



Gas markets: From energy crisis towards net zero

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**Keynote to Workshop on Economics of Gas:
New Research Avenues for a Reconfigured Gas Scene**
Paris-Dauphine University, 22 May 2023

Views are mine & not necessarily those of any organization

Strategic context for gas in Europe

- **Climate change** & social license to operate
 - Russia-Ukraine & **geopolitics of energy**
 - European **energy crisis** & policy response
 - Evolving **corporate strategies** & financial markets
- ⇒ Gas now relevant in *macroeconomic* & social terms

Plan for this talk

① **Gas markets during the energy crisis**

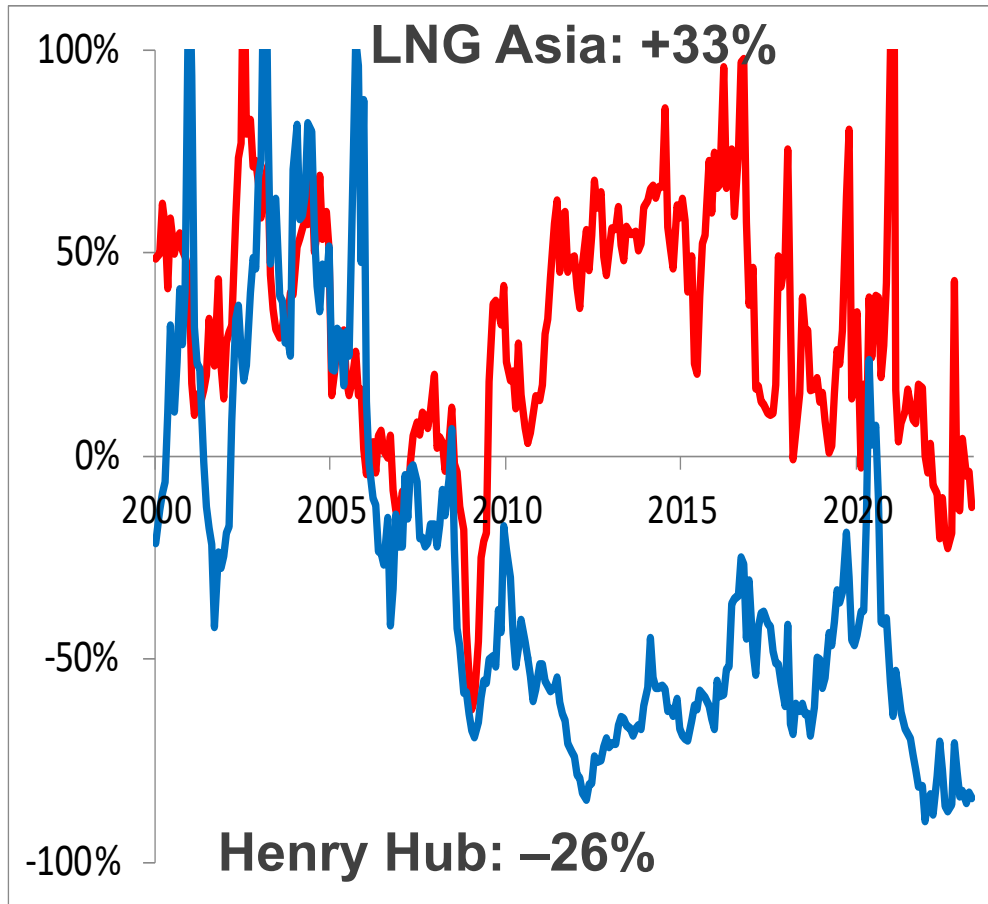
② European gas market (emergency) policy

③ Role of gas in net zero energy markets

④ New avenues for economics research

Regional price divergence remains the norm

Price premium relative to EU natural gas



“Asian premium”:

