

European gas demand

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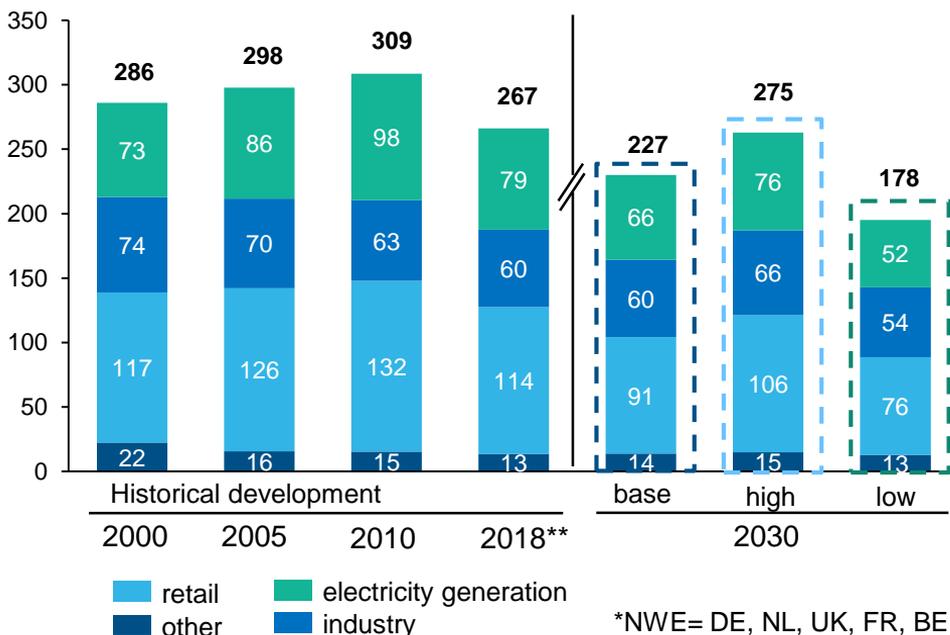
RWE

Gas demand in NWE driven by retail decrease and growth potential of power sector



Demand analysis North-West Europe*

Gas demand scenarios NWE (bcm/a)



*NWE= DE, NL, UK, FR, BE

**preliminary, estimation

Source: Eurostat 2018, RWE Supply & Trading

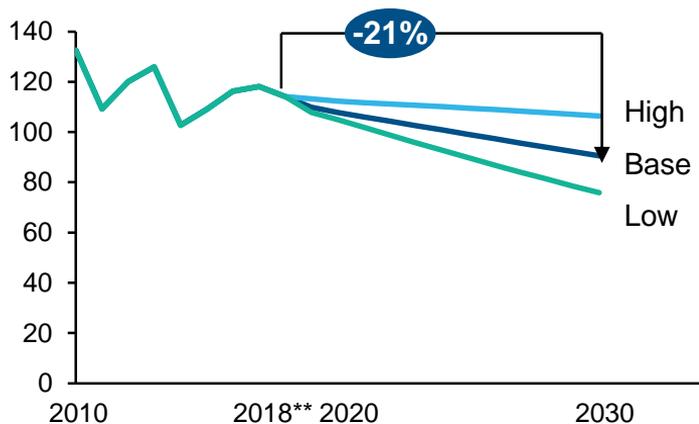
Key messages

- Structurally, total gas demand in NWE shows a decreasing trend after financial crisis; Substantial y-o-y fluctuations mostly driven by temperature
- Heating demand shows a moderate downward trend based on efficiency gains (insulation & rise of alternative technologies e.g. heat pumps)
- Industrial demand consists of gas used as energy source and as feedstock. Historical development is in line with economic deviations and efficiency gains
- Demand from electricity generation recovered lately mainly driven by increased competitiveness of gas fired generation
- Scenarios see different structural changes within different demand types but a similar trend
- Main drivers for total gas demand are the change to low carbon heating systems e.g. electrical heat pumps/ pellets and competitiveness of electricity generation based on gas in comparison to other fossil fuels (coal) and speed of RES growth

