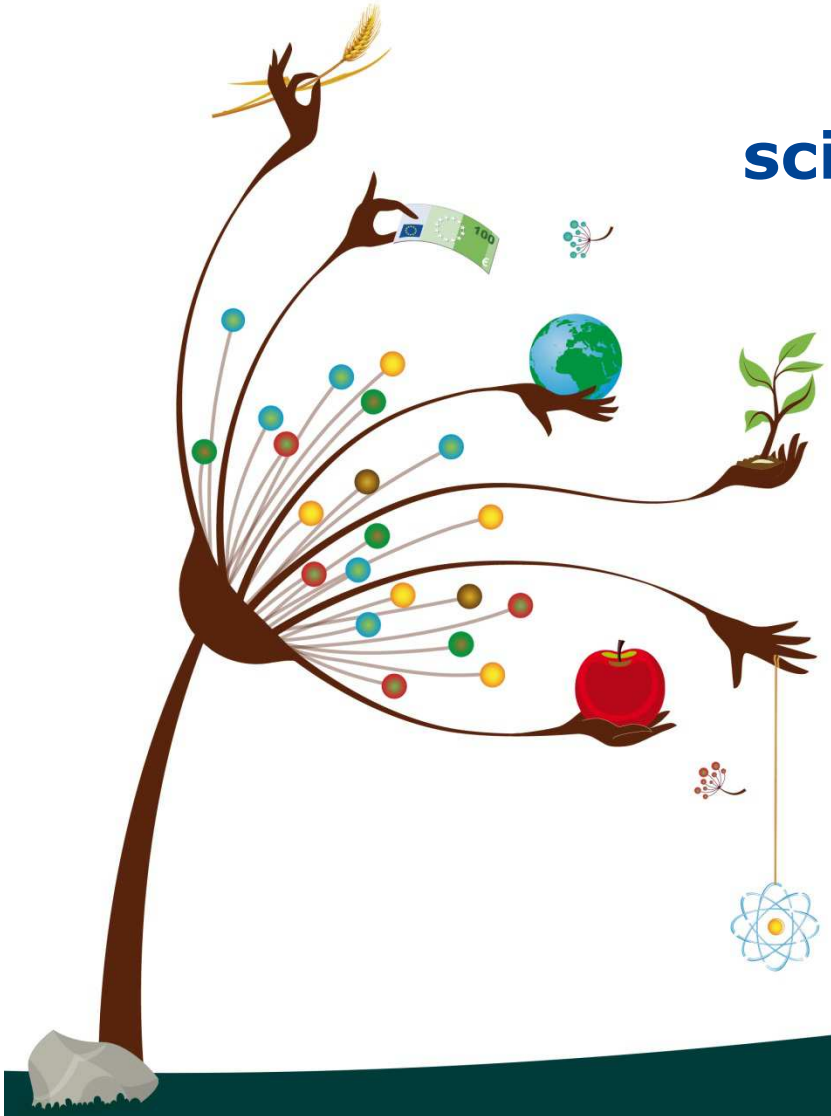
European Commission



The European Commission's science and knowledge service

Joint Research Centre

Bottleneck materials for the deployment of low-carbon technologies in the EU

Dr. D. Blagoeva, Dr. P. Dias, Dr. A. Marmier, Dr. C. Pavel

Joint Research Centre

8 November 2016, Berlin

Materials for low carbon technologies in EU

More renewables!

More electric cars!

More systems to generate, distribute and store energy!!

More materials!

EU resilience

in view of Low Carbon Technology deployment (materials aspects)

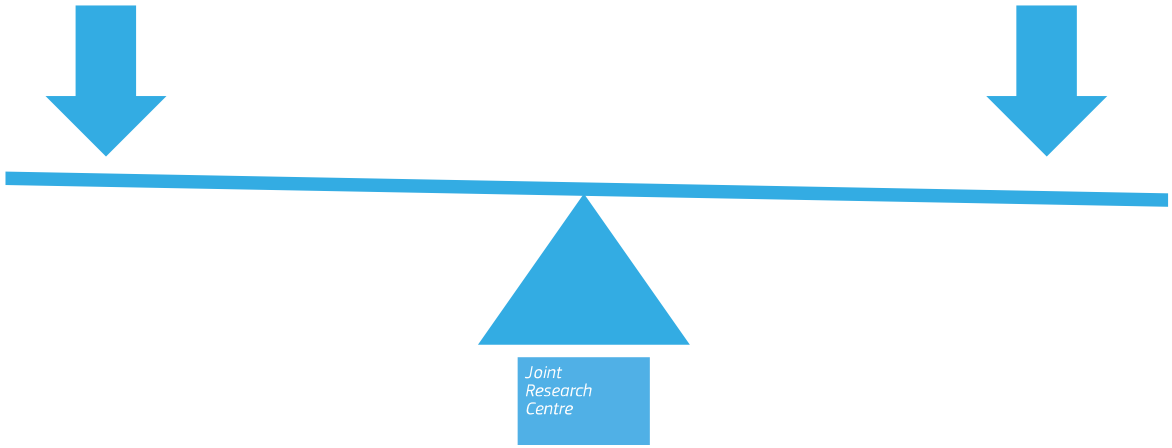
Bottlenecks

Increasing material demand
Sectorial and countries competition
Concentration of supply
Geopolitical risk
Environmental constrains
Geological/production constrains
Import dependency (raw materials)
Manufacturing capacity dependency

