Centre Energie - Centre for Energy

The perspectives for biomethane in the EU

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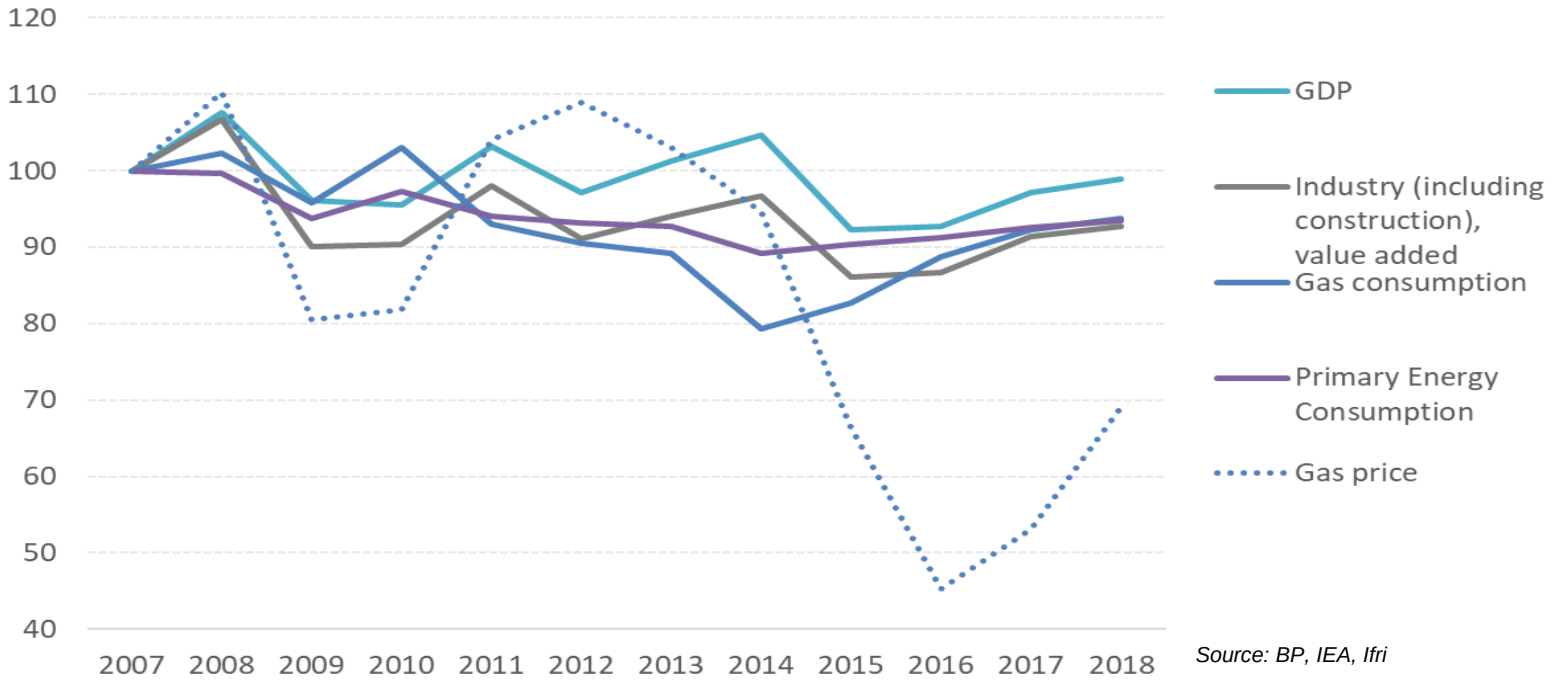
German-Danish Chamber of Commerce, Copenhagen, 24/09/2019

The strategic context for gas in Europe

Evolution of selected economic and energy indicators in the EU, base 100, year 2007



Source: BP, IEA, Ifri

The EU will be moving towards carbon neutrality by 2050 implying a fundamental change for natural gas. Gas represents 25% of EU total CO2 emissions and 20% of its power sector emissions (18% of total power generation in 2018). The EU imported 363 bcm of gas in 2018 worth 90 billion EUR and 20% of its total external energy bill.

