming to achieve the objectives listed above.

3 Interaction Analysis, Policy Coherence and Policy Evaluation

Due to the many challenges of non-energy mineral resources policy that were outlined in the previous section and the sheer number of issues that need to be addressed in this field of policy, it will always be the object of a wide variety of different rules, regulations and other policy instruments. This leads to an increasing number of interactions within the policy space and between individual policies that cannot be avoided and should consequently be addressed proactively. In order to do so, an interaction analysis needs to be performed to find out which interactions take place and where they occur, what their direct and indirect effects are, and whether they ultimately lead to conflicts or synergies. Only through this process is it possible to ensure that the natural resources field is regulated by a coherent set of policies and to maximize their efficiency in addressing the challenges at hand.

Such an interaction analysis should take place twice during the policy cycle: **ex-ante**,[4] meaning during the policy design stage and prior to implementation, and **ex-post**, or during the policy evaluation stage when the policy has already been implemented. Glachant (2001) suggests that the key to coping with (negative) policy interactions lies in making policies adaptable. To achieve this, he proposes the following criteria for use during both the policy design and implementation phases:

- "Flexible policy solutions in the face of unanticipated exogenous changes […],
- Integration with parallel [natural resource policy] measures […],
- Improved horizontal co-ordination between different policy branches […and,]
- Policy learning and ex post evaluation" (Glachant 2001, p. 248).

Flexibility is generally easier to achieve in economic than in 'command and control' instruments, as it requires minimal prescription (Sorrell et al. 2003). Policy interactions can occur both within a policy area (**internal interactions**) and between policy areas (**external interactions**). As described by Glachant, integration focuses on internal interactions; the levels of governance within the policy area of natural resources policy that must be integrated can be seen in Figure 1.

4 Terms are written in bold font in this text whenever they are being defined for the first time.

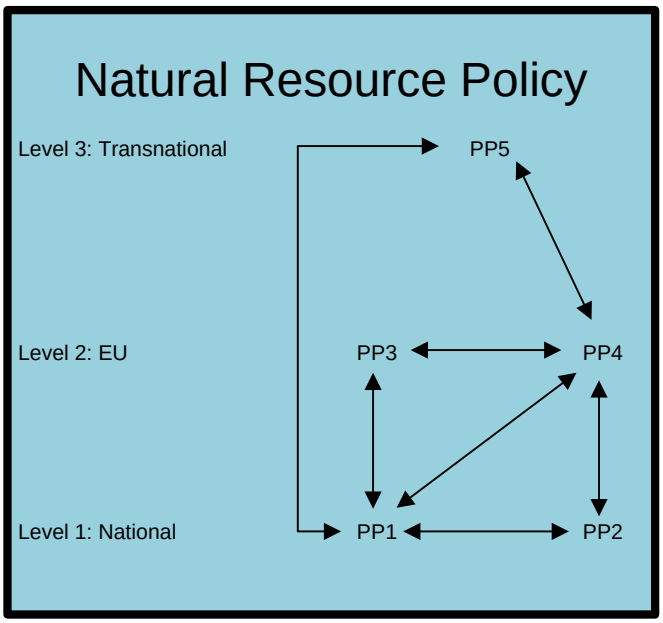

Figure 1: Internal interactions in natural resource policy, where PP 1-5 schematically represent different policy programs

Figure 2 shows the external and horizontally related policy areas that surround natural resource policy and should be taken into consideration during policy design to assure adequate horizontal coordination.