Mitigation measures

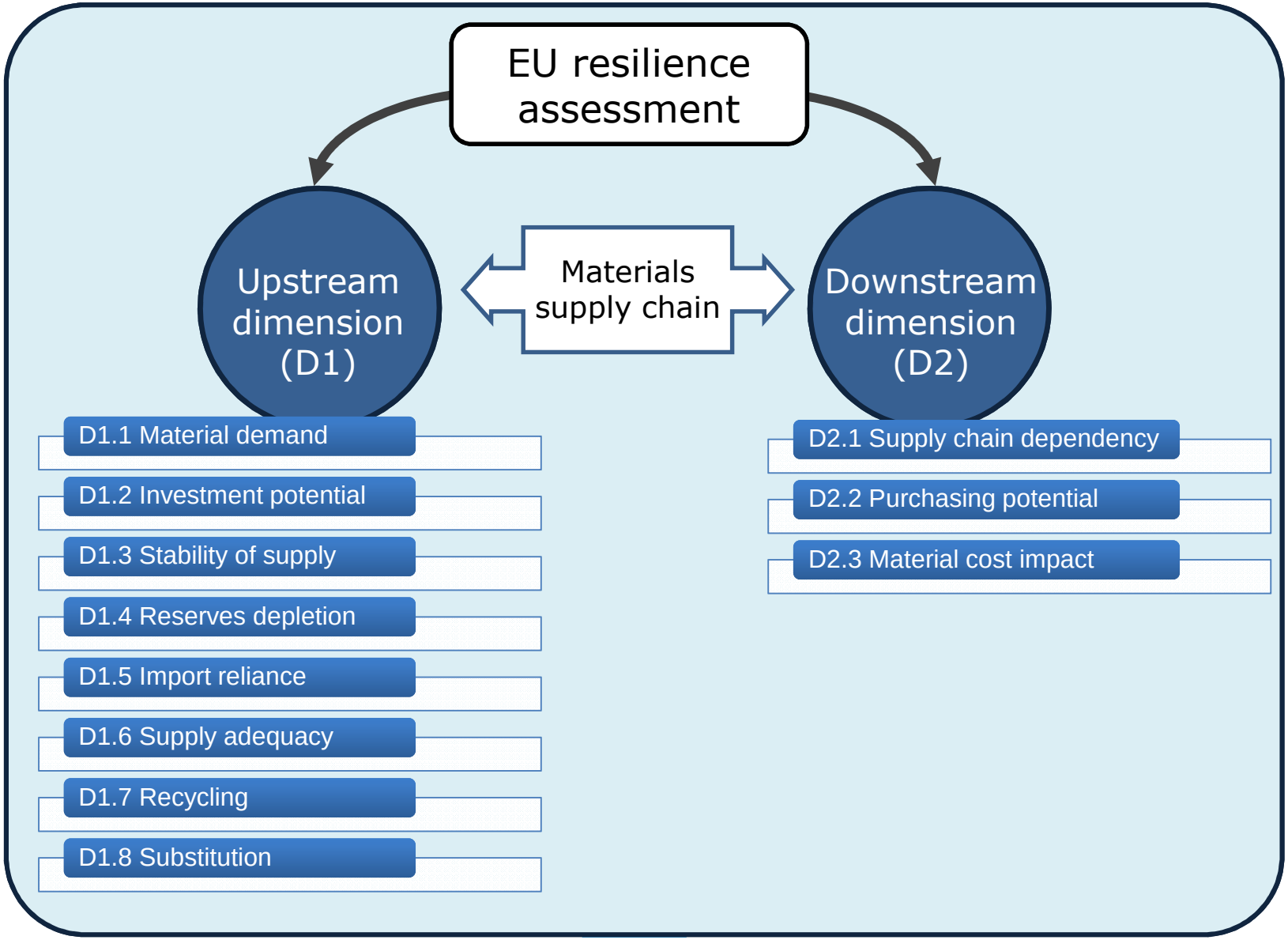
✓ Access to new resources:
- EU production
- Trade agreements

