



**CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE**

Comprehensive assessment - a framework for policy implementation (Article 14)

Executive Summary 7.6

Efficiency in energy supply

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1 Summary

A special focus of the sessions in the CA EED Plenary Meeting in October 2015 was on the comprehensive assessment (CA), a framework for policy implementation of efficient heating and cooling solutions (Article 14) and linking of other climate and energy policy goals.

Discussions during the Plenary Meeting were focused on the following linked key topics:

- **EU heating and cooling strategy:** the European Commission is in the process of preparing the strategy and a consultation on the issue papers, etc.
- **District cooling technology:** practical technology aspects, market status, methodological approaches for implementation, perspectives and barriers.
- **Cost benefit analysis (CBA) at the installation level:** how Member States (MS) have implemented this instrument, what we have learned so far and what are the first practical experiences with reference to MS examples?
- **CA results:** presentation of first CA results and the role of this tool in linking the goals of different (linked) directives.

This final report includes the findings of a survey to which 19 MS responded on the status of implementation of Article 14 with a special focus on first experiences of CBA relating to individual installations and on harmonisation and integration of different energy and climate policy goals in the CA.

The survey results indicate that implementation of the CBA instrument on the installation level is slow. The practical experiences with the instrument are very limited and MS cannot yet make any assessment of the benefits of the instrument. The linking of provisions of different Directives - Energy Efficiency Directive (EED), the Directive on the promotion of the use of energy from renewable sources (RES Directive) and the Directive on the energy performance of buildings (EPBD) - on efficiency in heating and cooling seems an important topic with clear differences of approach and progress between MS. Results show that CA and CBA are increasingly recognised as valuable support tools in this process.

Heating and cooling is a key element of the new EU policy framework (The Energy Union): an EU Strategy for Heating and Cooling is planned to be communicated by the European Commission by the end of 2015. The main challenge of this document will be how it supports MS implementation activities.

Sweden is a good practice example for implementation of CBA at the installation level. A positive CBA approved by the Swedish Energy Agency is a prerequisite for the environmental permit required for the development of an energy plant or waste heat facility. Sweden applies thresholds in terms of available useful heat from the waste heat plant as well as different distances according to the production volumes of the industrial facility and energy plant.

With a 1-2 % share of the current cooling demand, district cooling (DC) is a proven and mature technology appropriate for the utilisation of free or low cost cooling through the application of available natural resources (sea, river, lake, etc.) or waste heat sources (industry, combined heat and power (CHP), etc.) in dense service and industry locations. In this context the [RESCUE¹](#) project has developed several useful tools and resources to support DC project development.

The Danish experience of implementing CA brought improved documentation and new knowledge to the process of heating and cooling planning and policy development. Whilst the future role of CHP is decreasing in significance, the market share of district heating could realistically increase from 50% to 70% by 2020 (though the total heat supply due to energy savings at end use level is expected to decrease in this period) under Denmark's wind or biomass scenarios. We also learnt that for district cooling a large and currently untapped potential exists due to scale of economy. The combined production of district cooling and district heating will lead to substantial energy savings, compared to their separate production.

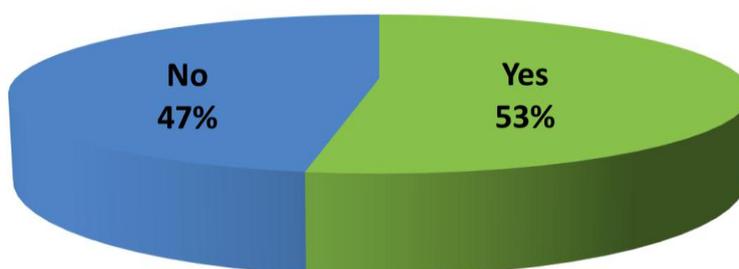
¹ Project was supported under the Intelligent Energy Europe programme of the European Commission.

2 Recommendations/Conclusions

2.1 Survey on strategies, policies and measures

The results of our survey indicate that MS are facing several challenges with regards to the implementation of the CBA mechanism at the installation level. Of the 19 MS that responded to the survey, only 10 reported that the mechanism is already a working instrument: 9 responded that it is still not operational (Figure 1). Over a year after the implementation deadline (June 2014), practical experiences with the instrument are very limited and MS cannot yet make any assessment of the benefits of the instrument.