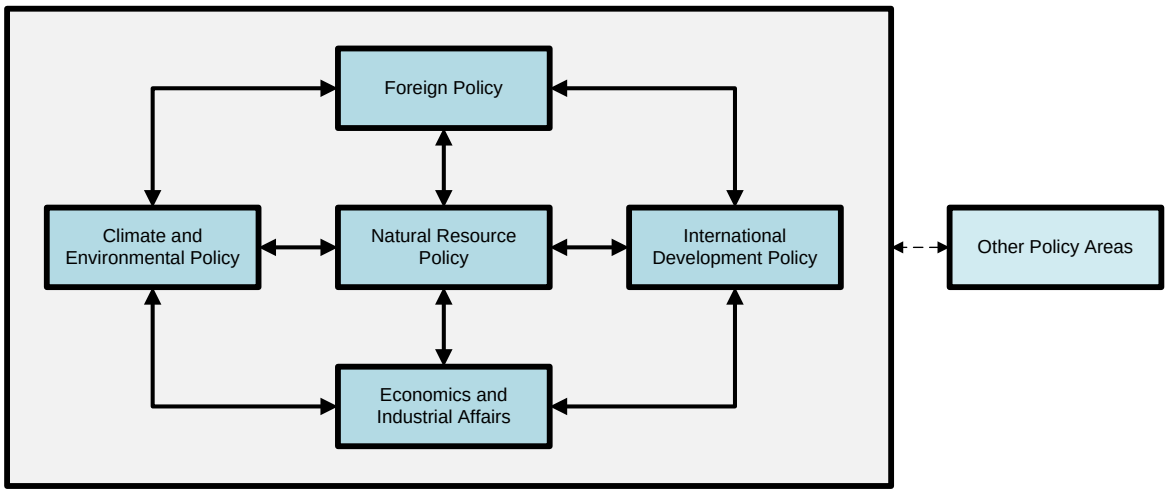

Figure 2: External interactions between policy areas relevant to natural resource policy

With the help of these criteria, as well as the results of the ex-ante and ex-post interaction analyses, it is possible to reduce the negative impact of policy conflicts and strengthen favorable synergy effects.

4 Description of the Methodological Approach

The methodological approach that will be described in this section is not new. A similar methodology was previously used in the INTERACT project (Sorrell et al. 2003) to analyze interactions in EU climate policy, as well as in the APRAISE project (Tuerk et al. 2012), which examined policy impacts on sustainability in Europe. Building on the foundations of these two projects, we have adjusted the approach to address the different circumstances encountered in the present analysis. First, RohPolRess is situated in a national, rather than an EU-wide context. This means that we include EU regulations as relevant context where they have a significant impact on national regulation, but they are not the focus of the analysis. Second, as explained in Section 2, the natural resources sector presents a set of unique characteristics that must be taken into consideration when analyzing policy interactions in this field. Finally, the analyses conducted in INTERACT and APRAISE both involved mostly hard policy instruments, such as laws, taxes and sanctions. The natural resources policies in Germany, on the other hand, include primarily soft policy instruments and focus more on the formulation of strategies and goals than on specifying instruments

in great detail.[5]. This last fact, in particular, requires considerable adjustment in the methodology.

Governments use soft policy instruments to equip strategies with incentives so that actors will adopt and follow them. Strategies that are primarily implemented through soft policy instruments have the advantage of including considerable flexibility and can therefore more easily react to a change in circumstances. According to Abbott and Snidal, soft policy instruments offer "more effective ways to deal with uncertainty" and are better suited to facilitate compromise "between actors with different interests and values, different time horizons and […] different degrees of power" (2000, p. 423). They are therefore well-suited for complex topic areas that involve various actors from different policy fields. However, as they are less rigid and defined as hard policy instruments, their effects – both intended and unintended – are harder to predict and assess: Harder to predict as it is uncertain how and to what extent the actors will use the available instruments, harder to assess as developments in a specific field may not be easily attributable to a specific instrument, because they may also have been influenced by other policies.

With regard to the methodology described here, this implies that a strong focus must be placed on the interaction analysis. In contrast to hard policy instruments, whichaddress a defined set of stakeholders , soft instruments are broader and may involve a variety of actors. In order to consider all relevant stakeholders , both intended and unintended, as well as direct and indirect effects need to be included. This approach is necessary to identify synergies and possible conflicts between the desired and actual outcomes of the instruments as well as their contribution to the overall goals of the strategies.

5 „Policy instruments are hard or soft with respect to the degree of government intrusiveness and coercion involved in the use of a specific instrument" (Zehavi 2012 in Levi-Faur).

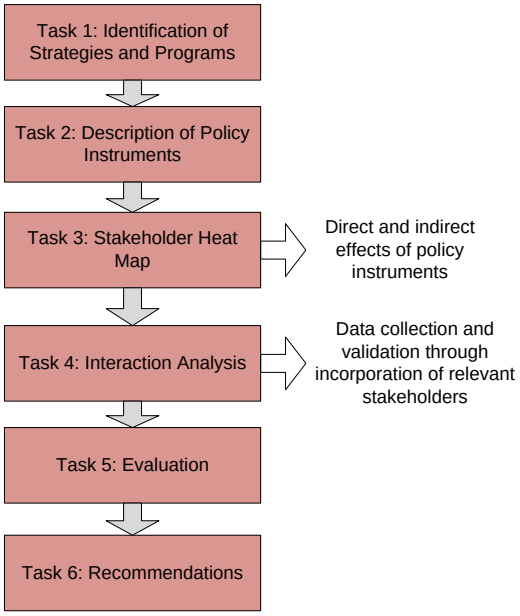

Figure 3: Overview of the methodology for the assessment of policy coherence

The adjusted approach has been divided up into six separate tasks (see Figure 3), each of which will be described in greater detail below.

