Shaping Our Energy Future: Energy Demand

1. Introduction

Reducing energy demand plays a key role in any secure energy future. It reduces import dependence and exposure to volatile global energy markets, and reduces environmental pressures [1] [2]. It also contributes to emissions reductions. Increased energy productivity implies greater economic benefit per unit of energy consumed.

2. Current energy demand

The total amount of electricity consumed by UK households has been growing by around 1.7% per year since the 1970s. This is set against an overall downwards trend in households' total energy demand (the bulk of which is fuel for space heating) since the early 2000s. Total energy consumption by UK industry has also been falling since 1980 [3].

The breakdown of fuels used to provide the energy consumed in Scotland is given in Figure 1[1].

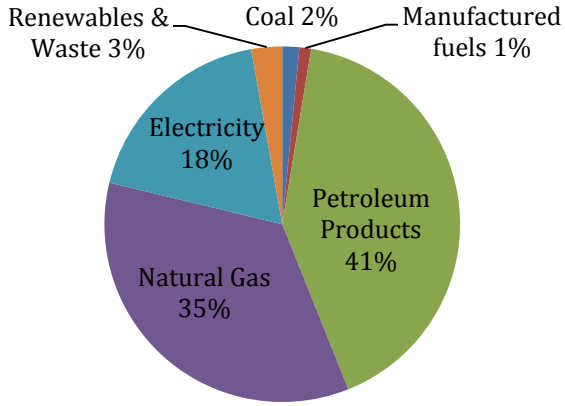

Figure 1. Scottish final energy consumption in 2009 by fuel type (source: DECC, 2011 [4]).

Energy use in homes accounts for 35% of Scotland's total energy consumption [5]. The average household demand in Scotland is greater than the UK as a whole mainly due to the relatively harsher climate, while total consumption has been growing due to the rising number of households [5].

Total electricity consumption in Scotland was 33.6 TWh in 2010. Figure 1 provides an indication of the electricity generation mix in Scotland. However, Scotland is a net exporter of electricity, with 20.8% being exported in 2010 [6].

3. Energy efficiency

The UK as a whole has been assessed as having the highest energy efficiency score amongst 12 of the world's largest economies. The UK's energy productivity was over $17,000 dollars of gross domestic product (GDP) per tonne of oil equivalent consumed as primary energy. This is high compared to other economically developed nations [7].

[1] Despite only representing a small component of overall energy demand, 'electricity' is sometimes confused with 'energy' [21].

In 2009 Scotland saw a 9.6% reduction in energy consumption against the 2005-07 baseline years, to 142.7 TWh. The extent to which this was due to the economic downturn is unclear [8]. The reduction in energy demand over this period can be seen in Figure broken down by demand sectors into industrial & commercial, domestic and transport. The figure also shows the total Gross Value Added (GVA) for Scotland with constant base prices, suggesting that not all the reduction may be due to the economic climate. Indeed, energy productivity, measured as the level of GVA per GWh of final energy consumed, has increased in Scotland by approximately 18% between 2005 and 2009 [9].

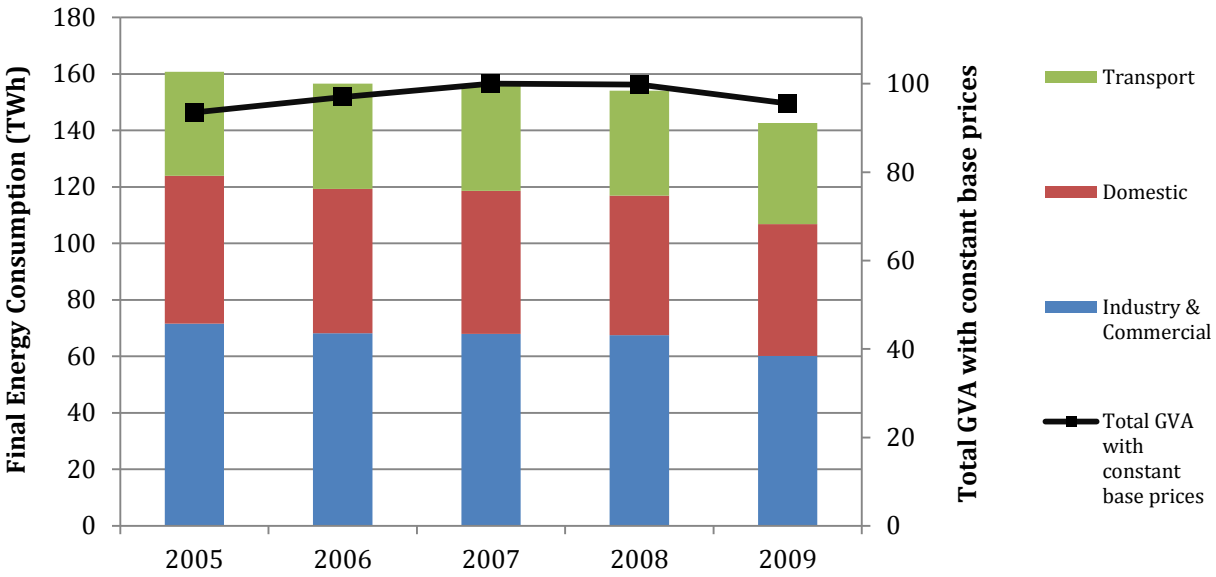

Figure 2. Scottish final energy use by demand sectors (source: DECC, 2011 [4]) and Scottish GVA with constant 2007 base prices (source: The Scottish Government, 2011 [10]).