- Most of last 25 years
- Limits to arbitrage

Low & stable HH price

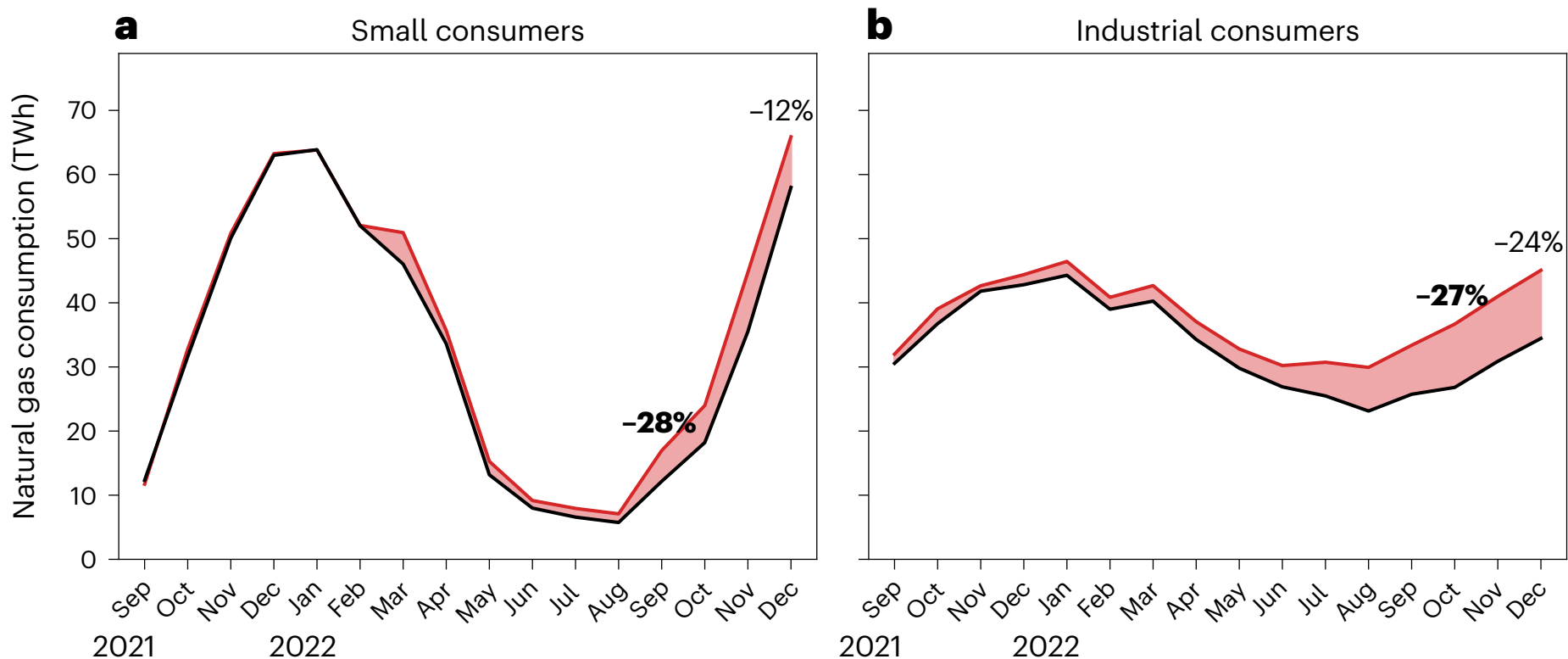
- US LNG exports
- Security of supply

⇒ Global price convergence (still) unlikely any time soon

Source: Calculations based on IMF data, Ritz (2014). [Price discrimination and limits to arbitrage: An analysis of global LNG markets](#), *Energy Economics*

