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FACING THE EU ENERGY TRANSITION: PROGRESS AND CHALLENGES FOR 2030

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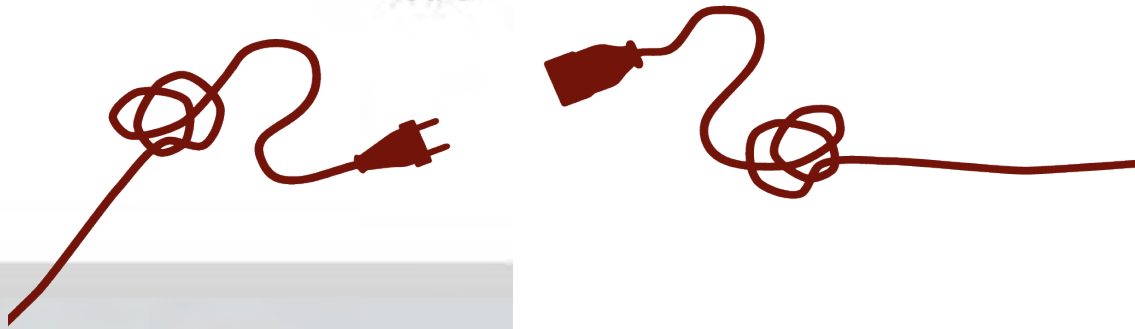


Watts Next: Securing Europe's Energy and Competitiveness

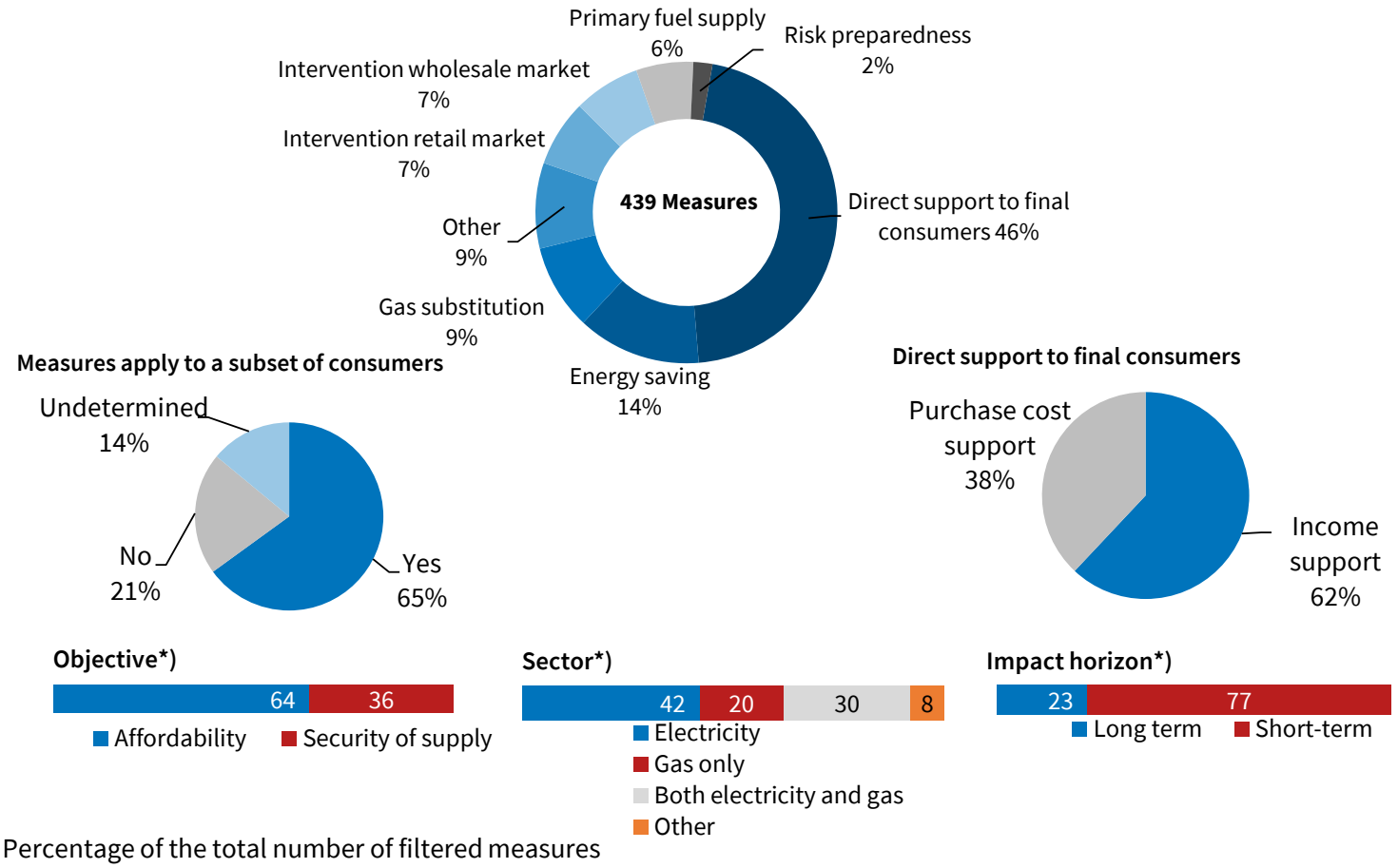
Where the EU's Energy Policy Should Go Now

Frédéric Gonand, Pedro Linares, Andreas Löschel, David Newbery, Karen Pittel, Julio Saavedra, Georg Zachmann

