



COGENERATION OBSERVATORY  
AND DISSEMINATION EUROPE



# Analysis of financial benefits of cogeneration investments in different EU Member States based on IRR calculations

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# Agenda

- The CODE project
- Potential from Member State reports
- Financial analysis - methodology
- Financial analysis - results
- Best practice - examples
- The untapped potential

# The CODE Project

<http://www.code-project.eu>

## Aims:

- Early assessment allows for improvement of the Directive
- Develop regional knowledge bases to facilitate market development.
- A central database of European cogeneration policy
- A regional systematically review and report on the Member States progress.
- Comparisons between the 27 national policy approaches against standard test cases.

**All results feed in to the European Cogeneration Roadmap leading to 2020.**

# The CODE Regions

## Eastern Europe

Czech Republic, Estonia, Hungary, Latvia, Lithuania,  
Poland, Slovakia, Slovenia

## Northern Europe

Austria, Belgium, Denmark, Finland, Germany, Ireland,  
Netherlands, Sweden, United Kingdom

## South-Eastern Europe

Bulgaria, Cyprus, Greece, Romania

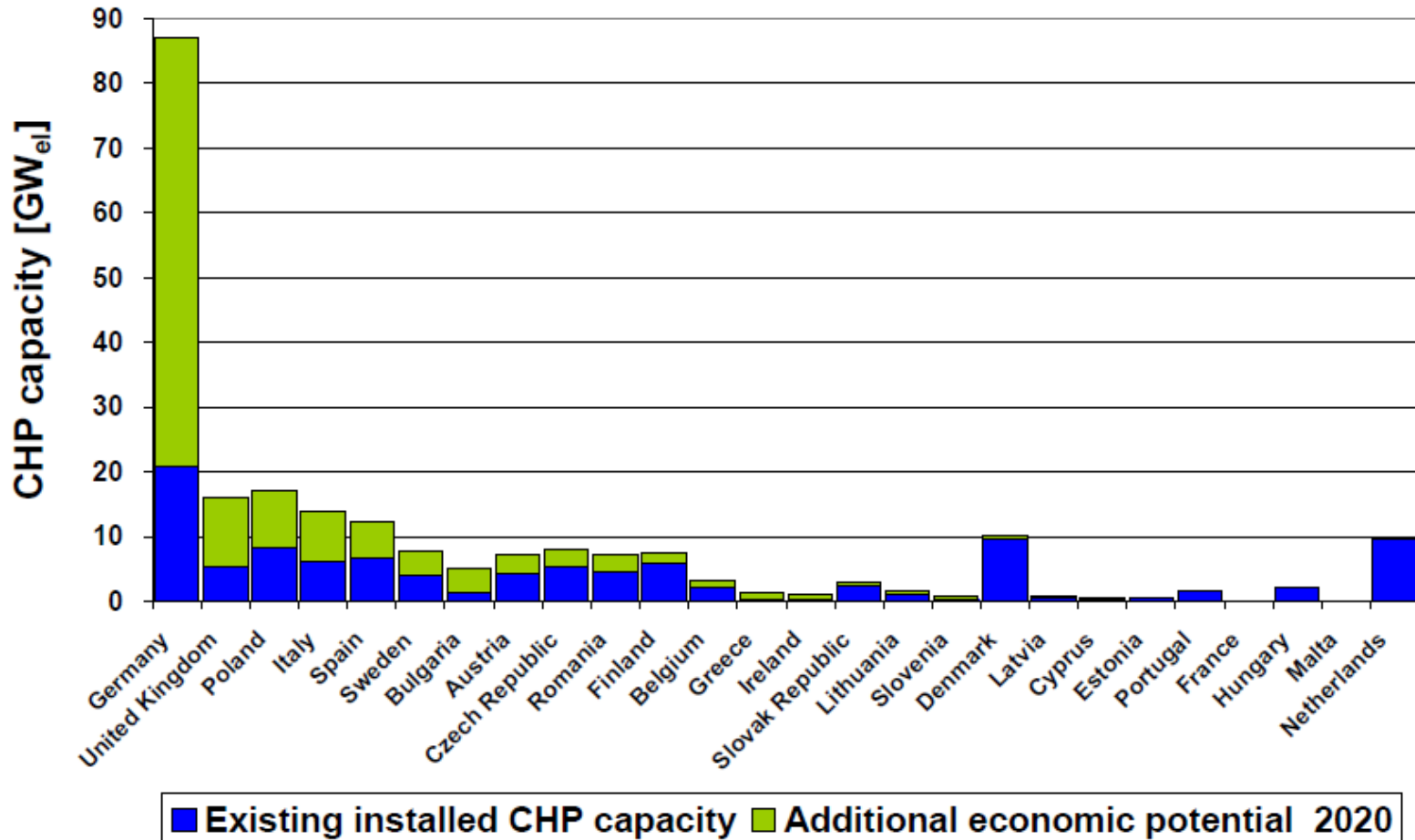
## South-Western Europe

France, Italy, Luxembourg, Malta, Portugal, Spain



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# Potential from MS Reports economic Vs existing capacity



# Financial Analysis Methodology

Comparison of MS support modelled through calculation of IRR of a group of CHP projects:

|                                     |                |  |               |  |              |
|-------------------------------------|----------------|--|---------------|--|--------------|
| <b>Notional Electrical capacity</b> | <b>50kWe</b>   | <b>1MWe</b>  | <b>1MWe</b>   | <b>12MWe</b>   | <b>66MWe</b> |
| <b>Primary generator</b>            | Gas engine     | Gas engine   | Diesel engine | Coal turbine   | CCGT         |
| <b>Typical use</b>                  | Community Site | Commercial Installations: power, space heating and hot water |               | Industrial sites with need for high grade heat (steam) |              |

# Methodology

- Fossil plant only
- Standardised running profiles for CHP plant
  - Smaller plant 4000 hours, larger plant 8000
- Standardised export/onsite ratio
  - All onsite power generation use except for 60 MW
- All plant with a 20 year life
- Data sourced from regional leaders and published data – 2007 data
- Government support smoothed across a year

# Results Summary

- Most MS have some support for CHP
  - Ireland is particularly weak
  - Belgium (Flanders), Spain and Germany are particularly strong
- Some support has changed since the modelling
  - Netherlands
  - Flanders
- The stage of market liberalisation influences scheme design
  - More liberal market support mechanisms are more complex



