FLORENCE SCHOOL OF REGULATION

ROBERT SCHUMAN CENTRE

The EU internal energy market

Online training as part of the EU Support for Sustainable Energy Connectivity in Central Asia Project

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www.eui.eu

Poll 1 – Опрос 1

What do you think is the ***biggest challenge*** for the ***energy sector*** today?

a. Reducing greenhouse gas emissions
b. Ensuring energy security (reliable supply)
c. Keeping energy prices affordable for everyone
d. Transitioning to new energy technologies

Что, по Вашему мнению, является ***самой большой проблемой*** для ***энергетического сектора*** сегодня?

a. Сокращение выбросов парниковых газов
b. Обеспечение энергетической безопасности (надежные поставки)
c. Сохранение цен на энергию доступными для всех
d. Переход на новые энергетические технологии

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Outline

- **Energy Markets in the EU:** Structure and liberalisation

- **Electricity Market in the EU**: Integration, competition, and infrastructure challenges.

- **Gas Market in the EU**: Infrastructure, liberalization, regulation and decarbonization.

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Energy Market in the EU: Structure and Liberalization

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The electricity sector

Generation





Transmission

Distribution


Supply





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The gas sector

Exploration and Production


Transmission


Distribution

Supply




Poll 2 – Опрос 2

How do you see ***competition in the energy sector***?

a. It is beneficial, as it reduces prices and promote innovation
b. It is beneficial, but the benefits depend on the size and structure of the sector
c. It not necessarily beneficial, as some general objectives (e.g. security of supply) are more difficult to pursue
d. It is not necessarily beneficial, as it requires more regulation
e. Prefer not to say

Как вы видите ***конкуренцию в энергетическом секторе***?

a. Она полезна, так как снижает цены и способствует инновациям
b. Она полезна, но выгоды зависят от размера и структуры сектора
c. Она не обязательно полезна, так как некоторые общие цели (например, безопасность поставок) сложнее достичь
d. Она не обязательно полезна, так как требует большего регулирования
e. Предпочитаю не отвечать

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Competition

- Competition is the general rule in a modern economy
- Competition is expected to
  - promote efficiency
  - ensure prices in line with costs
  - stimulate innovation (new products & processes)
- The liberalisation of the energy sector in the EU has aimed at introducing competition whenever possible
- However, some activities are natural monopolies and therefore need to be regulated.

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Competition and regulation in the energy sector

Activities in competition

- Gas exploration, production
- Electricity generation
- Commercial activities (supply)

Competition does not happen easily:

- repeal of any legal monopoly (liberalisation) is fundamental, but only a pre-requisite
- conditions for competition are necessary

Monopolistic activities

- Networks are "***essential facilities***", i.e. infrastructures which are necessary to competitors for serving their customers
- Networks are often a "***natural monopoly***":
  - cannot be (economically) replicated because of decreasing average costs
  - consequently one producer is socially more efficient than many … for the relevant amount of demand
- Monopolistic activities needs to be regulated

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Competition and regulation in the electricity sector

Activity in Competition

Generation





Regulated Activities

Transmission

Distribution


Activity in Competition

Supply





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Competition and regulation in the gas sector

Activity in Competition

Exploration and Production


Regulated Activities

Transmission


Distribution

Activity in Competition

Supply




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The liberalisation of the energy sector

- The liberalisation of the energy sector, to introduce competition wherever possible, requires:
  - Unbundling between competitive and monopoly activities
    - to remove the conflict of interest between competitive and monopoly (network) activities:
      - Possible cross-subsidies in tariff setting
      - Possible discrimination in access conditions
      - Possible distortions in network development
  - Third–party access conditions to the networks
- Transition to competition implies political choices, overcoming opposition

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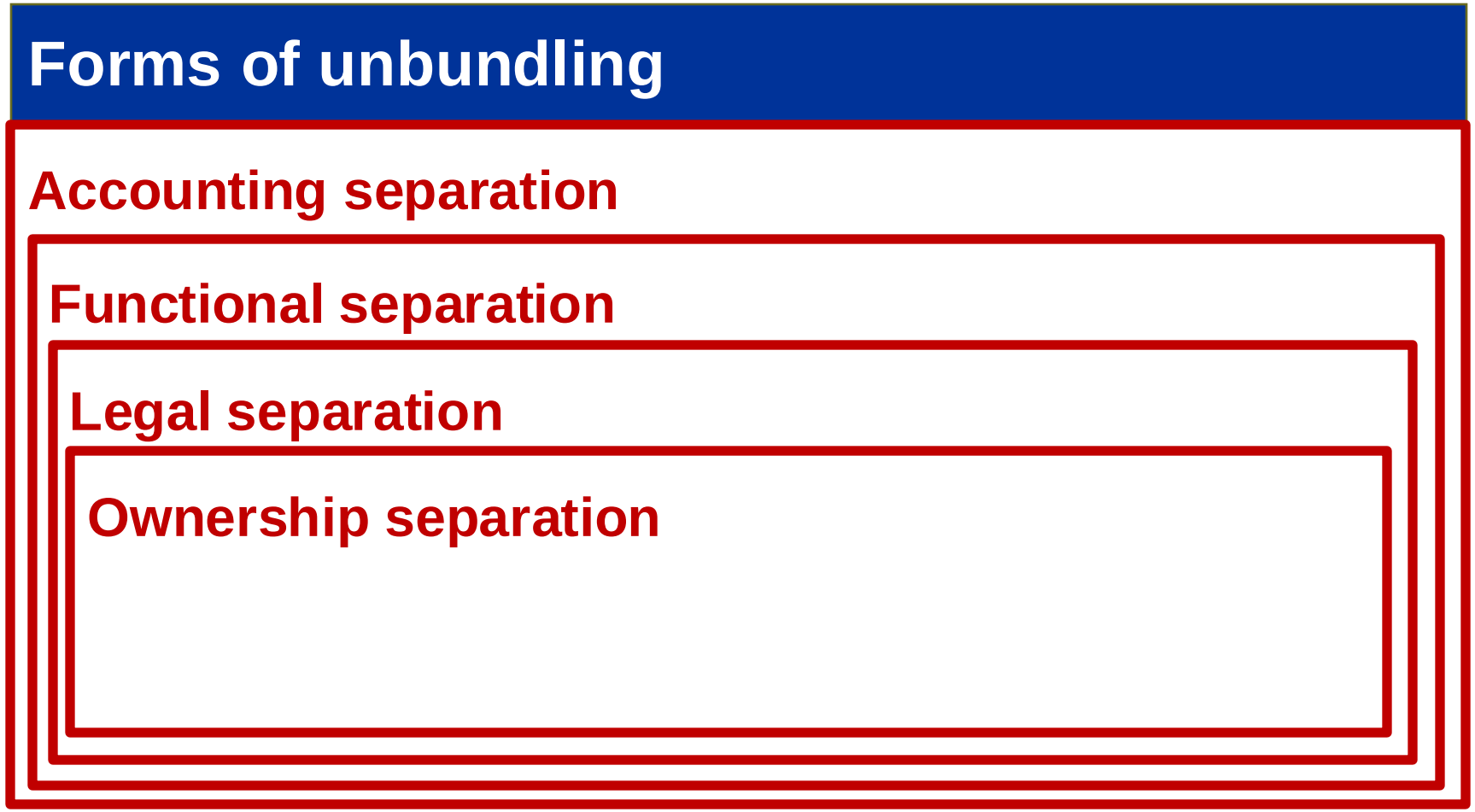
Unbundling in the energy sector (1)



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Unbundling in the energy sector (2)

Accounting separation

- Requires separate internal accounts for each of the activities of the same undertaking, in particular separate accounts for regulated and non-regulated activities
- MAIN AIM: avoiding cross-subsidisation of the competitive activities by the regulated activities of the same undertaking, by facilitating proper tariff setting for the regulated activities
- MAIN CHALLENGE: allocation of joint and common costs, setting of internal transfer values

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Unbundling in the energy sector (3)

Functional separation (managerial and decision-making)

- Requires separate management and decision-making of the different activities of the same undertaking, in particular separate management and decision-making for regulated (operation, maintenance and development of the network) and non-regulated activities
- MAIN AIM: avoiding that the management and operation of regulated activities favour the competitive activities of the same undertaking
- MAIN CHALLENGE: independence of management and decision-making within the same legal entity. “Chinese walls”

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Unbundling in the energy sector (4)

Legal separation

- Requires separate legal entities operating the regulated and non-regulated activities
- MAIN AIM: making the relationship between the regulated and non-regulated activities of the same undertaking more transparent, thus more easily avoiding that the management and operation of regulated activities favour the competitive activities of the same undertaking
- MAIN CHALLENGE: independence of management and decision-making within the same group. “Chinese walls”

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Unbundling in the energy sector (5)

Ownership separation

- Requires regulated and competitive activities to be operated by undertakings with separate ownership
- MAIN AIM: removing conflicts of interest
- MAIN CHALLENGE: requires asset divestment by a vertically-integrated undertaking

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Poll 3 – Опрос 3

Which of these is an example of unbundling in the energy sector?

a. Separating the management of energy generation and transmission within the same company
b. Allowing one company to both generate and distribute energy freely
c. Charging customers different prices based on their location
d. Reducing the price of energy through government subsidies

Что из этого является примером разделения в энергетическом секторе?

a. Разделение управления производством и передачей энергии в рамках одной компании
b. Разрешение одной компании и производить и распределять свободно энергию
c. Взимание с клиентов разных цен в зависимости от их местоположения
d. Снижение цен на энергию за счет государственных субсидий

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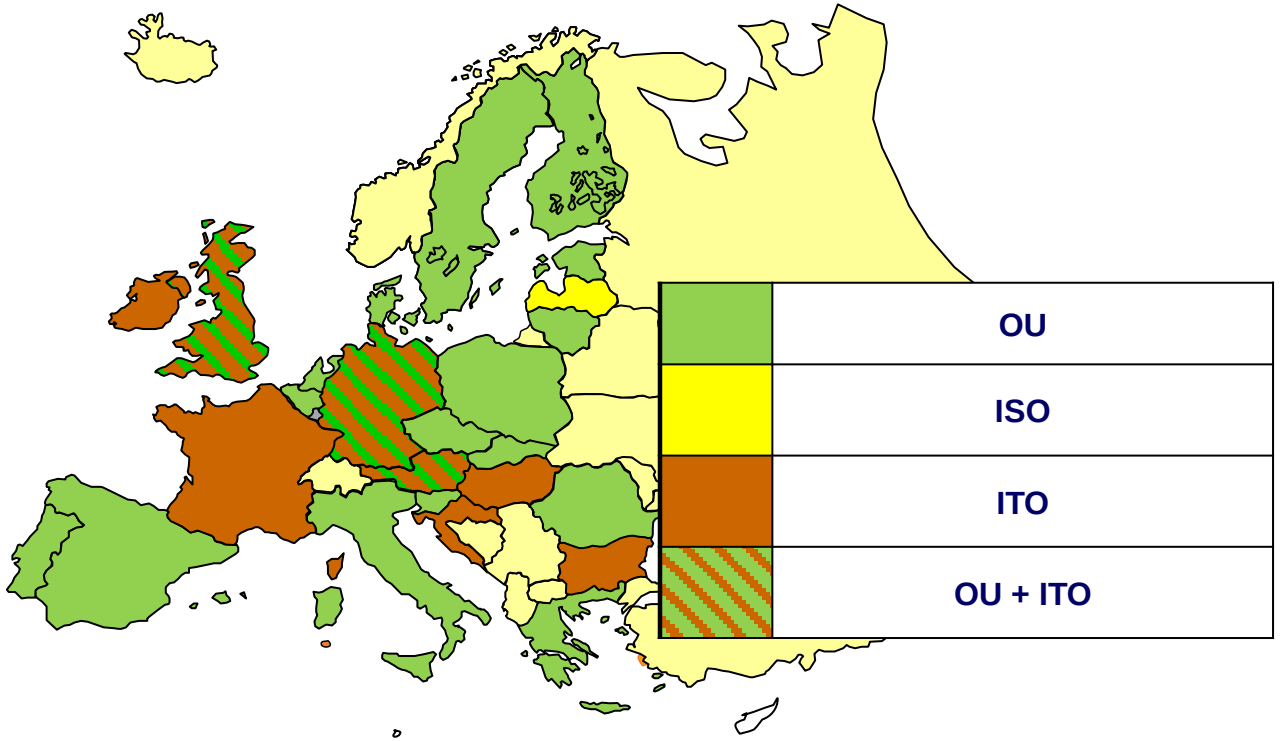
The unbundling of electricity transmission in the EU