4.1 Task 1: Identification of Policy Programs

The focus of the first task is to set the system boundaries for the interaction analysis, both internally and externally as depicted in Figures 1 and 2. In the context of RohPolRess, the German Raw Materials Strategy (BMWi 2010), the German Resource Efficiency Program (BMU 2012) and the Strategy Paper Extractive Resources in German Development Cooperation (BMZ 2011) clearly lie at the center of the analysis and represent Level 1 (national) Policy Programs. For the purposes of this analysis, we define **Policy Programs (PP)** as those high-level documents that outline the government's long-term strategies for particular policy areas. As such, they generally contain three central components: objectives or goals, a strategic plan that outlines how to achieve those aims, and specific instruments. **Policy Instruments (PI)** are those parts of policy that are actionable and can be implemented to achieve the objectives of the policy program.

While the focus of the analysis will be on these three PPs from Level 1, there are several Level 2 (EU) and Level 3 (transnational) programs that shape the context within which the Level 1 PPs exist and thus should not be left out of the analysis completely. Among these

higher-level programs are for example the EU's Raw Materials Initiative and its Flagship Initiative "A Resource Efficient Europe", as well as - on the transnational level - the WTO General Agreement on Tariffs and Trade and the ILO's core labor rights. These international PPs are, however, only taken into consideration insofar as they have an impact on the implementation or effects of the national-level PPs.

Once the system boundaries have been clearly established both within and across relevant policy areas, the following information should be gathered for each PP to be analyzed:

- Complete title
- Publishing/Leading institution
- Publication Date
- Other associated national strategies
- Associated EU strategies
- Associated transnational strategies
- Objectives
- Natural resources addressed
- Document Type (Strategy, Program, Strategy Paper, etc.)

4.2 Task 2: Identification and categorization of Policy Instruments

4.2.1 Task 2.1: Identification of Policy Instruments

Once the system boundaries and PPs to be included have been set in Task 1, the specific PIs must be identified and classified systematically. To ensure that no PIs are overlooked, we created the matrix shown in Table 1.

Policy Program	Objectives	Challenges	Governance Approach suggested in Policy Program	Public Governance Approach Type					Policy Instruments specified
				1	2	3	4	5	
PP 1	Objective 1	Challenge 1	International development aid	x					PI 1, PI 2, PI 3
			Economic incentives				x		PI 4
			Basic technical research		x				PI 5, PI 6
		Challenge 2	Publically-financed research				x		PI 3, PI 5
			Support for industry cooperation, network-building					x	(...)
		Challenge 3	Regulation			x			(...)
			International agreements	x				x	(...)
			Provision of information					x	(...)
PP 1	Objective 2	Challenge 4	(...)						(...)
PP 2 (...)	Objective 3 (....)	Challenges 2 and 5 (...)	(...)						(...)
			(...)						(...)

Table 1: Exemplary depiction of Task 2.1

Each PP is divided up into its specific objectives and the challenges that exist in meeting each of these objectives. Next, the general approach that is suggested in the PP is identified and classified according to its **Public Governance Approach**. This classification is based on the work done by Braun and Giraud (2003).

Security of public goods and resources		Steering of society's behavior		
		Direct Governance	Indirect Governance	
Sovereign rights of the State (1)	State as supplier of public goods and services (2)	Statutory regulation and legislation (3)	Economic incentives (4)	Information, advisory and networking services (5)

Table 2: Overview of public governance approaches (Braun, Giraud 2003)

As can be seen in Table 2, the actions of a State can broadly be said to fulfill two separate objectives: first, assuring the security of public goods and resources provision and second, steering the behavior in society. To accomplish the first objective, the State can either make use of its sovereign rights or directly act as the supplier of public goods and services. For the second objective, its options can be further broken down into the categories of direct and indirect governance. Direct governance refers to statutory law in the form of legislation or regulations. Indirect governance generally takes place through the establishment of **positive** or **negative economic incentives** (financial rewards or costs/fees/taxes, respectively), or the provision of information and advising services.

The final step in completing Task 2.1 is to identify the specific policy instruments that are specified in the PP. For example, if the general approach suggested in the PP is classified

as "economic incentives" (Approach Type 4), a specific PI could take the form of tax breaks, low-interest loans, or a fine.

4.2.2 Task 2.2: Description and categorization of Policy Instruments

Task 2.2 is primarily descriptive and requires the detailed characterization of the selected PIs. The following information should be gathered for each of the PIs identified in the last column of Table 1:

- Name
- Short description
- Objective(s)
- Influencing mechanism(s)
- Approach/procedure
- Enforceability
- Financial framework for the support of the PI
- Timeframe

Prior to addressing a few of these categories in greater detail, it is important to note that Task 2.2 focuses on the policy makers' intentions, not on the actual implementation of the PIs, which will be discussed in Section 4.5. This is thus the type of ex-ante consideration that lawmakers should ideally perform during the policy design stage.