Consumption cuts during the crisis

Germany: Like-for-like gas savings of up to 28% by late 2022

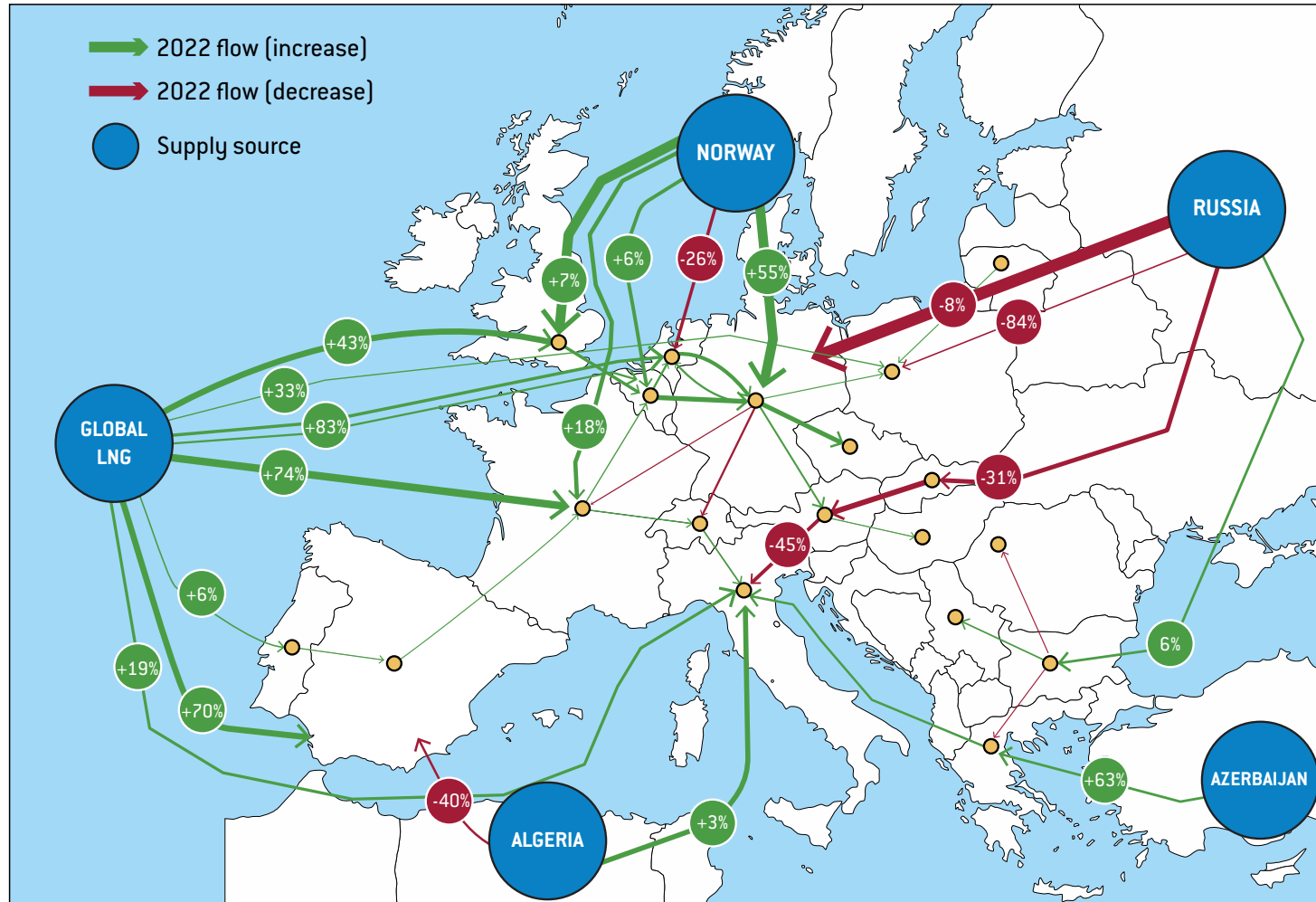


⇒ Industrial consumers already responded to prices in late 2021

Note: Red lines are estimated baseline (controlling for trend, seasonality & temperature), black lines are observed outcome
Source: Ruhnau, Stiewe, Muessel & Hirth (2023). [Natural gas savings in Germany during the 2022 energy crisis](#). *Nature Energy*

Substitution patterns in gas trade

Figure 1: Natural gas flows in the European market, first half 2022 vs first half 2021



McWilliams, Sgaravatti, Tagliapietra & Zachmann (2022). [A grand bargain to steer through the European Union's energy crisis](#). Bruegel Policy Contribution Issue n°14/22, September 2022

Competition in global LNG: A changing market

Balance of power: Shift to gas buyers post-2014

- Global price decline (comparable to oil)

LNG market structure: **Presentation at Paris-Dauphine, June 2019**

	2007	2012	2017	2022
Seller HHI (# players)	.102 (14)	.140 (18)	.136 (18)	↑? Further US & AUS
Buyer HHI (# players)	.218 (18)	.180 (27)	.132 (39)	↓? Smaller Asian

⇒ LNG sell-side now more concentrated than buy-side

Note: Herfindahl index (HHI) is a measure of market concentration, ranging from 1 (monopoly) to 0 (many small players)

Source: Calculations based on GIIGNL data

Competition in global LNG: Towards net zero?

Balance of power: Shift back to suppliers in 2020s?