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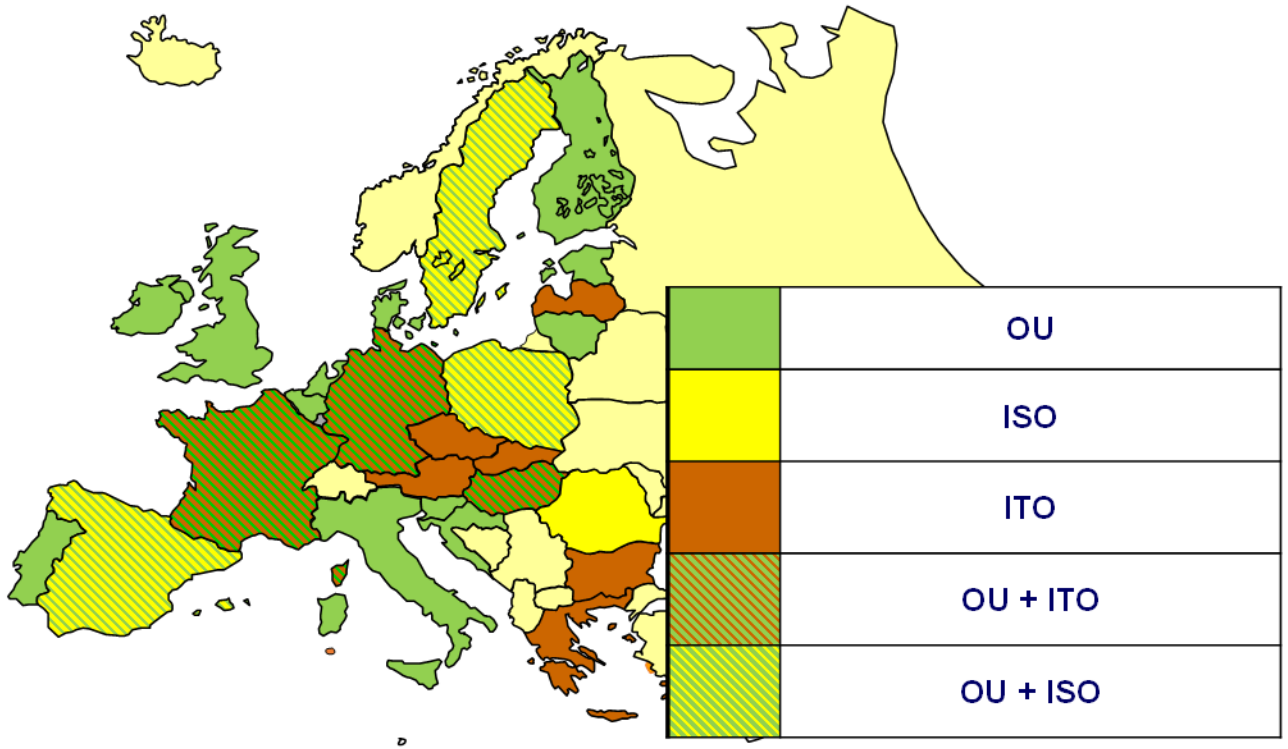
The unbundling of gas transmission in the EU



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Electricity Market in the EU: Integration and Coupling

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The Electricity Target Model

… for the forward, day-ahead, intraday and balancing timeframes

Capacity Calculation	**OPTIMAL BIDDING ZONES + FLOW-BASED to optimise the use of infrastructure**
Forward	**SINGLE EU RULES AND ALLOCATION PLATFORM to allocate transmission rights**
Day-Ahead	**SINGLE EU-WIDE (AUCTION-BASED) PRICE COUPLING to optimise XB capacity use**
Intraday	**SINGLE EU-WIDE (CONTINUOUS) CROSS-BORDER TRADING with (three) auctions**
Balancing	**SINGLE EU COMMON MERIT ORDER LIST for all balancing energy products**

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Electricity Trading

- Electricity is traded over different timeframes with respect to the time of delivery

From several-year ahead to week-ahead

Main reference market, run the day before delivery

"Adjustment" market run after the day-ahead market and until "gate closure"

- Electricity may be traded:
  - on Organised Market Places:
    - auction-based trading (e.g. Day-ahead markets)
    - continuous trading
  - bilaterally, over the counter (OTC)

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Congestion

- Congestion occurs when the available transmission capacity is not sufficient to satisfy the demand for transmission services (e.g. from commercial transactions)
- Therefore, congestion depends:
  - on the demand for transmission services
  - on the available transmission capacity
- Liberalisation has increased and made the demand for transmission services more explicit

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Approaches to congestion management

- **Ex-post congestion management**
  - Redispatching
  - Counter-trading
- **Ex-ante congestion management**
  - Explicit allocation of (physical) transmission capacity rights (PTRs)
  - Implicit allocation of transmission rights (and energy positions):
    - Implicit Auction
    - Market Splitting
    - Market Coupling (market splitting between different PXs)

    Possibly with an explicit allocation of (long-term) Financial Transmission Rights (FTRs)

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The geographical structure of the electricity market (1)

- How close should the geographical structure of the market reflect the physics of the network?
- Nodal vs. Zonal market configuration

Nodal market configuration

- Electricity exchanges between different nodes are limited by the available transmission capacity
- Exchanges between nodes compete for the available transmission capacity
- There might be a different price in each node

Zonal market configuration

- Electricity exchanges between different zones are limited by the available transmission capacity
- Exchanges between zones compete for the available transmission capacity
- Exchanges between nodes within the same zone are not constrained
- Different zones might have different prices

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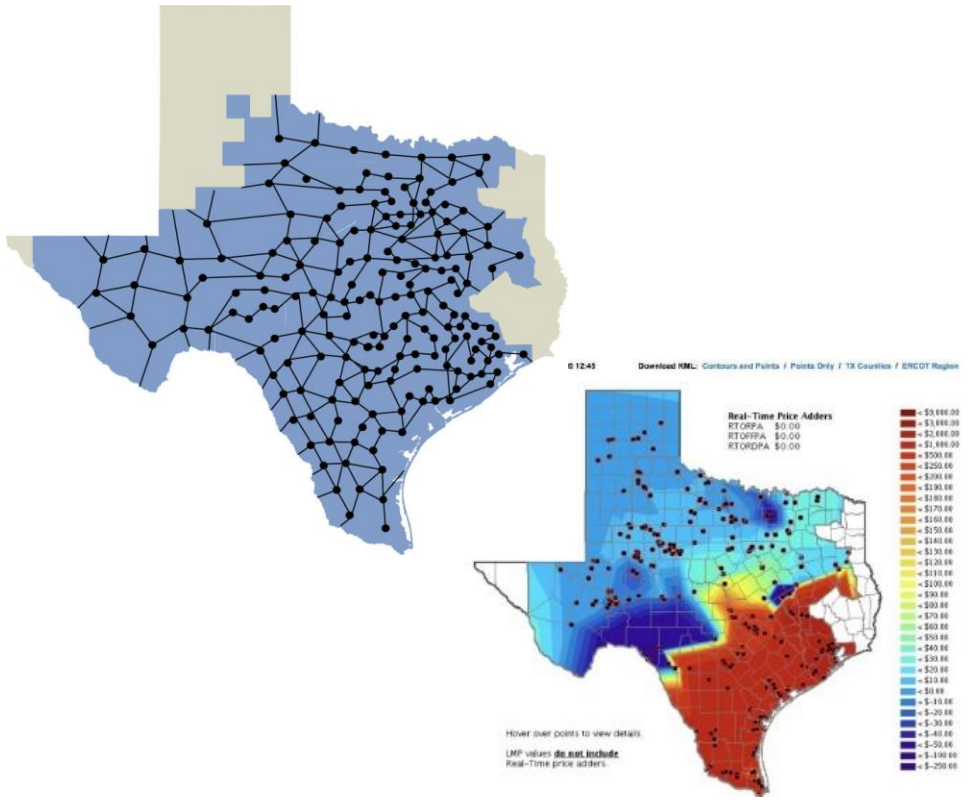
The geographical structure of the electricity market (2)

Texas (ERCOT)



The European Internal Electricity Market

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Nodal vs zonal market configuration

Nodal market configuration

- Closely reflects network reality
- All cross-nodal exchanges subject to capacity availability
- Price differences between nodes may create risks for trading
- More complex set of hedging instruments

Zonal market configuration

- Facilitates trading among a set of nodes (zone)
- Potentially requires costly remedial actions if the capacity of the network does not support the demand for intra-zonal exchanges
- Promotes (apparent) liquidity (true liquidity only if supported by the network)

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Regional market integration in Europe

- The European Union has developed a sophisticated regional electricity market integration approach based on 'market coupling'

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Market coupling in the day-ahead and intraday timeframes

- Different approaches to market coupling depending on the trading method
- Auction-based trading – allows the use of market-based implicit allocation of cross-border capacity
- Continuous trading – usually associated with first-come-first-served capacity allocation (or, conceivably, explicit allocation)
- Day-ahead has always been auction based. Intraday has been historically based on continuous trading, with three daily auctions being introduced

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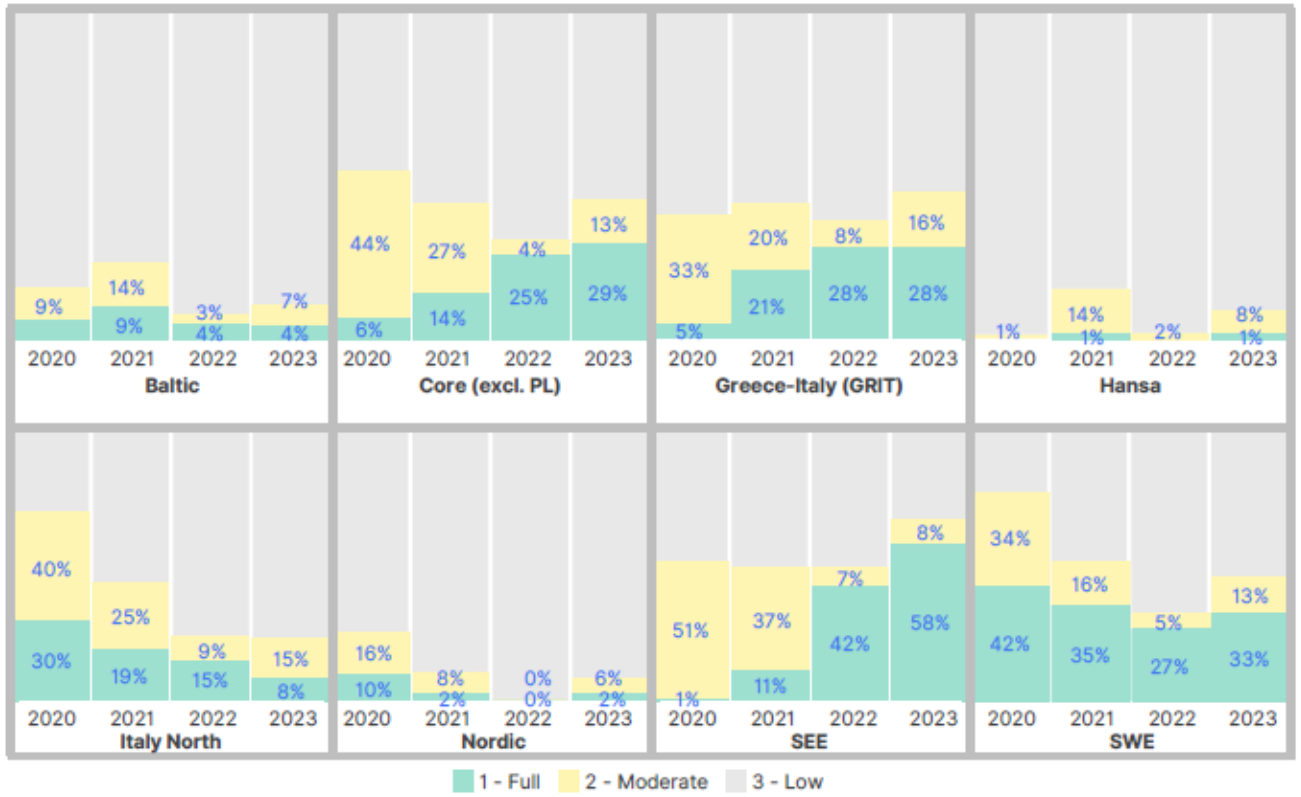
Price convergence in the EU electricity market is increasing

- Price convergence across the EU is generally increasing, even though full price convergence should not be the objective
- Price convergence depends on:
  - the difference in generation mixes between bidding zones
  - the level of transmission capacity between bidding zones made available for cross-zonal trade
  - the way in which this transmission capacity is allocated to the market (e.g. by implicit market coupling in intraday and day-ahead markets)

Day-ahead price convergence in the EU per capacity calculation region 2020-2023 (% of hours)



Source: ACER, Transmission capacities for cross-zonal trade of electricity and congestion management in the EU, 2024 Market Monitoring Report, 3 July 2024

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Electricity Market in the EU: Infrastructure challenges