Introduction to Report and Lessons Learnt

The Way It Was and The Way It Is

National Measures to Ameliorate Impact of Energy Crisis

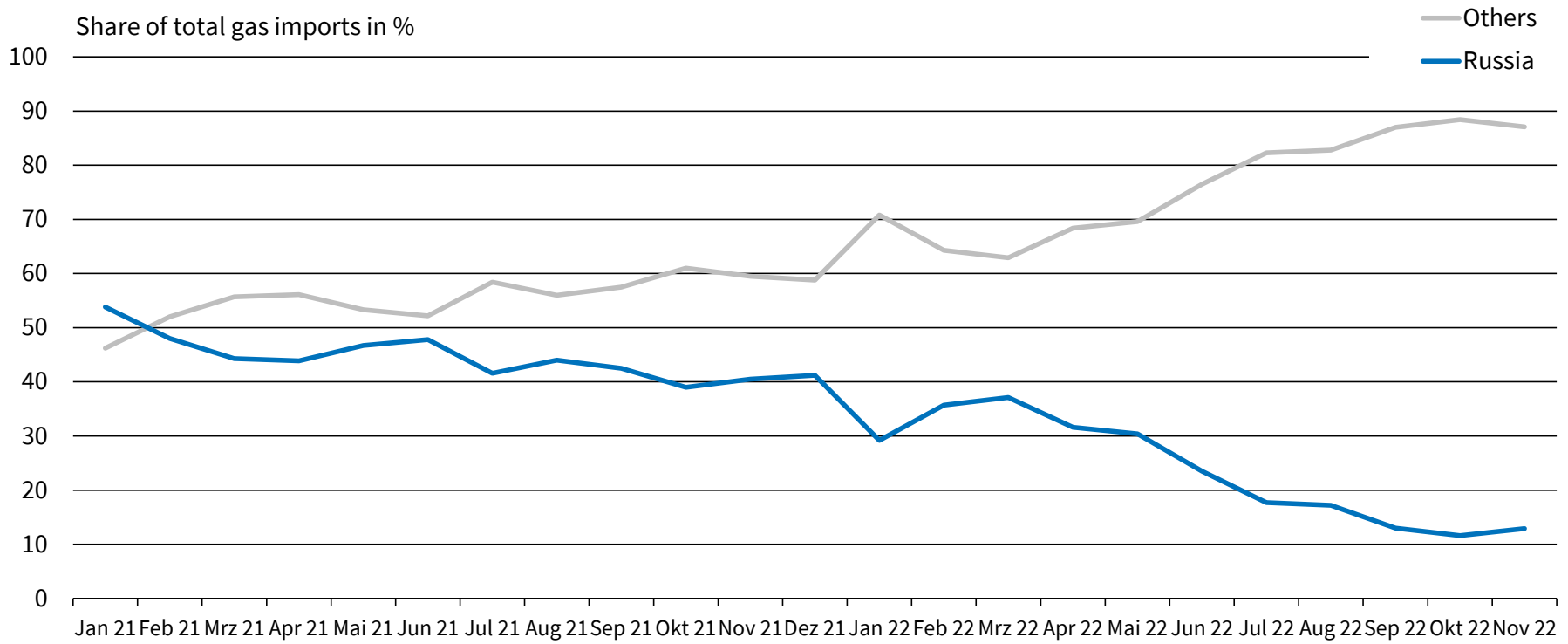


*) Percentage of the total number of filtered measures

Source: ACER (2023)

