

Residential hot water supply

Heating water for domestic purposes consumes about 28% of total residential energy requirements (2010 estimates) (EDMC, 2013). Current electrification rate for water heating is quite low, just over 13%. In recent years, the installation rate of high efficiency water boilers using heat pump techniques such as Panasonic's "EcoCute" is attracting attention, but its diffusion rate is still negligibly small today.

Several factors (described below) that affect domestic hot water energy use have been considered in the Low Carbon Navigator:

Installation of Home Energy Management System (HEMS)

Level 1 assumes that no HEMS is installed in the households and thus no energy demand reduction takes place. **Levels 2, 3 and 4** assume domestic hot water energy demand reduction at 7%, 9% and 10% rates respectively, thanks to progressively higher rate of HEMS installation with more advanced energy management features.

Choice of technology

Under **Level 1**, half of hot water is supplied by advanced gas boilers. In **Level 2**, gas-fired fuel cogeneration replaces gas boilers. Electric heat pumps share remains relatively low at 10% in both **Level 1** and **Level 2**. However, major electrification

takes place under **Level 3**, where half of hot water is supplied by electric heat pumps. **Level 4** assumes that these electric pumps supply 70% of domestic hot water.

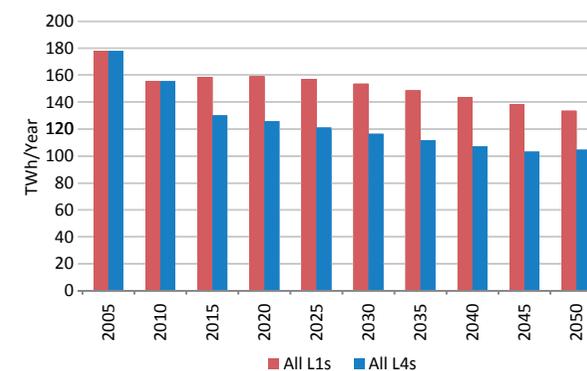
Energy efficiency of appliances

Energy efficiency is not assumed to change over time under **Level 1**. In **Level 2**, COP for heat pump/electricity increases moderately. This trend is also assumed for **Levels 3 and 4**. Overall, FC cogeneration technology increases over time. Efficiency for electricity generation FC cogeneration increases substantially in **Levels 2, 3 and 4**. Energy efficiency of conventional electricity boilers does not change across the levels but increases for kerosene and gas boilers.

Solarthermal boilers

At **Level 1**, the current number of 2.4 million units of solarthermal boilers is installed in 2050, which is about 5% of total households in 2050. In **Level 2**, solarthermal boiler installations count 14 million units in 2050, which is more than 30% of total households in 2050. Similarly, in **Levels 3 and 4**, boiler installations increase to 21 million units (45% households) and to 26 million units (55% of total households).

Figure 1 Residential hot water energy demand



Note: Society scenario is set at R&D under both all L1s and all L4s scenarios.

Source: Authors.