# Financial Analysis

## MS Support Schemes

| Country               | Tax support | Feed in tariff | Certificate scheme | Capital grant | Other |
|-----------------------|-------------|----------------|--------------------|---------------|-------|
| <b>Austria</b>        |             | √              |                    |               | √     |
| <b>BE - Flanders</b>  | √           |                | √                  |               | √     |
| <b>Bulgaria</b>       |             | √              |                    |               | √     |
| <b>Cyprus</b>         |             |                |                    |               | √     |
| <b>Czech Republic</b> |             | √              |                    |               | √     |
| <b>Denmark</b>        |             |                |                    |               |       |
| <b>Estonia</b>        |             |                |                    |               | √     |
| <b>Finland</b>        |             |                |                    | √             | √     |
| <b>France</b>         |             | √              |                    |               | √     |
| <b>Germany</b>        |             | √              |                    |               | √     |
| <b>Greece</b>         | √           | √              |                    |               | √     |
| <b>Hungary</b>        |             | √              |                    |               | √     |
| <b>Ireland</b>        |             |                |                    | -             |       |
| <b>Italy</b>          | √           | √              |                    | √             |       |
| <b>Latvia</b>         |             | √              |                    |               | √     |
| <b>Lithuania</b>      |             | √              |                    |               | √     |
| <b>Luxembourg</b>     | √           |                |                    |               | √     |
| <b>Malta</b>          | √           |                |                    |               | √     |
| <b>Netherlands</b>    | √           | √              |                    | √             | √     |
| <b>Poland</b>         |             |                | √                  |               |       |
| <b>Portugal</b>       |             |                |                    | √             | √     |
| <b>Romania</b>        |             | √              |                    | √             |       |
| <b>Slovakia</b>       |             | √              |                    |               |       |
| <b>Slovenia</b>       |             | √              |                    |               | √     |
| <b>Spain</b>          | √           | √              |                    |               | √     |
| <b>Sweden</b>         |             |                |                    | √             | √     |
| <b>United Kingdom</b> | √           | √              |                    | √             |       |