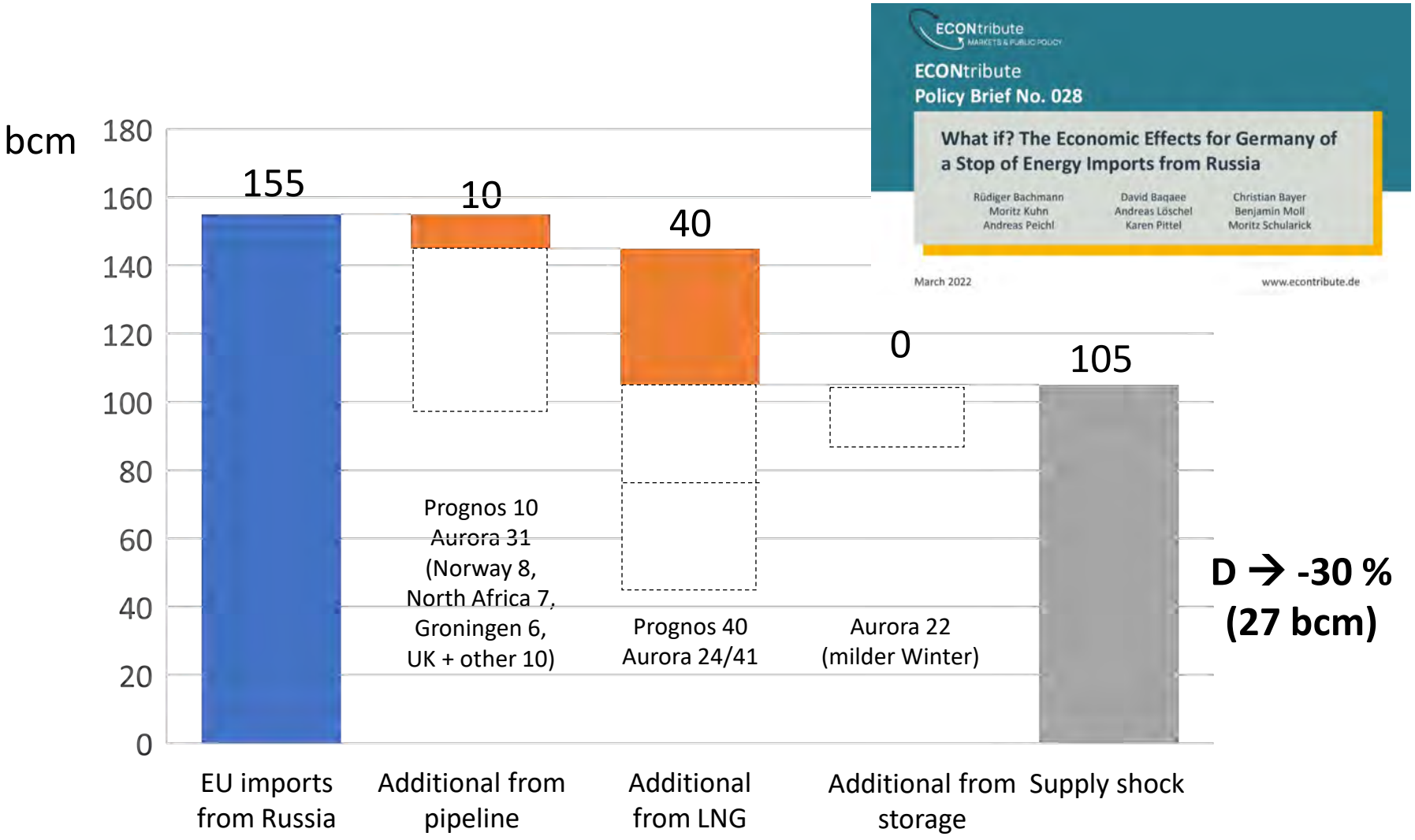
The Way It Was and The Way It Is

EU Diversification Away from Russian Gas



Source: European Commission (2023)

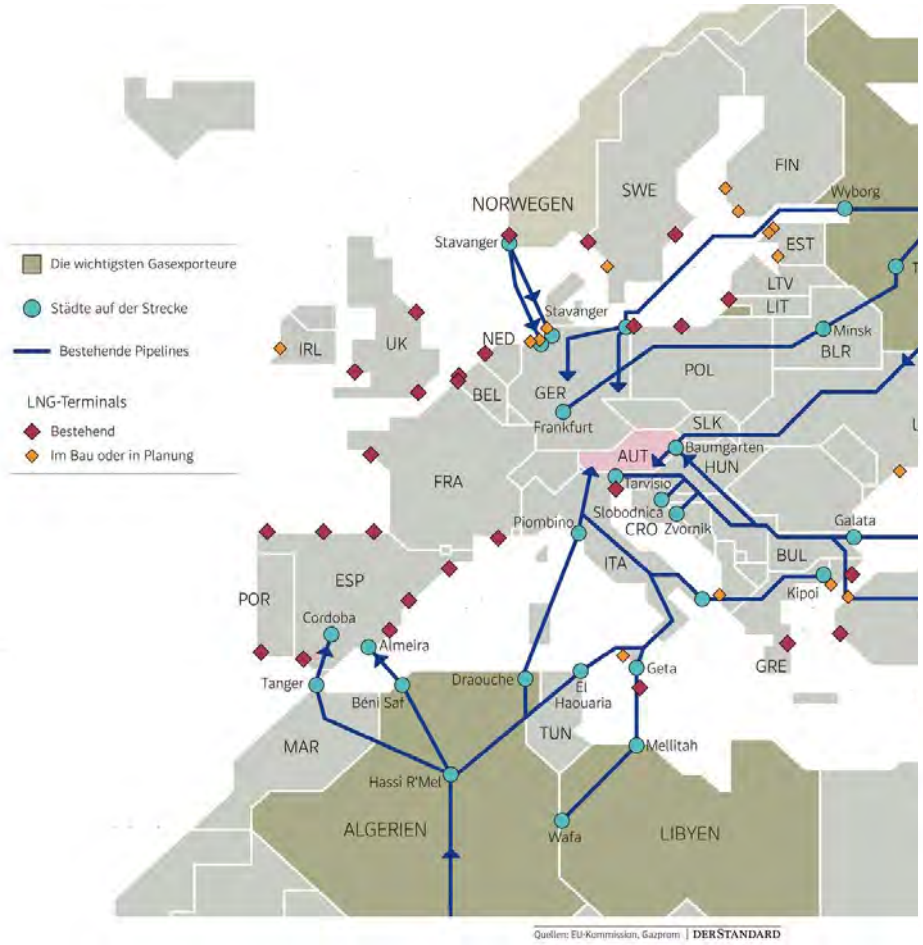
GERMANY - Geopolitical Resilience



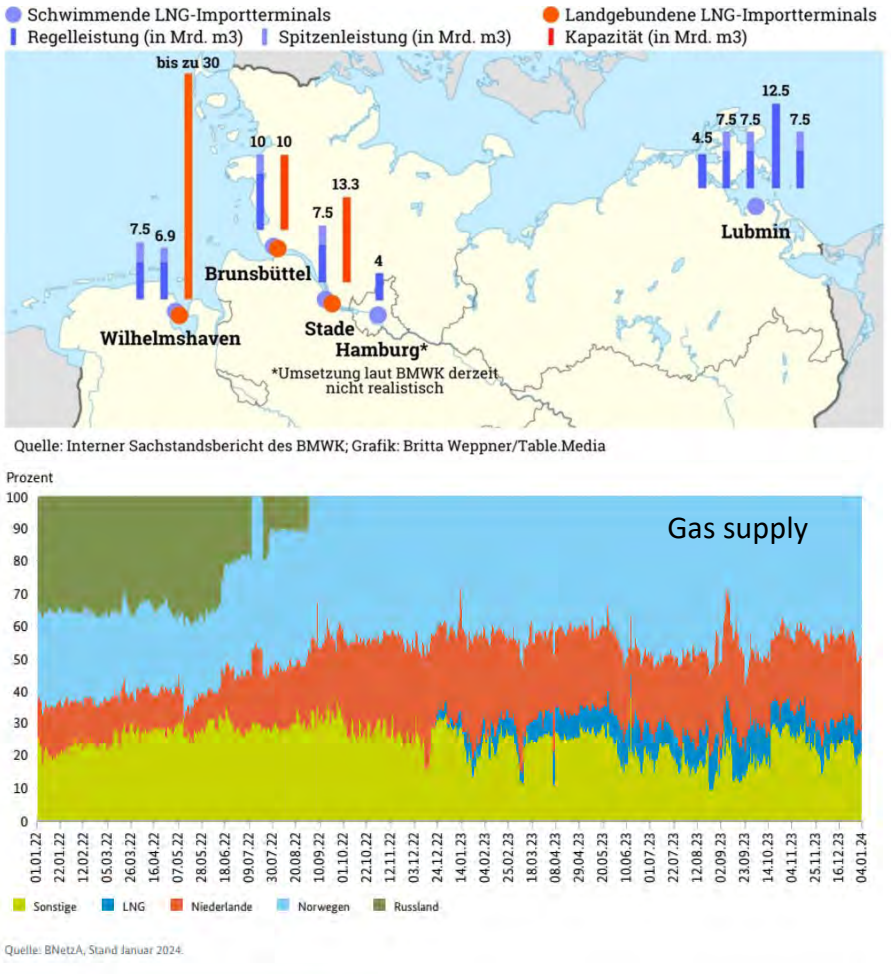
Source: Eigene Darstellung nach Agora/Prognos (2022) und Aurora (2022)