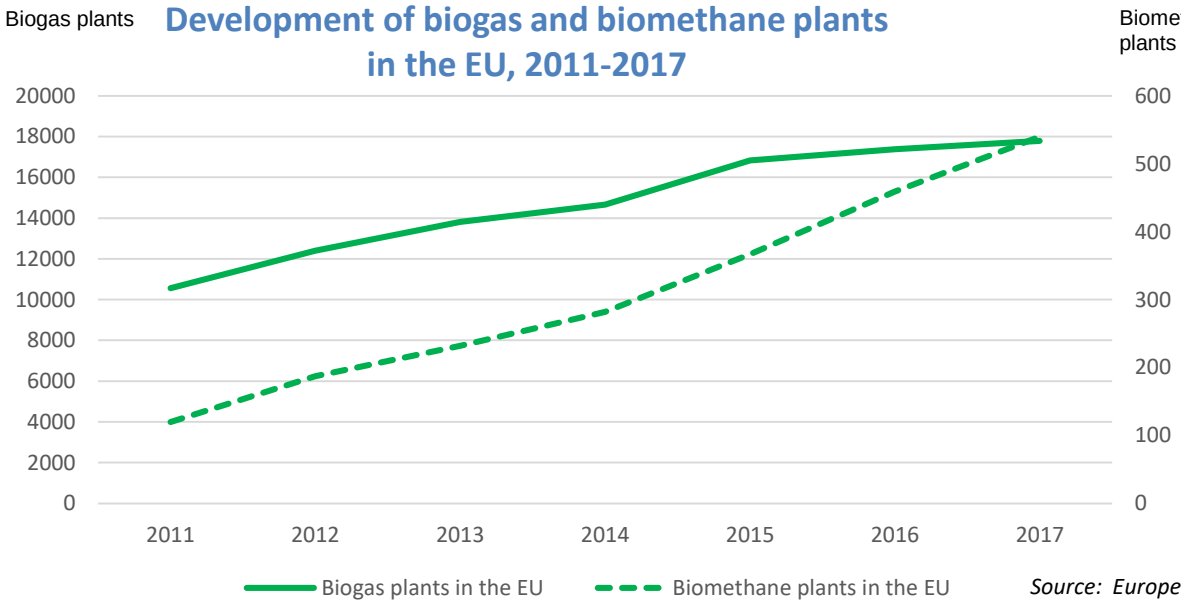
EU emission allowance prices continue to rise

EU ETS settlement prices, Nov-2017 to August-2019 (€/tCO_2)

- EUA prices at 7 years high
- Over 20€/ton since mid-August 2018
- The best-performing « commodity » in 2018

Source: Market Business Insider, European Energy Exchange, Market Data, 03.09.19

Greening the gas: biomethane + H2O



Source: European Biogas Association

- Biogas has been dominating so far, mainly for small CHPs
- New push for upgrading into biomethane in Italy, France, Denmark, UK
- 2 bcm/y production in 2018 (460 bcm demand)
- Two main uses: gas grid injection or transport sector

Costs are five times higher than natural gas. Scale and technology can only provide limited cost reductions. Biomethane can make use of existing sunk cost transmission infrastructure. The assessment of its costs and benefits must be made based on the energy system and through a cross-sectoral approach including the agriculture and transport sectors as well as territorial development.

Denmark

- ✓ Mature industry (since 1975)
- ✓ Following the 2012 Energy Agreement, sharp increase in biomethane production/grid injection since 2014
- ✓ Driven by objective to convert 50% of manure to energy by 2020, only 10% currently
- ✓ Many existing and planned upgrading plants (from biogas installations) around the dense gas grid
- ✓ 10% of gas in the grid is biomethane
- ➢ Concerns over subsidy costs, switch to auction based system as of 2020 with EUR 32 million/y
- ➢ Obstacles to deployment in the transport sector (taxes for bio-CNG vehicles)
- ➢ Laboratory role:
  - Improvement of quality of digestates: contracts, pre-treatment
  - Management of installations through professional operators
  - Social acceptance issues