4. Future energy demand

The Scottish Government's Energy Efficiency Action Plan (EEAP) targets a reduction in Scottish final energy consumption of 12% by 2020 from 2005-07 levels, to a revised figure of 138.9 TWh [8]. In existing homes, the greater part of energy consumed is used for space heating. Thus measures that increase heating efficiency in existing dwellings are important for achieving energy targets [5]. The Scottish Government has published a list of measures to increase energy efficiency in the domestic, business and transport sectors [2].

4.1 Electricity demand

Predictions of growth rates in Scottish electricity demand, from 2010 levels of 34.2 TWh are low: between 0.3% and 0.5% until 2030, reflecting the anticipated drive to increase energy efficiency [11]. These low projected growth rates imply that electricity demand does not recover to pre-recession levels until beyond 2015 [11]. Figure 1 shows one scenario of future Scottish electricity demand to 2030, set against an indicative generation mix that could broadly achieve the Scottish Government's 2020 renewables target [12].

Predictions for the UK as a whole are similar, due to low forecasts of GDP growth [13]. The National Grid estimates that UK electricity demand, in the Gone Green scenario, will rise slowly from 310 TWh in 2011 to 345 TWh in 2030 [14]. However electricity demand has been predicted to rise in the longer term as greater use is made for transport and heat [15], possibly even doubling by 2050 [16].

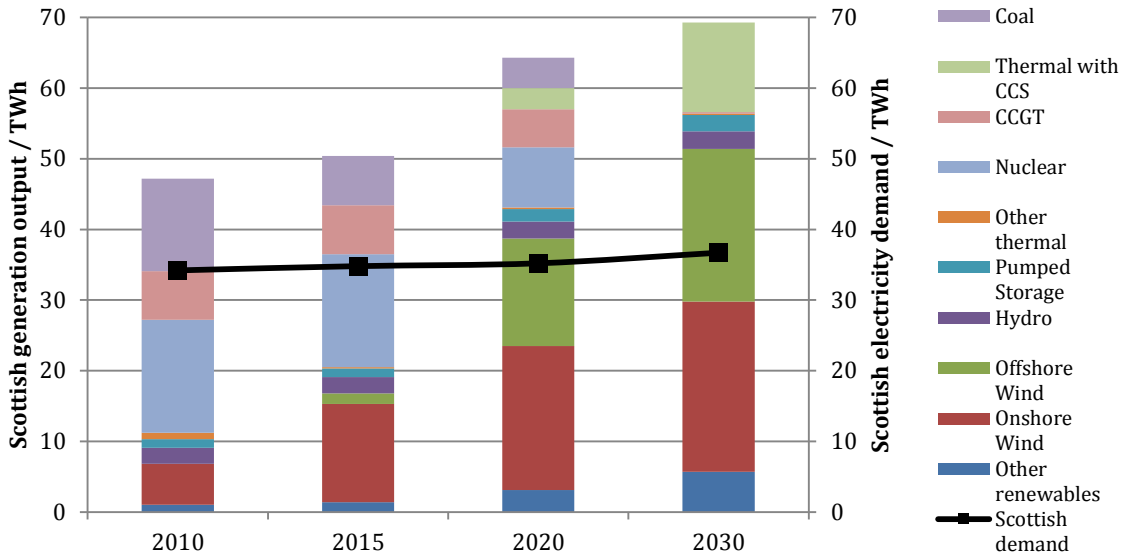

Figure 1. Scottish electricity demand and generation mix (source: Sinclair Knight Merz, 2011 [11]).

4.2 Demand for heat

The Scottish Government's Renewable Heat Action Plan [17] sets a target of delivering 11% of the projected 60.1 TWh of heat demand in 2020 from renewable sources. In 2010, renewable heat output in Scotland was 1,696 GWh, or 2.8% of the forecast heat demand in 2020 [18]. UK heat demand is projected to fall from 740 TWh to 650 TWh in 2020 [14].

4.3 Demand in transport

In Scotland – as for the UK as a whole – personal transport fuel demand has been decreasing, dropping 7.3% over the period 2005 to 2010. This is the result of increased personal vehicle efficiency, as personal road miles have increased by 0.5% over the same period. Freight consumption rose by 6.2% and freight miles increased by 6.9% from 2005-2010. This partially offset the personal fuel demand decrease, to give a total transport fuel decrease of 2.7% [19] [20].

Scotland has a target of 10% for the share of biofuels in transport petrol and diesel consumption by 2020. Biofuels were 3.6% as a percentage of road fuels consumed in the UK in 2010, rising from 2.9% the previous year [9]. Total demand for energy in the UK transport sector has been suggested to continue to fall gradually from 700 TWh to 560 TWh by 2030 [14].

5. References

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