

## Gas demand for power generation peaked as early as 2010

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The outlook for natural gas demand is often considered bright, especially for gas used to generate electricity. This is because gas is the cleanest of all fossil fuels. The carbon intensity of modern gas-fired power stations is less than 50% that of modern coal plants. Moreover, gas-fired units are well-suited to follow rapid swings in supply and demand due to their flexibility. In the future, these balancing tasks will become more and more important given the intermittent character of the supply of wind and solar power. Gas seems to hold out the promise of being a key pillar of the energy transition and the perfect partner of renewables. Given the EU's long-term climate policy goals, however, there is strong evidence that demand for gas for purposes of power generation peaked as early as 2010.

In 2010, gas and coal accounted for an equal share of electricity generation at 24%. By 2014, gas had decreased to 17%, while coal increased to 27%. The recovery in demand for gas for power generation therefore implies replacing coal with gas, i.e. getting a bigger slice of the cake. But one must also consider the diminishing total size of the cake.

A well-known outlook for demand is published by the association of Europe's gas grid operators, ENTSO-G.<sup>1</sup> It is used to estimate future infrastructure requirements. According to their 'Green Transition' scenario, gas demand for power generation will increase from last year's 94 billion cubic meters (bcm)<sup>2</sup> to 167-232 bcm in 2035. At present, 2010 marks the record year for gas-to-power consumption with some 154 bcm.

The report does not say anything about consumption beyond 2035. Such a forecast horizon is not unusual in the private sector, because business plans do not extend to 2050.

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<sup>1</sup> See "Ten Year Network Development Plan 2015", ENTSO-G, April 2015 (<http://www.entsog.eu/publications/tyndp>).

<sup>2</sup> See "Statistical Report 2015", Eurogas, January 2016 (<http://www.eurogas.org/statistics/>).

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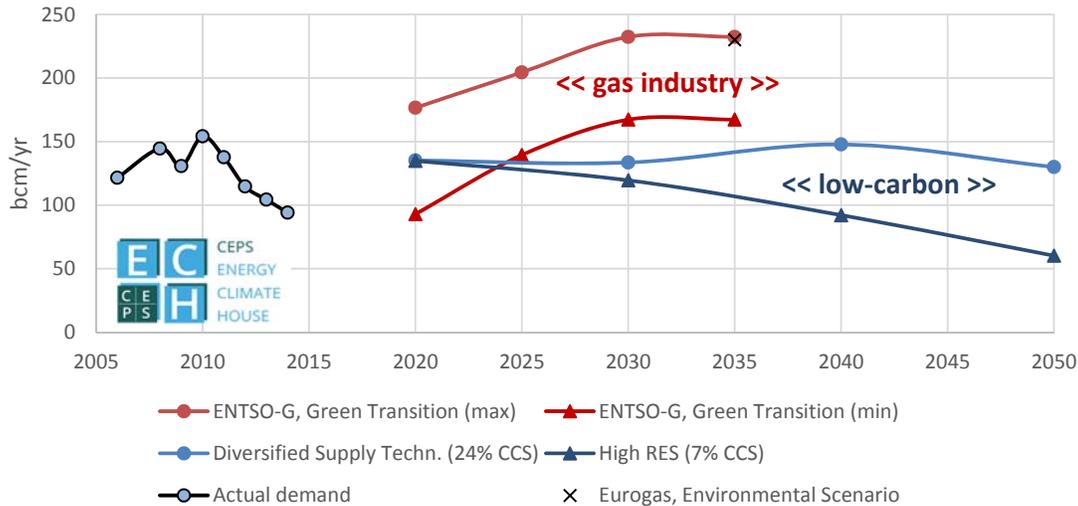


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Eurogas, a trade organisation representing the European gas industry, also projects an increase in its 'Environmental Scenario' to 230 bcm by 2035,<sup>3</sup> assuming a rebalancing of the power mix towards more renewables and gas: By 2035 the share of gas for power generation would increase to 33%, while the share of coal would decline to 6%. Renewables would cover 44% of electricity demand.