The remaining categories are purposely vague and general, as they have been designed to include all manner of PIs. Some categories are not relevant for every type of PI; irrelevance or a lack of information for a particular category should be noted, since these can likewise be important for the analysis.

Influencing mechanisms are an element of policy design: "While policy objectives define what the policy is trying to achieve, the rules and influencing mechanisms define how it is trying to achieve it […]. Influencing mechanisms […] are the means by which the policy ensures that actions are taken in accordance with the rules and in support of the desired objectives" (Sorrell et al. 2003, p. 16; Schneider, Ingram 1990). There are five influencing mechanisms:

- Sanctions
- Positive economic incentives
- Negative economic incentives
- Capacity
- Symbolic

Sanctions are fines that encourage compliance with official laws. **Capacity** as a mechanism provides needed knowledge or skills that enable citizens to behave in a certain way. The **symbolic** mechanism, finally, aims "to alter perception and values" (Sorrell et al. 2003, p. 17).

The **approach/procedure** is a fairly open-ended category that allows the researcher to include relevant details about the involved actors, approval procedures, or other important components of the instrument that are not described elsewhere.

Enforceability is an ordinal and contains the categories low, medium, and high. Generally speaking, sanctions and negative economic incentives tend to have the highest enforceability, followed by positive economic incentives. Capacity and symbolic mechanisms tend to have rather low enforceability. However, a determination should still be made on an individual basis, as some instruments may fall outside of this pattern.

Not every PI will have a **financial framework** and **timeframe**, as some are open-ended or have variable costs. In this case, these characteristics should be noted accordingly.

4.3 Task 3: Stakeholder HeatMap

The reason that a policy interaction analysis should take place both ex-ante and ex-post implementation is that interactions happen in practice and not on paper. A **policy interaction** takes place when two or more policy instruments affect the same action at the same time. It is possible that multiple PIs affect a single action by a single actor, or that multiple actors are involved in the same action and each affected by different or multiple PIs with regard to the same action (see Sections 4.4.1 and 4.4.2). Either way, the interaction takes place at the level of an action, since PIs are generally designed to induce (or sometimes prevent) behavioral changes in a particular target population.

However, the number of actions that can be affected by a PI directly or indirectly is almost unlimited. Consequently, "action" as a category is not particularly well-suited to structure an analysis systematically. A more viable alternative is to look at stakeholders who are impacted by a particular PI and, in a second step, look at which of their actions are influ-

enced by the PI. To ensure as complete a consideration of the relevant stakeholders as possible, we use a value-chain approach. Given that our analysis centers on a sector that almost always represents the beginning (extraction/mining) or end (recycling/disposal) of a product value-chain, this approach is appropriate to the context; however, for other sectors another means to identify the relevant stakeholders may be better suited.

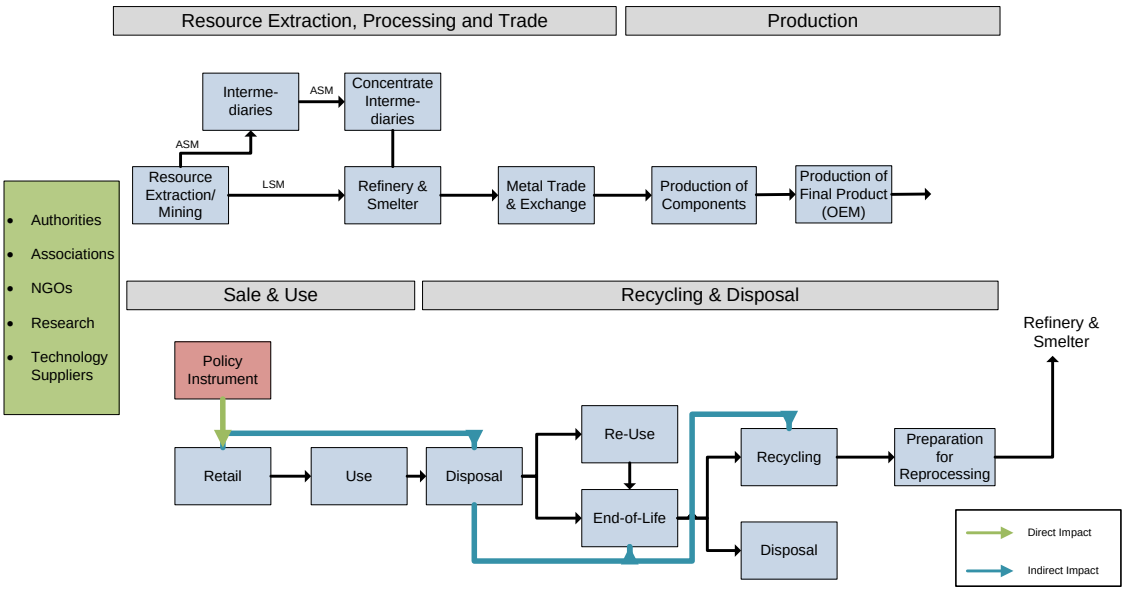

Figure 4: Exemplary value chain for a product manufactured with non-energy natural resources