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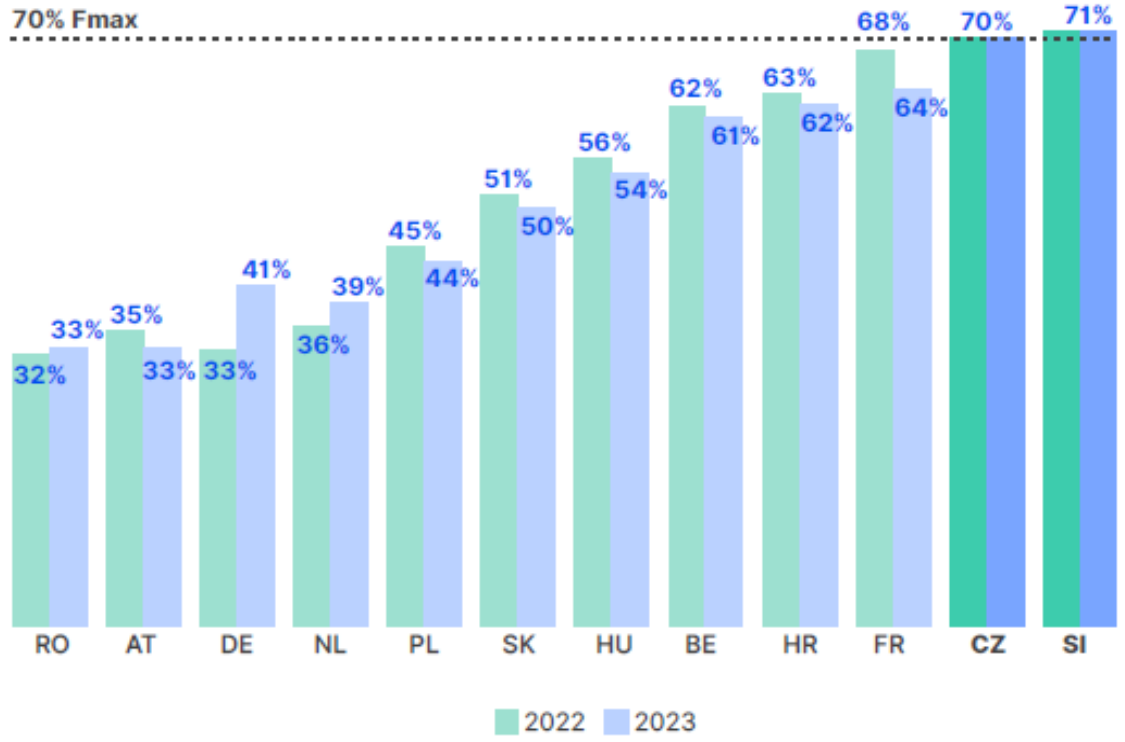
The EU electricity network is increasingly congested

- The EU electricity network is increasingly congested.
- The Clean Energy Package set a 70% target for the share of cross-border capacity to be made available to the market (by 2025, if action plans and derogations are used)
- In 2023, only two Member States in the Core region met the 70% target

Average minimum hourly margin available for cross-zonal trade in the Core capacity calculation region per Member State June-December 2022 and 2023 (% of Fmax)



Source: ACER, Transmission capacities for cross-zonal trade of electricity and congestion management in the EU, 2024 Market Monitoring Report, 3 July 2024

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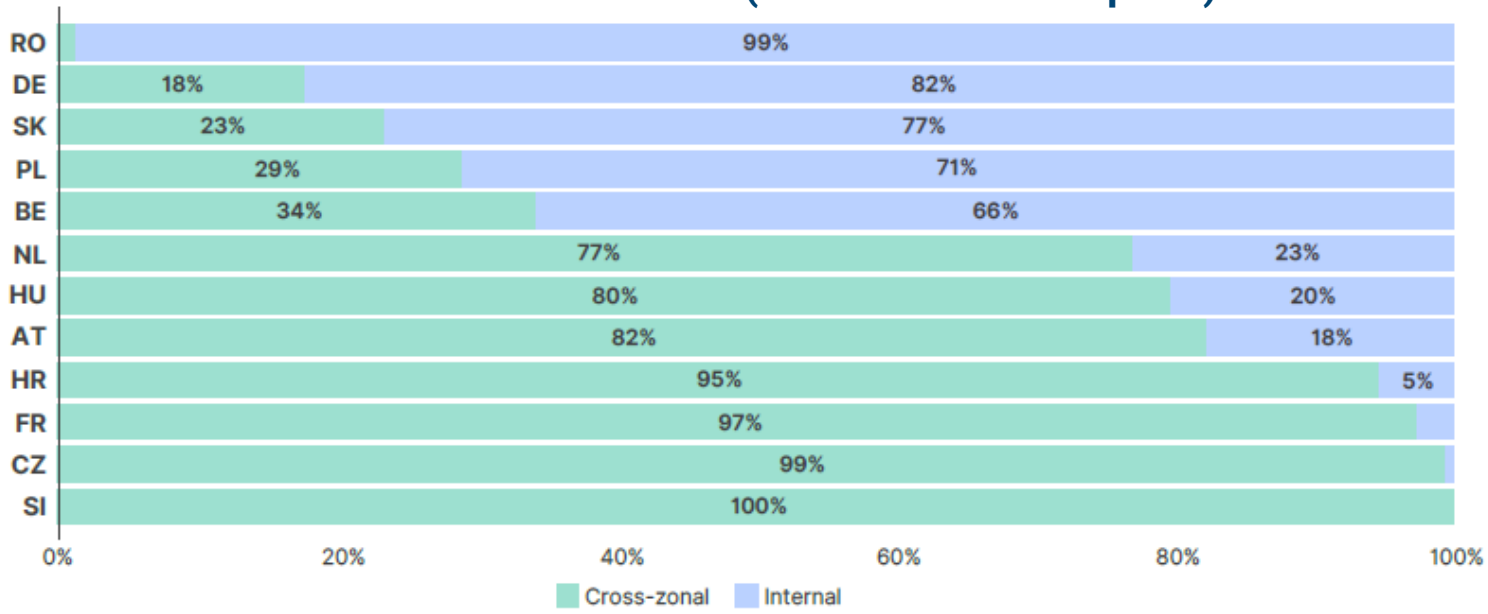
Cross-zonal congestion is often not on the zonal borders

- Cross-border capacity is often limited by critical network elements internal to the bidding zones
- Approaches to congestion within bidding zones:
  - Remedial actions (redispatching)
  - Bidding zone reconfiguration (splitting)
  - Expansion of transmission capacity within the bidding zone
- A bidding-zone review is underway, but severely delayed!!

Distribution of the sum of shadow prices in all active constraints in Core flow-based market coupling, attributed to internal or cross-zonal network elements, in each Member State in the Core region - 9 June 2022 to 31 December 2022 and 2023 (% of total shadow price)



Source: ACER, Transmission capacities for cross-zonal trade of electricity and congestion management in the EU, 2024 Market Monitoring Report, 3 July 2024

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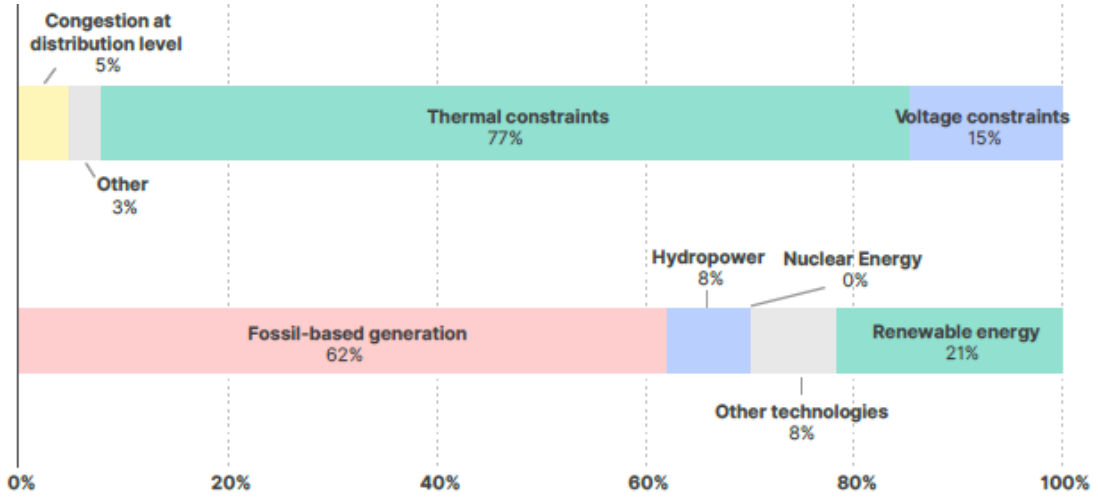
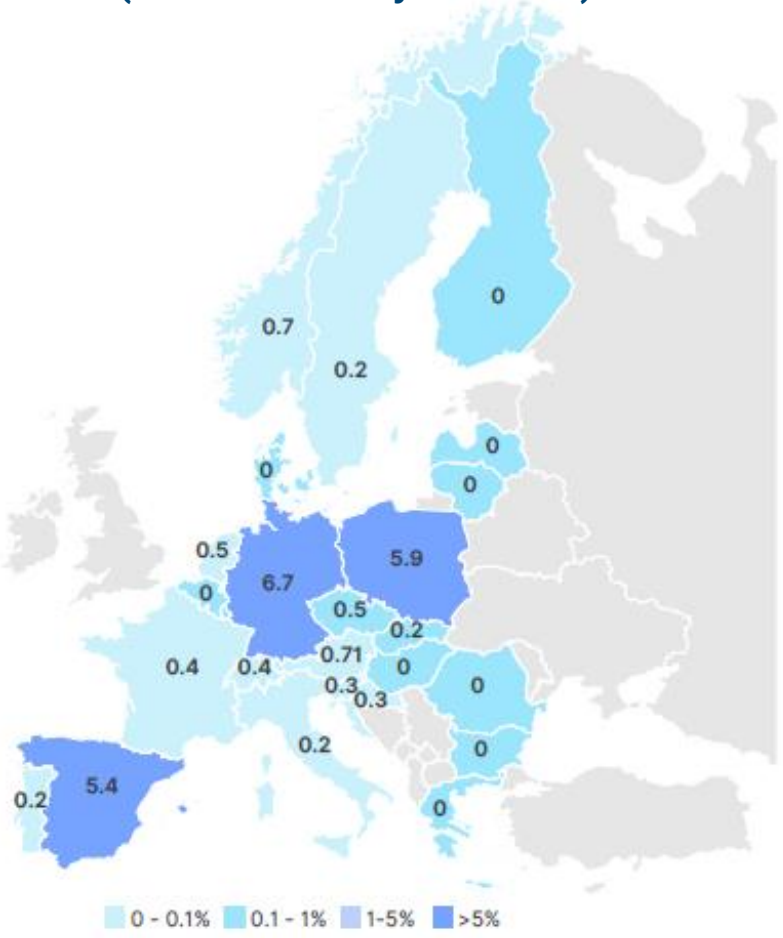
Intra-zonal congestion leads to increasing remedial action costs

- Costly remedial actions in 2023 in the EU:
  - 57.28 TWh (+14.45% wrt 2022)
  - € 4.28 bn (-21.12% wrt 2022)

Distribution of total upward and downward redispatching volume in the EU, by underlying cause (top) and technology involved (bottom) – 2023 (% of MWh)



Volume of remedial actions activated in Member States as a percentage of electricity demand – 2023 (% of electricity demand)



Source: ACER, Transmission capacities for cross-zonal trade of electricity and congestion management in the EU, 2024 Market Monitoring Report, 3 July 2024

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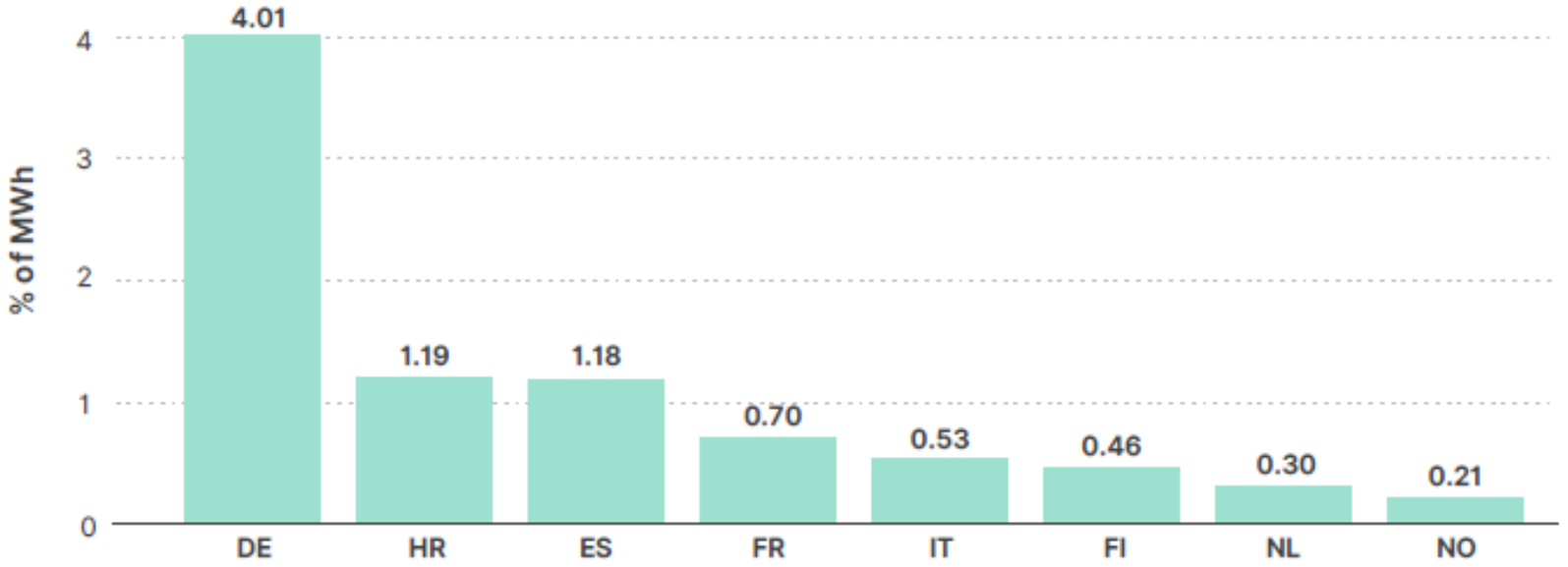
Impact of congestion on renewable-based generation

- Grid congestion also lead to curtailment of renewable-based generation

Curtailment of energy generated by renewable technologies as a percentage of total renewable energy generation for each Member State – 2023 (% of renewable electricity generation)



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Exercise 4 – Упражнение 4

What comes to your mind when you think of gas markets?

