



Norsk olje&gass

The role of gas in energizing the European heating market

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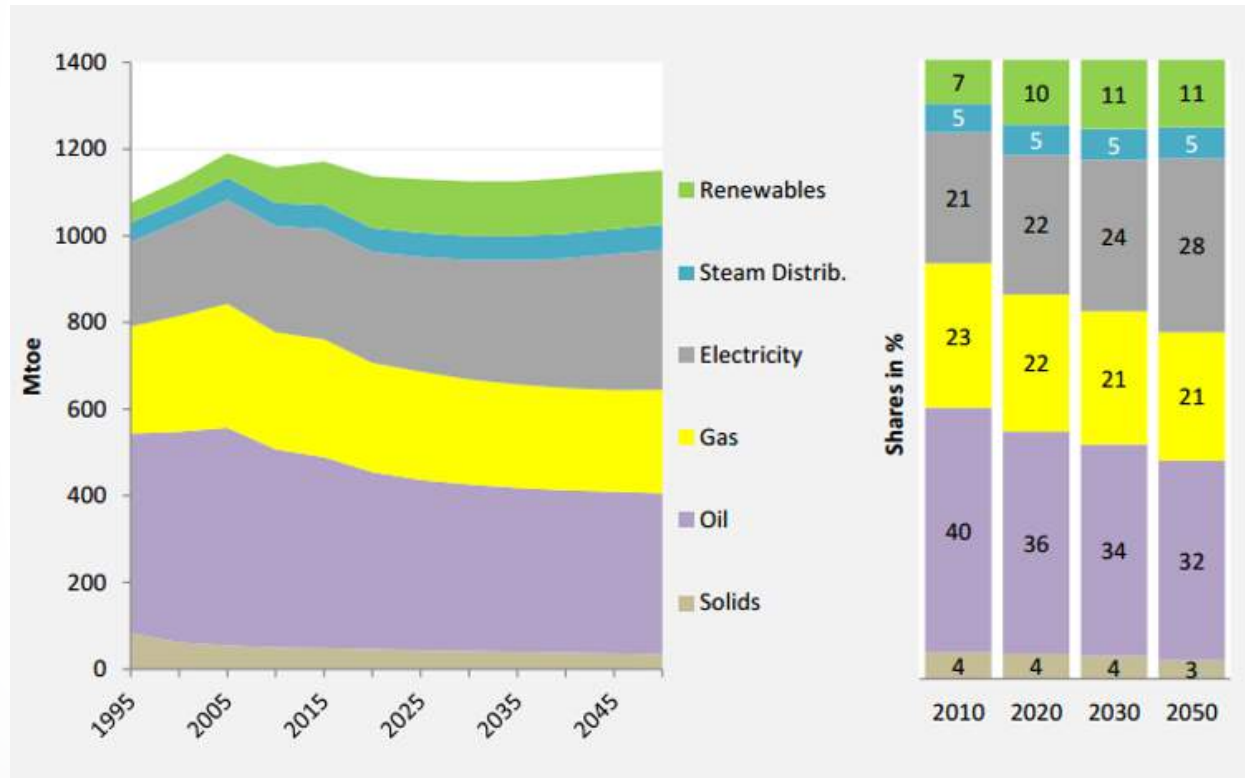