Figure 4 shows a value-chain sub-divided into four phases (top-left to bottom-right): resource extraction, processing and trade; production; sale & use; and recycling & disposal. The blue boxes signify individual steps in a product's lifecycle and their relationship to each other, based on which specific actors can be identified. The black arrows represent material flows, including resources, goods, and scrap metals. The green box shows other actors that are not directly involved in the value chain, but are nevertheless considered stakeholders of natural resource politics.

Lastly, the red box is an exemplary PI. The green arrow towards retail implies that retailers are directly affected by this PI, which could for example require them to maintain a product return program and ensure that the collected products are recycled according to certain standards. This is the only direct effect of the PI; indirectly, however, it touches on the role of the consumer (blue arrow to disposal), who must make use of the program for it to work, and the end-of-life and recycling steps, that would look different if such a program

did not exist. Thus, while only the first and last phases of the value-chain directly involve the handling of non-energy mineral resources, all four phases can be interconnected through indirect effects and should thus be part of the interaction analysis.

Value-Chain Phase	PI 1	PI 2	PI 3	PI 4	PI 5	TOTAL
Resource extraction/mining						
Resource extraction/mining	0	1	0	0	0	1
Local/international intermediaries	0	0	0	0	0	0
Concentrate intermediaries	0	0	0	0	1	1
Refinery & Smelter	0	0	0	0	1	1
Metal trade and exchange	0	0	0	0	0	0
Production						
Production of components	1	1	1	0	1	4
Production of final product (OEM)	0	0	0	0	0	0
Retail & Use						
Retail	0	0	0	0	0	0
Use	0	0	0	0	0	0
Recycling & Disposal						
Disposal, Re-Use, Recycling, Re-Processing	0	0	0	0	1	1
Other (outside the Value-Chain)						
Research institutions	0	0	0	0	0	0
Authorities	0	0	1	0	0	1
NGOs	0	0	0	0	1	1
TOTAL	1	2	2	0	5	

Figure 5: Exemplary and schematic Stakeholder HeatMap

Once the set of potentially relevant stakeholders has been established, direct and indirect effects must be identified. This process should be straightforward for direct effects, as the affected actors should be easily identifiable from the working mechanisms of the PI. A **directly affected target group** "has obligations and incentives imposed upon it directly by a policy instrument" (Sorrell et al. 2003, p. 15). Indirect effects are much harder to predict: an "**indirectly affected target group** is influenced in some way by the behavioural changes that are made by the directly affected group" (Sorrell et al. 2003, p. 16). Consequently indirect effects can only be posited as hypotheses at this point in the analysis. To ensure that important effects are not overlooked early on in the process, when in doubt, possible indirect effects should be included in the list of hypotheses.

Because our analysis included a very large number of different policy instruments, many of which were predicted not to include significant interactions, we created a Stakeholder HeatMap (see schematic example in Figure 5) that shows, in red, which stakeholders are affected (directly or indirectly) by each PI. This simplifies the identification of hot spots of

interaction that are worth examining more closely. **Hot spots** occur when a single stakeholder is affected by multiple PIs. In our example, the actors involved in component production, which are affected by four different PIs, represent a hot spot. Once the list of hot spots for closer examination is complete, the remaining analysis will focus only on these hot spots.

The final step in Task 3 is to validate the assumptions and hypotheses made with regard to direct and indirect effects. Using the information gathered up to this point in the analysis, representatives of the relevant stakeholder groups for each PI (in a hot spot) should be asked for their input on how the PI(s) impact both their behavior and actions and that of other associated stakeholders. The findings gathered in this consultation process can be compared with the original assumptions made with regard to direct and indirect effects, which can then either be validated or adjusted accordingly.

One of the greatest challenges in this type of analysis is defining cut-off criteria for indirect effects. The INTERACT study chose to "focus solely on those groups which bear the greatest economic impacts" (Sorrell et al. 2003, p. 47), which in their analysis comprised only a single target group. This criterion, however, cannot be utilized in this analysis as the economic impact of a soft instrument is difficult to determine. Given the soft nature of the instruments, defining a common quantitative cut-off criterion for all instruments is not feasible. Therefore, expert interviews will be conducted and the cut-off criterion for indirect effects individually specified.