1 PJ = 0,278 TWh
1 bcm = 10,97 TWh

GERMANY - Gas supply: Pipelines / LNG-Terminals



Source: Tagesspiegel Pipelineatlas

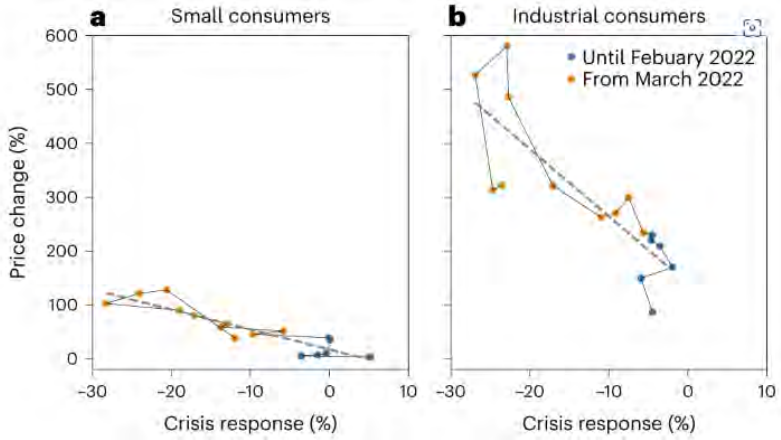


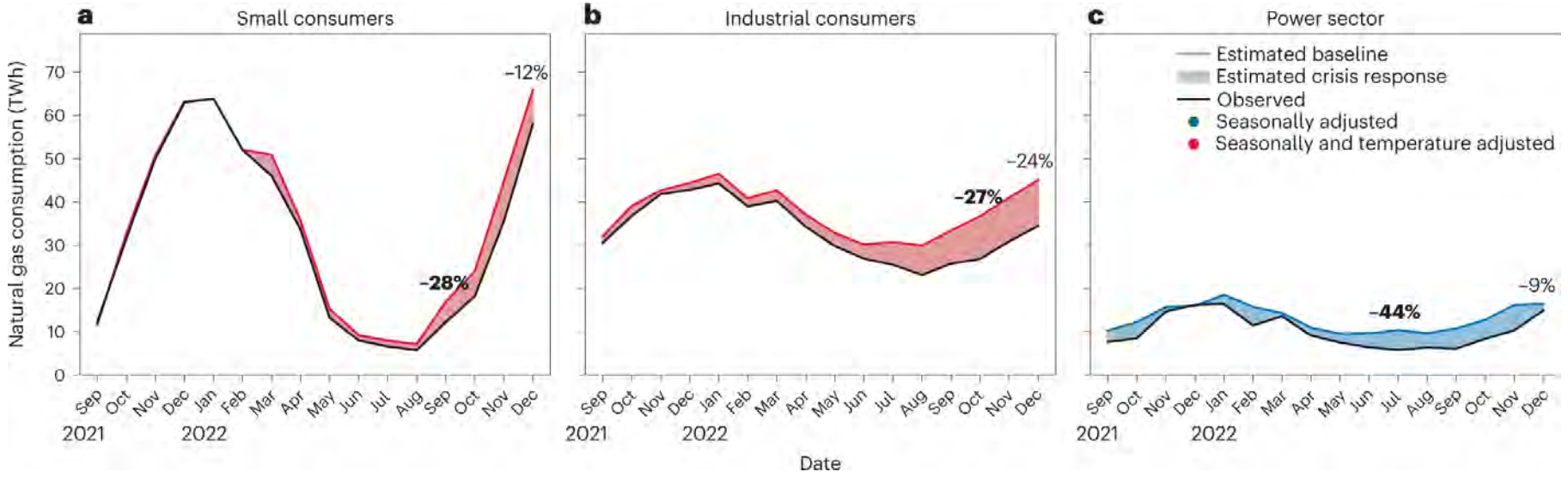
Quelle: TableBerlin / Malte Kreuzfeld , Jahreswirtschaftsbericht 2024

https://interaktiv.tagesspiegel.de/lab/globaler-pipeline-atlas-das-unsichtbare-netz-der-weltweiten-energieversorgungs/

GERMANY - Gas demand

- consumers have massively reduced their demand, first industry, then households (max 28% in 9/22, 23% 2.Hj 23)
- market prices play major role (price elasticities $\varepsilon_{HH} < 0.16$, $\varepsilon_{Ind} < 0.04$ → pass on higher energy costs)