Gas in retail further decreasing - driven by efficiency and heat pumps



Gas in retail- development since 2010 (bcm/a)*



*NWE= DE, NL, UK, FR, BE

**preliminary, estimation

Assumptions and key driver

- Residential & commercial gas demand already peaked in 2003 and turned into a slight downward trend thereafter
- One reason for the turning point is progress in building insulation
- Another reason is market penetration of alternative fuel based heating systems such as wood pellets and electrical heat pumps
- Fluctuations over recent years are largely driven by temperature differentials
- Future scenarios show further decrease of residential & commercial demand driven by efficiency increase reduced by rebound effects and heat pumps
- Efficiency rate and amount of heat pumps varies between scenarios
- In a low scenario higher efficiency assumptions lead to a reduction of non-power gas demand of more than 30% in 2030
- In a high scenario, the efficiency rate is moderate and penetration of heat pumps is rather slow as alternative heating systems are only voluntary in new buildings

Regulation like new houses “free of gas” limits future gas demand in retail



North-West Europe

Regulation of gas demand

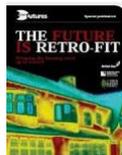


UK needs to retrofit 26 million homes by 2050 to reduce greenhouse gas emissions

NEWS

Gasverbod voor nieuwbouwwoningen officieel

Gas hobs and boilers could be banned in new h...
news.sky.com



By 2025 at the latest, no new homes should connect to the gas grid. Instead they should have low-carbon heating systems such as heat pumps and low-carbon heat networks.

De Telegraaf

DE KWESTIE: AARDGAS

Alle huizen van het gas af; kan dat wel?



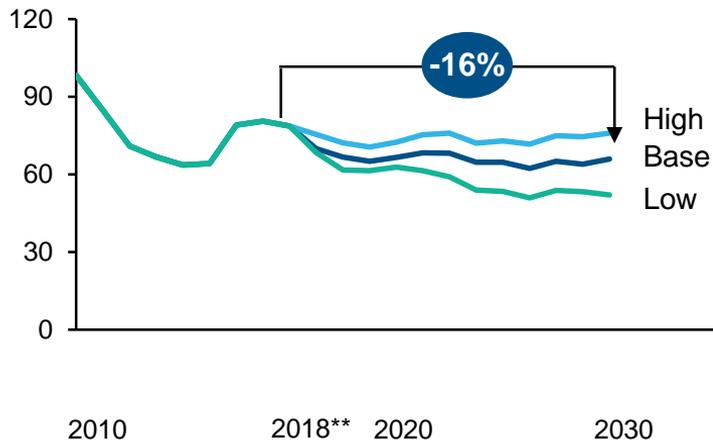
Comments

- Residential gas demand has to be reduced to reach carbon emission targets
- With regard to new houses strict regulations - more or less explicitly-ban fossil heating systems; e.g. the Dutch Klimaatakkoord aims to have 200.000 houses “free of gas” by 2030
- Still new build rates (e.g. approx. 2% in DE) are too low to ensure to meet strict emission reduction targets for the total heating sector
- With regard to refurbishment of existing houses politics shows initiatives but less concrete measures
- Strict regulation of existing houses could result in large cost burdens for a majority of house owners and tenants and is therefore usually more vague which limits the effect on carbon emissions and gas demand
- Current initiatives like “retrofitting existing homes” in UK and “renovate more than 50.000 households each year” in the Dutch Klimaatakkoord focus on refurbishment
- In total, regulation for the heating sector will reduce gas demand-but only at a low speed

Gas plants as replacement of coal mean growth potential but emission targets limit total gas demand in power generation



Total gas demand in power generation (bcm/a)