4.4 Task 4: Interaction Analysis

Sorrell et al. (2003) have a single PI that is at the center of their study (the EU Emissions Trading System (EU ETS)). As a result, they perform their policy interaction analysis in an iterative process that always focuses on a pair of PIs made up of the EU ETS and a single other PI. They break down their analytical process into three steps:

1. "identifying how and why the two policies affect each other;
2. identifying the consequences of this, for the target groups, the organizations involved in implementation and the attainment of the policy objectives; and
3. evaluating the desirability of these consequences against chosen evaluation criteria" (Sorrell et al. 2003, p. 45 (sic.)).

Because we have a much larger number of PIs and no single instrument that is at the center of the analysis, our process is less iterative and does not necessarily focus on only two

PIs at a time. Consequently, for our type of analysis, which covers a large number of policy instruments that potentially interact, the initial screening process described in Tasks 2 and 3 has great significance, since it leads to a holistic and systematic identification of potentially relevant policy interactions within a policy area. We thus continue to employ a stakeholder-focused approach and analyze the interactions that occur between PIs that impact single or multiple stakeholder groups. Due to the large number of expected overlaps and interactions in our stakeholder system, we choose a qualitative approach to our analysis.

Of the three steps listed above, the first will be discussed in Section 4.4.1, while the other two will be the subject of Sections 4.4.2 and 4.4.3.

4.4.1 Identifying Direct and Indirect Interactions

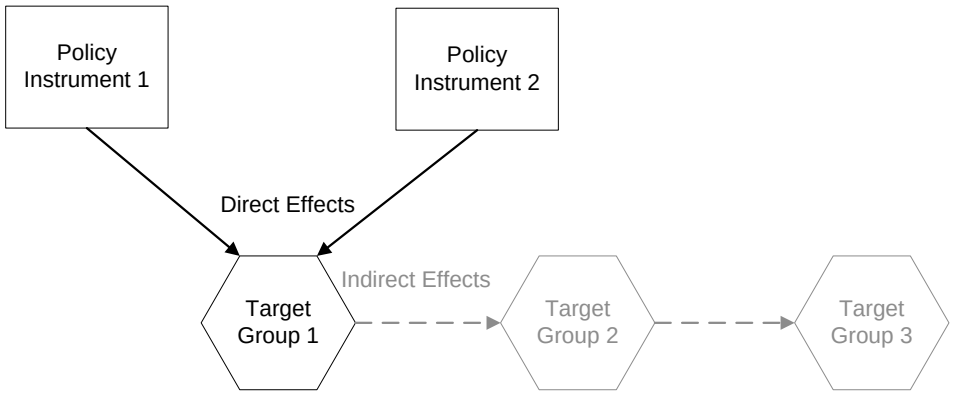

Figure 6: Direct interaction and possible indirect effects (shown in grey)

Once the list of effects stemming from each PI in a hot spot is finalized, it is useful to graphically represent the connection between PIs, stakeholders and direct/indirect effects. A graphic representation allows for a better understanding of where, how and why interactions might take place within the entire stakeholder system, thus aiding in the accomplishment of Step 1. There are three basic types of interactions that can take place here (based on Sorrell et al. 2003), shown in Figure 6 and Figure 7. A **direct interaction** takes place when two separate PIs both impact the same target group Figure 6. PIs are designed to have an impact on the target group's behavior; because no group of stakeholders exists in isolation, any change in behavior (or lack thereof) can in turn have an impact (indirect effect) on further groups of stakeholders in the stakeholder system. When a particular

target group is affected both by direct effects from one PI and indirect effects from another PI, an **indirect interaction (type A)** takes place. An **indirect interaction (type B)** occurs when indirect effects from two different target groups, affected directly by two different PIs, are both passed along to a single third target group (see right side of Figure 7).