Figure 1: Is CBA at the installation level a working mechanism in your MS?



The linking of different Directive's provisions on efficiency in heating and cooling (EED, RESD and EPBD) appears to be an important topic. Links have been established in almost 70% of responding MS, although only four MS stated that they are fully satisfied with the level of coordination at the implementation level with the remaining nine MS who responded to this aspect of our survey stating that room for the improvement exists. Despite this, MS satisfaction with the level of harmonisation and coordination at the policy level and regarding the measures in place is (perhaps surprisingly) better: seven of the responding MS assessed it to be well harmonised and coordinated with a further five MS identifying only minor discrepancies. Only two MSs identified conflicts that had not been addressed in national legislation, meaning that almost 80% of responding MS assessed the situation to be rather positive.

Nevertheless, our survey results indicate that there is a need for more harmonised, integrated and coordinated implementation and / or solutions for the three most linked directives (EED, RESD and EPBD). Consistency in support for renewable heat and other efficient heat supply options was recognised as the most important topic that would benefit from a more harmonised and coordinated implementation (Figure 2). Of similar importance was the role of district heating and cooling systems in fulfilling the minimum level of renewable obligations in buildings and feasibility assessment (CBA) of high efficient alternatives for heating and cooling. Mandatory minimum levels of renewables in buildings and the setting of primary energy factors for buildings energy performance seem less important to responding MS. Huge diversity between MS is evident. Seven respondents did not acknowledge that a more harmonised/integrated/coordinated implementation was necessary for any of the topics listed whereas four respondents acknowledged 5-6 topics.

It appears that MS now recognise or could recognise the CA and CBA as appropriate tools for linking and enabling comprehensive planning and implementation of the heating and cooling related goals from all three directives in the near future. Almost 70% of participating MS responded positively to this aspect of our survey (26% Yes, 42% Maybe). This indicates the growing importance of the CA and CBA tools for MS (Figure 3).

Figure 2: Need for more harmonised, integrated and coordinated implementation or solutions by MS