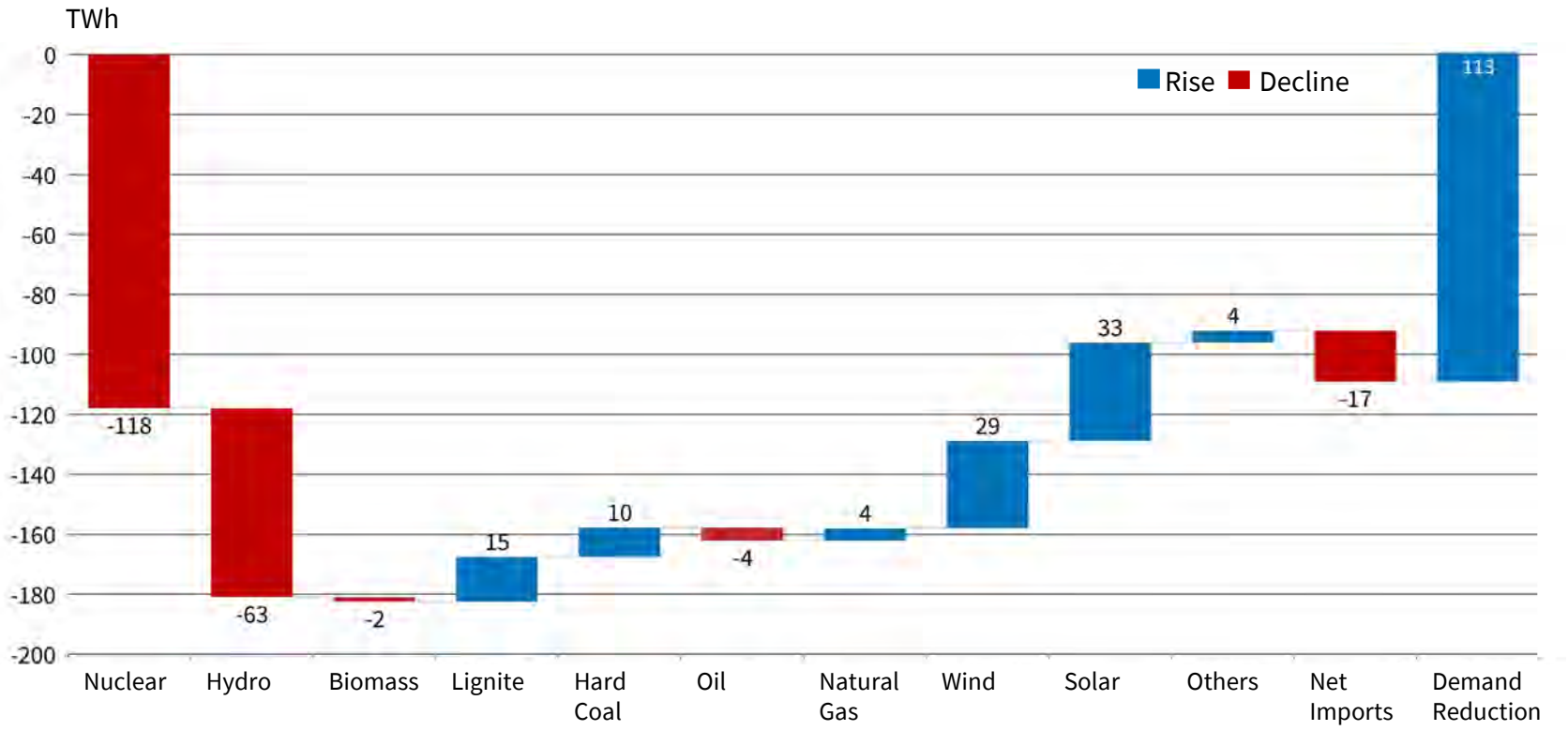




Quelle: Ruhnau, O., Stiewe, C., Muessel, J. et al. Natural gas savings in Germany during the 2022 energy crisis. Nat Energy (2023). https://doi.org/10.1038/s41560-023-01260-5

The Way It Was and The Way It Is

Change in EU Electricity Generation, 2021 vs. 2022



Source: Fraunhofer Institute for Solar Energy Systems (2023); own calculations

Lessons Learned from the Energy Crisis

Strengthen energy security

Reducing dependencies and improving flexibility within Europe, increasing energy efficiency

Avoid distortionary policy and use the power of markets

As little as possible dampening of market prices as short term palliative (balance between HH and firms)

Adjust existing and built new infrastructure

Decommission gas grids and repurpose them

Establish a strategic Foresight Office

Reducing risks of future pandemics, energy crisis, raw material shortages, or large-scale cyberattacks

Communicate honestly!

Policy Coordination

Policy Coordination

Creation of a single European long-term electricity market: lower costs, more security

- Regulators: promote long-term contracting at the European level

  Standardized products, trading platforms

  Contracts for Difference: Not mandatory, not distortionary, not unfair, not only public

  Carbon Contracts for Difference

- Governments: refrain from interfering in markets (emergencies may be different)

Policy Coordination

While this is done: **temporary coordination arrangements**, e.g.:

Concerted RES auction

Concerted price for Reliability Options

Common design for promoting storage

Resilience

Resilience

What went well

Keeping the market open

- Limited border closures
- Little energy-price subsidies (joint demand-reduction pledge most important)
- Maintain ETS

What went okay

New coordin'/inform'ation fora emerged

- Ad-hoc coordination of energy ministers (good on demand reduction, bad on joint diversification)
- IEA