✓ EU manufacturing capacities
✓ Recycling
✓ Substitution



Joint Research Centre

JRC methodology



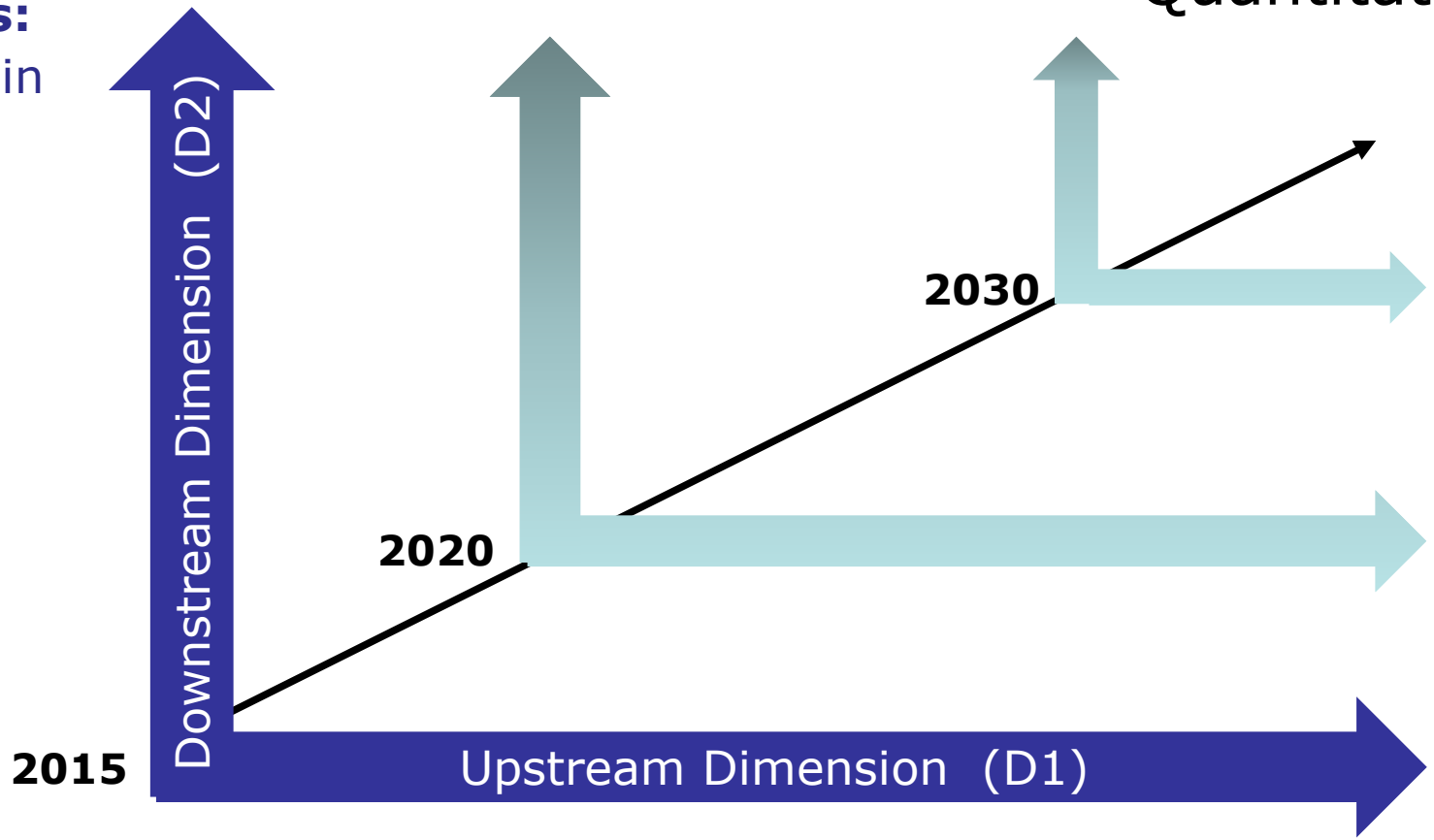
JRC Methodology

Dynamic & Quantitative

Indicators:
Supply chain

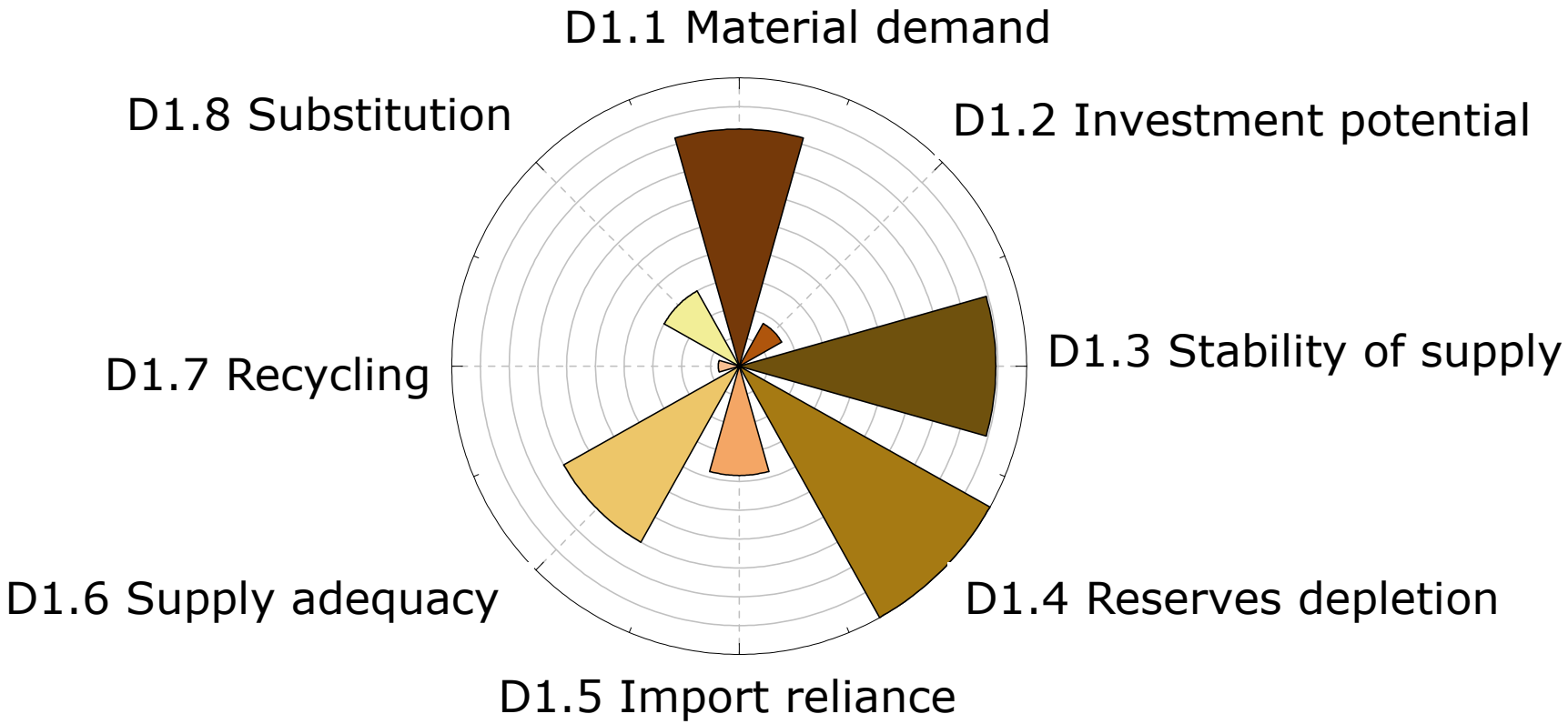
Financial potential

Cost

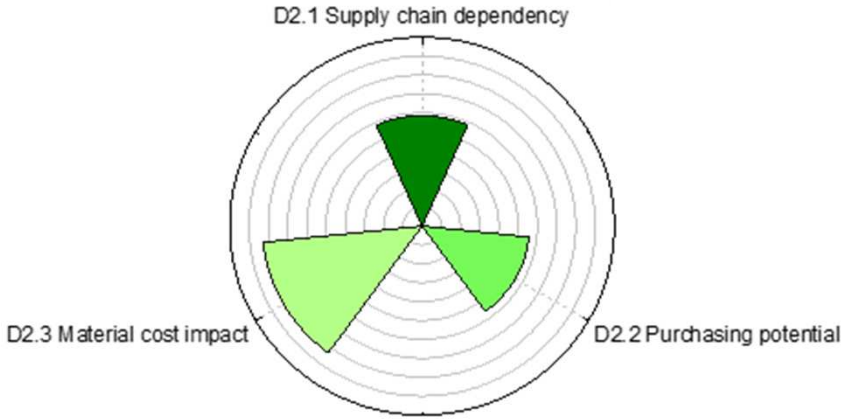


Indicators: Market, geopolitical, geological, financial, environmental, recycling, substitution

Upstream dimension evaluation

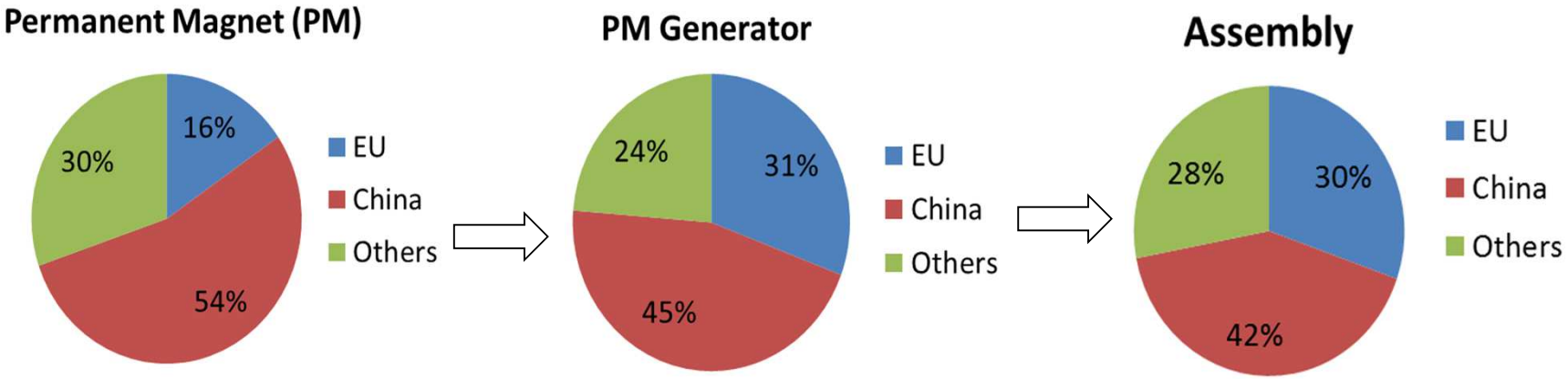


Downstream dimension evaluation: wind



Supply chain dependency indicator

(example for wind energy in the EU)

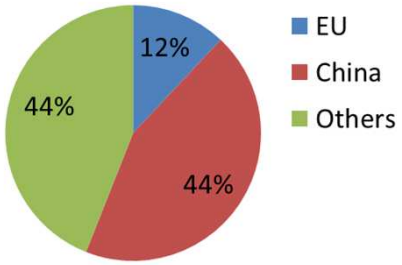


Downstream dimension evaluation

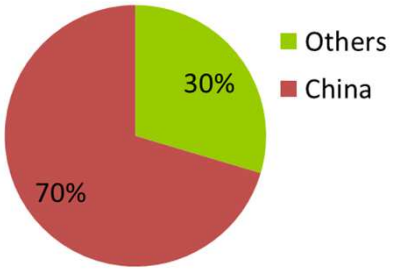
Supply chain dependency indicator
(example for electric vehicles in the EU)

