# HNIP main scheme clarification

## Counterfactual technology note

Triple Point
**HEAT NETWORKS**
INVESTMENT MANAGEMENT

## Counterfactual technology note

As part of the assessment process, Triple Point Heat Networks Investment Management compare the Social Net Present Value (SNPV) your project against the SNPV of the counterfactual technology for the scheme's customers. The counterfactual technology is the heating technology that would have been used by the customer in the absence of the heat network. The SNPV Calculation incorporates the evaluation of the equipment and running costs plus the evaluation of greenhouse gas and air quality damage costs.

The Financial and Economic Appraisal Model (FEAM) requires the selection of a counterfactual technology in the "FEAM Demand Inputs" sheet by customer for Heat and Cooling demand. The inputs are required at a customer/building level (per the Demand input sheet) as the counterfactual technology choice may be different for different customers or buildings. The current version of the FEAM has eight counterfactual technology types:

- Gas boiler,
- Electric heating,
- Oil boiler,
- Biomass boiler,
- Gas Combined Heat and Power (CHP),
- Air source heat pump,
- Ground source heat pump, and
- Water Source heat pump.

The key metric for sizing the counterfactual calculations for residential customers is the number of individual units. For commercial customers it is the annual demand (to allow for scaling from small to large installations).

We have adopted this approach because evaluation of the HNIP pilot indicated that applicants struggled to produce sufficiently detailed, comparable data for the counterfactual scenario. This made making a consistent comparison across projects more difficult. Thus, for the HNIP main scheme assessment process, we have adopted a deemed counterfactual approach. This utilises standard values for the costs and performance of gas boilers and other counterfactual heating technologies within the calculation of carbon savings.

The applicant is required to select the appropriate counterfactual technology type from a pre-defined drop-down list next to each customer type demand input. The counterfactual will then be generated by the FEAM based on standard BEIS assumptions and data collected from applicants in the HNIP application form. Below we outline the assumptions used in the FEAM in relation to these counterfactuals.

The FEAM references a comprehensive suite of data because it has to allow for a wide range of technologies and fuels across the whole range of applications. Primarily, the FEAM uses the BEIS published guidance which outline the rules for valuing energy usage and greenhouse gas emissions.

## EQUIPMENT AND RUNNING COSTS

An expected equipment cost (capital expenditure and replacement expenditure) and expected life has been determined from a review of the pilot projects and other public information. The costs for commercial installations have been converted into a standard cost per kWh to allow for the costs to scale for different sized schemes. The same process has been followed for Operating and Maintenance Costs.

## EMISSIONS FACTORS

Valuing energy use and greenhouse gases is vital to ensure government takes full account of climate change and energy impacts when appraising and evaluating public policies and projects. TP Heat Networks takes this approach when assessing potential projects.

The model puts a price on the carbon emissions and the air quality damage associated with the project. For most projects, we use BEIS published data on emissions factors and use the damage cost calculations outlined in the Green Book[1]. However, for projects fueled by CHP, we use the bespoke natural gas CHP analysis emissions factors. We have used the same source data as the HNDU recommend for the annual company reporting for GHG emissions factors[2], however the FEAM utilises the forecast values and not just the current year's metric.

## ENERGY PRICES

To compare the proposed project against the counterfactual to ensure no consumer detriment, we calculate the expected cost of energy based on published BEIS Green Book projections. We also take into account regional domestic price variations.

The Green Book energy cost price forecasts are updated annually and for each HNIP Funding Round the FEAM is updated to use to the current figures. For the real energy prices specifically, the FEAM uses the data included in the following tables which can be found here.

- Table 4 Retail Electricity Prices (real p/kWh)
- Table 5 Retail Gas Prices (real p/kWh)
- Table 7 Retail Oil Prices (real p/kWh)

In addition to the real retail energy prices, the FEAM also considers the Long-Run Variable Costs of energy supply (LRVCs). The LRVC is used instead of the retail energy price, because energy prices include:

- fixed costs that will not change in the long run with a small sustained change in energy use,
- carbon costs, since these are valued separately, and
- taxes, margins, and other components which reflect transfers between groups in society.
- Supply costs vary by fuel, category of end user, and over time because each fuel has different energy demand profiles and networks costs, which vary over time.

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1 Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal
https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal
2 https://www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis

These are found in the below tables which can be viewed online here.

- Table 9 Electricity LRVC (real p/kWh)
- Table 10 Gas LRVC (real p/kWh)
- Table 12 Oil LRVC (real p/kWh)

The below table summarises the sources used for each model input. Further information about the Treasury's Green Book which provides rules for valuing energy usage and greenhouse gas emissions within government can be found here.

| MODEL INPUT | SOURCE |
| --- | --- |
| GDP deflator index | https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal (Table 19) |
| RPI and CPI forecasts | https://obr.uk/forecasts-in-depth/the-economy-forecast/inflation/ |
| Emission factors detailed by source and fuel | http://naei.beis.gov.uk/data/ef-all?q=107134 |
| Air quality damage costs from primary fuel use | https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal (Table 15) |
| CHP emissions factors | https://www.gov.uk/government/publications/bespoke-natural-gas-chp-analysis |
| Energy prices | https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal  (Tables 9-12) |
| Annual regional domestic price statistics | https://www.gov.uk/government/statistical-data-sets/annual-domestic-energy-price-statistics |

Get in touch with enquiries@tp-heatnetworks.org for further information.