What went wrong

Lack of preparedness

- Modelling of major disruptions (RU gas, FR nuclear)
- N-1 for countries

MS tried to withhold sensitive elasticities

- Groningen, nuclear, demand reduction

Lack of data crucial for effective policies

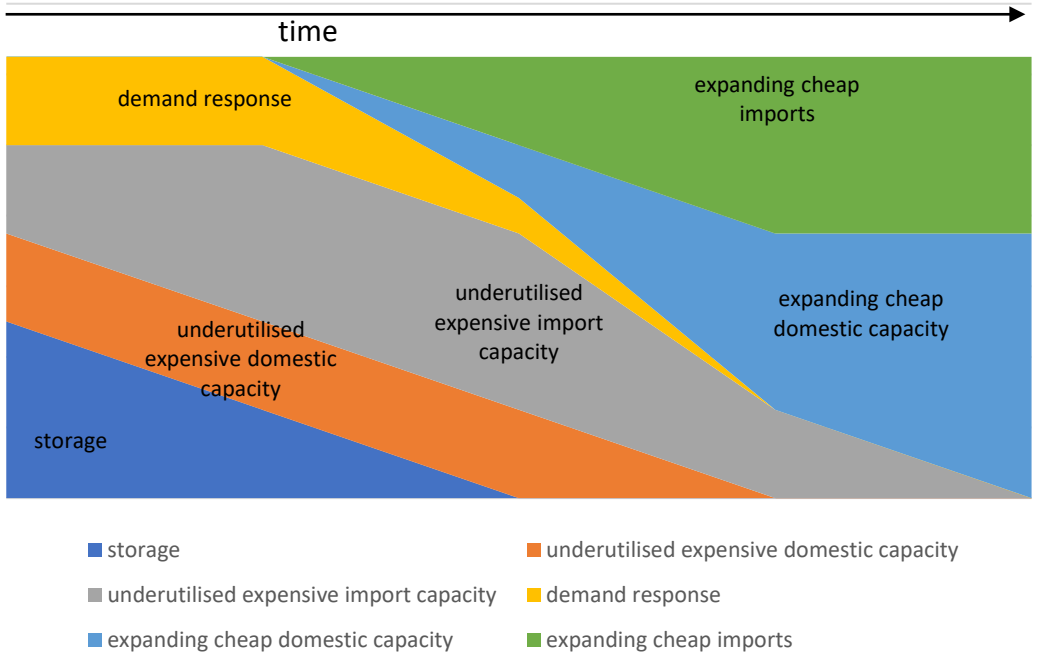
- granular data on prices, contracts, flows, demand was missing (comp's used info strategically)
- Much of academia/modelling capacity was under-utilised

Resilience

What can we learn?

- Energy policy needs to prepare for major disruptions
- Diversification and excess capacities have cost
- Foresight allows to balance the cost of preparation and disruption
    1. Understand systemic risks
    2. Identify lowest-cost options to reduce the cost of such disruptions (remembering the elasticity of the system)
    3. Sufficient foresight to trigger adjustments in time
- -> need for transparent, reliable and relevant data and modelling to coordinate efficient policies in time

Illustration



Infrastructure: location signals and UK/GER energy market reforms

GERMANY Climate neutral electricity market design

Monitoring process "Energy of the Future" to review the progress of the energy transition and the implementation status of measure

appointment of an independent expert commission to review and comment on the monitoring reports prepared by the BMWK.

BMWK has asked expert commission for the platform "Climate Neutral Electricity System" (PKNS) to prepare an analysis on the current situation on the electricity market and on further development options for the electricity market design (published February 2023, summer paper, winter paper)


Expertenkommission zum Monitoring-Prozess „Energie der Zukunft“

Stellungnahme zum Strommarktdesign und dessen Weiterentwicklungsmöglichkeiten

Berlin · Bochum · Freiburg · Nürnberg, Februar 2023

- Prof. Dr. Andreas Löschel (Vorsitzender)
- Prof.in Dr. Veronika Grimm
- Dr. Felix Matthes
- Prof.in Dr. Anke Weidlich


ENERGIE DER ZUKUNFT

Kommission zum Monitoring-Prozess

Prof. Dr. Andreas Löschel (Vorsitzender)
Prof.in Dr. Veronika Grimm
Dr. Felix Matthes
Prof.in Dr. Anke Weidlich

https://www2.wiwi.rub.de/stellungnahme-zum-strommarktdesign-und-dessen-weiterentwicklungsmoeglichkeiten/

GERMANY Market design: Reform options

Coordination – Wholesale market	Uniform Merit-Order	Market segmentation			New forms of bidding
Coordination – Flexibility	Partly market-based procurement of SyS	Flexibility platforms	Expanseion of market-based procurement SyS	Systemcompatible network charging sys.	
Financing – Renewable Energy Promotion	Market premium model (unilateral CfDs)	Two-sided CfDs	Bandwidth models	Financial CfDs	
Financing – dispatchable power plants	Electricity market 2.0	Further developement of capacity instruments	Systemic investment framework		
Localisation signal – Wholesale market	Uniform bidding zone	Bidding zone division	Nodalpricing system	Cost-/market-based redispatch	Network charging system - G-component	Localisation signals – Single-load power plants
Localisation signal – Renewable Promotion	Reference yield model	Regionally based support of renewables			
Electricity costs	Historical developed selective interventions	Restructuring of levies and charges	Strengthening and diversification of PPAs	Tenant electricity model	Industrial electricity price

* SyS Systemservices
** PPAs Power Purchase Agreements

GERMANY Infrastructure: Electricity 2037/2045 (2024)