Electrode materials supply

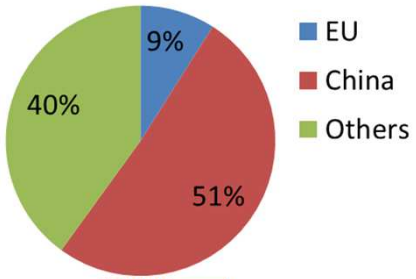
Cathode materials



Anode materials

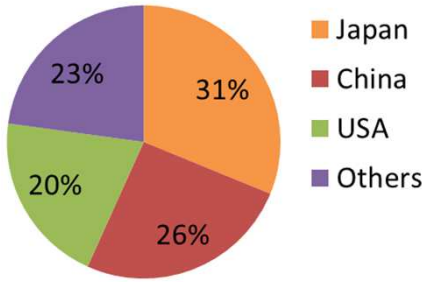


Electrolyte

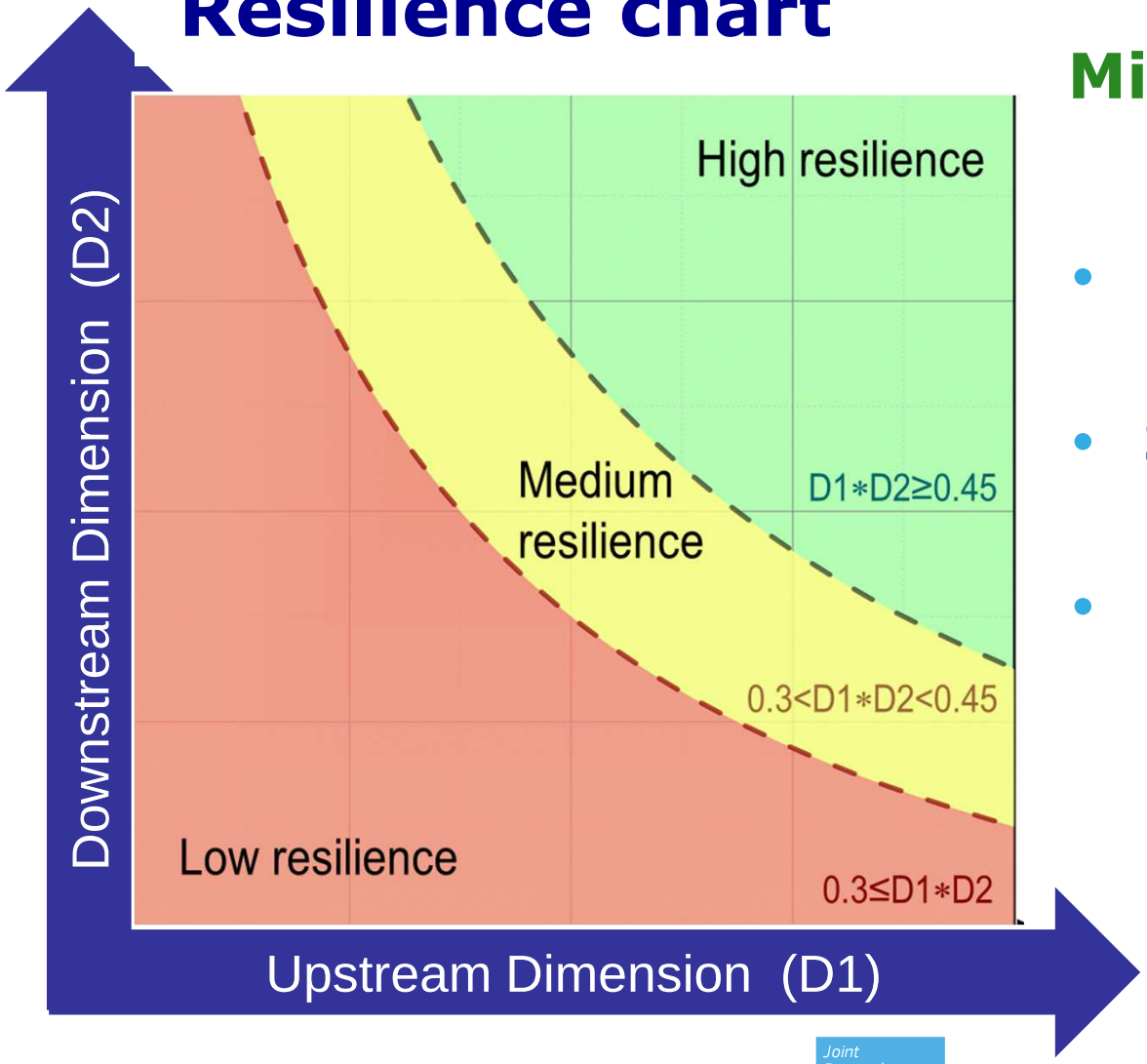


Supply of LIBs

Cell/ modules manufacturing



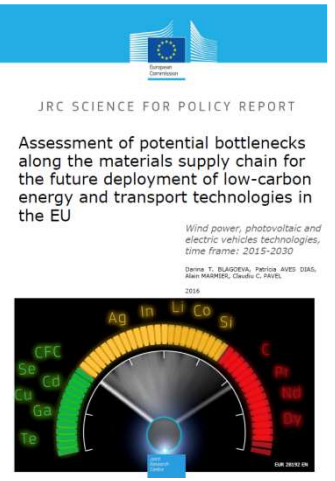
Resilience chart



Mitigation measures

- Recycling
- Substitution
- Boosting EU raw materials production

New study on bottleneck materials for Wind, PV and EVs: 2030 timeframe



15 materials screened …

Turbines
Neodymium
Praseodymium
Dysprosium

Blades
Composites
(criticality expected on the manufacturing side rather than raw material side)

Batteries
Lithium
Cobalt
Graphite

Electric motors
Neodymium
Praseodymium
Dysprosium

PV Modules

Silicon
Silver
c-Si

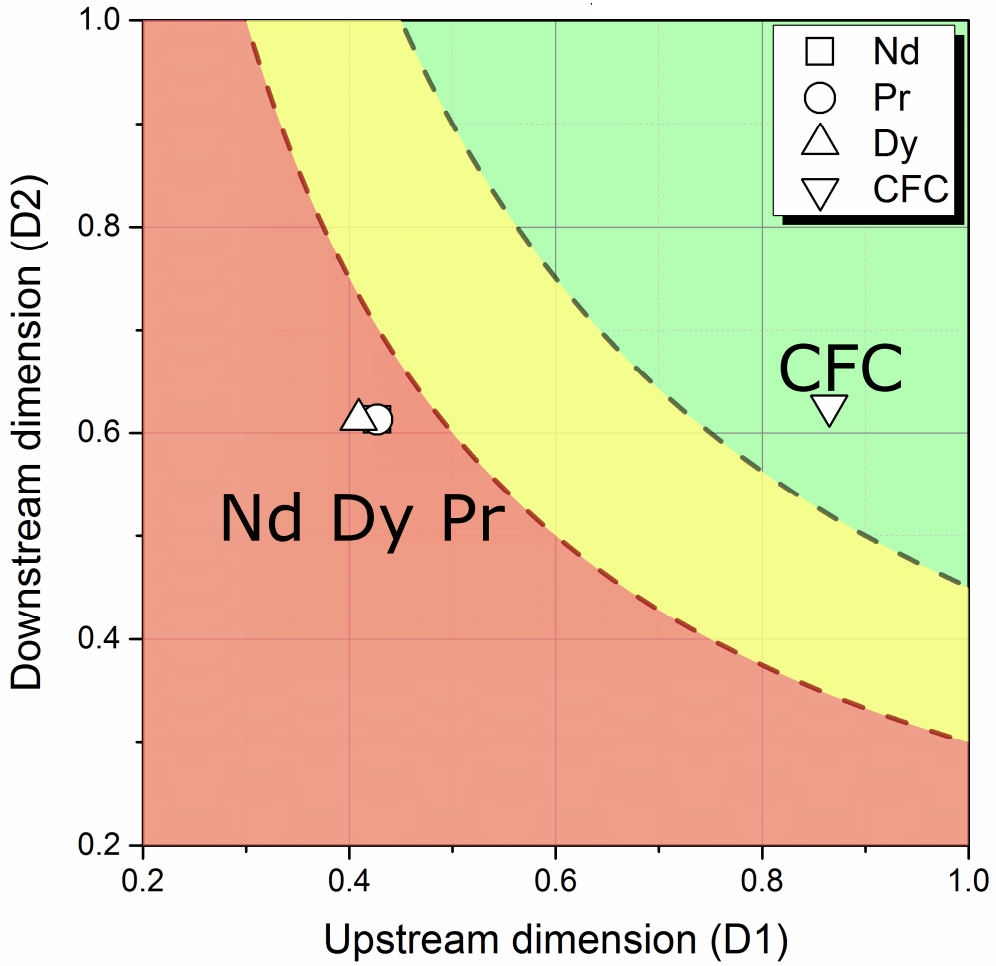
Copper
Indium
Gallium
Selenium
CIGS

Cadmium
Tellurium
CdTe

http://publications.jrc.ec.europa.eu/repository/bitstream/JRC103778/materials%20supply%20bottleneck_online%20version.pdf