SUSTAINABLE DEVELOPMENT GOALS



EU Energy Trends 2050

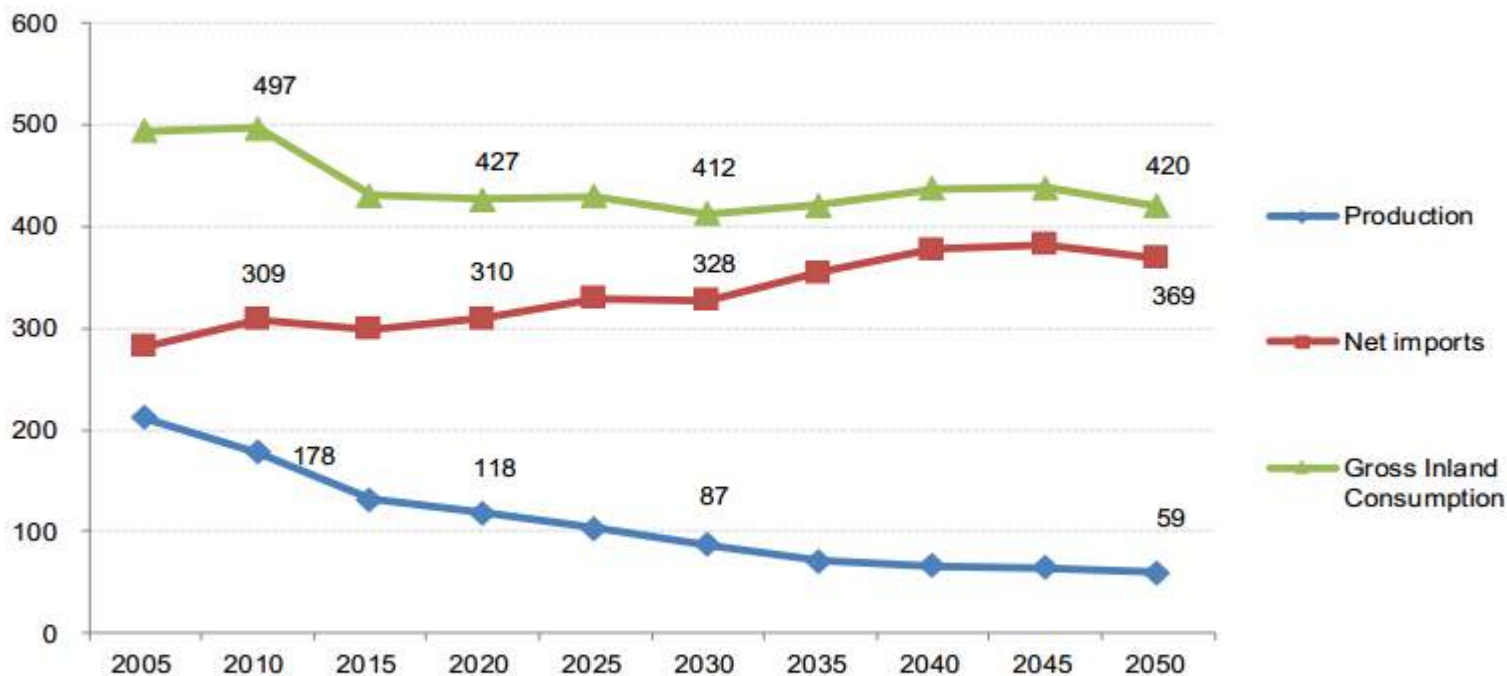
Final EU Energy consumption to 2050



Source: European Commission EU energy trends to 2050

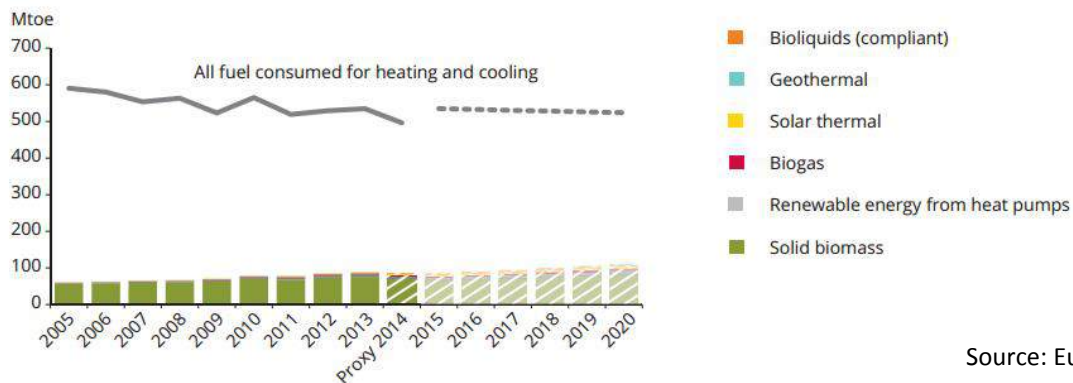
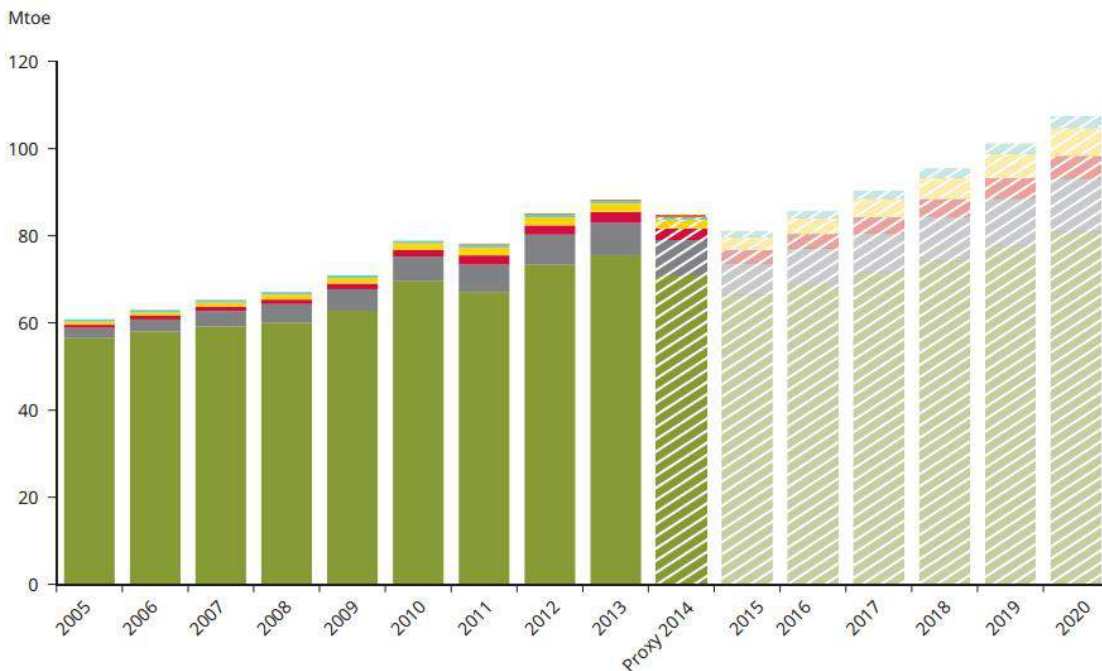
EU Energy Trends 2050

Figure 3: Gas - production, net imports and demand (volumes expressed in bcm)



Source: PRIMES

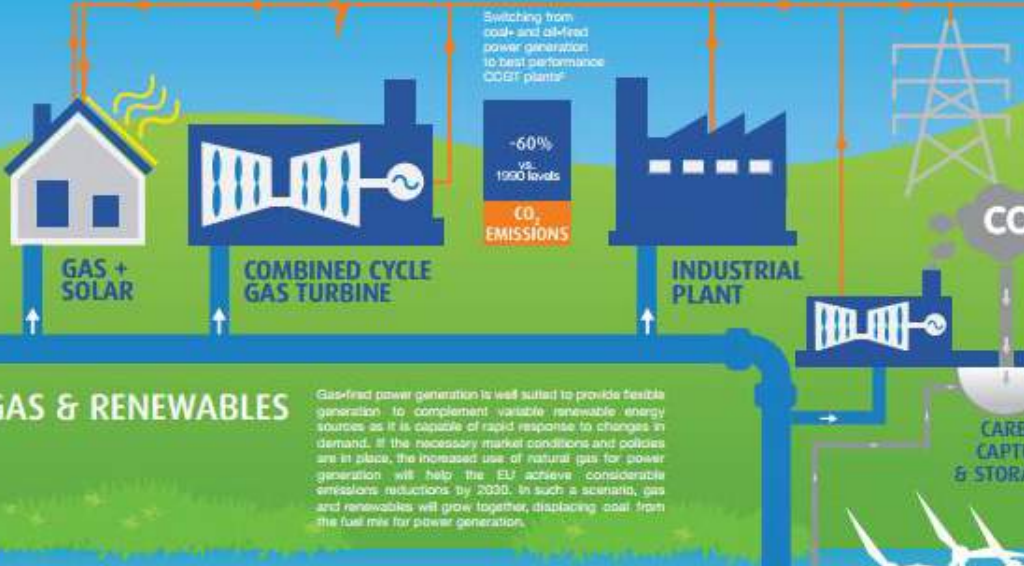
Renewable heating and cooling in the EU 28



**IT IS NOT
EITHER OR**

SUPPLY

Europe enjoys varied supplies of gas, with a majority coming from European countries (including Norway). Europe will continue to diversify its gas supplies via new significant sources such as the United States, and in the long term Azerbaijan, East Africa, Eastern Mediterranean, etc. Developing untapped domestic gas resources will reduce Europe's import dependency. Europe's potential to diversify its natural gas supplies will further be realised through deliveries of liquefied natural gas (LNG) from all over the world.