- Huge prices spikes & continuing volatility

LNG market structure:

2020s LNG expansion:
Qatar, US...

	2007	2012	2017	2021
Seller HHI (# players)	.102 (14)	.140 (18)	.136 (18)	X (close!) .135 (20)
Buyer HHI (# players)	.218 (18)	.180 (27)	.132 (39)	✓ .114 (44)

⇒ How to reconcile additional LNG trade with global net zero?

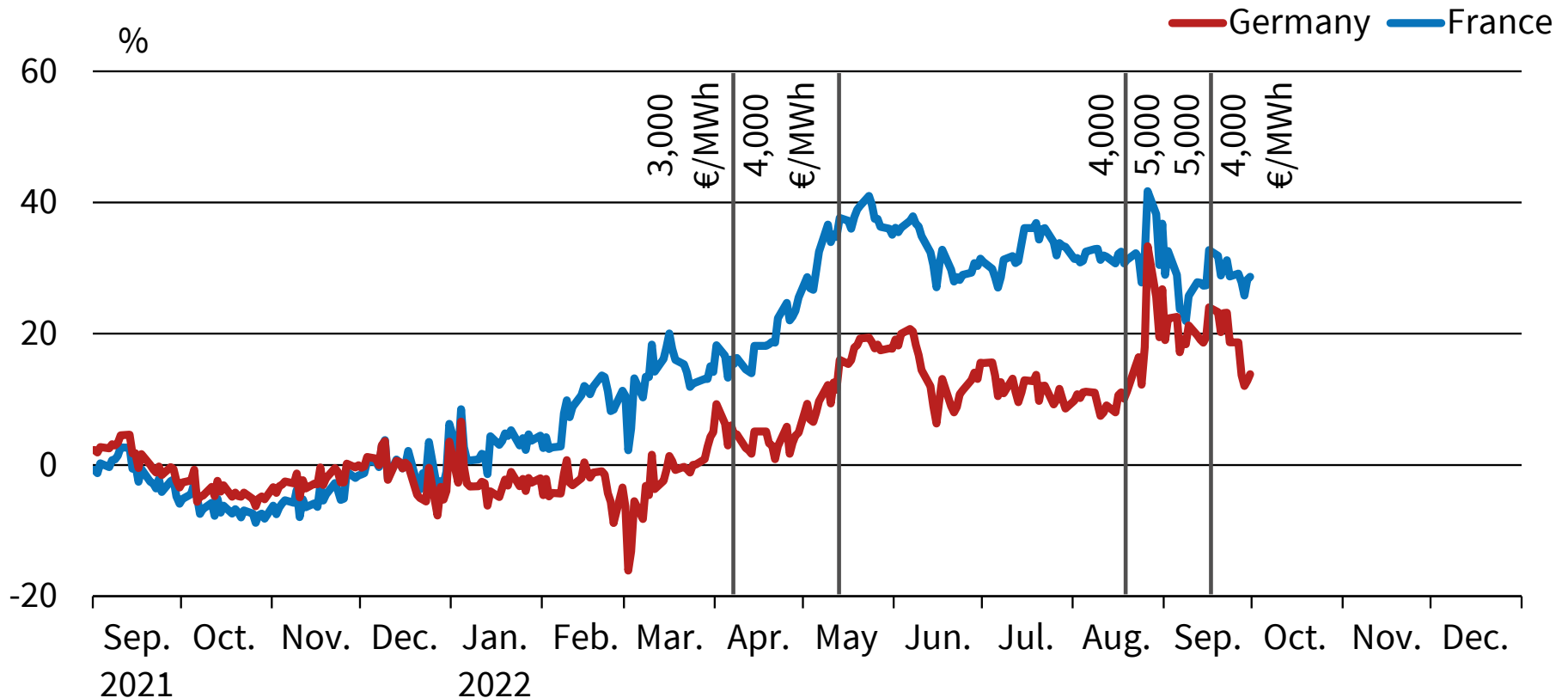
Note: Herfindahl index (HHI) is a measure of market concentration, ranging from 1 (monopoly) to 0 (many small players)

Source: Calculations based on GIIGNL data

An electricity crisis, in addition to a gas crisis

Electricity prices traded with a risk premium, triggering margin calls

Risk Premium



Note: Risk premium = difference between 2023 forward electricity price and SRMC of representative gas-fired power plant
Source: Gerlagh, Liski & Vehviläinen (2022). [Stabilizing the EU Electricity Market: Mandatory Demand Reduction and a Lower Price Cap](#). *EconPol Forum, CESifo*

Power-carbon-gas market interactions

Energy crisis since Summer 2021

⇒ Proposals for energy market re-design

- *Electricity market*: “Split market” for fossils & low-C, price cap, windfall taxes...
- *Gas market*: Price cap, single buyer, market integration, new LNG terminals...
- *Carbon market*: surprisingly robust...