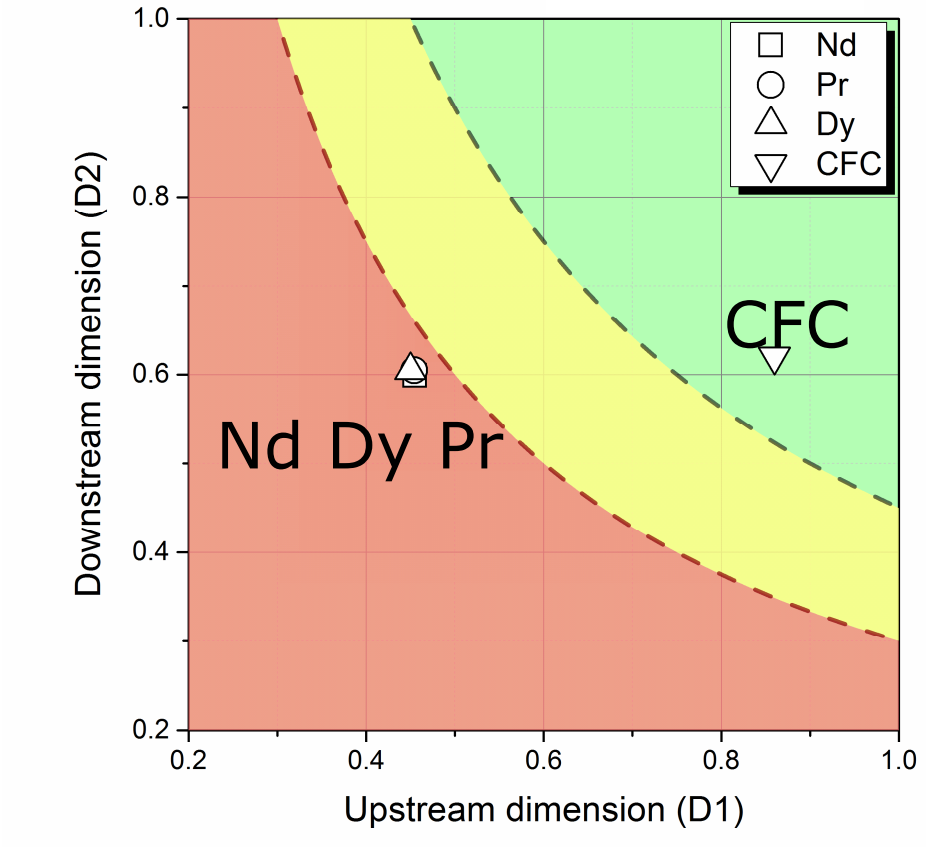
Wind technology current situation

- Today the EU is highly vulnerable to supply chain bottlenecks for rare earths used for magnets in wind turbines
- High resilience for carbon fibre composites (CFCs)