Germany

- Mature biogas industry for electricity and heat production: EU leader with > 9000 plants, including 205 for biomethane producing 0,9 bcm/y of gas.
- About 32 TWh produced, including 10 TWh biomethane
- Slowdown in biogas development&investments following lower subsidies (EEG law)/switch to tenders in 2017
- No significant decrease in production costs for biogas observed yet greater offer from manufacturers (membrane, pressure water scrubbing and amine scrubbing) and competition
- Concerns over:
  - Agricultural feedstock: use of dedicated crops or agriculture crops + animal waste/manure
  - Costs, although larger number of manufacturers and possible Chinese entrants
- Auction based system with price ceilings makes new investments hardly viable, government is reluctant to consider long term potential
- Lack of cross sectoral strategy: transport and heat
- Upgrading of biogas to biomethane new option + plant expansion

Italy

- Biogas industry developed since 2008: > 1550 biogas plants
- Focus on electricity (8,3 TWh) and heat generation 3,1 TWh) in Northern Italy
- March 2018 Biomethane Decree gives boost to the sector: EUR 4,7 billion for 2018-2022
- Nascent biomethane industry with booming perspectives with over a thousand of grid connection requests
- Sector coupling: biomethane promoted as a transport fuel via blending obligations from transport fuel suppliers
- Bulk of the costs rests on fuel suppliers and indirectly, fuel consumers
- Biomethane strategy builds on the existing gas use for the transport sector
  - One million CNG vehicles
  - 3 300 methane buses
  - 1250 CNG refueling stations

France

- Government wants 30% cost reduction to increase its financial support: fall to 67 EUR/MWh in 2023 and 60 EUR/MWh to reach 22 TWh by 2028
- Industry says cost reduction is possible but need for 10 years to strengthen the industry and create economies of scale;
- Local entities+ Ademe provide around 20% of construction costs
- 100 installations operational, 1,5 TWh/y + over 900 projects in the pipeline totaling about 17 TWh/y
- Large industrial plants from animal waste/purification plants have issues:
  - Create value for some of the 180 million tonnes/y of animal waste
  - Digestate not fit as fertilizer: metalls + ammoniac +air = N2O (nitrous oxide) 300 times worse than CO2
- Need to develop intermediary crops
- Industry says externalities must be better incorporated
- Territories support circular economy approach
- Major public acceptance issues

