EED Art. 14 CHP, Heating and Cooling

Smart, efficient and sustainable heating and cooling systems

Stane Merse, Jozef Stefan Institute – Energy Efficiency Centre
Ljubljana, Slovenia

CA-EED: CT7 leader - Efficiency in Energy Supply

Energy Community

12th ENERGY EFFICIENCY COORDINATION GROUP MEETING
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EED – Art. 14:
Efficiency in energy supply

Overall objective

The overall objective is to encourage the identification and delivery of cost effective potential for efficient heating and cooling through the use of:

- Efficient heating & cooling: planning & utilization
- High efficiency cogeneration
- Efficient district heating and cooling
- Other efficient supply options

Integrated approach!
High-efficiency cogeneration (CHP) definition

- Power plant
- Losses
- Electricity
- Boiler
- Heat
- Industry, services, households

Requested Criteria

- 10 – 30% energy savings

CHP
2004/8/EC + ESD
2006/32/EC = EED
2012/27/EU

ANNEX I, II

FOR A SUSTAINABLE FUTURE
High-efficiency cogeneration (CHP) criteria

1. **Annual overall efficiency > 75 %**
   (80% for combined cycle GT and condensing steam turbines)
   - If not fulfilled only part of electricity eligible:
     \[ E_{\text{CHP}} = H_{\text{CHP}} \times C \]

2. **Primary energy savings >10** (>0 micro CHP)

\[
PES = 1 - \frac{1}{\eta_{\text{CHP}_H} + \eta_{\text{CHP}_E} + \eta_{\text{Ref}_H} + \eta_{\text{Ref}_E}} \times 100\%\
\]

Values of CHP unit
Harmonised eff. reference values for separate production of El & H (EU) 2015/2402
## Harmonised efficiency reference values for separate production of electricity (EU) 2015/2402

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of fuel</th>
<th>Before 2012</th>
<th>2012-2015</th>
<th>From 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solids</strong></td>
<td>Hard coal including anthracite, bituminous coal, sub-bituminous coal, coke, semi-coke, pet coke</td>
<td>44.2</td>
<td>44.2</td>
<td>44.2</td>
</tr>
<tr>
<td></td>
<td>Lignite, lignite briquettes, shale oil</td>
<td>41.8</td>
<td>41.8</td>
<td>41.8</td>
</tr>
<tr>
<td></td>
<td>Peat, peat briquettes</td>
<td>39.0</td>
<td>39.0</td>
<td>39.0</td>
</tr>
<tr>
<td></td>
<td>Dry biomass including wood and other solid biomass including wood pellets and briquettes, dried woodchips, clean and dry waste wood, nut shells and olive and other stones</td>
<td>33.0</td>
<td>33.0</td>
<td>37.0</td>
</tr>
<tr>
<td></td>
<td>Other solid biomass including all wood not included under S4 and black and brown liquor.</td>
<td>25.0</td>
<td>25.0</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>Municipal and industrial waste (non-renewable) and renewable/biodegradable waste</td>
<td>25.0</td>
<td>25.0</td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Liquids</strong></td>
<td>Heavy fuel oil, gas/diesel oil, other oil products</td>
<td>44.2</td>
<td>44.2</td>
<td>44.2</td>
</tr>
<tr>
<td></td>
<td>Bio-liquids including bio-methanol, bio-ethanol, bio-butanol, biodiesel and other bio-liquids</td>
<td>44.2</td>
<td>44.2</td>
<td>44.2</td>
</tr>
<tr>
<td></td>
<td>Waste liquids including biodegradable and non-renewable waste (including tallow, fat and spent grain)</td>
<td>25.0</td>
<td>25.0</td>
<td>29.0</td>
</tr>
<tr>
<td><strong>Gaseous</strong></td>
<td>Natural gas, LPG, LNG and biomethane</td>
<td>52.5</td>
<td>52.5</td>
<td>53.0</td>
</tr>
<tr>
<td></td>
<td>Refinery gases hydrogen and synthesis gas</td>
<td>44.2</td>
<td>44.2</td>
<td>44.2</td>
</tr>
<tr>
<td></td>
<td>Biogas produced from anaerobic digestion, landfill, and sewage treatment</td>
<td>42.0</td>
<td>42.0</td>
<td>42.0</td>
</tr>
<tr>
<td></td>
<td>Coke oven gas, blast furnace gas, mining gas, and other recovered gases (excluding refinery gas)</td>
<td>35.0</td>
<td>35.0</td>
<td>35.0</td>
</tr>
<tr>
<td></td>
<td>Waste heat (including high temperature process exhaust gases, product from exothermic chemical reactions)</td>
<td></td>
<td></td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>Nuclear</td>
<td></td>
<td></td>
<td>33.0</td>
</tr>
<tr>
<td></td>
<td>Solar thermal</td>
<td></td>
<td></td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>Geothermal</td>
<td></td>
<td></td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Other fuels not mentioned above</td>
<td></td>
<td></td>
<td>30.0</td>
</tr>
</tbody>
</table>

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**Only High-efficiency CHP eligible for**

- **Support** *(State aid guidelines)*
- **Certificates of Origin**
Efficient heating and cooling in EED

**EED definitions:**

- ‘High efficiency CHP’
- ‘Efficient District heating and cooling (DHC)’ means a DHC system using at least:
  - 50 % renewable energy,
  - 50 % waste heat,
  - 75 % cogenerated heat or
  - 50 % of a combination of such energy and heat

- ‘Efficient heating and cooling’ - measurably reduces the input of primary energy needed to supply one unit of delivered energy [...] in a cost effective way, taking into account the energy required for extraction, conversion, transport and distribution

**PE savings + Cost effectiveness = EED**

*Article 14 & 15, ANNEX VIII & IX*
Do we need heat planning?