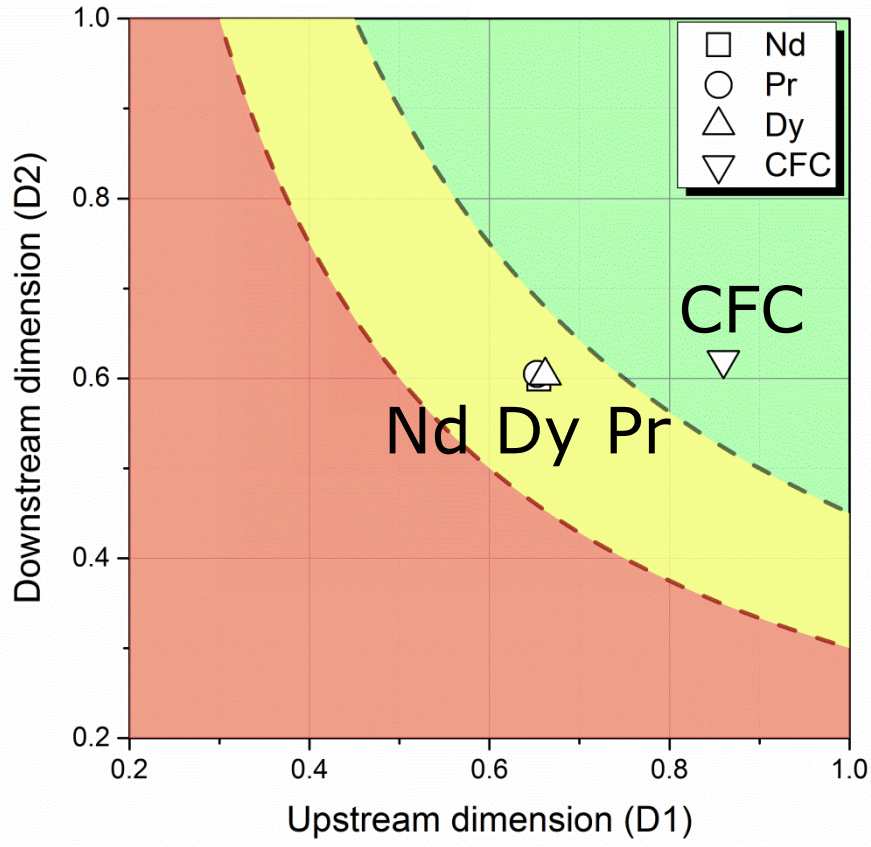


Wind technology 2030

Recycling **X**
Substitution **X**
EU RM production **X**



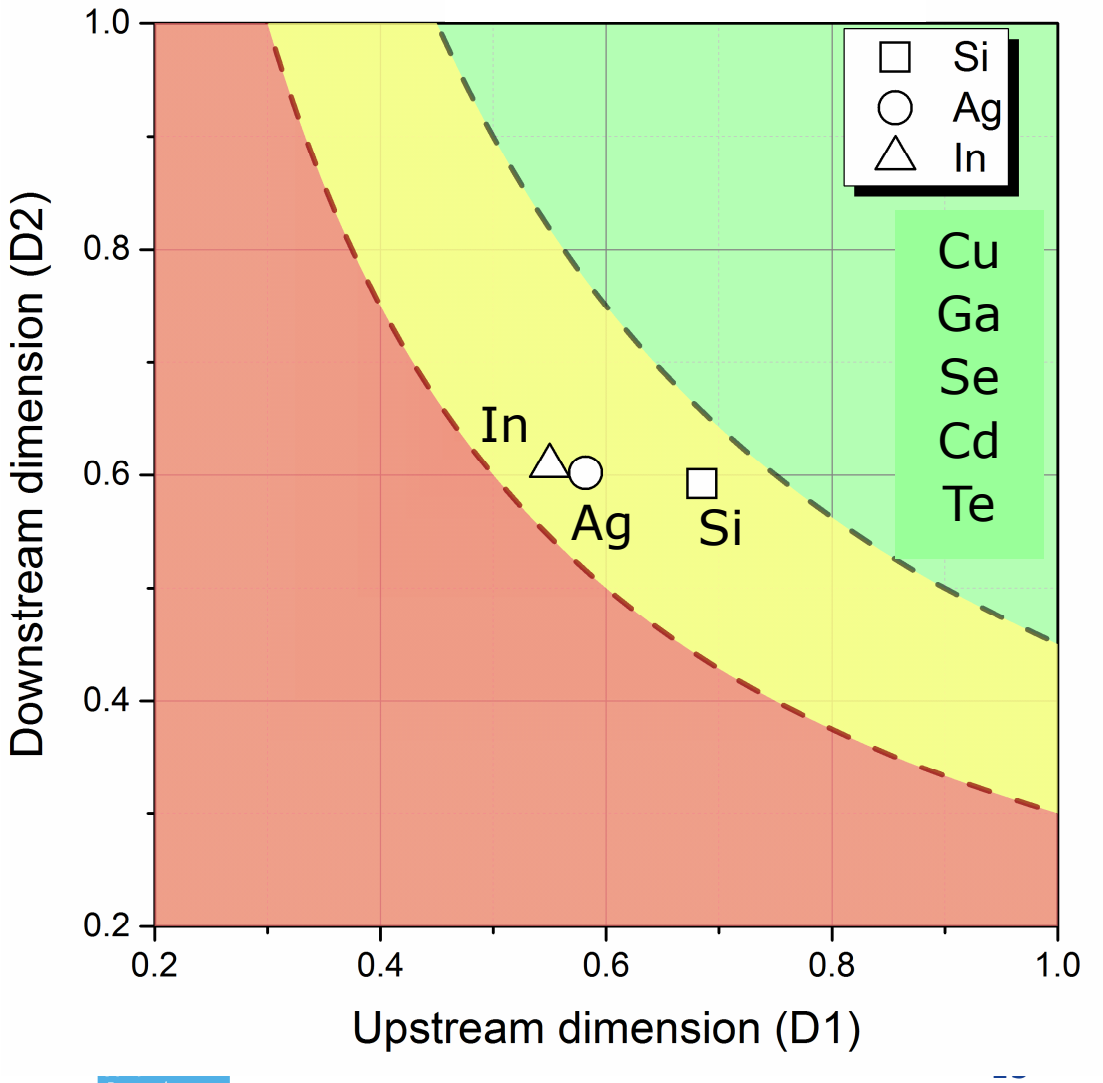
Recycling ✓
Substitution ✓
EU RM production ✓



RM – Raw Materials

PV technology current situation

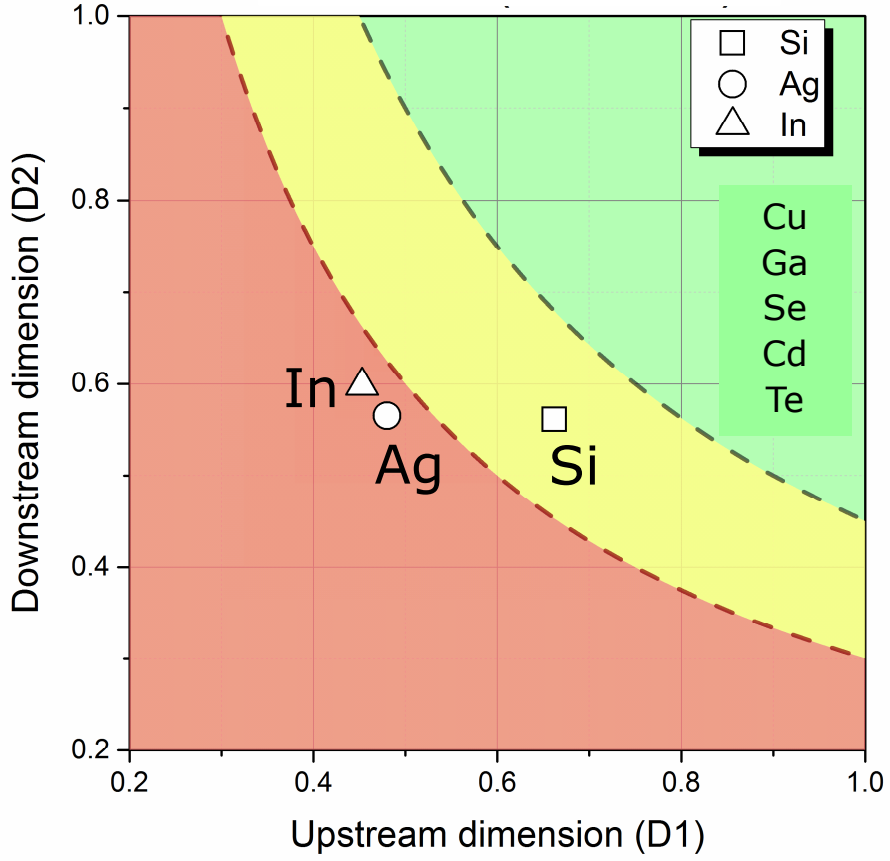
No strong concerns for PV materials!