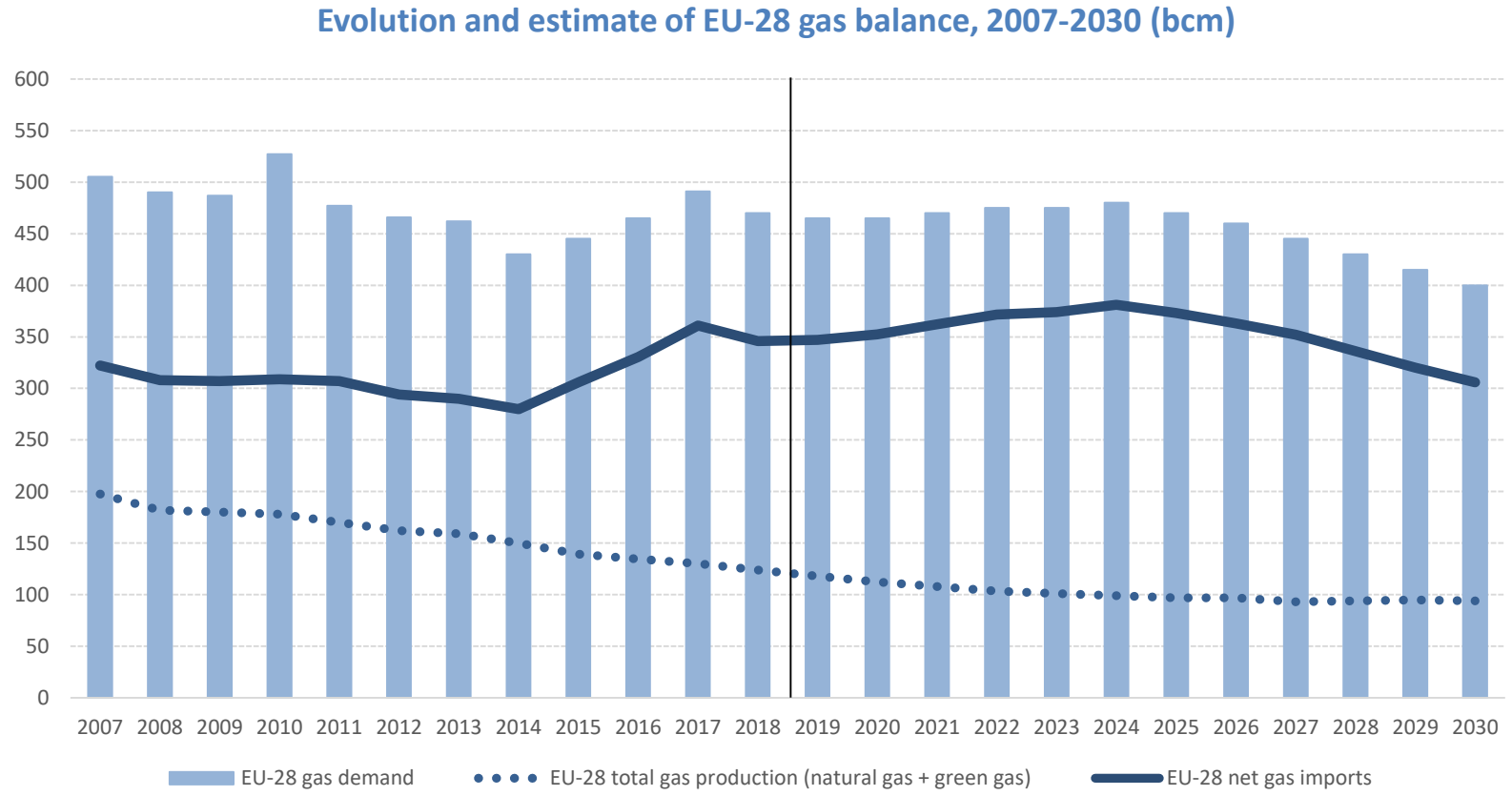
Conclusion (1/2)

- Key technology for the transition towards carbon neutrality, key pillar of the progressive greening of gas
- Production growth will come from Italy & France & UK mainly, some further upgrade projects in DE, DK
- Need for EU regulation on gas quality, compression, capacity allocation (priority), guarantees of origin
- Biomethane can compare with natural gas if all its positive externalities are maximized and accounted (notably CO2 savings) and negative ones are addressed. Cost comparison must be made on the basis of low carbon energy system options + rising CO2 prices
- Production cost reduction and optimization are possible:
  - Need to support projects closest possible to the grid
  - Gas transmission operators should be able to invest to cover connection costs
  - Need to support larger projects for economies of scale; standardize plants; quality of feedstocks; agregate tenders for procurements
- EU biomethane production @ 20-23 bcm by 2030 and helps to push gas use in the transport sector (CNG and LNG)

Conclusion (2/2)

- Need to watch feedstocks/type of substrates used: intermediary agricultural feedstocks/crops and farming waste only; overall, need to reduce costs of substrates and improve pre-treatment notably to avoid foreign objects
- Need to address methane leakage (up to 4% at plants)
- Need to maximize externalities, improve the operations and optimize the subsidy costs allocation:
  - Include the job creation (1 TWh=250 jobs) and ensure proper qualification of technical staff
  - Ensure comprehensive environmental and social assessments
  - Create opportunities for the sale of digestate as biofertilizers
  - Implement a strategic sector coupling approach to policies especially in the transport sector
  - Clearly define what are the different green gases and their regulation
  - Develop a European system of guarantees of origin as CH4 molecules are all the same

Outlook to 2030: gas demand overall flat until 2025, before progressively & slowly declining



Source: Ifri

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