Что приходит вам на ум, когда вы думаете о газовых рынках?

Write it in the chat, please ☺

Напишите в чате, пожалуйста ☺

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Gas Market in the EU: Infrastructure and Supply Chain

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The EU gas market - infrastructure

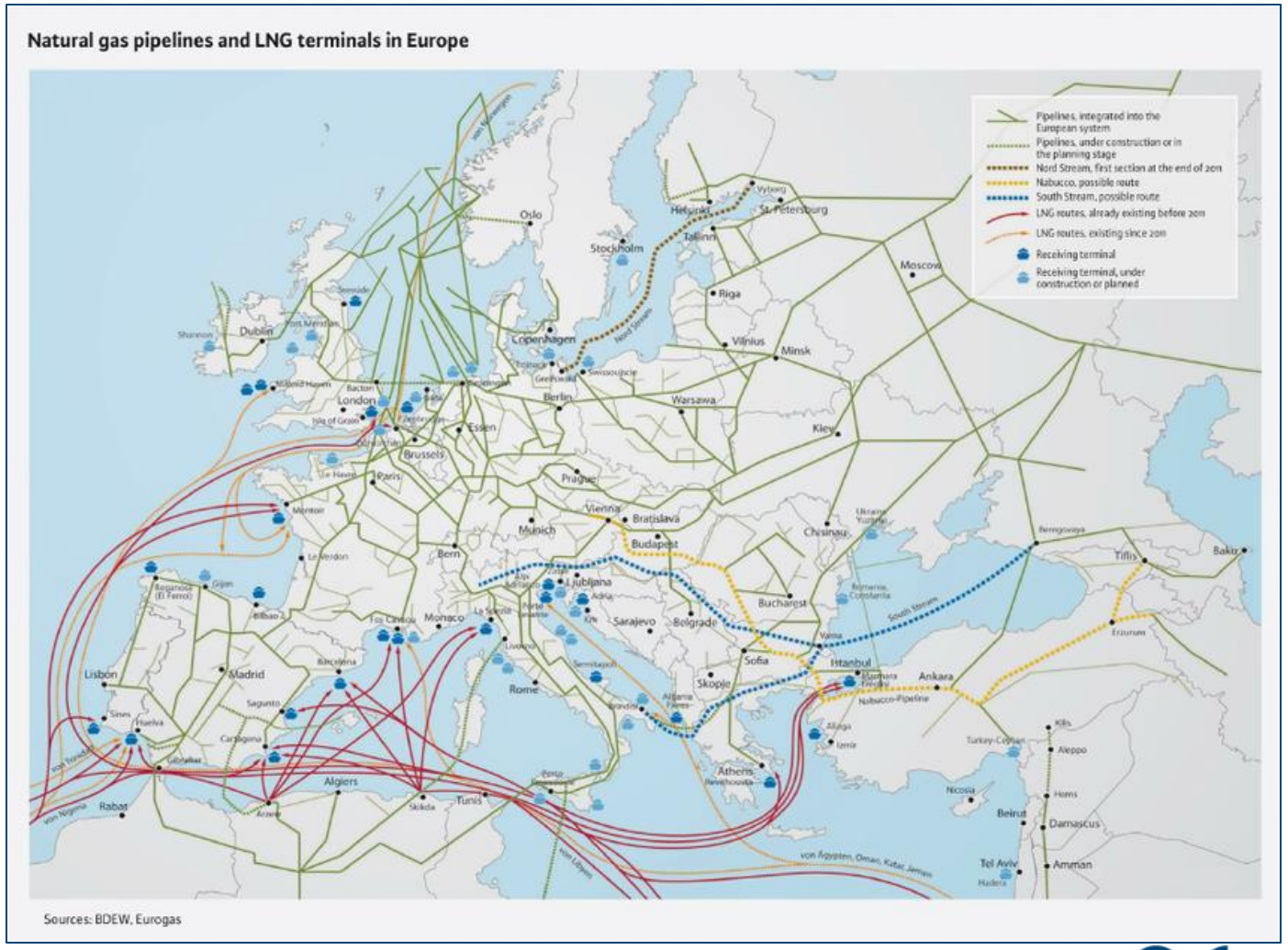
EU annual gas consumption: 300 bcm

Share of the different sources of gas supply

Pipeline imports: 49%

Domestic production: 10%

LNG imports: 41%



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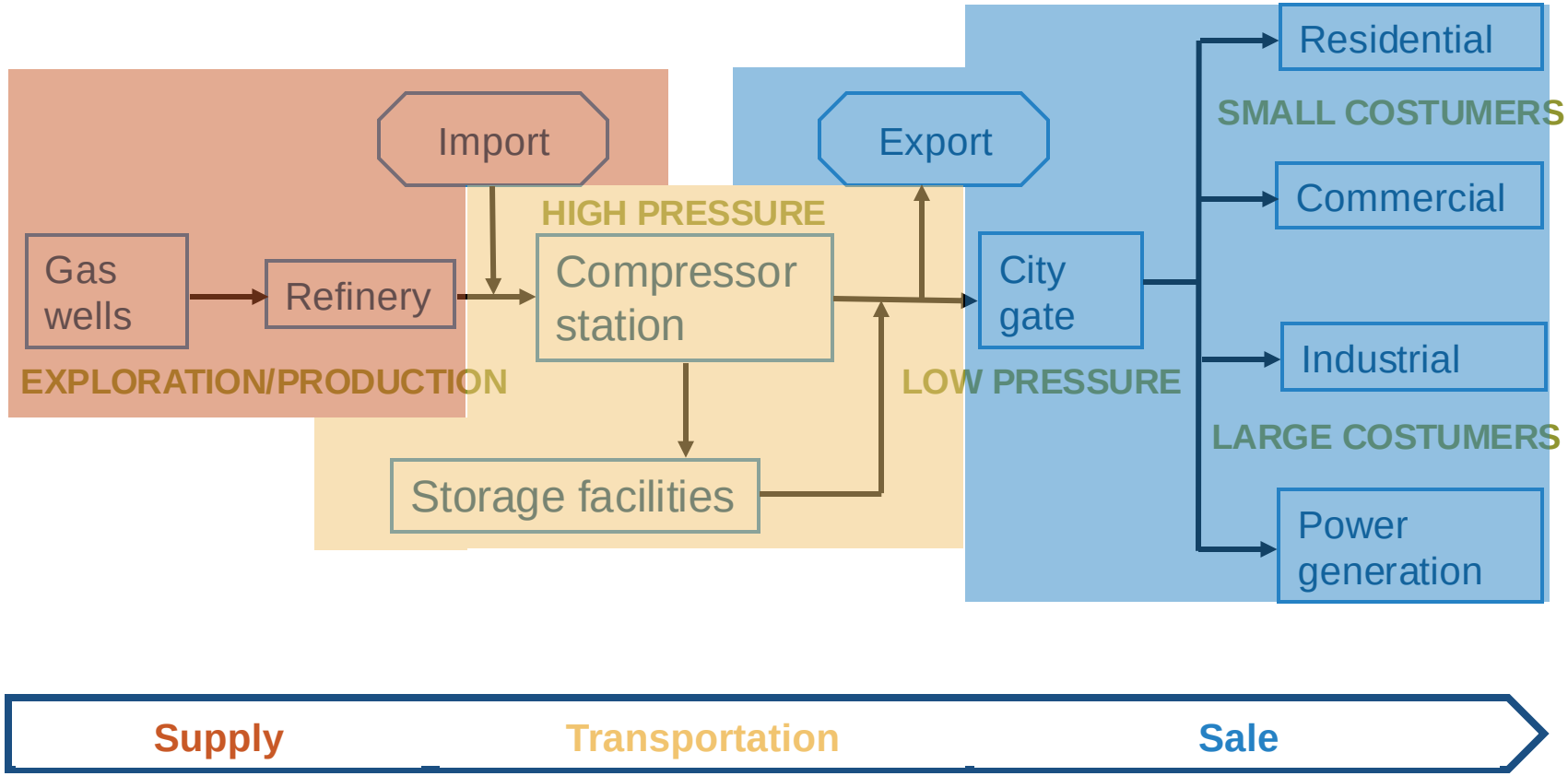
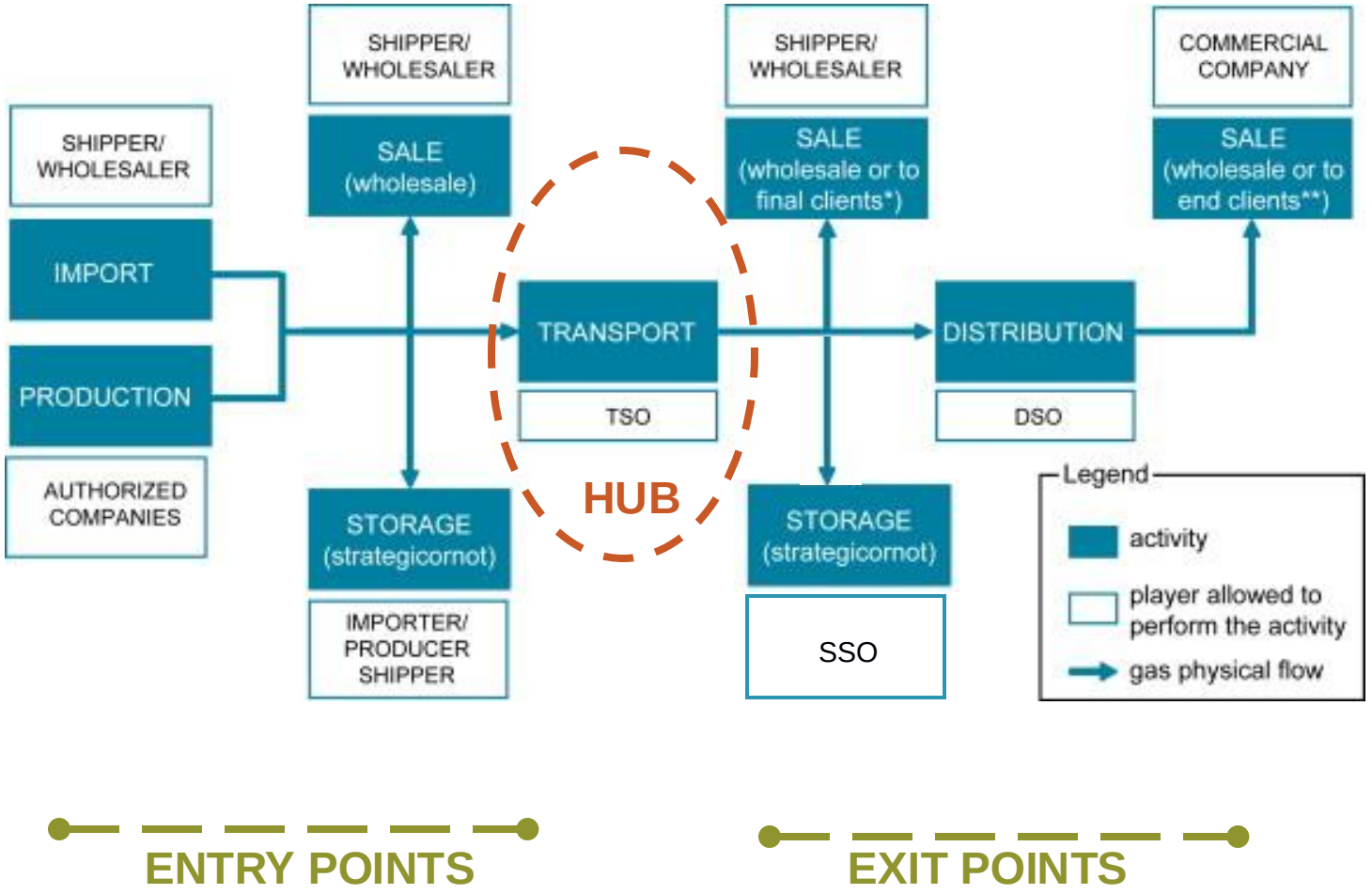
Schematic view of a gas network



(Source: Author's elaboration on Farahani et al., 2011)

Commercial vs. Physical gas flows



(Source: Author's elaboration on Dorigoni et al., 2009)

Gas Market in the EU: Liberalization and Regulation

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Poll 5 – Опрос 5

If someone asked you how the gas market works in your country, what would you say?

a. The government controls everything—prices, infrastructure, and supply
b. It is partly open, with some competition but still government oversight
c. It is a free market, with private companies competing like in other sectors
d. Honestly, I am not sure how it works
e. There is no gas market

Если бы кто-то спросил Вас, как работает газовый рынок в Вашей стране, что бы Вы ответили?

a. Правительство контролирует все — цены, инфраструктуру и поставки
b. Он частично открытый, с некоторой конкуренцией, но все же с государственным надзором
c. Это свободный рынок, где частные компании конкурируют, как и в других секторах
d. Честно говоря, я не уверен(а), как он работает
e. У нас нет газового рынка

