Mapping & Benchmarking: Combined fridge/freezers

Total consumption Scenario based on submitted data.

Scenario results

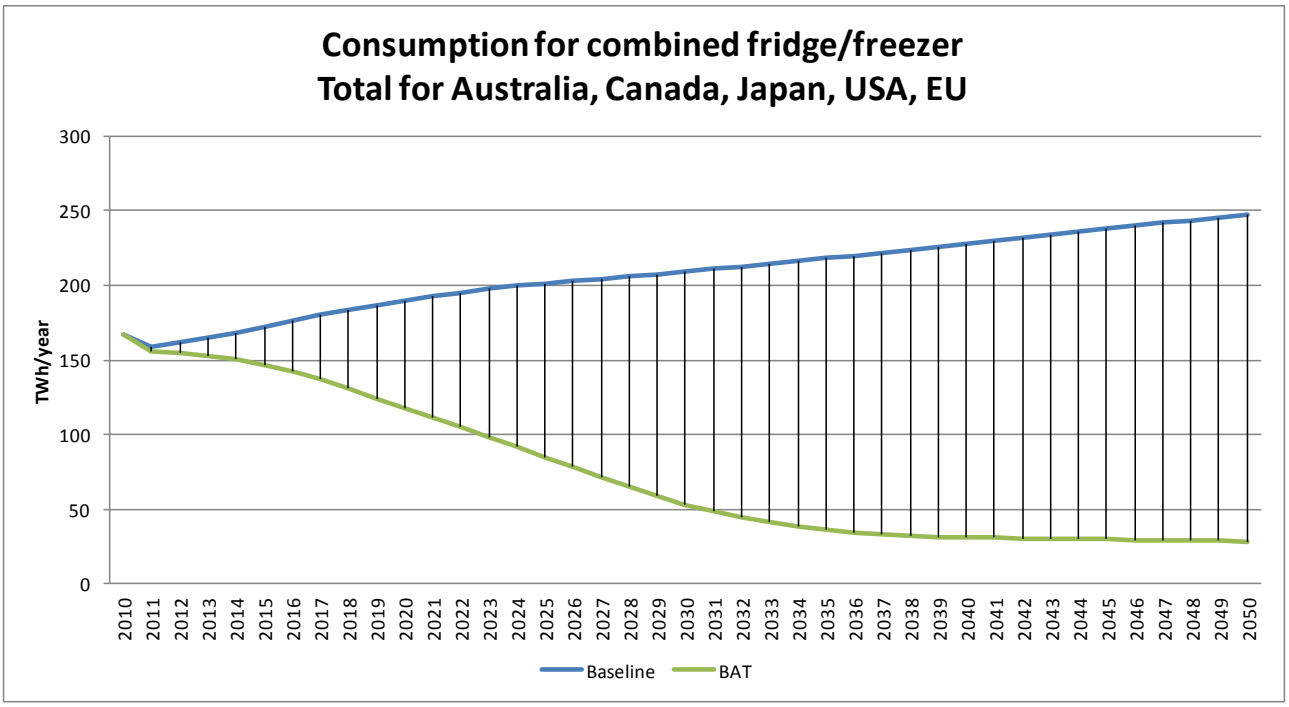

Figure 1. Total consumption for combined fridge/freezer.

Baseline scenario

The projection driver is by default the GDP affecting the total stock in the region. From this, the total sales and sales distribution on efficiency classes are deduced year by year, following the criterions set up in the spreadsheet regarding technology life span, sizes and natural development in sales distribution. Finally, from the sales distributions, the individual efficiency class stocks are deduced, to provide for the calculation of total consumption.

BAT scenario

This scenario shows the estimated effects of coercing sales towards BAT as it evolves over time, where current BNAT is expected to be best available technology towards 2050, i.e. BAT's not available today, but is assumed to enter the market. The estimations of the efficiencies have been carried out by Technological Institute of Denmark. A report on the work is available. Some key assumptions are:

- The COP that has been used for the cooling system is based on a 40 % Carnot efficiency. This has been assumed on the basis of a modern compressor is installed in the cooling system.
- It is assumed that due to research and development in the near future the Carnot efficiency of the cooling system will steadily increase from 40 % to 65 % by the year 2050.
- It is assumed that the insulation within the doors and cabinets comprise of 0% VIP (Vacuum insulated panel) panels and slowly increased to 55 % by the year 2050. It is assumed that only a 55 % substitution of the currently used polyurethane is plausible due to the weakening of the structural integrity of the units, meaning that a fridge/freezer will not be able to support itself if the VIP panels are not surrounded with polyurethane foam.
- Due to the relatively high cost of the VIP panels, it is assumed that in the future, the manufacturers will be given economic or political incentives to develop more energy efficient product and therefor implement VIP.
- The insulation thickness of the doors and cabinets are based on measurements of products that represent the average of that type of unit.

Comments

The total consumption in the Baseline is seen to increase slowly towards 2050, in spite of assumed improvements in energy efficiency of the bought refrigerators. This is due to growing sizes of the appliances as well as growing stocks.

The BAT scenario shows an alternative development, reducing the total consumption by around 50 TWh per year already in 2020, compared to Baseline. An accumulated saving from 2013 towards 2050 of no less than 5430 TWh can be achieved.

Remediations of data

Australia, Canada, Japan, EU:

- Canada: only total stock of refrigerator and freezer is provided: assumed the whole of refrigerator stock is combined fridge/freezer. Sales estimated to fit provided stock.
- No sales split by efficiency classes provided: assumes same pattern as Australia
- No sizes split by efficiency classes provided: assumes same pattern as Australia, scaled to fit the average size for Australia/Canada/Japan

In general:

- linear interpolations and extrapolations are done to cover single holes in data series