Switching from coal and oil-fired power generation to best performance CO2R plants*
-60% vs. 1990 levels
CO₂ EMISSIONS

GAS & RENEWABLES

Gas-fired power generation is well suited to provide feasible generation to complement variable renewable energy sources as it is capable of rapid response to changes in demand. If the necessary market conditions and policies are in place, the increased use of natural gas for power generation will help the EU achieve considerable emissions reductions by 2030. In such a scenario, gas and renewables will grow together, displacing coal from the fuel mix for power generation.

GAS AT THE CENTRE OF OUR ENERGY SYSTEM IN 2030

IMPORTS BY PIPE

Gasification capacity expected in Europe*



LNG

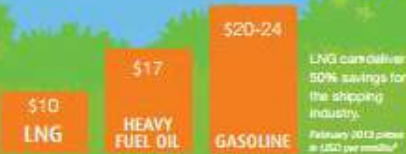
LNG TERMINAL

GAS IN TRANSPORT

In the future, natural gas has the potential to play a greater role in transport, in light of lower CO₂ and other emissions. According to industry estimates, LNG heavy-duty vehicles could reach more than 50,000 units per year by 2020. By then, they could represent 10-15% of the market*. Today, there are however only 38 filling stations for LNG for heavy-duty vehicles in the EU*. Refuelling infrastructure therefore needs to be developed to allow the technology to grow. There are also interesting prospects for LNG in maritime transport, with a clear environmental case of 25% lower CO₂ emissions and very substantial reductions in emissions of sulphur, nitrogen oxide and particulate matter.*



LNG-FUELLED SHIP



GAS STORAGE

INFRASTRUCTURE

The current gas infrastructure can be used for the future energy system without any fundamental modifications beyond 2050. However, further investments will be needed to safeguard secure supplies, provide alternative supply routes and integrate growing variable renewable energy sources. Investments needed by 2020 are estimated around €90 billion for transmission, storage and LNG.* For comparison purposes, it should be noted that the transmission of gas is up to 20 times cheaper than the transmission of energy in the form of electricity.* Gas storage offers seasonal and short-term flexibility in a fully functioning European gas market, as well as security of supply.

Biogas can be produced from various sources (biomass, organic waste) and is already injected today into the gas grid