Network development plan (approved 3/ 2024) DC AC

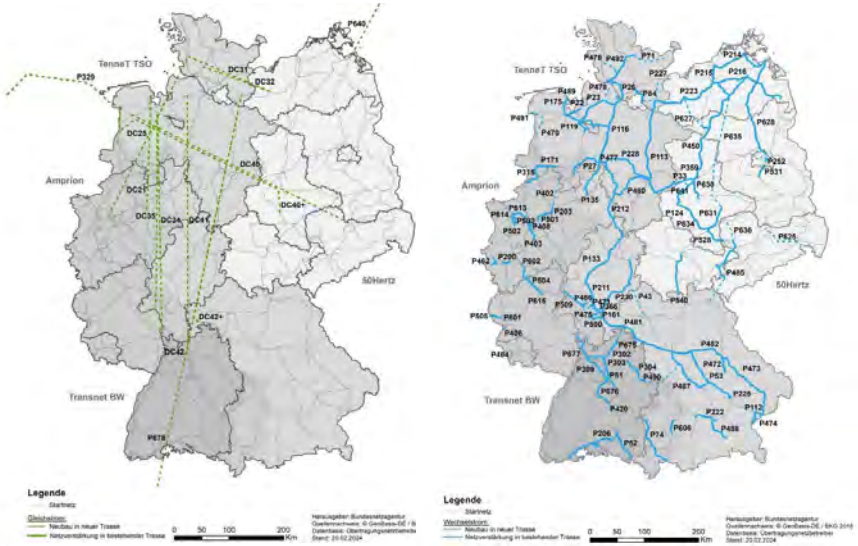
Übersicht der Szenariokennzahlen

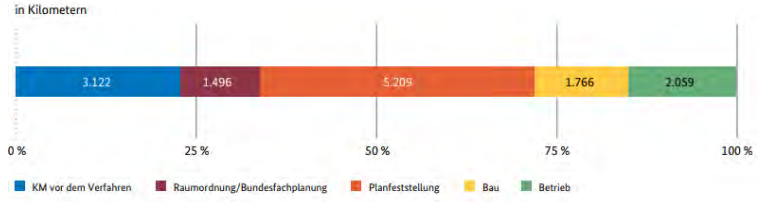
Energieträger	Referenz 2020/2021	A 2037	B 2037	C 2037	A 2045	B 2045	C 2045
Installierte Leistung in GW							
Erdgas/Wasserstoff*	32,1	>38,4	>38,4	>38,4	>34,6	>34,6	>34,6
Stromverbrauch in TWh							
Nettostromverbrauch	478	828	891	982	999	1.025	1.222
Bruttostromverbrauch	533	899	newly approved 961	1.053	1.079	1.106	1.303
Treiber Sektorenkopplung							
Wärmepumpen – Haushalt und GHD, Anzahl in Mio.	1,2	14,3	14,3	14,3	16,3	16,3	16,3
Elektromobilität – Anzahl in Mio.	1,2	25,2	31,7	31,7	34,8	37,3	37,3
Power-to-Heat – Fernwärme/Industrie, in GW	0,8	12,6	16,1	22,0	14,9	20,4	27,0
Elektrolyse in GW	<0,1	40,0	26,0	28,0	80,0	50,0	55,0
Weitere Speicher und nachfrageseitige Flexibilitäten in GW							
PV-Batteriespeicher	1,3	67,4	67,4	67,4	97,7	97,7	113,4
Großbatteriespeicher	0,5	23,7	23,7	24,2	43,3	43,3	54,5

Trassenkilometer und Investitionen des Zubaunetzes in den Szenarien A/B/C 2045

	Trassenlänge in km	Investitionsvolumen in Mrd. EUR
Offshore	13.310	145,1
Onshore	12.413	106,2
Summe	25.723	251,3