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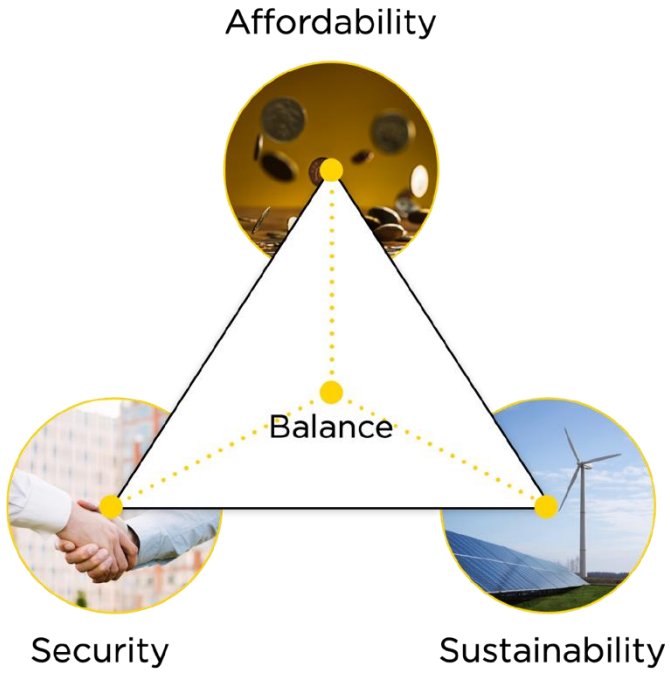
From Policy to Implementation



The three pillars of EU energy policy

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The EU Vision for a Single Energy Market

- **In the 1990s-2000s**

- National champions for electricity and gas
- Vertically integrated companies
- No harmonisation across borders
- Barriers to entry
- Non-transparency
- Limited cross-border trade
- Different measurement units

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The Transition to a Liberalised Gas Market

Old World	Transition	Mature Market
• Vertically integrated monopolies • Oil indexation • Long-term contracts	• Changing industry structure (via unbundling) • Evolving regulation	• Separation of generation from transmission assets • Transparent gas index measures value • Gas-on-gas indexation

Price indexation: oil indexation significantly reduced between 2005 and 2022:

- 60% →26% in pipeline gas
- 80%→53% in LNG

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Evolution of market liberalization

POLICY		
First Gas Directive 98/30/EC [31]	**Second Gas Directive** 2003/55/EC [32] **Third Energy Package** (Directive 73/2009; Regulations 713 and 715/2009) [33–35]	**Gas Regulation** 994/2010 **Infrastructure Package 2011 Energy Security/Clean Energy Package** 2016
The 1990s	**The 2000s**	**The 2010s**
Completion of the **internal gas market** and creation of an **internal competition.**	**Infrastructure and regulation** to ensuring security of supply and creating a self-standing and **competitive internal market.**	Towards a more **"converging energy security supra-national society":** cooperation, coordination, solidarity.

IMLPICATIONS

The 1990s

- Gradual market opening within MS
- Regulated or negotiated Third Party Access
- Separation process between transmission and supply.

The 2000s

- Energy company unbundling
- Central role of consumers
- Operators and regulators (e.g.: ACER) to monitor transparency, discrimination, levels of competition and tariffs.

The 2010s

- Common rules, harmonization and liquidity of the internal natural gas market
- Regulations dealing with infrastructures and Third Party Access and transparency obligation
- Creation of European Network of Transmission System Operators (electricity (E) and natural gas (G))
- Requirements to collectively cope with disruptions of natural gas supply both internally and externally

Source: Based on ***Sesini et al (2022) "Solidarity measures: Assessment of strategic gas storage on EU regional risk groups natural gas supply resilience"*** https://doi.org/10.1016/j.apenergy.2021.118356

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The EU Third Energy Package (2009)

The main principles

Framework	
Market	**Institutional**
Network Codes	Independence of NRAs
Unbundling	New Organizations: ACER, ENTSO-E and ENTSO-G
Third Party Access (TPA)	
Market Mechanisms	

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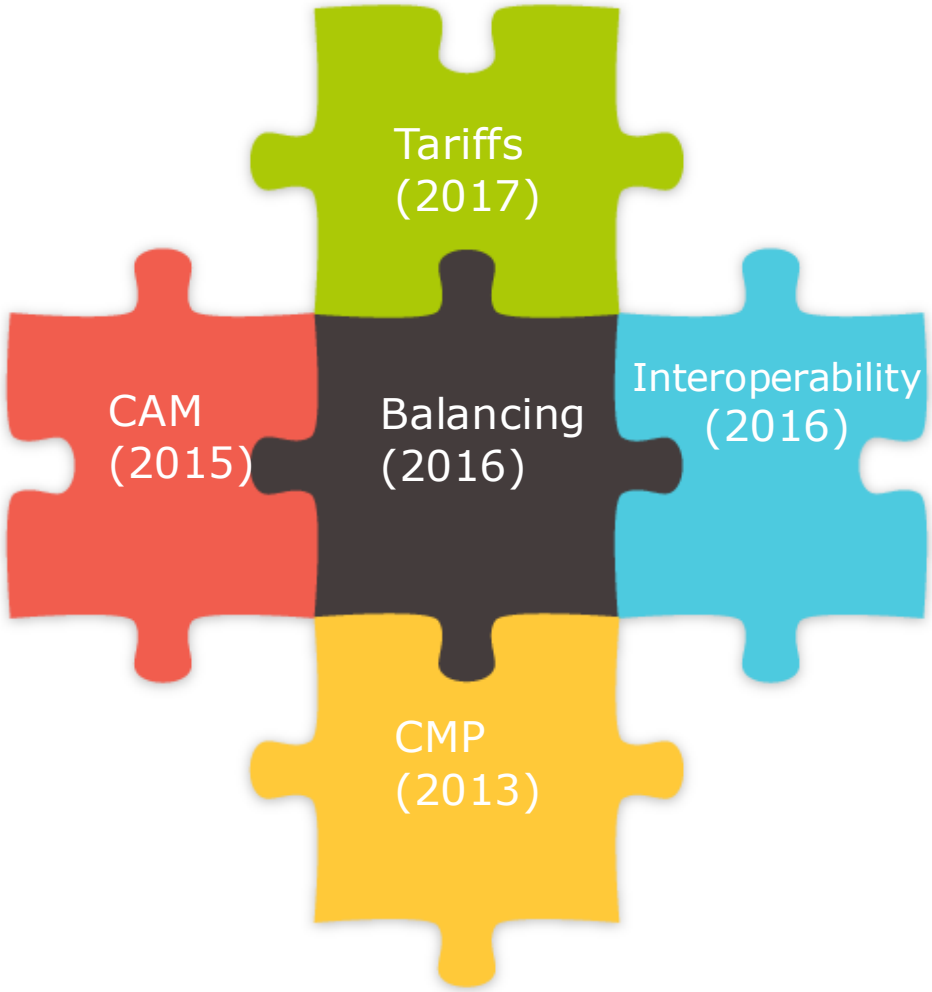
The gas Network Codes and Guidelines

The Network Codes provide the details of market regulation and eliminate trade barriers deriving from different national rules



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The Gas Target Model (CEER, 2011)

The rationale: connecting competitive markets

- Market effectiveness via **efficient investments**: wholesale markets are yet emerging, the degree of "connectivity" of gas markets needs improvement
- Concern that some wholesale gas markets are not yet **liquid** and **volumes** traded still relatively small compared to LTCs
- **"Islands"** in Europe which are not connected to the rest of the Union, hence higher SoS risk

Three pillars:

Enabling functioning wholesale markets

Tight connection of markets

Enabling secure supply patterns

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The Gas Target Model 2

(ACER, 2014)

The integration and cross border cooperation in gas wholesale markets have improved with the implementation of the NCs and the GTM. However, uncertainties remain regarding future demand and supply patterns

Further analysis of supply and demand changes, along with an examination of gas wholesale markets and hub trading, is still needed to identify effective measures for creating well-functioning wholesale markets that benefit all gas customers

Key issues:

Hub liquidity

Regional market integration,

Gas-electricity market interactions

Gas use in transport

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Hub-centric markets

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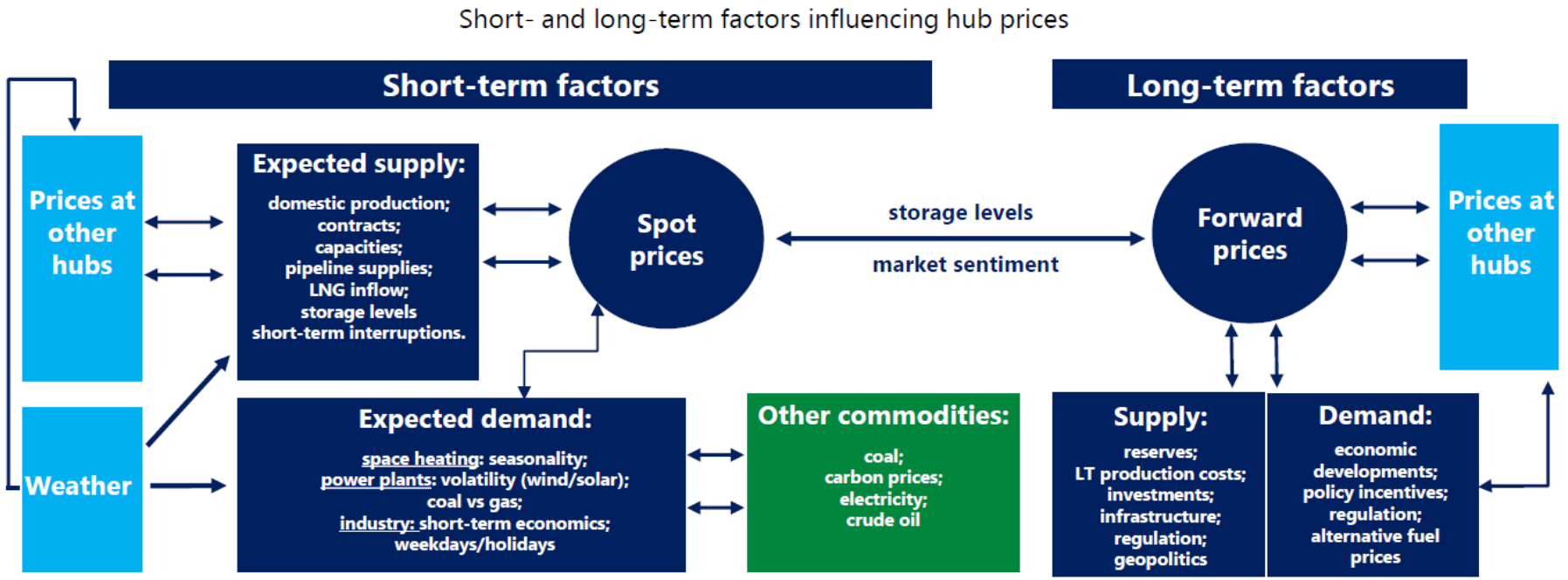
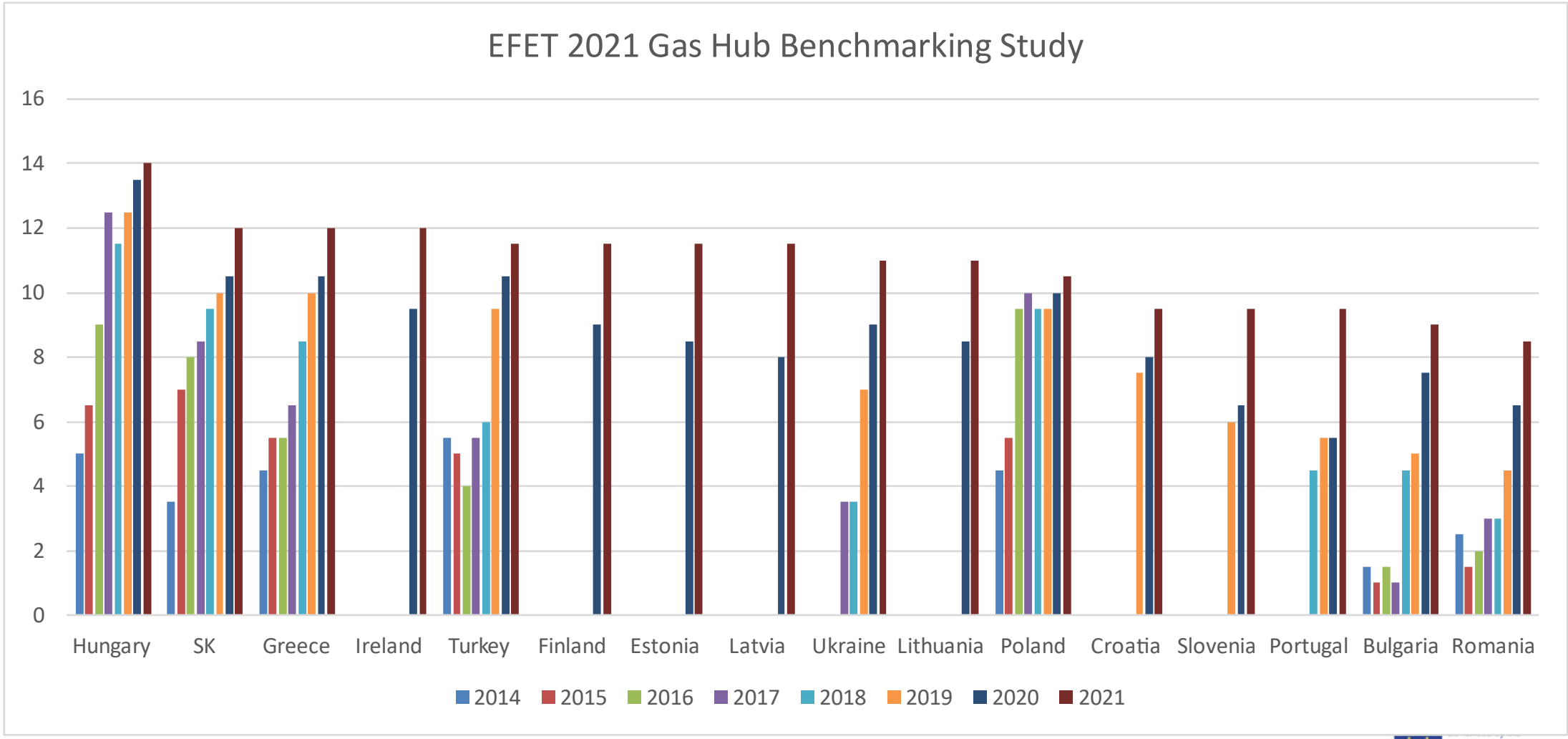
Price formation at hubs