# Financial Analysis- Results

|                       | 50kWe  | 1MWe   | 1MWe   | 12MWe  | 66MWe  |
|-----------------------|--------|--------|--------|--------|--------|
| <b>Austria</b>        | 0%     | >10%   | 0%     | 0%     | 0%     |
| <b>Bulgaria</b>       | 0%     | >10%   | 0%     | 0%- 5% | >10%   |
| <b>Cyprus</b>         | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Czech Republic</b> | 0%     | 0%     | 0%     | 0%- 5% | 0%- 5% |
| <b>Denmark</b>        | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Estonia</b>        | 0%     | >10%   | 0%     | 0%     | 0%     |
| <b>Finland</b>        | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Flanders</b>       | >10%   | >10%   | 0%     | >10%   | >10%   |
| <b>France</b>         | >10%   | >10%   | 0%     | 0%     | >10%   |
| <b>Germany</b>        | >10%   | >10%   | >10%   | 0%     | 0%- 5% |
| <b>Greece</b>         | 0%- 5% | 5%-10% | 0%     | 0%     | 0%     |
| <b>Hungary</b>        | 0%     | 5%-10% | 0%     | 5%-10% | 5%-10% |
| <b>Ireland</b>        | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Italy</b>          | 5%-10% | >10%   | >10%   | 0%     | >10%   |
| <b>Latvia</b>         | 0%     | 0%     | 0%     | 0%     | 0%- 5% |
| <b>Lithuania</b>      | 0%     | >10%   | 0%- 5% | 0%     | >10%   |
| <b>Luxembourg</b>     | 0%     | 0%     | 0%- 5% | 0%     | 0%     |
| <b>Malta</b>          | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Netherlands</b>    | 5%-10% | >10%   | 0%     | 0%     | 5%-10% |
| <b>Poland</b>         | 0%- 5% | >10%   | >10%   | 0%- 5% | >10%   |
| <b>Portugal</b>       | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>Romania</b>        | 0%- 5% | >10%   | 0%     | 0%     | >10%   |
| <b>Slovakia</b>       | 5%-10% | >10%   | >10%   | 0%- 5% | >10%   |
| <b>Slovenia</b>       | 0%     | 0%     | 0%     | 0%     | 5%-10% |
| <b>Spain</b>          | 5%-10% | 5%-10% | >10%   | 0%     | 5%-10% |
| <b>Sweden</b>         | 0%     | 0%     | 0%     | 0%     | 0%     |
| <b>UK</b>             | 0%- 5% | >10%   | 0%     | 0%- 5% | 0%- 5% |

Effect on  
Project IRR  
of Support  
Measures

# WP3 Approach comparison: Results

## Northern Region

Austria, Belgium, Denmark, Finland, Germany, Ireland, Netherlands, Sweden, UK

- More complicated support mechanisms possibly underpinned by desire to be proportionate and not over incentivise
- Represents complex liberalised markets
  - Competing incentives/costs?
  - Barrier to entry

# WP3 Approach comparison: Results

## Eastern Region

Czech Republic, Estonia, Hungary, Latvia, Lithuania,  
Poland, Slovakia, Slovenia

- More standardised approach reflecting more managed economies
  - FiT approach commonest
- Low spark spreads through low electricity supply prices eroding IRR
- Data availability were difficult

# WP3 Approach comparison: Results

## South East Region

Bulgaria, Cyprus, Greece, Romania

- Limited deployment of CHP
- Poor data availability
- Forward gas price used to determine FiT value making modelling difficult (Greece)

# WP3 Approach comparison: Results

## South West Region

France, Italy, Luxembourg, Malta, Portugal, Spain

- Similar to Northern Region
- Variable support types less complex than NR
- Cogen broadly supported through mechanisms

# Results conclusions

- Varying results
- Occasionally particularly high or low IRRs
- Onsite power use had a dramatic impact on the IRR
- Modelling provides a useful baseline BUT
  - IRR Percentage point change is an INDICATOR
  - Overall IRRs should not be relied upon
  - Improved data are needed to develop the analysis
- Some support schemes have ended –
  - e.g. Netherlands

# How should WP3 be used

- Examines theoretical assessment of value of MS support
- Provides an open source model for future analysis and refinement
- CHP growth data may include renewable and fossil
- Provides useful starting point for further analysis for individual plant
- Limitations of data quality and necessary assumptions need to be accounted for
- Reasons for actual uptake are not purely financial – e.g. existing infrastructure
- Specific events can conflict with analysis
  - e.g. Ireland 80 MW CHP plant

# Future development

- Model bioenergy
- Model differing export scenarios
- International example for comparisons
- Examine support effects on supply chain cost inflation

# Contact

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