nationalgrid

Two Degrees

A Future of Gas Programme Sensitivity

This is the first of three publications which set out divergent views of the future energy landscape. Given the uncertainty which exists around the future of gas, they have been produced in order to support our testing of a broader range of possible uncertainties and what might need to happen to reach the 2050 carbon reduction goals. They are not intended to provide a National Grid view of what the future energy landscape will look like, but are intended to facilitate debate and test the boundaries when considering what the future of gas could look like.

Background

Two Degrees is one of the four core Future Energy Scenarios. It assumes high levels of prosperity and economic growth. Consumers make conscious choices to be greener and can afford technology to support it such as home energy management systems, low carbon heating and insulation.

There is a collective ambition to decarbonise the economy and high taxes are levied on those who continue to use carbon intensive options. This ensures progression towards the long-term green ambition.

Alongside a drive to make transport greener, technology and investment are focused on low carbon generation, particularly solar, wind and nuclear generation. Investment in gas innovation is also present as we look to produce more biomethane as well as other green gases.

From a gas demand perspective, this scenario represents our 'mid-case' when compared with the High Electrification (low-case for gas) and Decarbonised Gas (high-case) sensitivities.

The Journey to 2050

In 2020, gas still makes up a quarter of annual electricity generation, however this is set to change with the contribution of renewables & electricity interconnectors set to grow strongly. Overall, gas demand is still relatively steady, as ahead of the prosperous and environmentally conscious society beginning to deploy electric heat pumps in high numbers as the decade progresses.

By 2030, high economic growth is the driving force behind strong electricity demand growth. To support this, nuclear development continues post Hinckley C. Electric heat pumps continue to deploy in high numbers due to strong government incentives & a positive consumer environment.

Gas demand is declining, made up of 68% imports, with 40% of the total supply from Norway and LNG growing in the mix. Carbon Capture and Storage (CCS) regulations have been established, business models implemented and a number of sites deploy throughout the 2030's, supporting the nuclear baseload and intermittent renewable generation. By 2035, the GB electricity supply is largely decarbonised; through wind, solar, nuclear, interconnection and CCS enabled gas , however some unabated gas stations are still present providing necessary flexibility.

Gas supply in 2040 is made up of 90% imports due to a depleted UK Continental Shelf, with the remaining 10% coming from green gases. Reduced demand, highly distributed supply patterns and high levels of volatility mean that the operation of the NTS has become increasingly challenging. The continuing decarbonisation of heat alongside a decline in gas fired generation means that overall gas demand reduces to around 65% of its 2016 figure. Our roads have also changed significantly, with only electric cars being sold to consumers. Gas plays a role here too, with all HGVs either gas or Hydrogen fuelled, contributing around 34TWh of additional demand.

By 2050 the goal of an 80% reduction in carbon emissions compared to 1990 levels has been achieved. Nuclear and wind dominates electricity supply, with 10GW electric storage capacity on the system. Consumers have largely moved away from gas as a heat source, with more than 23 million heat pumps in operation.

Gas demand is down by around 40% compared to 2016 levels, with most domestic heating demand having been lost. However commercial demand has remained relatively steady across the period and the transport sector has provided growth. Hydrogen vehicles are increasingly common, with 20% of gas demand now coming from this sector.

Summary

In two degrees the GB electricity sector is the primary source of growth, as consumers move away from gas based heating towards electric heat pumps supplied by clean generation sources including CCS. However the gas market plays an important balancing role in heat and power, alongside supporting the growth of low carbon transport and Hydrogen.

If you would like to discuss anything contained in this document, or discuss the Future of Gas programme in general please get in touch with Justin Goonesinghe directly or contact us via our website.