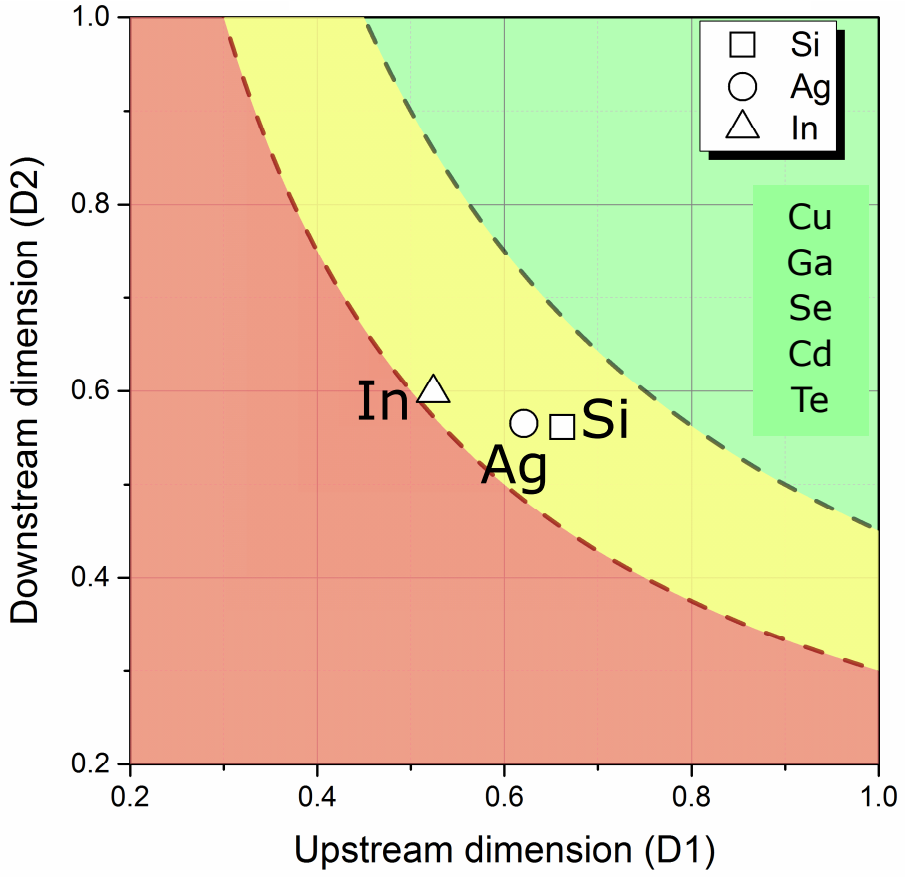
PV technology 2030

European Commission

Recycling **X**
Substitution **X**
EU RM production **X**



Recycling ✓
Substitution ✓
EU RM production ✓

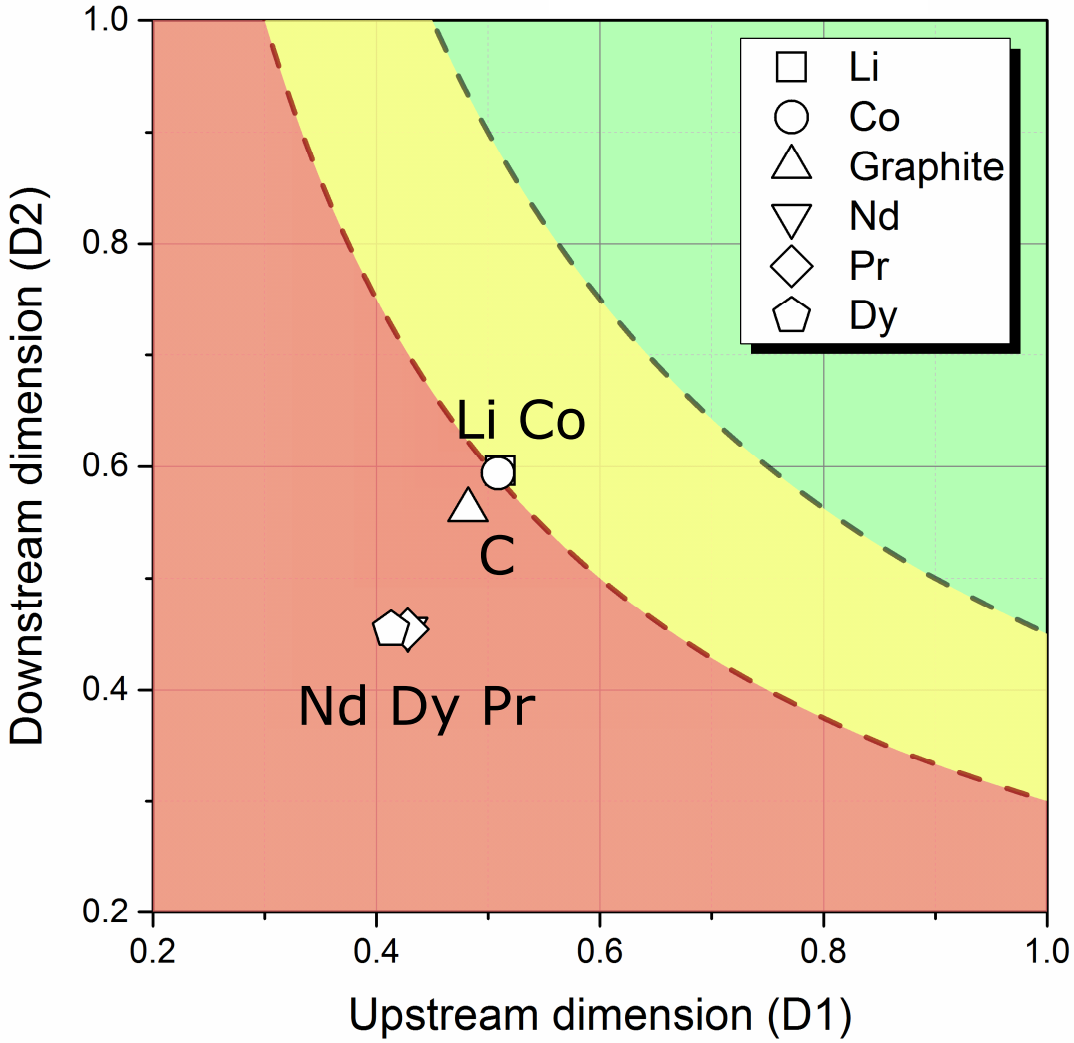


Joint Research Centre

EV technology current situation

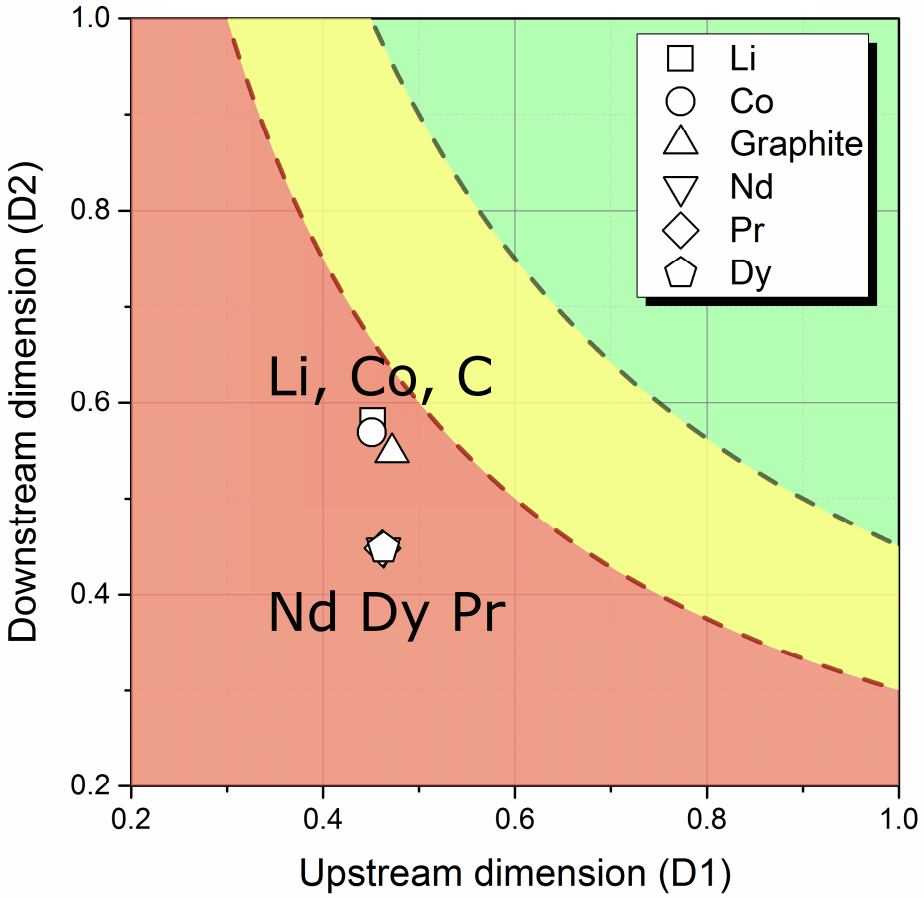
Rare earths in magnets for electric traction motors and graphite for rechargeable batteries are at risk of supply