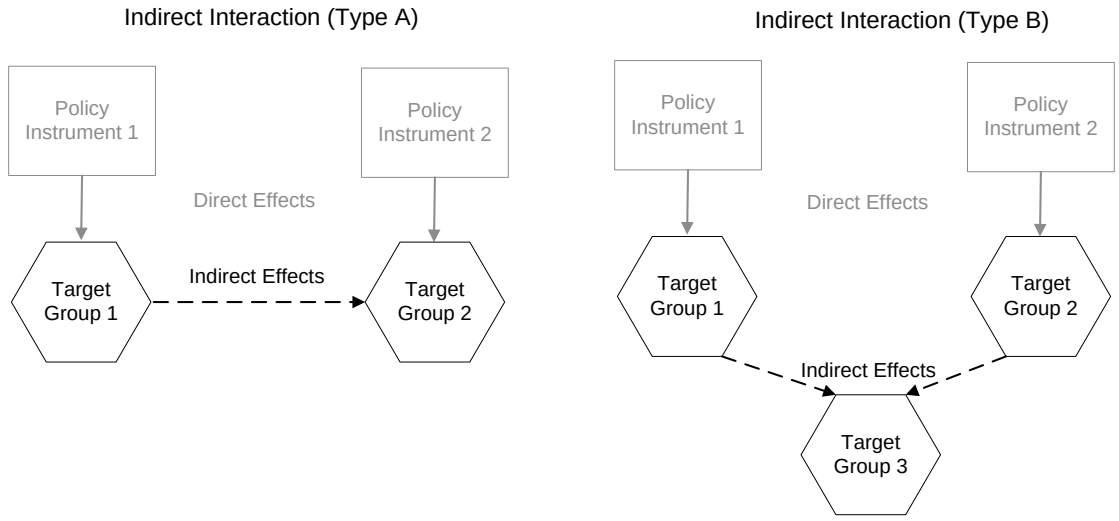

Figure 7: Indirect Interaction Types A (left) and B (right) and prior direct effects (shown in grey)

4.4.2 Identifying Relationships of Interactions in Stakeholder System

While a value chain approach is useful for identifying all involved stakeholders, it may be too linear a concept for the interaction analysis, whose indirect effects can go beyond those stakeholders immediately before or after a particular actor in the value chain. This is why it is useful, for the second step of the interaction analysis, to begin thinking of actors as being part of a **stakeholder system** that is not necessarily organized in a linear fashion. Figure 8 shows an example of what such a stakeholder system could look like. Here, we once again consider the hypothetical example of a product return program, coupled with a second PI, which provides research funding to improve the efficiency of recycling

technologies. This leads to the following series of effects or consequences on target groups:[6]

In red:

1. Direct: New legislation (PI 1) requires electronics retailers to create a product return program and collect their old products at the end of their lifetime.
2. Indirect: Retailers inform customers that products should be returned at the end of their lifetime for proper recycling.
3. Indirect: Customers return products to retailers

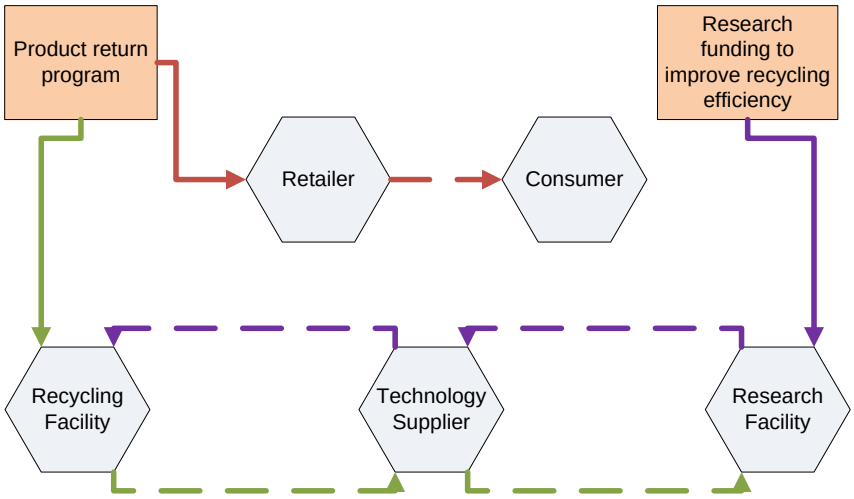

Figure 8: Exemplary stakeholder system with direct (solid line) and indirect (dotted line) effects from two policy instruments

In green:

4. Direct: The same legislation requires retailers to ensure that the collected products are recycled with an above-average degree of recycling efficiency.
5. Indirect: Retailers demand certification of above-average degree of recycling efficiency from recycling facilities.

6 These effects should be recorded in writing while creating the stakeholder system, as they will be needed again in Section 4.4.3.

6. Indirect: Recycling facilities demand more efficient recycling technology from technology suppliers.
7. Indirect: Technology suppliers commission research facility to design more efficient recycling technology.

In purple:

8. Direct: PI 2 provides funding to the research facility to improve the efficiency of recycling technology.
9. Indirect: Research facility conducts research and provides technology supplier with more efficient technology.
10. Indirect: Technology supplier sells more efficient technology to recycling facility.

This system shows both types of indirect interactions. Type A can be seen at both the recycling and research facilities, while Type B affects the technology supplier.

This system could be further expanded: it may turn out that the more efficient recycling technology would be even more effective if the electronics product was designed differently. This would in turn set off a new set of indirect effects on the OEM, component producers, a different set of technology suppliers, and so on.