BIOGAS PLANT

POWER-TO-GAS

INNOVATION

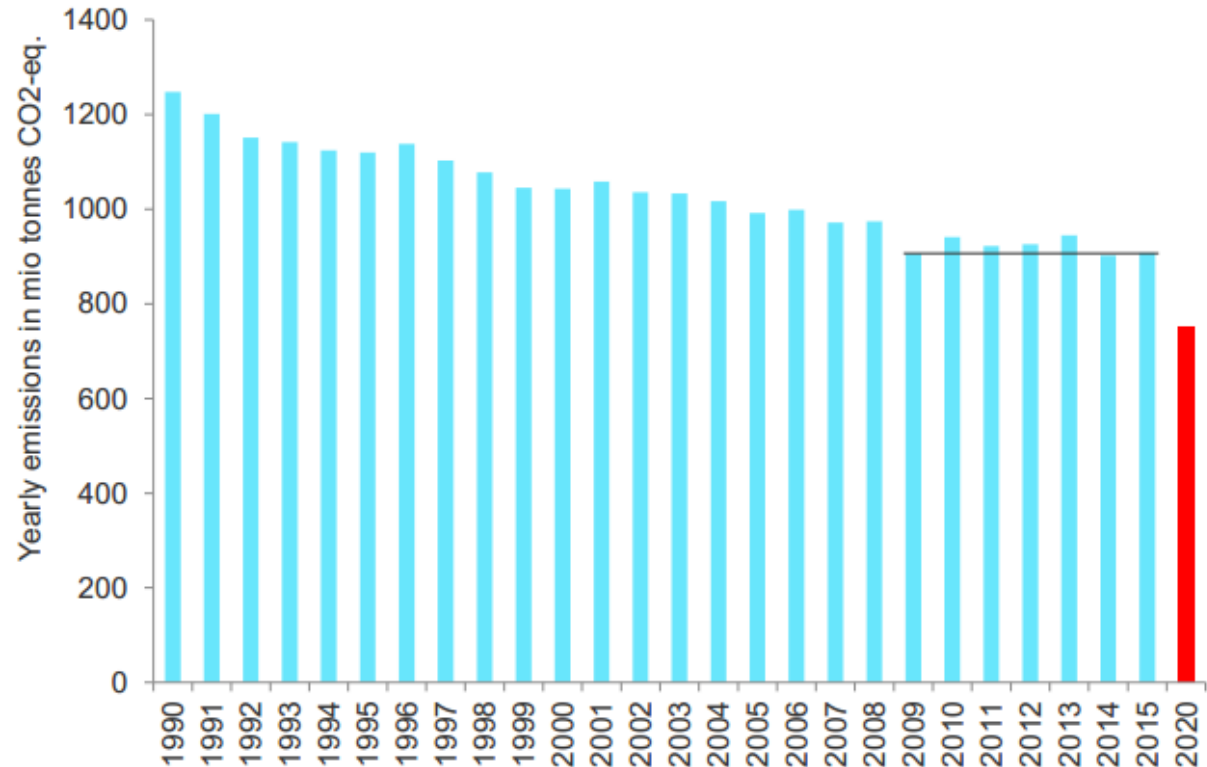
The priority use of renewable energies in the future requires a very flexible storage of excess electricity since constant balance between electricity production and consumption is technically needed. The ideal way to do this is Power-to-Gas, which allows for the storage of renewable electricity in the natural gas grid. Each can be converted to hydrogen (H₂) via electrolysis, a proven technology in the chemical industry. Hydrogen produced is either fed directly into the gas system or turned into methane (CH₄). Finally, by 2030 beyond, CO₂ should be an important option to reduce carbon dioxide emissions. The CO₂ captured from power generation or industry can either be stored underground or injected into the gas system as synthetic methane using Power-to-Gas facilities. End-user technologies such as condensing boilers, gas heat pumps, micro-CHP and fuel cells in space heating & cooling.

CARBON CAPTURE & STORAGE



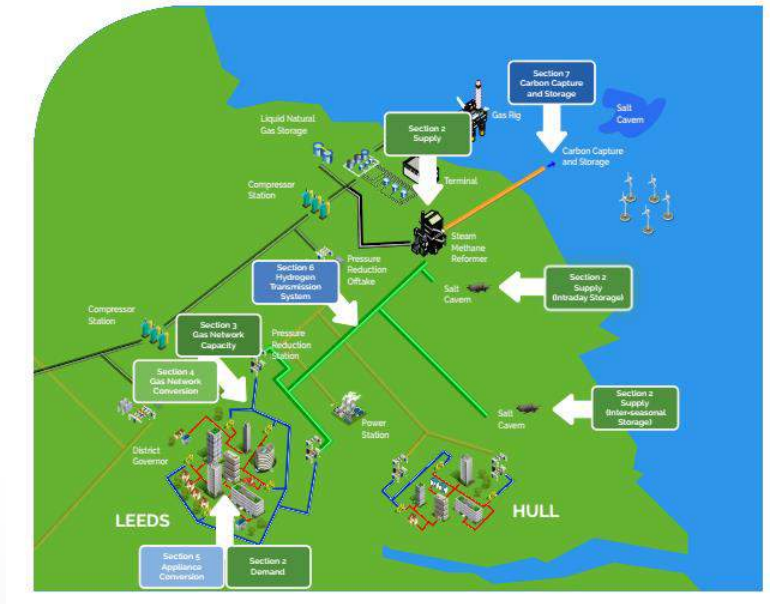
German GHG emission trend

- 1990 vs. 2015:
Emissions reduced by 27.2%
- National target is 40% reduction by 2020
- Strong decline in 1990s due to end of East German heavy industry
- No emission reduction since 2009



Leeds leading the way into the future

H21 Leeds City Gate System Schematic



**IT IS NOT
EITHER OR**

Nations Unies

Conférence sur les Changements Climatiques

COP21/CMP11

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