Complex market & policy interactions

⇒ EU ETS can exacerbate energy price shifts

- Gas/LNG price ↑ ⇒ carbon price ↑
⇒ electricity price ↑↑
- Carbon price no longer induced coal-to-gas switching in power generation

Future: Power-carbon-gas-hydrogen interaction...

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Key EU policy responses in gas markets

Gas price cap

“Market Correction Mechanism”

Joint purchasing

“Aggregate EU”

An emergency gas policy package

Three-part policy package

Mid-November 2022

- ① EU-wide gas price cap
- ② Gas saving targets by each country
- ③ Continued price incentive to cut gas consumption

⇒ Complementary measures enhance overall policy credibility

Key issue: How to avoid market distortions from price cap?

- Supply shortages
- Shift to OTC trading



VOXEU COLUMN | EU POLICIES | ENERGY

European economists for an EU-level gas price cap and gas saving targets

Natalia Fabra, Karsten Neuhoff, Nicolas Berghmans / 16 Nov 2022

Source: Fabra, Neuhoff, Berghmans & 17 others (including Newbery & Ritz) (2022). [European economists for an EU-level gas price cap and gas saving targets](#). CEPR VoxEU Column, 16 Nov 2022

EU Gas Market Correction Mechanism

December 2022: “Gas market correction mechanism to protect Union citizens and the economy against excessively high prices”

February 2023: MCM enters into force for period of one year.

- Bidding limits activated if front-month TTF price for 3 days:
 1. Exceeds 180 EUR/MWh; and
 2. Exceeds LNG import basket price by 35 EUR

— Does not apply to OTC trading but may be extended(?)

— Will be extended to other European gas hubs beyond TTF(?)

Plus:

— MCM can be suspended if gas supply situation deteriorates...

So what happened (so far)?

“By 1 March 2023, neither ACER nor ESMA have identified significant impacts (positive or negative) that could be unequivocally and directly attributed to ... the MCM ... one should not infer ... that the MCM might not have any impacts on financial and energy markets or on security of supply in the future.”



Source: S&P Global Commodity Insights

ICE launches new TTF gas futures, options market in London as planned

Source: ACER (2023). [Market Correction Mechanism: Effects Assessment Report](#), 1 March 2023, [S&P Global Commodity Insights](#), 20 February 2023