Figure 1. Competing scenarios for gas demand for power generation (bcm/yr)



But these projections should be taken with a grain of salt for at least two reasons. First, getting a bigger slice of the cake should not be taken for granted. Such a massive fuel switch from coal to gas is not going to happen in the absence of strong carbon pricing or policies targeting the phase-out of coal. Second, the pie is shrinking. Consumption of all fossil fuels including gas will have to decrease significantly, if the EU's long-term climate policy objectives of reducing GHG emissions by at least 80% below 1990 levels by 2050 are to be met.<sup>4</sup>

As stated in the EU low-carbon roadmap, an almost carbon-neutral<sup>5</sup> power sector forms the central assumption behind *all* decarbonisation scenarios.<sup>6</sup> This implies a declining use of fossil-fuel-fired power generation technologies, including gas-fired power stations. The decline could be partly offset by carbon capture and storage (CCS), a technology that captures carbon dioxide emitted by fossil-fuel-fired plants and hence would allow for a continued use of coal or gas. Yet, even in the EU's low-carbon scenario with the highest share of CCS (24% of EU power generation), gas demand would not rise above 150 bcm and therefore would remain below the 2010 peak (see Figure 1).

Such a scenario would require that CCS reaches technological maturity and becomes economically viable, which is currently not the case. Given the lack of CCS demonstration

<sup>3</sup> See "Long-term Outlook for Gas to 2035", Eurogas, October 2013 ([http://www.eurogas.org/uploads/media/Eurogas\\_Brochure\\_Long-Term\\_Outlook\\_for\\_gas\\_to\\_2035.pdf](http://www.eurogas.org/uploads/media/Eurogas_Brochure_Long-Term_Outlook_for_gas_to_2035.pdf)).

<sup>4</sup> See "A Roadmap for moving to a competitive low carbon economy in 2050", Communication from the Commission COM(2011) 112 final, 8 March 2011.

<sup>5</sup> GHG emissions of the power sector would have to be reduced by some 95% below 1990 levels.

<sup>6</sup> See Commission Staff Working Paper Impact Assessment accompanying the Communication from the Commission, Energy Roadmap 2050, SEC(2011) 1565 Parts 1 and 2, 15 December 2011.

projects worldwide, one could argue that it is optimistic to assume that CCS could capture a market share of 24%. Other low-carbon options could be diffused more rapidly, displacing CCS. In the EU's low-carbon scenario with less CCS (7% of EU power generation), gas demand would even decrease to 60 bcm by 2050, which is less than the eight-year low reached in 2014. Hence, considering 2050 objectives, it is reasonable to assume that demand for gas for purposes of power generation has already peaked in 2010.<sup>7</sup> Gas will simply not displace coal-fired generation in the absence of targeted carbon pricing. Moreover, the share of both coal and gas will have to decrease more strongly than indicated by the industry to reach the EU's climate policy objectives.

### **Without gas, how would the power system be balanced?**

A phase-out of fossil-fuel-fired generation is often equated with a power system running 100% on solar and wind. Such a conclusion, however, is overly simplistic and wrong. Hydro power and biomass will continue to account for a significant share of installed capacity, e.g. 13-14% by 2050.<sup>8</sup> Similar to gas, these technologies are also considered flexible and therefore well-suited to follow rapid swings in demand and supply, thereby compensating for the intermittent availability of wind and solar. But it is also true that if we want more renewable electricity and less fossil fuels, we have to find smarter ways of storing and using power. Driven by price signals, the demand side could react to the availability of intermittent sources, e.g. by partially reducing consumption on a cloudy, windless day. Low-cost storage would allow for this adaptation without a loss of comfort. Gas turbines would still be part of such a system but they would increasingly be used as a measure of last resort (back-up). Already by 2030, 50% of conventional capacity would be on standby 80% of the time, i.e. not producing and hence not emitting carbon dioxide. Utilisation will further decrease towards 2050, thus implying very low GHG emissions despite a substantial amount of gas turbines, which is consistent with running an almost carbon-neutral power sector.

### **What does this mean for overall EU gas demand?**

A declining trend of gas demand for power generation does not allow any firm conclusions to be drawn as regards overall gas demand. In 2010, the power sector amounted to almost 30% of total gas demand. In 2014, it amounted to 23% of total demand with residential/commercial consumers and industry accounting for 41% and 33%, respectively. Hence, the power sector still represents a significant share of overall gas consumption. In the public debate, an increase in gas demand for power generation is often mentioned as the reason for an increase in total demand.

Yet, this analysis suggests that the power sector will not act as a driver of growing gas demand, because gas will not replace all coal-fired generation and the consumption of all fossil fuels will have to decrease. Combined with the limited evidence for growing gas demand in other sectors, it is uncertain whether there will be a significant increase in total gas demand. It is time that policy-makers have another look at the projections for gas demand.

<sup>7</sup> Still, compared to last year's low of 94 bcm, a slight recovery of gas demand until 2030 would be consistent with the EU's low-carbon objectives.

<sup>8</sup> See Commission Staff Working Paper Impact Assessment accompanying the Communication from the Commission, Energy Roadmap 2050, SEC(2011), op. cit.