Quelle: Übertragungsnetzbetreiber



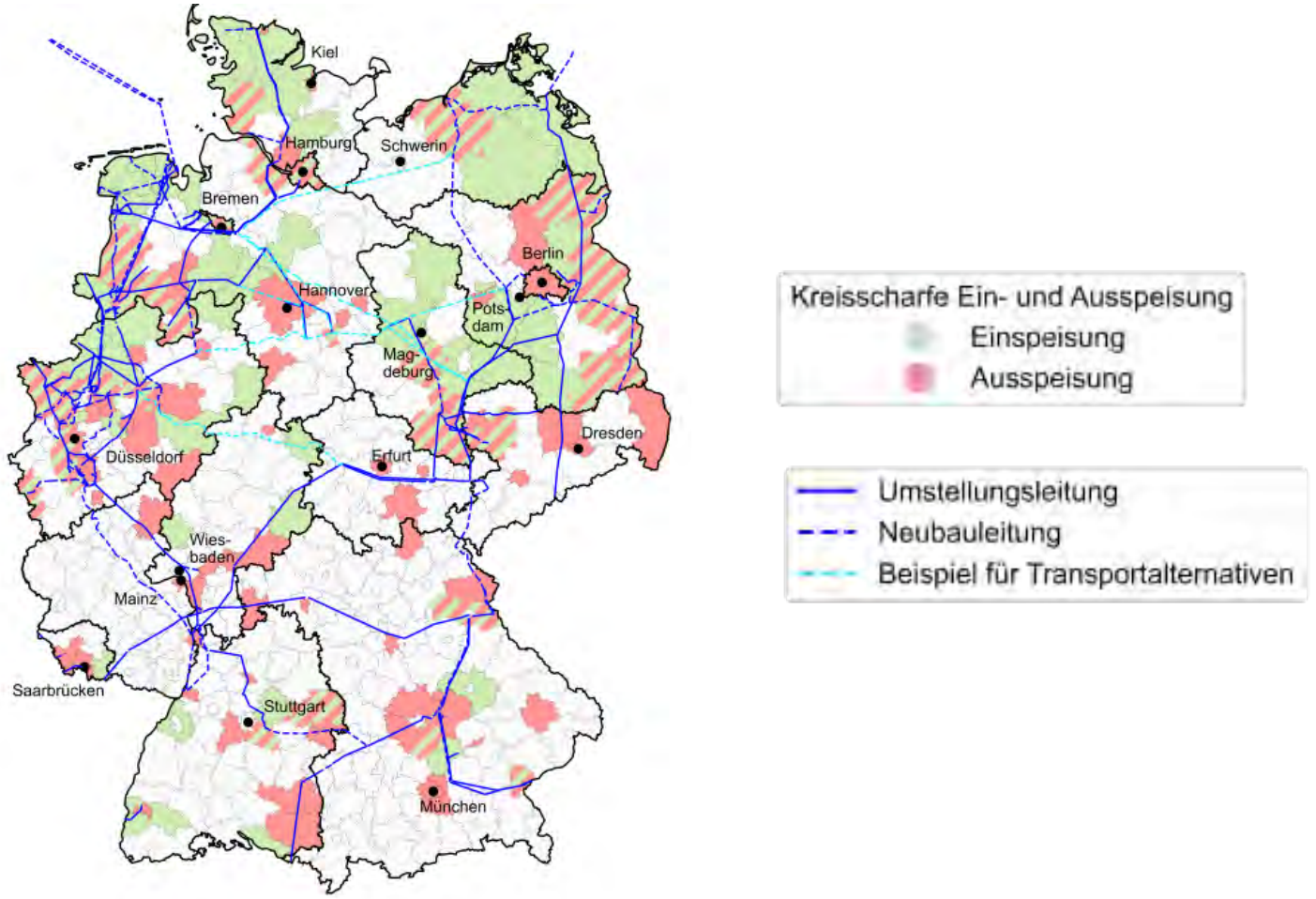


Monitoring
BBPlG, EnLAG

Quelle: NEP (2023)

GERMANY Infrastructure: Hydrogen (2023)

Wasserstoff-Kernnetz (Juli 2023)



Quelle: FNB Gas (2023)

Metals and Raw Materials

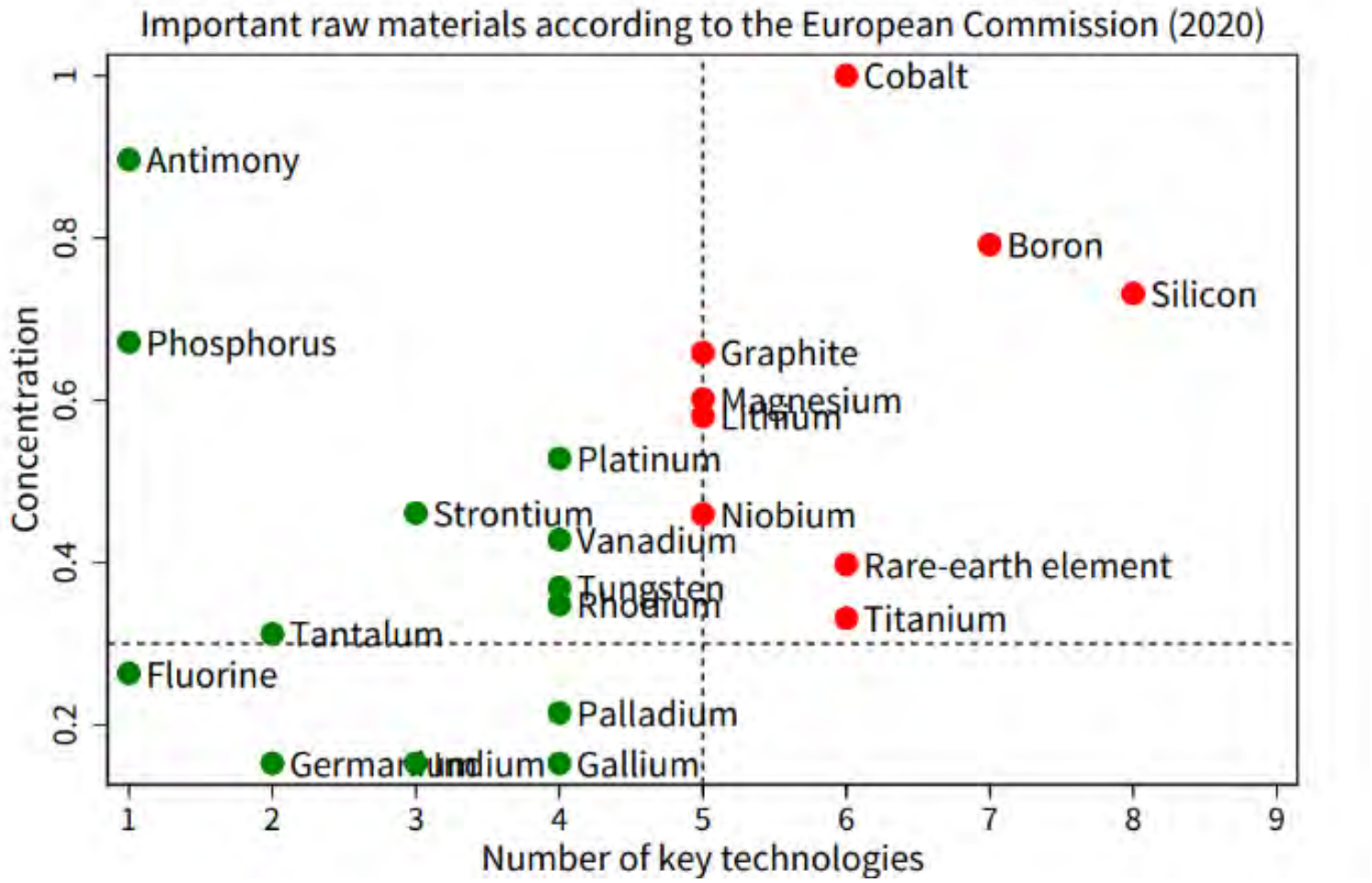
Security of supply in metals

Rising demand for metals needed for the green transition: lithium, cobalt, graphite, rare earths... (-> batteries) + aluminum and copper (cables, PV panels).

Few grounds to believe that **metal prices** will fall significantly in the medium term. Investments low since mid-2010's.

Europe heavily dependent on imports for many of these metals.

Import concentration and key technologies



Source: ifo (2022)

How to deal with rising concerns?

Diversify and reduce risks of supply disruptions

Encourage production of critical metals in Europe

Ramp up circular economy

Getting from outlining framework and measures to **implementation** of, e.g., Critical Raw Materials Act

Risks: **Carbon Border Adjustment Mechanism (CBAM)** may accelerate relocation of downstream (e.g. aluminum industry) to non-European countries.

Gracias.
Gràcies.
Thanks.
Danke.

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