Source: IEA

EU Gas hubs improved performance overtime…



…and tend to price alignment

Figure 3: Gas front month contracts from January to September 2021 – EUR/MWh

Source: ACER based on Reuters

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Poll 6 – Опрос 6

Which of the following best describes the main goal of liberalizing the gas market in the EU?

a. To ensure governments maintain control over prices and supply
b. To foster competition, improve efficiency, and lower prices for consumers
c. To prioritize renewable energy over natural gas infrastructure
d. To create large monopolistic companies that can operate internationally

Что из перечисленного ниже лучше всего описывает основную цель либерализации газового рынка в ЕС?

a. Обеспечить сохранение контроля правительств над ценами и поставками
b. Способствовать развитию конкуренции, повышению эффективности и снижению цен для потребителей
c. Дать приоритет возобновляемым источникам энергии над инфраструктурой природного газа
d. Создать крупные монополистические компании, которые могут работать на международном уровне

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Gas Market in the EU: Decarbonization

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The EU Green Deal

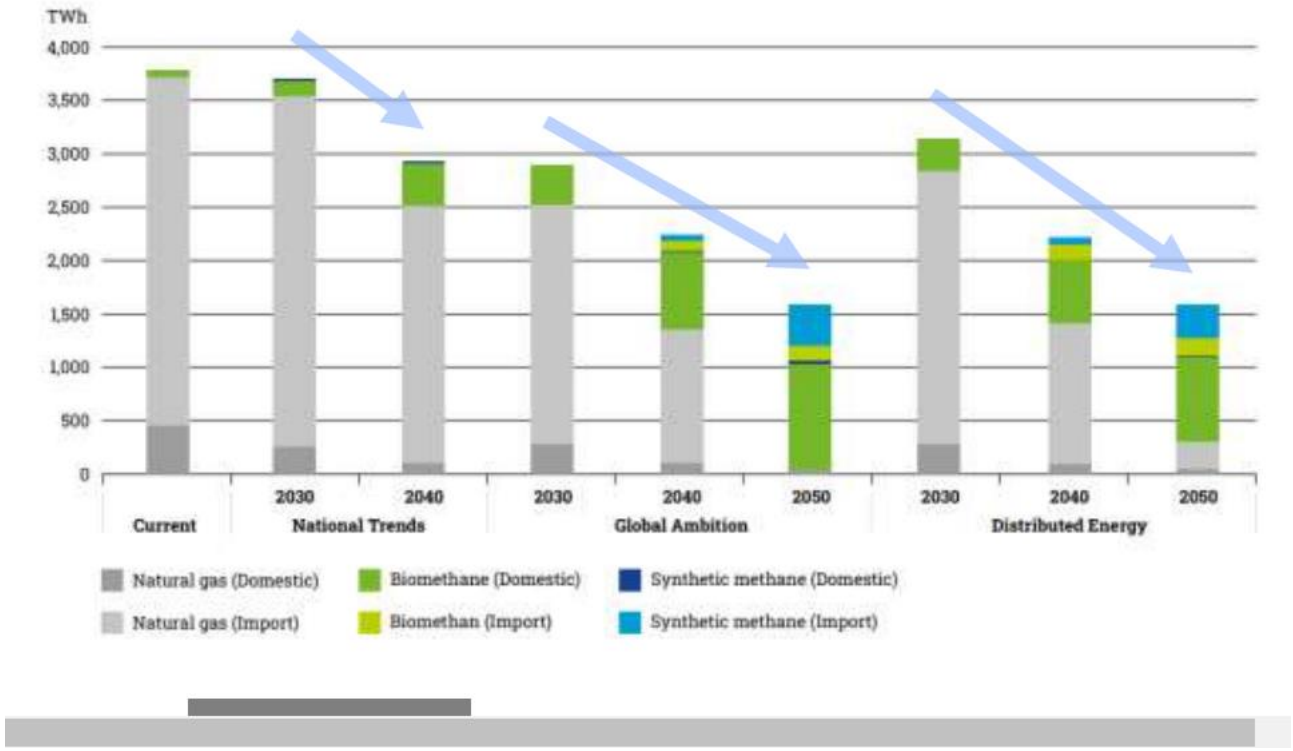
- The European Green Deal sets the target of climate neutrality by 2050.
- EU Green Deal's objectives go beyond climate change or environmental policy as they address decarbonisation of the entire EU economy.

The EU Green Deal Targets

- 55% GHG emissions reduction by 2030
- Carbon neutrality by 2050
- 42.5% share of RES
- 36-39% energy efficiency improvement for final and primary energy consumption wrt BAU

The decarbonisation challenge

Forecasted long-term decline in EU gas demand



Methane supply to EU27
Source: ENTSOG/ENTSO-E TYNDP, 2022 (in ACER 2023)

A new role for gas → support to decarbonisation

- Smaller volumes
- Natural gas as a «back up» (storage, LNG-to-X, etc)
- Clean molecules (Green gas): biogas, biomethane, synthetic methane, Hydrogen

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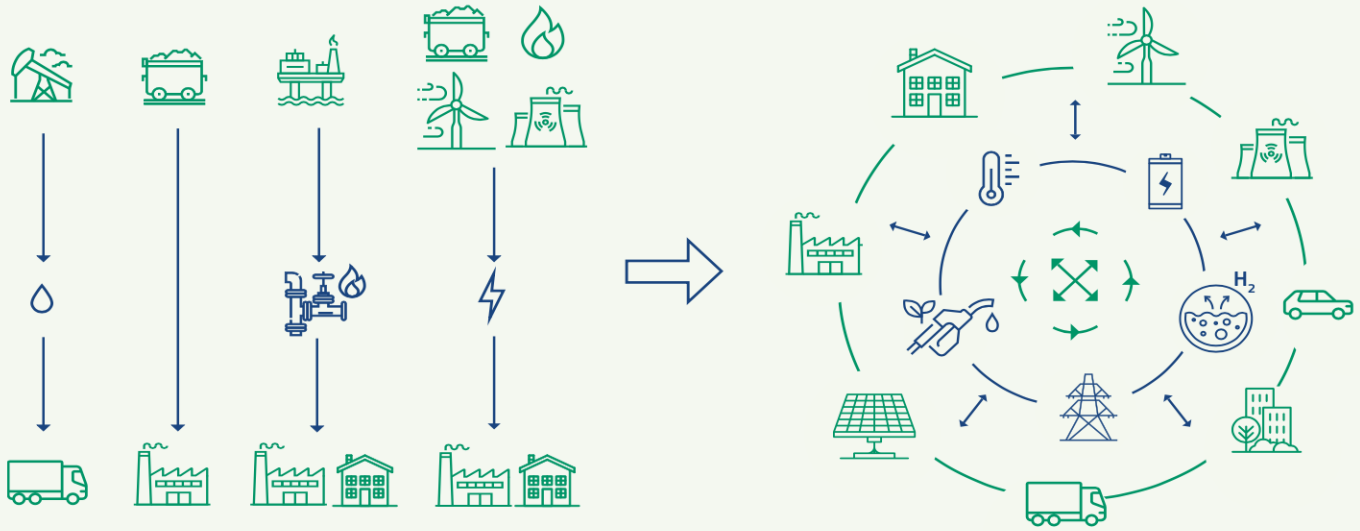
A new paradigm

The energy system today : linear and wasteful flows of energy, in one direction only

Future EU integrated energy system : energy flows between users and producers, reducing wasted resources and money



The six pillars

1. A more circular and efficient energy system
2. Electrification
3. Renewable and low-carbon fuels in hard-to-abate sectors
4. Consumers' empowerment
5. Integrated infrastructure
6. Digitalisation

EU Commission's Strategy for Energy Systems Integration, July 2020

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Clean Molecules

What are they?

•Renewable and Decarbonised Gases: The Clean Alternative to Natural Gas

•Key gases: Biogas, biomethane, synthetic methane, and hydrogen

•These gases can be produced in various ways

•Not "new gases"—biogas and biomethane are already well-established technologies

•Significant momentum and high expectations around renewable and decarbonised gases

•Many questions remain about their large-scale deployment and the development of a market

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REPowerEU: raising ambitions on hydrogen policy

REPOWER EU TRACK	FOCUS	FF55 AMBITION BY 2030	REPOWEREU MEASURE	REPLACED BY THE END OF 2022 (BCM equivalent) estimate	ADDITIONAL TO FF55 BY 2030 (BCM equivalent) estimate
GAS DIVERSIFICATION	NON-RU NATURAL GAS	-	LNG diversification	50*	50
		-	Pipeline import diversification	10	10
	MORE RENEWABLE GAS	17 bcm of biomethane production, saving **17 bcm**	Boost biomethane production to 35bcm by 2030	3.5	18
		5.6 million tonnes of renewable hydrogen, saving **9-18.5 bcm**	Boost hydrogen production and imports to 20mt by 2030	-	25-50
ELECTRIFY EUROPE	HOMES	Energy efficiency measures, saving **38 bcm**	EU-wide energy saving, e.g. by turning down the thermostat for buildings' heating by 1°C, saving 10bcm	14	10
		Counted under overall RES figures below	Solar rooftops front loading – up to 15 TWh within a year	2.5	frontloaded
		30 million newly installed heat	Heat pump roll out front loading by	1.5	frontloaded

The **"Hydrogen Accelerator"**

Scope: replacing 25-50bcm of RU gas

- Production: 20 Mt of Renewable hydrogen by 2030 (instead of 5,6 in FF55), of which 10 to be produced in the EU
- Infrastructure: 'Hydrogen ready', interconnectivity, bottlenecks, full supply chain
- Support: State Aid notifications as priority, IPCEI assessment in 6 weeks, pilot projects such as 'Green Hydrogen Partners', 'Global European Hydrogen Facility' (with the industry)

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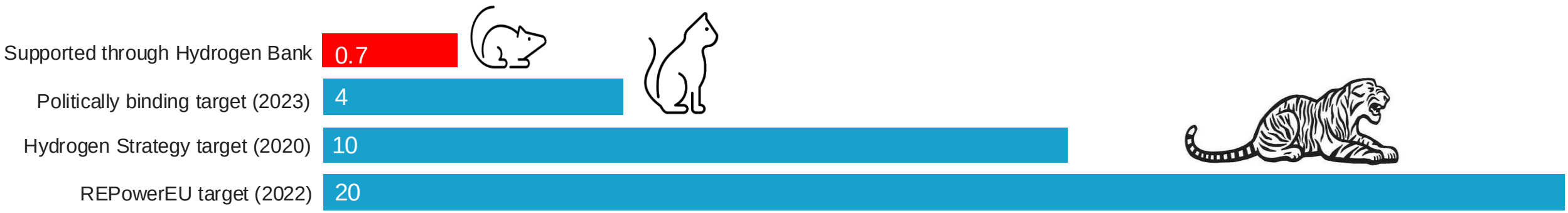
H2 Demand and Supply in targets

- Current clean hydrogen production is essentially zero
- Political vs Policy targets



Author's elaboration based on *"McWilliams, Kneebone, (2024). Lessons from the European Union's inaugural Hydrogen Bank auction, Bruegel"*