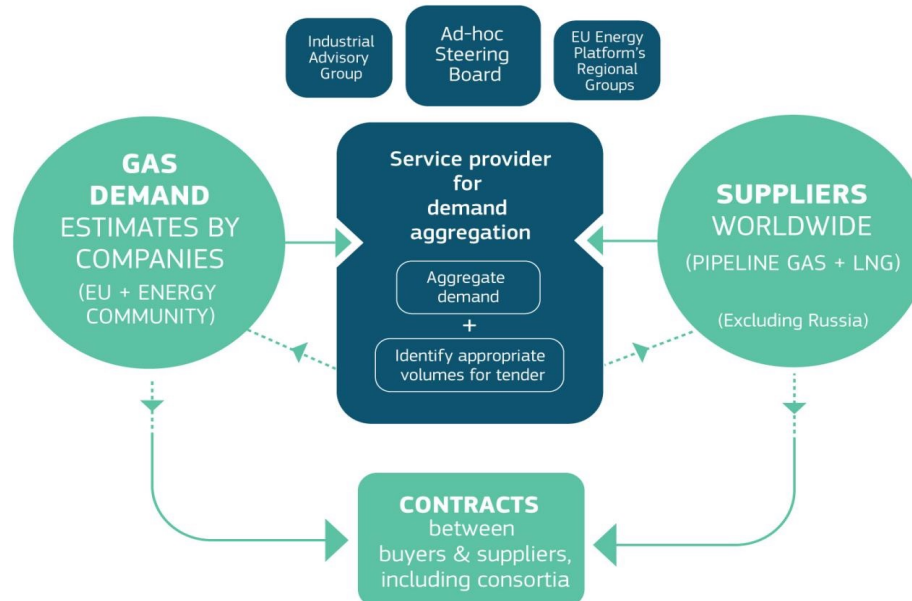
EU Energy Platform & AggregateEU

AggregateEU: Demand aggregation & joint purchasing mechanism

— *April/May 2023:* First tender with 11.6 bcm demand bids by 63 EU companies, and 13.4 bcm supply offers by 25 companies

⇒ **Matched via AggregateEU to 10.9 bcm (~80% by pipeline)**

⇒ *“EU companies will now be able to negotiate the terms of the supply contracts directly with the supplying companies, with no involvement of the Commission.”*



— *Future:* Joint EU purchasing for renewable hydrogen

Recap 1: Gas policy debate – circa 2015

:vivideconomics

RAMBOLL

Policy options analyzed

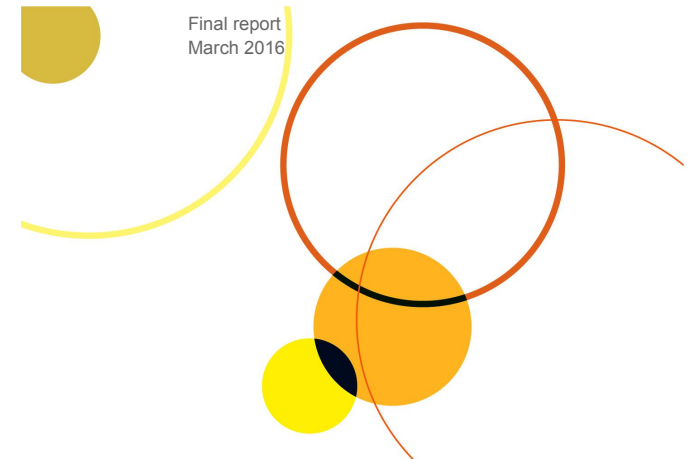
1. Additional gas suppliers
2. More supply diversification
3. Increased EU market integration
4. More infrastructure investment
5. Collective purchasing

Modelling results

- ⇒ Additional suppliers & market interconnection most favourable
- More desirable, effective & feasible than single buyer
(except for provision of a strategic reserve)

Economic analysis of costs and benefits of approaches to enhancing the bargaining power of EU buyers in the wholesale markets of natural gas

Report prepared for DG ENER



Final report
March 2016

Source: Vivid Economics and Ramboll (2016). [Economic analysis of costs and benefits of approaches to enhancing the bargaining power of EU buyers in the wholesale markets of natural gas](#). Report prepared for DG ENER, March 2016

Recap 2: Nicolas Sarkozy – May 2009



France wants central gas buying body for Europe

By Reuters Staff

1 MIN READ



NIMES, France, May 5 (Reuters) - France wants Europe to set up a central gas purchasing body to strengthen its negotiating hand with suppliers, President Nicolas Sarkozy said on Tuesday.

“I will not back down on the need to have a real energy policy,”

Source: [News from Reuters, 5 May 2009](#)

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Gas as the new coal (almost)?