Assumptions and key driver

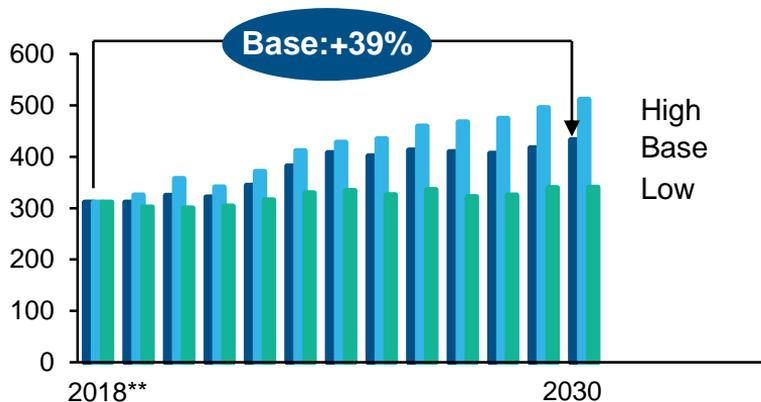
- In 2010 gas in power generation peaked; from 2011 onwards coal and EUAs became very cheap and gas fired generation became non-competitive
- Effects of renewables growth and nuke closures have approximately levelled out
- Most recent data show a change of this trend due to more competitive gas generation which led to coal-to gas switching
- An outlook on total gas demand of power generation shows a rather flat development as coal exit (DE+ NL) and reduction of nuke capacity (DE, BE+ FR) are largely compensated by an increase in renewables; emission and RES targets are met
- In the high scenario, electricity demand growth can not be balanced completely with RES generation; Quicker nuclear or coal phase-out would mean an additional upside
- In the low scenario, electricity demand is continuously decreasing @unchanged coal and nuclear capacity

Gas plants as provider of back-up drive peak demand for gas in the long-term



North-West Europe

Peak demand gas in power generation (mcm/d)