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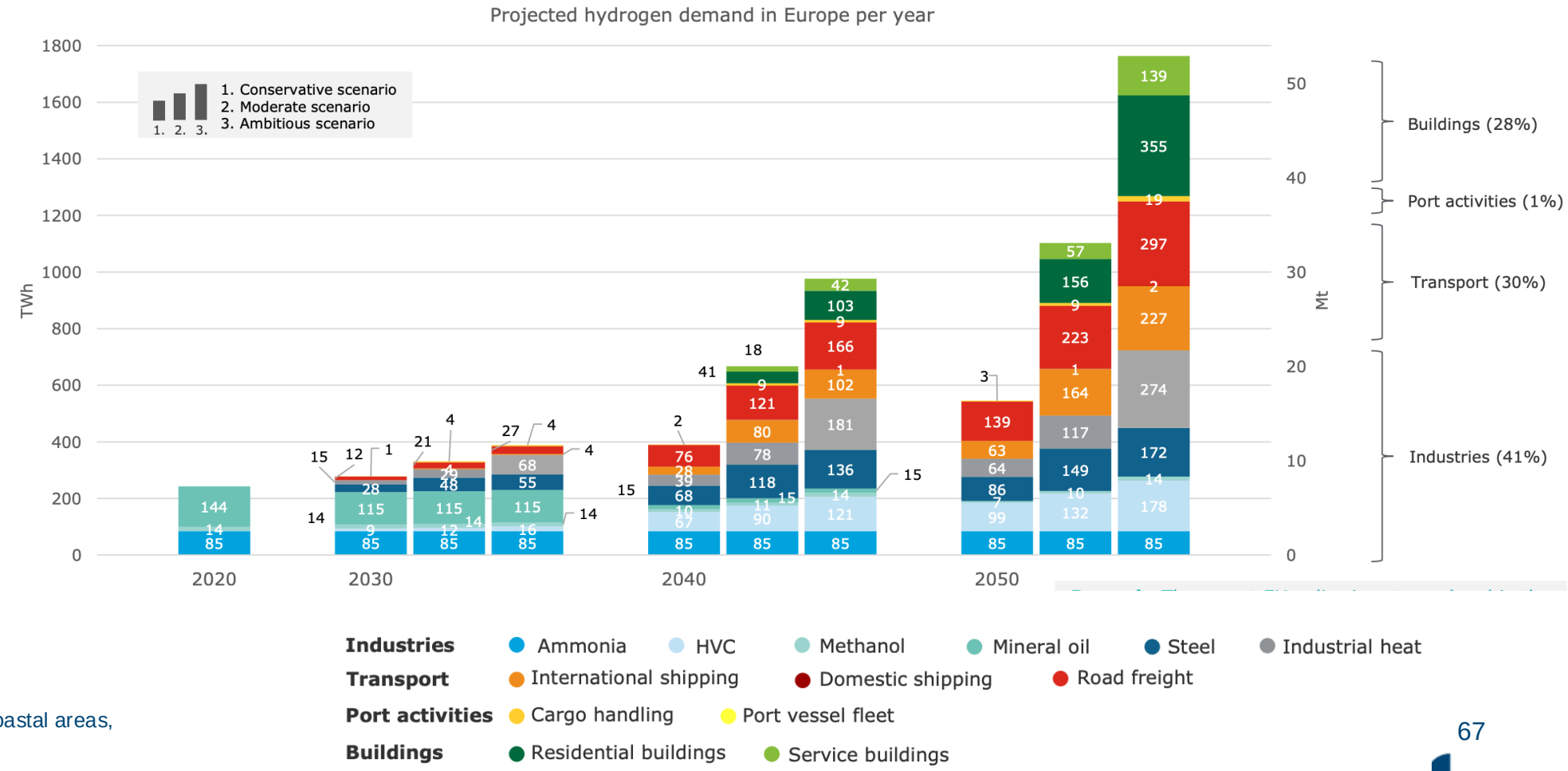
H2 Demand and Supply in numbers

2030 demand
8.5 to 11.7 Mt
(283 TWh - 389 TWh)

2050 demand
16.4 to 53 Mt
(545 TWh - 1,764 TWh)

Global hydrogen demand is ~10x



Study on hydrogen in ports and industrial coastal areas, (Clean Hydrogen Partnerships, 2023)

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Poll 7 – Опрос 7

Imagine you are in charge of your country's energy strategy for the next 20 years. What would you prioritize for the gas sector?

a. Building more pipelines and infrastructure to meet growing demand
b. Partnering with new countries to reduce reliance on current suppliers
c. Investing in hydrogen and other clean alternatives to natural gas
d. Promoting energy efficiency to reduce overall gas consumption

Представьте, что Вы отвечаете за энергетическую стратегию своей страны на следующие 20 лет. Что бы Вы приоритизировали для газового сектора?

a. Строительство бóльшего количества трубопроводов и инфраструктуры для удовлетворения растущего спроса
b. Партнерство с новыми странами для снижения зависимости от текущих поставщиков
c. Инвестирование в водород и другие чистые альтернативы природному газу
d. Повышение энергоэффективности для снижения общего потребления газа

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Gas Market in the EU: Case Study

Co-funded by the Erasmus+ Programme of the European Union

Poll 8 – Опрос 8

What do you think was the largest source of gas for the EU before 2022?

a. LNG imports
b. Domestic production
c. Russian pipeline gas
d. North African pipeline gas

Как Вы думаете, что было крупнейшим источником газа для ЕС до 2022 года?

a. Импорт СПГ (Сжиженного Природного Газа)
b. Внутреннее производство
c. Российский трубопроводный газ
d. Североафриканский трубопроводный газ

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The EU gas market until yesterday - Supply

Pipeline

- **140 bcm** of Russian pipeline gas
- 77 bcm of Norwegian gas
- 36 bcm of North African gas
- 8 bcm of Azeri gas
- 4 bcm of UK gas

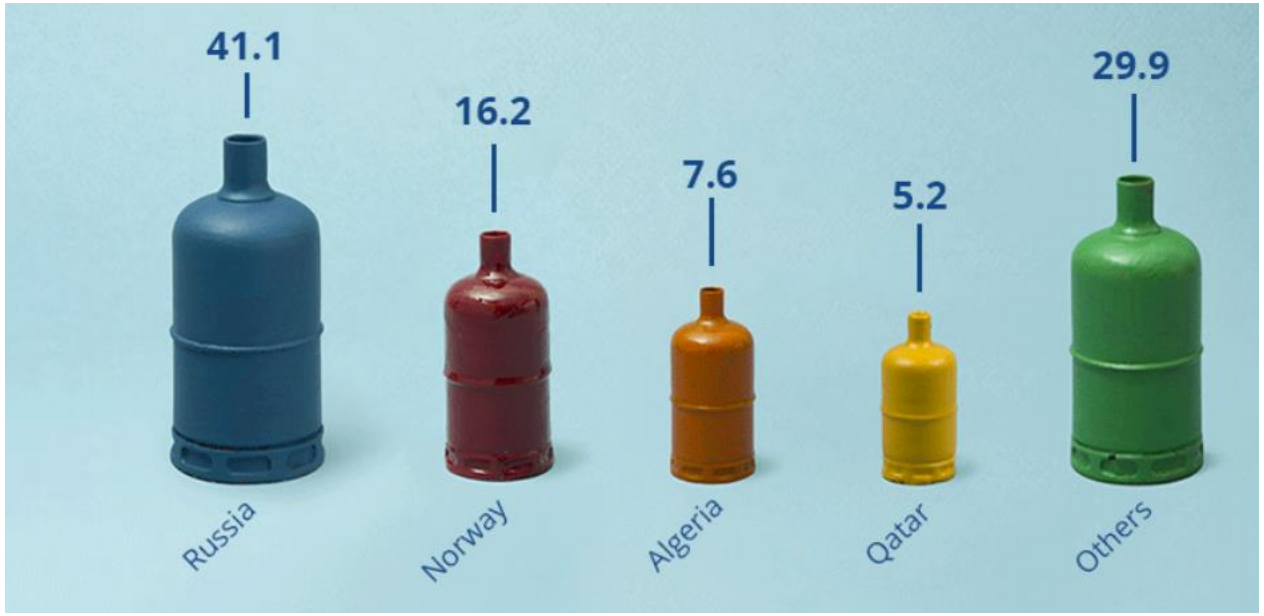
LNG

- **75 bcm** of LNG (incl. 14 bcm of Russian LNG)

Domestic

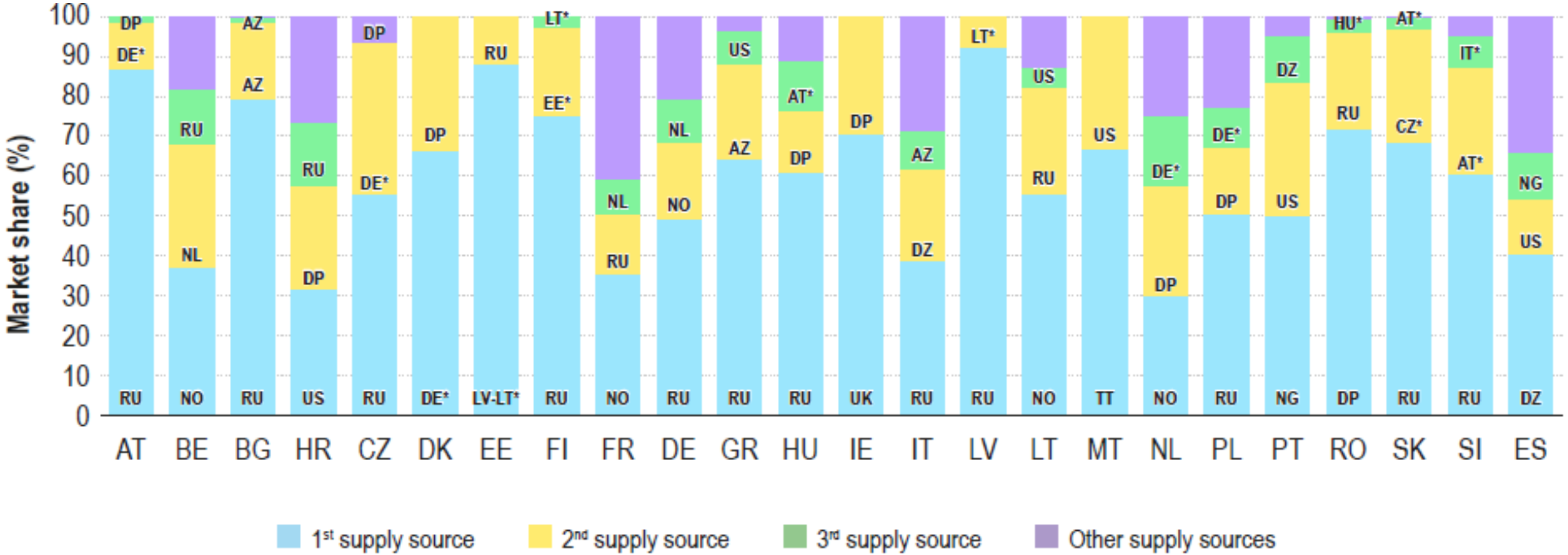
- 44 bcm of domestic gas

Eurostat: EU Gas imports (%) in 2019



- Strong dependence on fossil fuels (gas= ¼ of total consumption)
- Electricity generation from fossil fuels (about 37% in 2020)
- Strong dependence on energy imports (60% of total energy demand) and particularly from Russia (35-40 % share of total EU gas market)

Diversification of gas sources



Estimated number and share of supply sources in terms of the contractual origin of gas in selected Member States – 2021 – % of actual volumes purchased

Source: ACER/CEER: Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2021 - Gas Wholesale Markets Volume - July 2022