- Individual heating & cooling options
- Electricity generation
- Integrated heating & cooling solutions
- Heat storage
- Waste heat industry
- Transport
- RES

Sectors integrations!

For a Sustainable Future
Comprehensive assessment (CA) of the potential for the application of high efficient CHP and efficient district heating and cooling

I. Heating and cooling demand description
   • by sectors, 10 years forecast

II. Heat map:
   • Heat linking within system boundaries
   • Scenario construction: baseline + alternatives

III. Cost-Benefit Analysis (CBA):
   • economic analysis covering socio-economic and environmental factors
   • to identify the most cost-effective and beneficial heating or cooling option for a given geographical area (NPV criterion for the evaluation)

IV. Strategies, policy and measures for development of identified cost beneficial potential

Technical potential: CHP & DHC

Economic potential: CHP & DHC
Strategies policy and measures: 6 key topics *(Annex VIII)*

1. Increase the share of CHP in DHC & el. gen.
2. Development of the DHC infrastructure
3. Location of the waste heat generation close to the demand
4. Location of the heat demand close to the waste heat sources
5. Waste heat and RES sources connection to the DHC network
6. Consumer connection to the DHC network.
Authorisation procedure
>20MW\textsubscript{ther.inp.} - CBA Installation

Authorisation or equivalent permit criteria and procedures based on cost benefit analysis – installation level (after 5 June 2014):
for planned or substantially refurbished installations with total thermal input > 20 MW:

- **Thermal electricity generation:**
  - CBA for CHP
  - Exempted: Nuclear PP, Peak load/Back-up power, CCS

- **Industrial installation**
  - CBA for CHP & connection on DHC network

- **District heating and cooling network**
  - CBA for nearby industrial waste heat utilisation

• MS to adopt detailed guidance on the CBA to ensure consistent, robust and quick application of this requirement across sites
  (common assumptions on payback periods, required rates of return on investment, projected fuel and electricity prices, policy costs and support levels)
CBA – national & installation level

Comprehensive assessment (CA) of national heating and cooling potential

Policy

POTENTIAL CHP & DHC

CBA National

Mapping heat, cool

Regulation Support measures

31.12.2015

Regulation Authorisation

CBA Exemptions

CBA Installation

Authorisation

Installation CHP & DHC

CBA installation level

Authorisation – Installation permit

5.6.2014

FOR A SUSTAINABLE FUTURE
District heating and cooling (DHC) linking technology

- Common goals & efforts, conflicts?
- Existing & new DHC?
- Regulation: competition?
- State aid
- Climate specific, tradition,...
- Lack of capacity, finance,...

EED

DHC

EPBD

RESD
Heating & cooling mapping experiences

- Data challenge!!!
- Cooling – new focus
- New powerful tool for planning?
  - Especially for MS with limited DHC experiences
  - Crucial on local/municipality level
  - Future updates?
New technologies, sources, approaches best practices

Innovative new technologies & solutions:
- Technical data
- Real cases
Waste heat utilisation
EU Strategy on Heating and Cooling

"Usually it is more carbon neutral"


The heat being wasted in Europe could cover 100% of our buildings' heating needs.

Let's take action!

@Energy4Europe
Comprehensive assessment (CA) lessons learned

CA = Start point – not end result!

• **Brought more clarity to:**
  - Current heating and cooling demand and
  - the future role of DHC and heat supply in MS

• **Large potential assessed** – especially socio-economic

• **Limited policy and measures triggered**

• **Linking different energy and climate policy goals - directives**
  - contribution to National Energy and Climate Plans
Main barrier for further developing of DH in EU

- High investment costs and risks
- Too low return on investment
- Efficient alternatives more competitive
- Low NG and other fuels price for individual heating alternatives
- High (imported) NG prices
- Low electricity prices and profitability of CHP
- Lack of investment capital
- Exhausted DH potential
- Decrease of heat demand
- Dispersed population
- Bad planning and lack of knowledge
- Premature DH market, lack of DH tradition and regulation
- Weak DH regulation
- Administrative and regulation barriers
- State aid guidelines
- Complexity of approach
- Bad public opinion about DH

For a Sustainable Future
Sources of useful information

http://www.ca-eed.eu
Thank you for your attention!

Stane Merše, CT7 leader
Head of Energy Efficiency Centre JSI
Jamova 39
1000 Ljubljana
Slovenia

Tel: +386 15885210
Fax: +386 15885377
Web: http://www.rcp.ijs.si/ceu/
Email: stane.merse@ijs.si