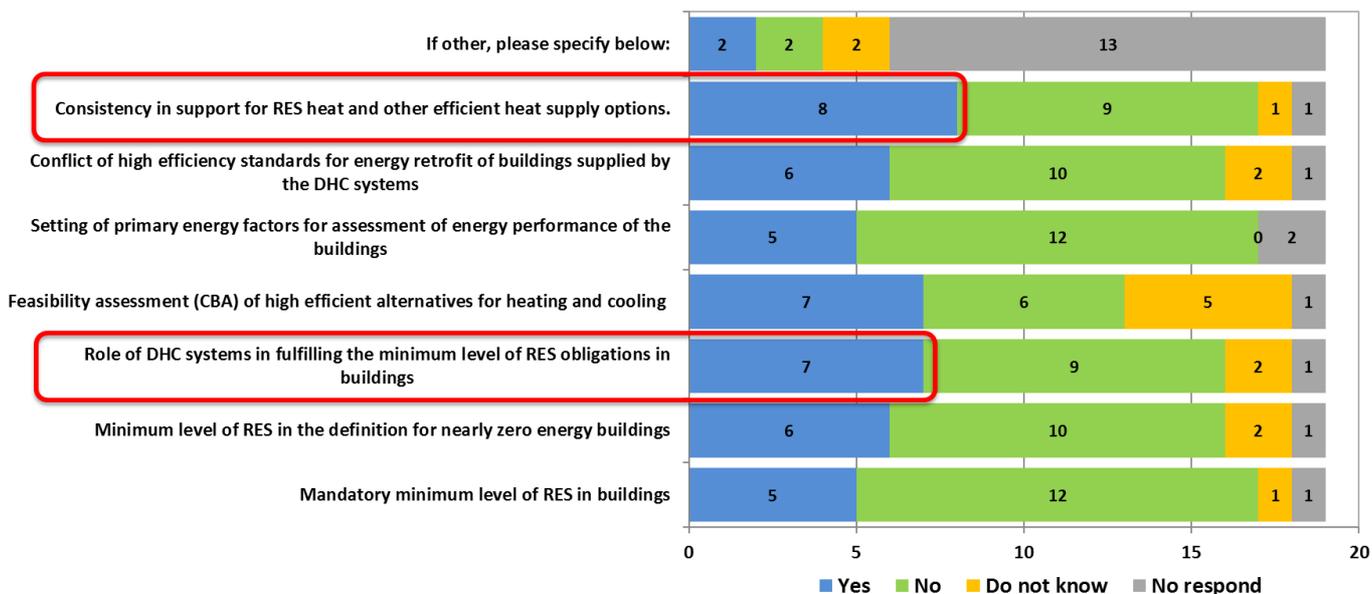
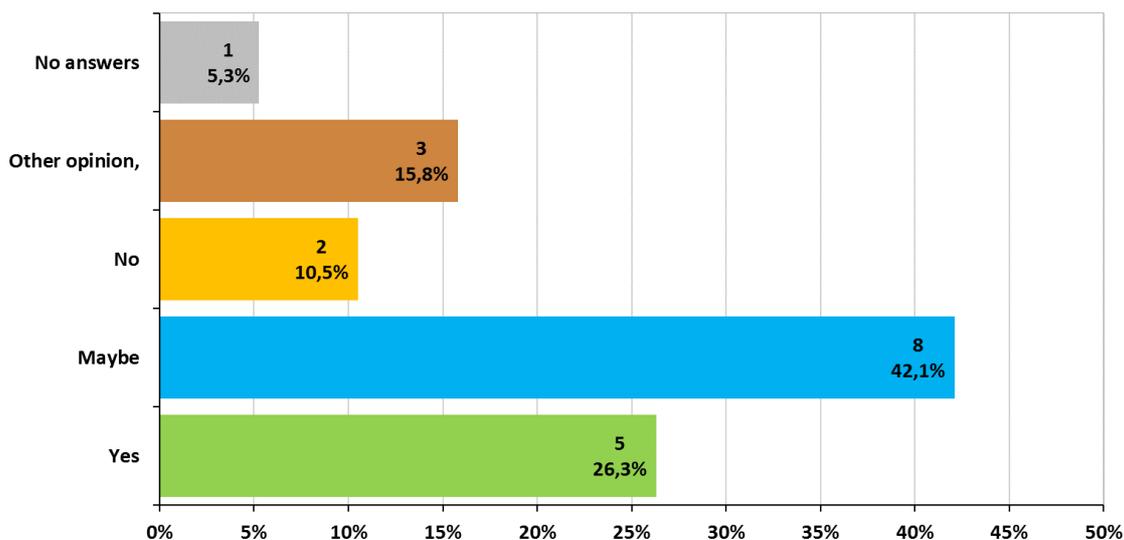


Figure 3: Are the CA and CBA appropriate tools for linking and enabling comprehensive planning and implementation of the heating and cooling related goals from all three directives? – Status by MS (percentage of answers and number of MS)



2.2 Discussions at the CA EED Plenary Meeting in October 2015

EU Heating and Cooling Strategy

The European Commission (EC) has recognised that heating and cooling has been a missing piece in EU energy policy and is preparing an EU strategy for heating and cooling that will be communicated by the end of 2015. The strategy aims to address the key challenges associated with delivering long-term decarbonisation objectives, energy security, the risk of a heating crisis caused by interruption of natural gas supply and increasing competitiveness of EU industry.

Current inefficient heating and cooling supply in EU28 was properly addressed in a presentation given at the CA EED October 2015 plenary by the EC which also indicated several broad sectorial and cross cutting key-issues as elaborated in the five discussion papers recently published by the EC (see Figure 4).

Figure 4: Part of key cross cutting issues from 5 Issues Papers for the Consultation Forum (9 September)

Key issues – cross cutting (2)

Financing

- ❑ How to mobilise financing for building renovation, the deployment of modern, efficient and renewable heating and cooling equipment, smart district heating and cooling networks, smart electricity and building heating and cooling systems?

The role of local, national authorities & EU

- ❑ Local empowerment, national and EU goals, coordination

Follow-up

- ❑ What actions can be the follow up of the Strategy, especially in the context of the EPBD, EED, RED, Ecodesign, IEM and gas supply security framework?