**preliminary, estimation

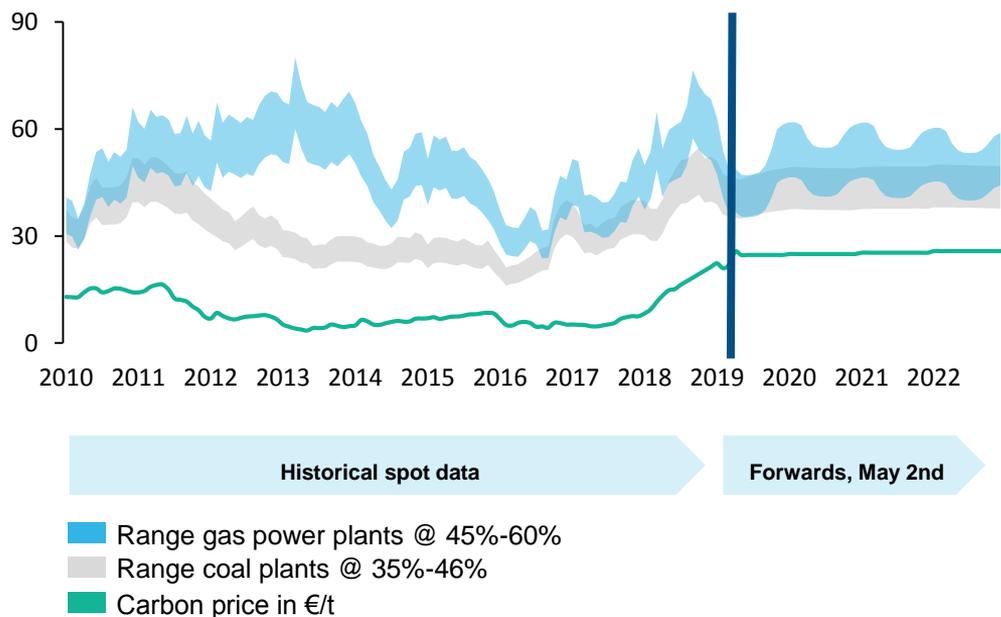
Assumptions and key driver

- An outlook on the development of future peak demand for gas shows an increase in the high and base scenario as well as a flat development in the low scenario
- More RES in the system reduce fossil power generation on an annual average
- But in times of scarcity („Dunkelflaute“) fossil power generation remains unchanged
- The trend to gas back-up generators in the electricity system increases the need for gas in times of scarcity
- Therefore the peak demand for gas will increase more than the (average) annual gas demand from power generation
- In the high scenario more electricity demand and more RES mean a higher peak demand for gas
- In the low scenario, electricity demand is continuously decreasing and less RES need less gas capacity as back-up

Gas vs Coal switching drives currently gas demand

Central Western Europe

Gas vs. coal switching in €/MWh; carbon in €/t



Assumptions and key driver

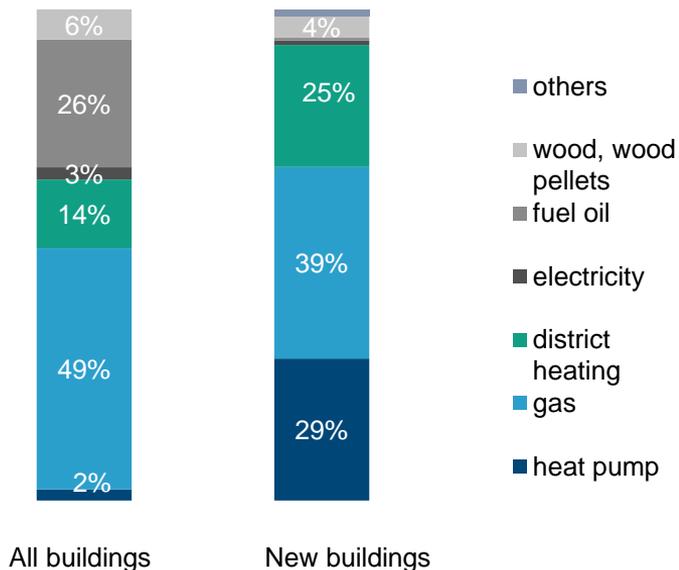
- Gas demand of power generation is driven by electricity demand and fuel prices
- Gas plants stay in direct competition to coal plants, short run marginal costs are based on fuel and carbon prices as well as plant efficiencies
- Figure shows the historical development of SRMC gas versus coal: After fuel switching in 2010 gas plants were out of money due to high gas, low carbon and coal prices
- Generation overcapacity across CWE also reduced the demand for gas generation
- In the years 2017-2019 efficient gas plants could increasingly compete with inefficient coal plants
- Current forwards show further fuel switching potential due to high coal and carbon prices

Low price scenario would drive gas demand in power sector but only to a limited extent in other sectors



North-West Europe

Share of heating systems in buildings in 2018*



Assumptions and key driver

- Lower Asian gas demand could lead to a LNG surplus in the global gas market
- Subsequently, in Europe a competition of pipeline gas and LNG would keep prices low
- Therefore a low price scenario is possible, but not all consumption reacts:
- Retail sector:** prices nearly have no impact as gas already has a high market share (e.g. nearly 50% in all German heating systems); regulation drives future replacement of heating systems in existing new buildings (e.g. DE allows gas in new buildings only in combination with RES); the only upside could be a quick ban of new oil heating systems also in existing buildings
- Industrial sector:** small price impact expected: industrial processes are usually complex and changes of energy source needs investment; a further switch from oil or coal to gas could be an upside and might be additionally subsidised to reach further carbon reductions
- Electricity generation sector:** high impact; in the long term this effect is limited by a decrease in coal capacity and decreasing need for fossil power plants in general; gas plants would mainly act as back-up

*preliminary data

Source: BDEW, 2019; Entwicklung der Energieversorgung 2018

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