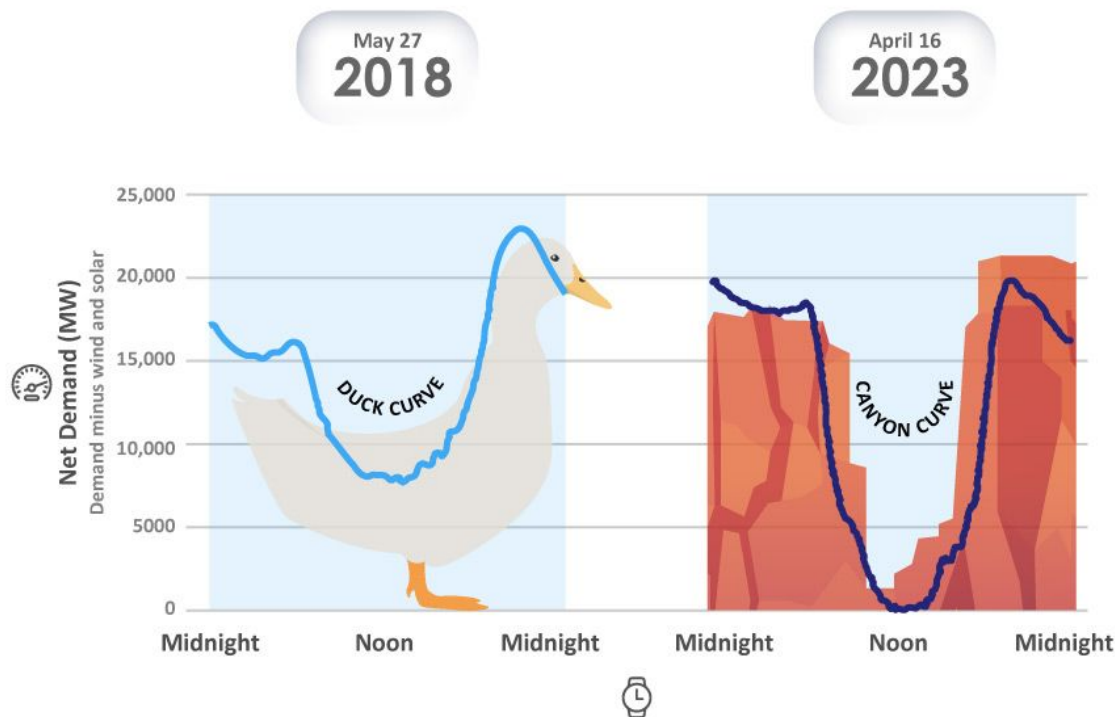
G7 Climate, Energy and Environment Ministers' Communiqué

“In this particular context, and recognizing the primary need to accelerate the clean energy transition through energy savings and gas demand reduction, investment in the gas sector can be appropriate to help address potential market shortfalls provoked by the crisis, subject to clearly defined national circumstances, and if implemented in a manner consistent with our climate objectives and without creating lock-in effects, for example by ensuring that projects are integrated into national strategies for the development of low-carbon and renewable hydrogen. We reaffirm the G7’s commitment to achieve net-zero emissions throughout the entire fossil fuel extraction and production chain by 2050.”

Source: [G7 Climate, Energy and Environment Ministers' Communiqué](#), 17 April 2023

Role of gas in net zero power system

- Since 2000:** GB power system with ~30-50% (unabated) gas generation
- Emissions cuts via renewables build, carbon pricing, coal phase-out
- By 2035:** Government target of net zero electricity generation
- Gas \approx hedge with increasing environmental & economic costs



California:
From “Duck Curve” (2013)
to “Canyon Curve” (2023)
— Plus: Daily vs seasonal
demand fluctuation

Flexibility: Gas CCS, hydrogen, batteries/storage, interconnection, DSR

Source: [EPRI Head: Duck Curve Now Looks Like a Canyon](#), 27 April 2023, Newbery, Pollitt & Ritz (2018). [Market design for a high-renewables European electricity system](#). *Renewable and Sustainable Energy Reviews*

Future of electricity pricing

Gas price crisis has led to calls for “split markets” for low-C & fossils...

What is the marginal price-setting unit in a net zero power system?

View A: Electricity prices driven by zero-MC renewables

⇒ Prices oscillate between zero and value of lost load

⇒ How well would the market cope (e.g. risk management)?

⇒ Shift to long-term contracts & capacity mechanism

View B: New technologies emerge as “price-setters”

- ① Gas with CCUS or hydrogen or energy storage
- ② Demand-side response by industrial consumers

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- ④ **New avenues for economics research**

Theory & modelling

- ① **Bilateral oligopoly models**
 - Most gas market modelling assumes all buyers are price-takers...
- ② **Design of policy *packages***
 - In a second-best world, which instruments (don't) work well together?
- ③ **Short-run vs long-run contracts**
 - What determines the actual vs optimal mix of contract duration?

Empirics & policy

- ① **Development of global hydrogen market**
 - To what extent will hydrogen retrace the history of gas & LNG?

- ② **Market design for low/zero carbon gases**
 - What are good regulatory designs in the shift towards net-zero gas?

- ③ **“Real-time” analysis of energy markets**
 - New research opportunities—policy & technology (e.g. satellite data, ML)