COGENERATION OBSERVATORY AND DISSEMINATION EUROPE

Work package 3 introduction

Work package 3 'Comparison of member state approaches' provides standardised cogeneration plant scenarios providing a theoretical financial assessment of the investment case with and without financial support mechanisms provided in each Member State (MS) under the EU Cogeneration Directive.

Each MS, as part of their implementation of the Cogeneration Directive, must ensure that support for cogeneration is based on meeting useful heat demand and delivering primary energy savings compared to separate heat and power generation. It is, however, very difficult in the abstract to anticipate the actual stimulus that will be achieved in the market and whether removal of the identified barriers will in itself be enough to improve the take-up of cogeneration. Barriers, support mechanisms, finance, economic climate, and wider policy can result in an apparently favourable set of policy instruments having no real effect on implementation.

The standard tool used by commerce and industry to evaluate whether or not an investment may be worthwhile is the Internal Rate of Return (IRR) and simple payback periods. It incorporates, in a transparent but consistent way, effects such as cost of capital, competing investment opportunities, and actual support in specific circumstances. The analysis models an anticipated rate of return on investment which to base the investment, and compare the investment across member state boundaries.

At the project outset three cogeneration scenarios were originally considered; a 50kW and 1MW gas engine and 50MW combined cycle gas turbine (CCGT) CHP. In consultation with the regional project partners and the Commission, these were revised and extended in the early stages of the project to; 50kWe gas engine CHP, 1MWe gas engine CHP, 1MWe diesel (gas oil) engine CHP, 12MWe coal fired heat recovery steam turbine CHP, and 66MWe CCGT CHP. These sizes and fuel types represent a range of real life plant and the 12MW and 66MW in particular were specified using plant design software GT pro. To create a basis for comparison it has not been possible to capture the reality in every MS.

It is important to note that whilst biomass fuelled cogeneration is a significant energy conversion technology in a number of MS; it was beyond the scope of this project to model a range of biomass scenarios. It is recommended that this be modelled as a subsequent project.

Assumptions

To ensure an equal basis for comparison, a number of assumptions have been made in these theoretical models of construction and maintenance. These are as follows:

- 2007 price data were used throughout (thereby ensuring complete dataset available) this includes the effect of EU ETS modelled as at 2007. Originally 2009 data was used.
- Data supplied directly from MS were the preferred source, but where this was not available published (fuel electricity and tax data) Eurostat or International Energy Agency (IEA) data were sought. Where construction and maintenance costs were not available UK sourced data were used
- The cost of land purchase was not included within the model
- An assumed weighted average cost of capital (WACC) was modelled at 8%
- Benefits and financial support mechanisms were spread across each operating year until the support finished. In some cases support at the beginning of the year is higher (to help address capital costs) and this falls with increasing cumulative output. The model was not sufficiency refined to address this.
- Writing down allowance (WDA) standardised at 13% across all MS
- All electricity modelled as used on site with the exception of the 66MW which is modelled to export 60% electricity
- The plant life was modelled to be 20 years

- Where electricity wholesale price data were not available, the wholesale price was calculated to be 70% of the industrial supply price based on the ratio between UK Government long term industrial supply and wholesale price data.

Methodology

The analysis was undertaken in the following stages:

- Five plant scenarios agreed with CODE project team (Cogen Europe and project leaders detailed below)
- IRR calculation spreadsheet developed and tested for UK
- Data input template sent to CODE regional leaders (CHPA UK, HACHP Greece, Anima Italy and Jožef Stefan Institute Slovenia) to gather data from individual MS
- IRR calculations undertaken by CHPA and where data not available from MS, remaining input data sourced from Eurostat and IEA
- Calculation sheets returned to MS via regional leaders for approval
- Two page country written descriptions of calculations written by CHPA and sent to MS for approval
- Regional overviews written by regional project leaders
- European overview written by Cogen Europe

Work package deliverables

- D3.1 Country IRR calculations and reports x27
- D3.2 Region comparative reports x4
- D3.3 European overview of results
- D3.4 Case studies for handbook

Possible futures uses for the IRR calculation spreadsheets

- Model specific engine sizes, more relevant to a given MS situation
- Model outputs for other countries
- Refine modelling to date
- Model changes in tax, support and legislation
- Model biomass / bioenergy support
- Model differing export scenarios
- Examine support effects on cost inflation by supply chain