The key question arising from participant discussions was **how will the strategy support their implementation activities?**

- Denmark presented their past practical experience. Careful heat planning by municipalities (using CBA) supported by proper government incentives (investment supports, feed in premiums, etc.) has resulted in very successful implementation of efficient heating solutions with a large amount of CHP plants installed in district heating systems in the period from 1990 to 1996, not only in larger cities but also in medium and small size Danish cities.
- Importance of appropriate classification and support for the efficient use of waste heat, especially compared to the use of RES was highlighted. Several building certification schemes require a certain minimum share of RES and, at present, buildings using waste heat do not meet this requirement.
- In order to maximise the impact of efficient heating and cooling, ensuring that effective links are established between the goals and measures of different Directives is of high importance. Of particular importance here are EED, EPBD and RESDA coherent policy framework will significantly reduce the risks and the costs associated with new investments in district heating and cooling infrastructure as one of the key cross-cutting technologies.

More information is available in the [presentations from the CA EED plenary meeting](#).

3 Practical Examples

The following is a summary of the practical examples presented by the RESCUE project, Sweden and Denmark during the sessions at the CA EED plenary meeting in October 2015. More detailed information is available in the presentations which can be found on the [CA-EED website](#) or on the national websites.

3.1 Challenges for development of district cooling – RESCUE project

The **REnewable Smart Cooling for Urban Europe (RESCUE)** project addressed the key challenges for the further development and implementation of district cooling using low and zero carbon emitting sources, thereby enabling local communities to reap the environmental and economic benefits of this energy efficient technology.

DC technology is a market established technology with the largest cool supply currently existing in France, Sweden and Germany with approximately 1- 2% share of the total cooling market (Figure 5). The availability of cheap cooling sources (river, sea, lake, waste heat, etc.), close to dense and growing cooling demand in services and industry, and economies of scale enable economical applications of district cooling using different cooling technologies across the EU (Figure 6). Effective cooperation between local authorities, energy companies and cooling customers is a prerequisite for the successful planning and implementation of DC projects (Figure 7). The **RESCUE** project has developed several useful tools and resources to support DC project development (www.rescue-project.eu).

More information available in [Rescue project presentation](#).

Figure 5: District cooling in Europe today and temperature dependency of some existing DC systems