Lithium and cobalt: borderline

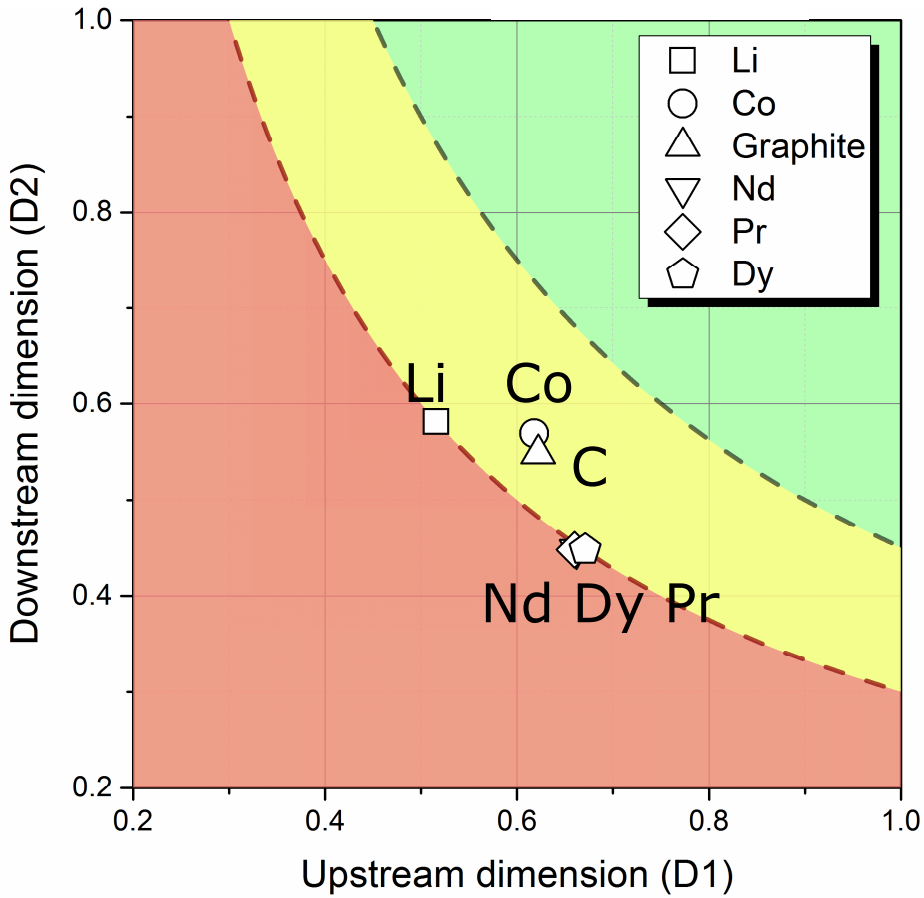


EV technology 2030

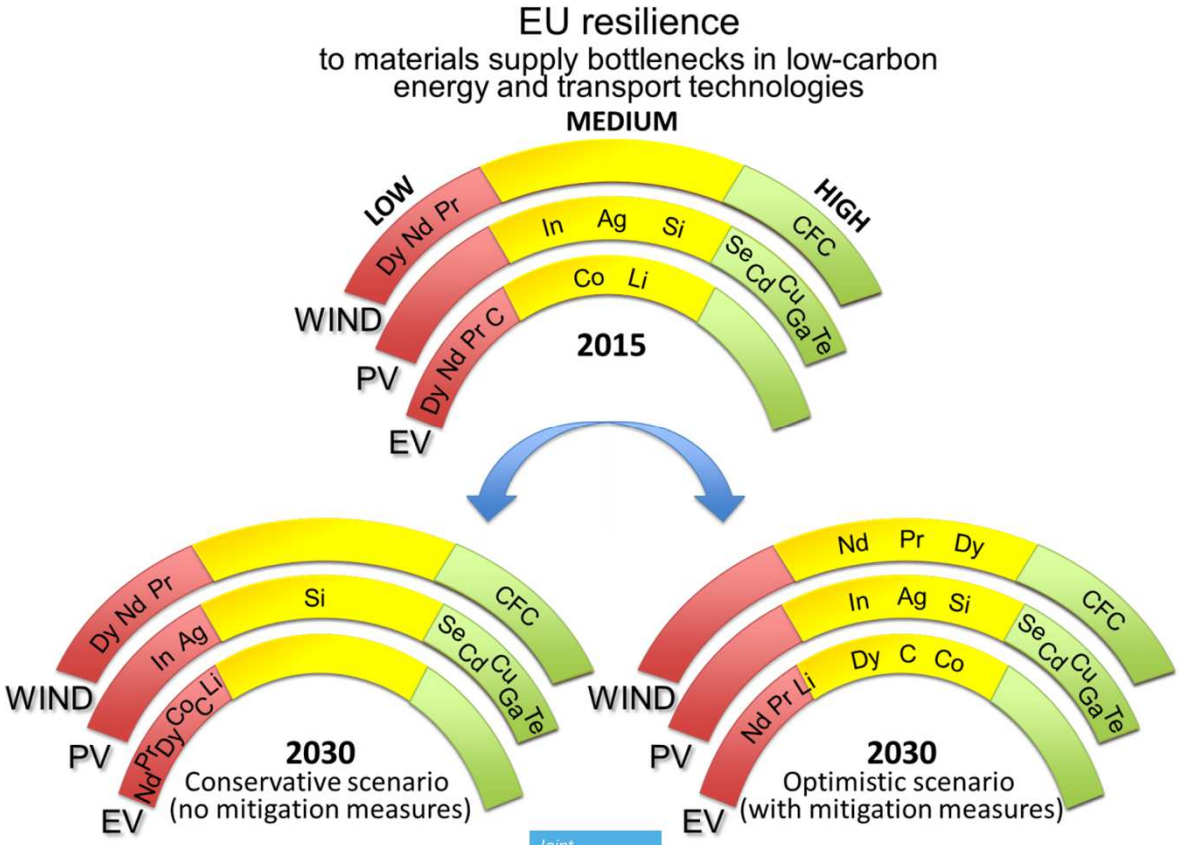
Recycling **X**
Substitution **X**
EU RM production **X**



Recycling ✓
Substitution ✓
EU RM production ✓



The EU is vulnerable to supply bottlenecks of several key materials needed in wind, photovoltaic and electric vehicles technologies! Unless mitigation measures are taken, the EU resilience to potential supply issues will deteriorate by 2030.



Thank you!


European Commission
SETIS
Materials Information System (MIS)
European Commission > SETIS
HOME
ABOUT US
LINKS
BIBLIOGRAPHY
The Materials Information System (MIS) has been established to provide relevant information on the materials used in SET-Plan technologies, including background information on the technology itself, the material's supply chain, which materials and how much material is used in each technology, descriptions of the materials themselves, both scientific and technical, as well as a library of relevant references, links and other literature.
Move the cursor over a technology below, which will unfold to give a very brief description of the technology, plus the option to look at the technology itself in more detail and the materials used within that technology or the option to go directly to the materials used.
wind energy
concentrated solar power
solar photovoltaic
electricity grid
bioenergy
carbon capture and storage
nuclear energy
Last update: 7 April 2016 | Top