4.4.3 Analysis of Identified Policy Interactions

Section 4.4.2 focused on the consequences of interactions for individual target groups or stakeholders. The second half of Step 2, as explained by Sorrell et al. (2003), involves identifying and evaluating the consequences of interactions on the fulfillment of policy objectives.

For every interaction, the policy objectives of the involved PIs should be compared and assessed as being either in conflict, neutral, redundant, or synergetic. If objectives are **in conflict**, "the achievement of one objective would undermine the achievement of [one or more of the others]"; objectives have a **neutral** relationship if the fulfillment of one objective has no or only a negligible impact on the fulfillment of the others; objectives are **redundant** if they duplicate efforts; and **synergetic** "if the combined effect is likely to be greater than the effect of either instrument acting alone" (Sorrell et al. 2003, p. 48).

Regardless of the type of relationship that exists between objectives, some PIs will have a greater impact on target groups than others. The next step is thus to determine the "relative size and importance of each of the obligations and incentives, the likely response of

the target groups to these, and the extent to which particular obligations and incentives will dominate" (Sorrell et al. 2003, p. 49). Once the relationship of all interacting PIs has been characterized as described, the overall compatibility can be assessed. Just like the objectives, the PIs can be in conflict, neutral, redundant or synergetic.

4.5 Task 5: Evaluation

The final task in the analysis is to evaluate the desirability of specific consequences of policy interactions. Our focus in this evaluation is on the overall effectiveness and efficiency of the examined policy instruments. This means that policy interactions that lead to synergetic effects between PI are very desirable, while PIs whose interactions do not have any impact on behavior (neutral) are acceptable. In all cases where there are currently no synergetic events, it should be determined if meaningful synergies are possible. If so, a cost-benefit analysis should be conducted to evaluate whether the costs necessary to change the design of the involved PIs is worthwhile.[7]

If the evaluation brings redundancies to light, these need to be examined on a case-to-case basis. Some redundancies are so significant that they need to be addressed, whereas others are only small overlaps and the costs to make changes outweigh the benefit gained.

Conflicts between PIs should be addressed, since they can lead to inefficiencies and wasted resources. How conflicts can be resolved depends on where they originate. Should there be any conflicts between the policy objectives themselves, these will evidently need to be resolved by policy makers and will likely require some debate. It is also possible that a conflict arises from a purely technical aspect of the instruments. Such a conflict should become evident when examining whether there is a difference in outcomes between any one of the PIs being implemented on its own (no interactions) or in combination with others (interactions). In this case, it may be possible, through the analysis, to suggest alternative formulations of the policy that avoid such a conflict.

The final source of conflict results from a difference in how the instrument was intended by policy makers and how it was ultimately implemented in practice. Here the analysis can

7 Such a cost-benefit analysis would need to be conducted by policymakers and falls outside of the scope of our work.

provide valuable insights that can act as a starting point in improving the formulation or implementation of the policy instrument(s) in question.

4.6 Task 6: Recommendations

The final task in this methodological approach involves formulating appropriate recommendations based on the findings of the analysis. A number of references to possible recommendations were already made in Section 4.5. Most recommendations will address those who make or implement policy, since the aim of increasing policy coherence can only be achieved in the stages of policy design or policy implementation.

5 Conclusion

Complete policy coherence is neither feasible nor desirable. In a democratic system there will always be diverging interests and therefore a certain degree of incoherence. Moreover, the degree of interconnectedness and complexity of certain regulatory arenas can lead to a number of interactions between political instruments, not all of which are intentional or desirable. Consequently, it is important to engage in an on-going review and evaluation process throughout the policy cycle with a specific focus on identifying overlaps in policy effects, encouraging those interactions that lead to synergies and limiting those that may be in conflict with each other,

The methodology described in this paper is an adjustment of an approach that was already employed in previous projects. The changes made here were necessary because, unlike previous studies, the policies in the non-energy natural resources sector are both softer and more numerous as compared to those examined in prior policy interaction projects (Tuerk et al. 2012; Sorrell et al. 2003). As a result, our adjusted methodology aims to create a systematic overview of all policy instruments established through the policy programs in question prior to the selection of certain stakeholder-based hotspots to analyze in greater detail. This initial screening process thus allows for a holistic and systematic identification of potentially relevant policy interactions within a policy area. With the introduction of the Stakeholder System concept to the Interaction Analysis, we likewise emphasized a birds-eye-view, looking not only at interactions between two PIs at a time, but instead at entire groups of related instruments. This approach then enables the identification and development of concrete policy recommendations that are aimed at specific policy groups, rather than the system as a whole.

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