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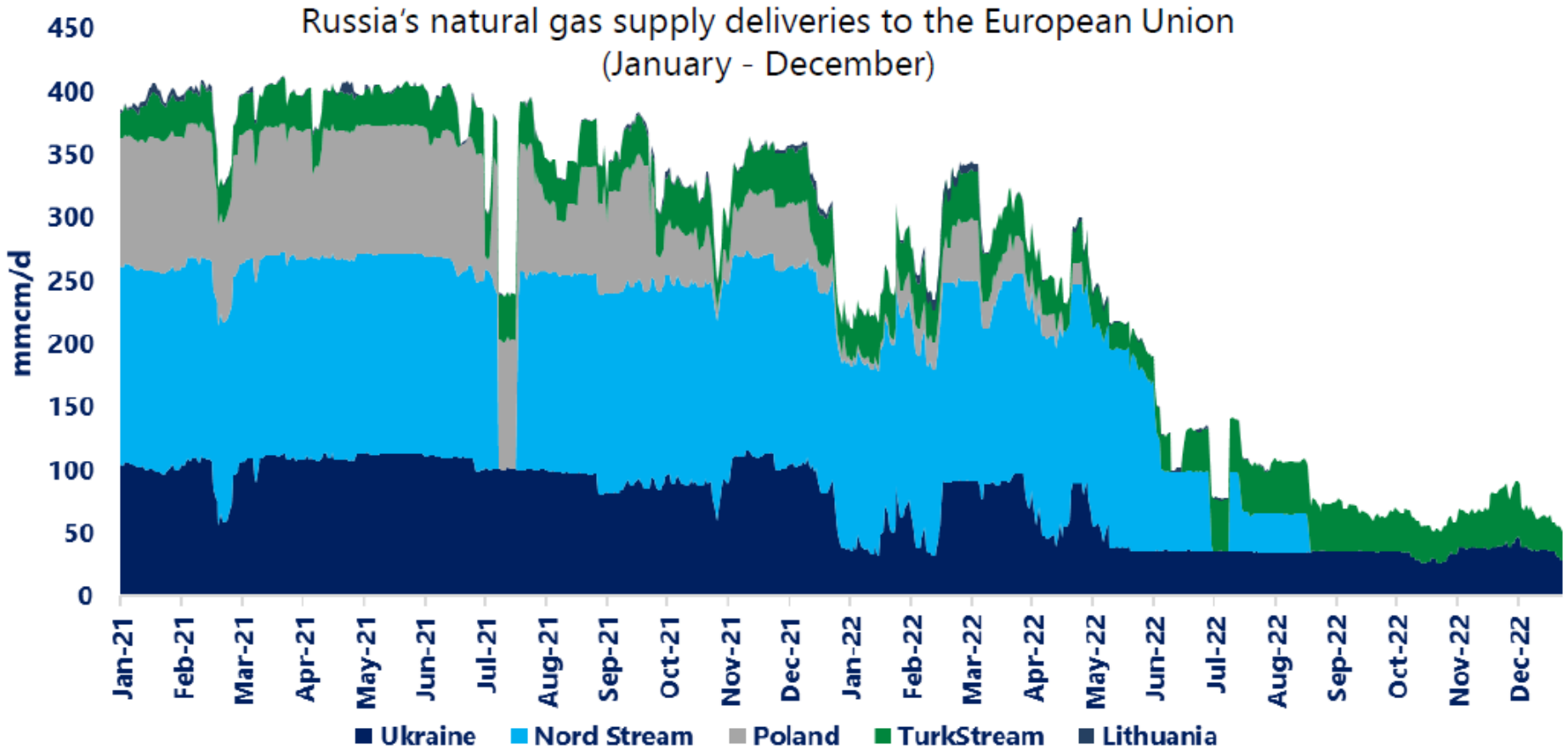
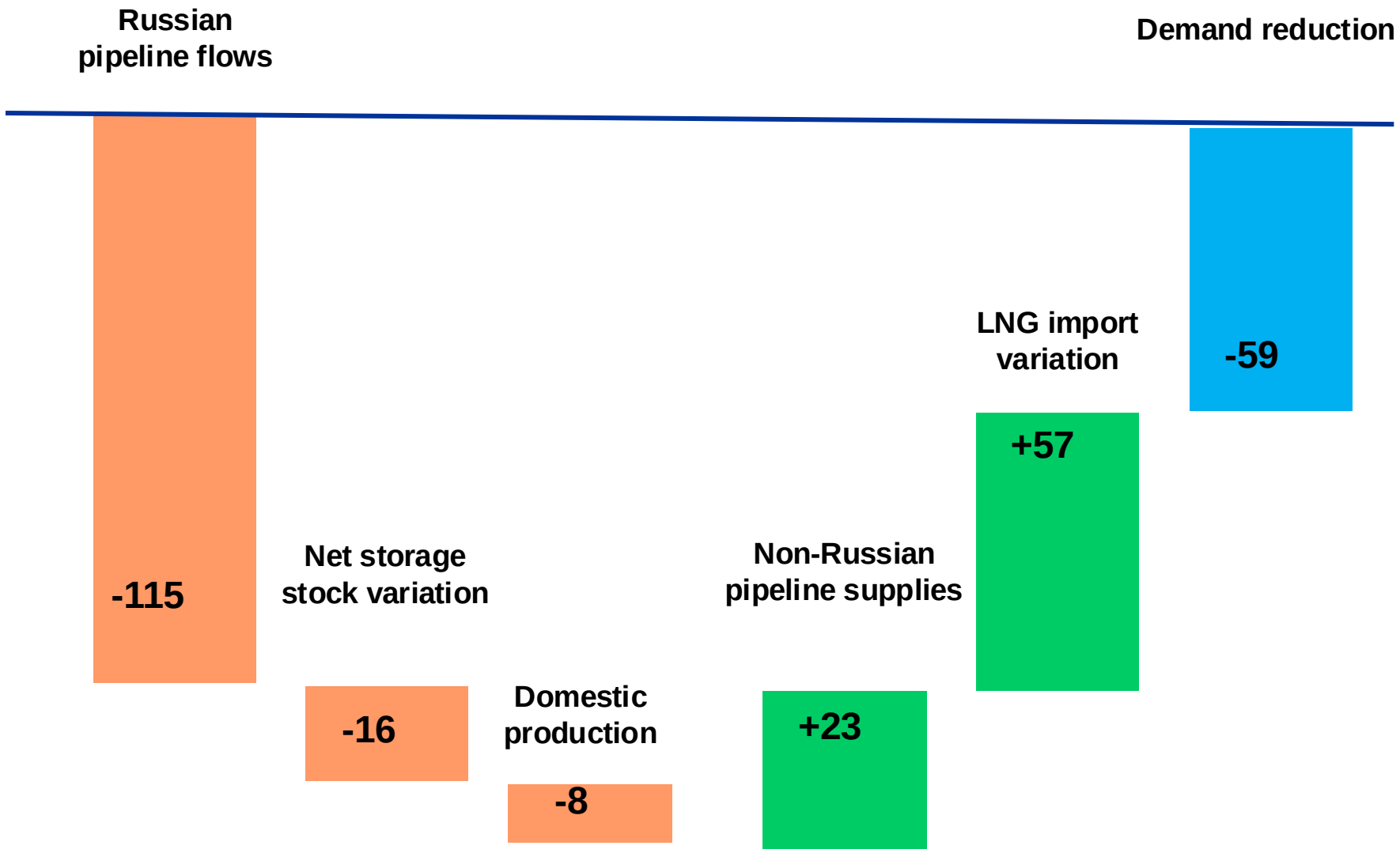
EU Energy crisis (2022)



Source: IEA

Replacing Russian gas



Estimated EU gas supply and demand differences in 2023 in comparison to 2021 (bcm)

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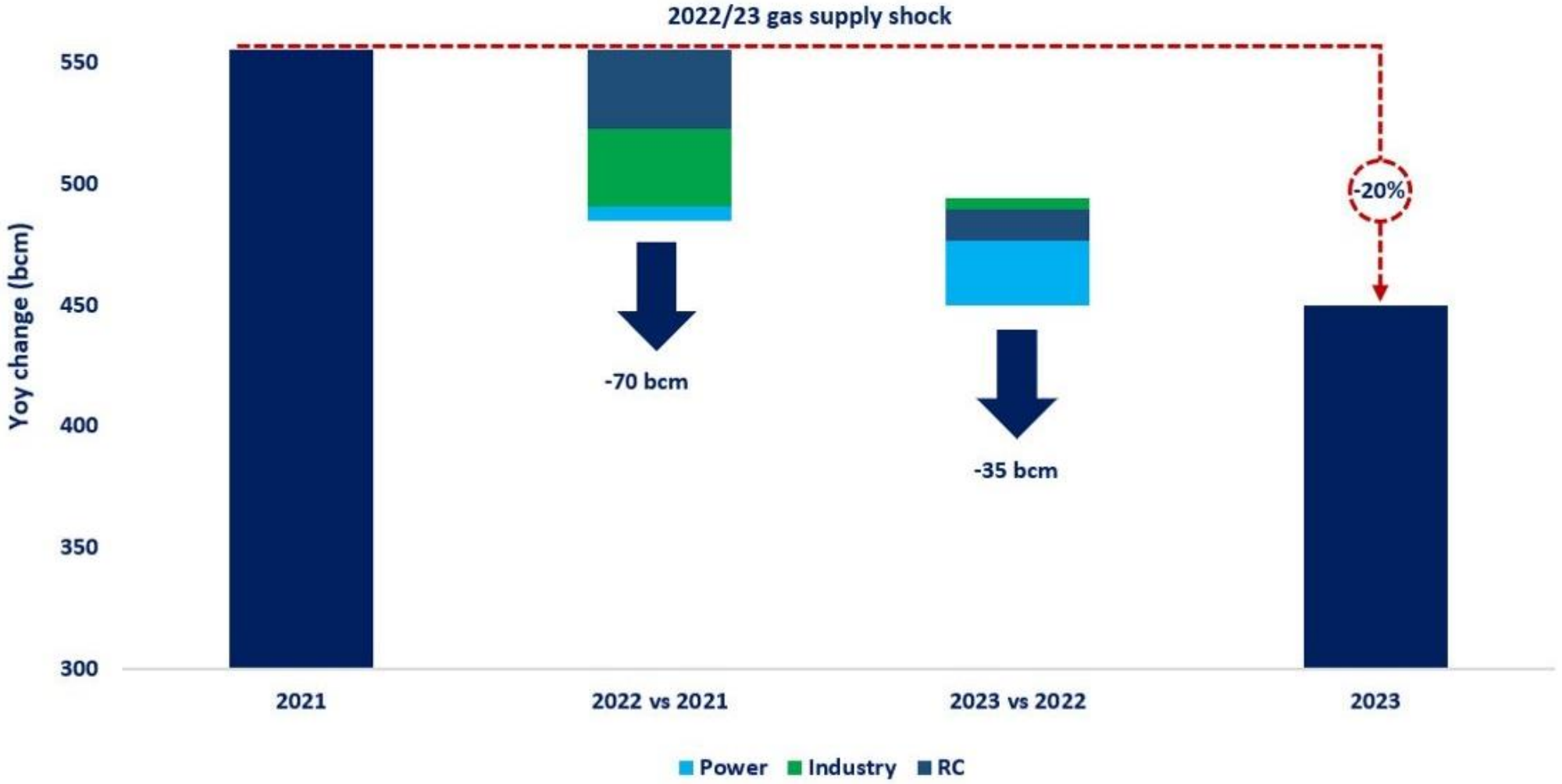
EU gas supply shock (2022)



Source: IEA

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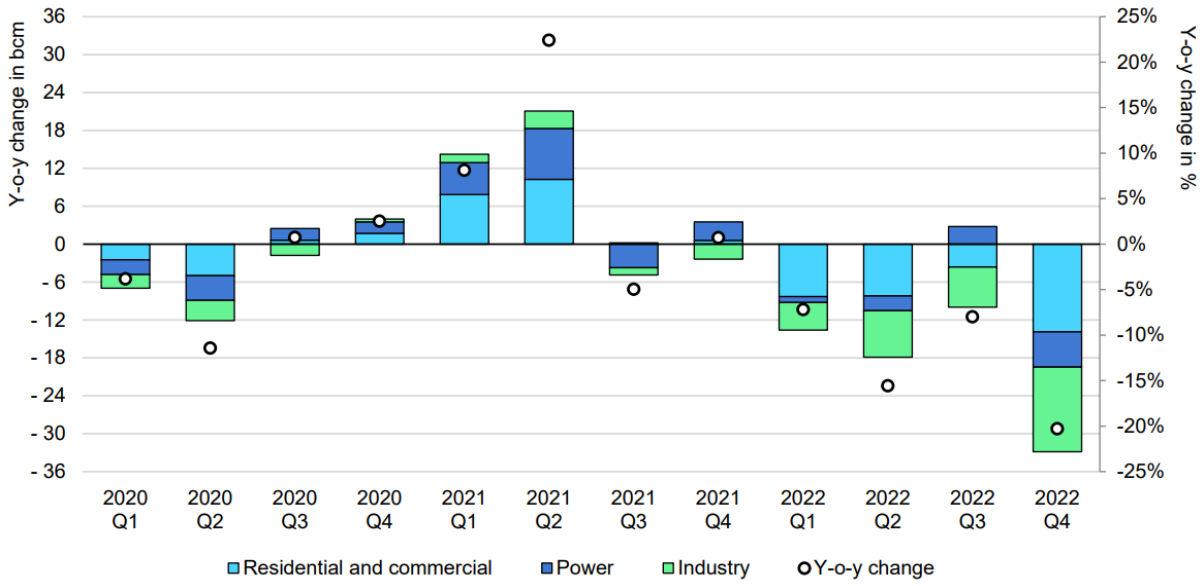
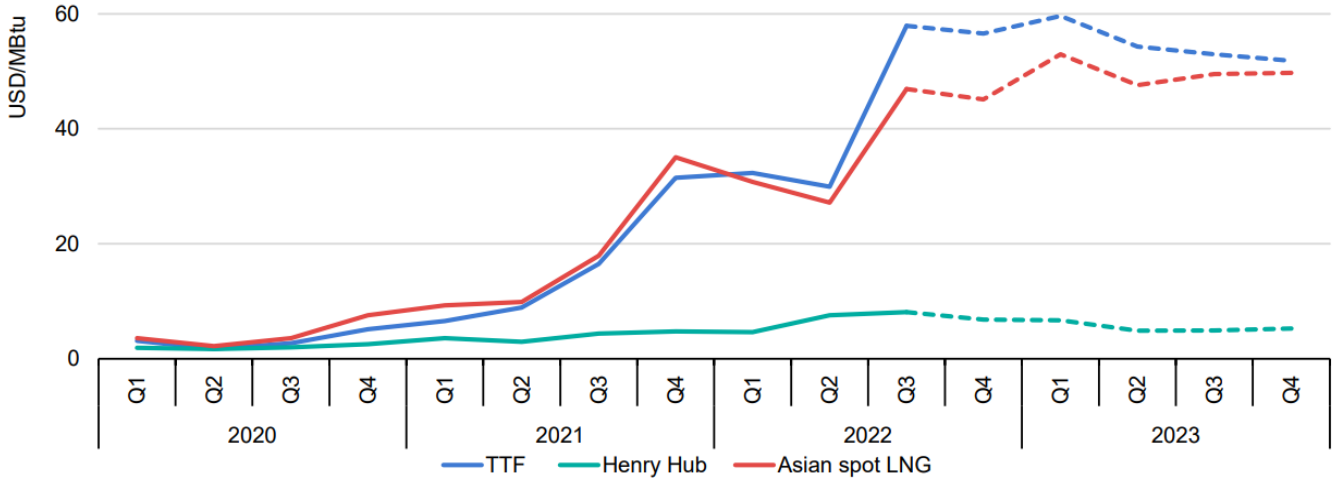
Background on crisis



Change in gas demand, 2020-2022



Spot and forward natural gas prices, 2020-2023

(Source: Gas Market Report Q4 2022 and Q1 2023, IEA)

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Exercise 9 – Упражнение 9

Let’s discuss this together

Давайте обсудим это вместе

Open your mic or write it in the chat, please ☺

Включите микрофон или напишите в чате, пожалуйста ☺

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Exercise 10 – Упражнение 10

What surprised you the most about the EU energy market today?

Что из сегодняшнего материала об энергетическом рынке ЕС удивило вас больше всего?

Open your mic or write it in the chat, please ☺

Включите микрофон или напишите в чате, пожалуйста ☺

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The EU internal energy market

That's all!

Thank you for your attention!