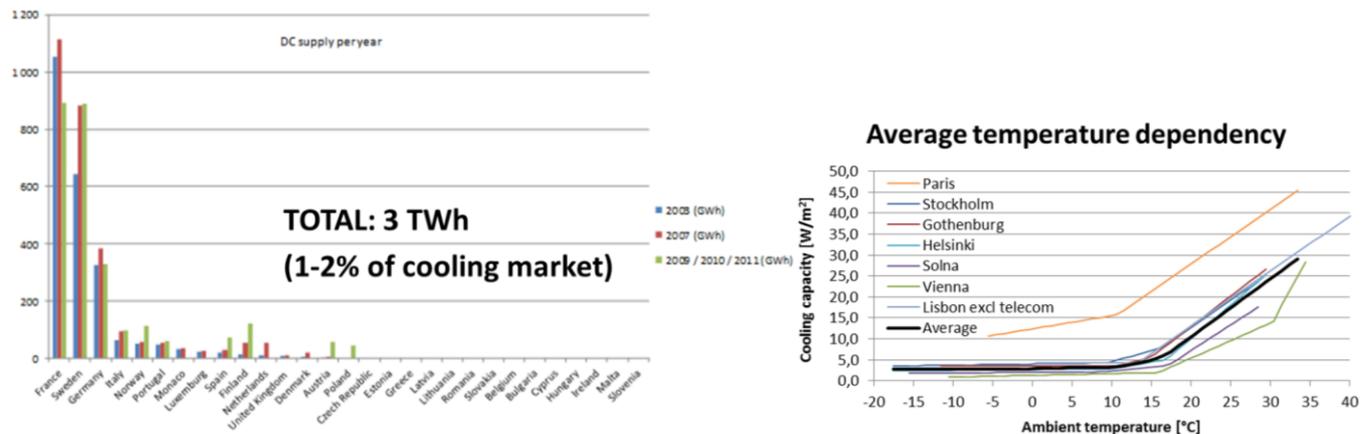


Figure 6: EU27 cooling market projection and EU DC demand assessment

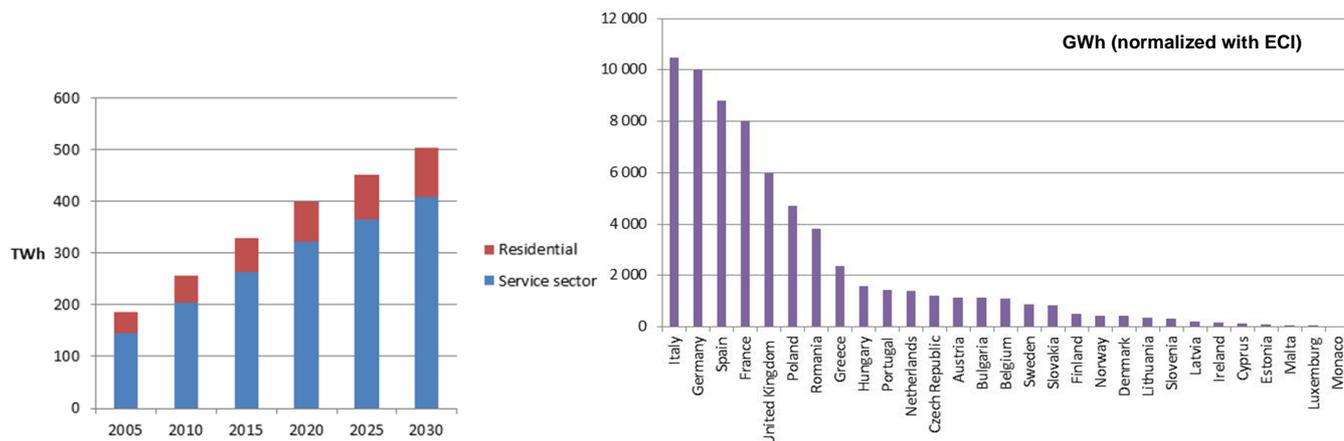
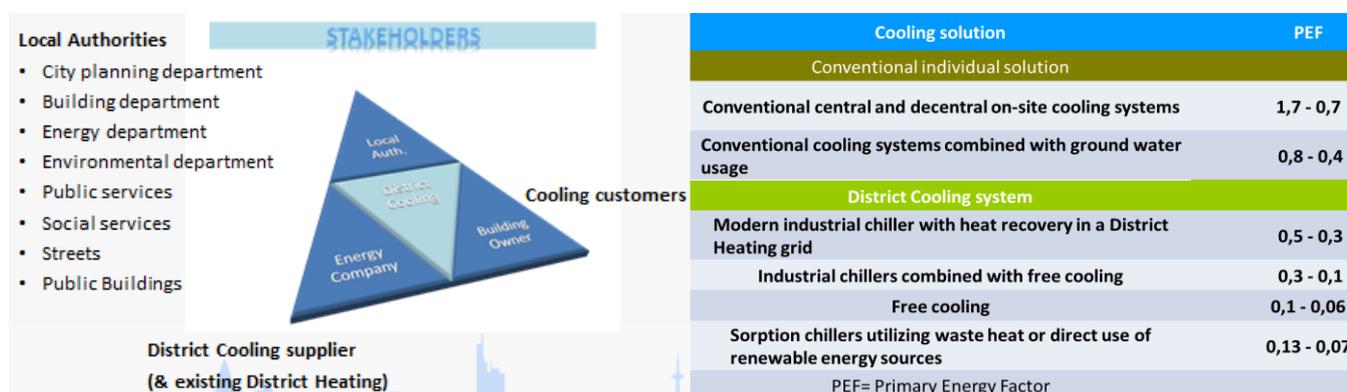


Figure 7: Main stakeholders important for the DC primary energy factors for different cooling solutions



3.2 Sweden: Implementation of article 14.5 EED – CBA on the installation level

Daniel Friberg presented Sweden’s concept and approach for the implementation of a CBA on the installation level. The CBA for new or refurbished plants above 20 MW is conducted by a local district heating company if it is within the stated thresholds. The thresholds are partially determined by available useful waste heat from a nearby industrial operation (20 km for less than 50 GWh and 40 km for more than 200 GWh heat production) based on delivered plant data. The CBA is sent to the Swedish Energy Agency for approval and the approved CBA is then submitted to the local authority that grants the environmental permit for the plant. If there is no approved CBA, no environmental permit is issued. Nuclear power plants, carbon capture and storage (CCS) installations, peak load and back-up electricity installations with less than 1,500 operating hours are excluded from the CBA obligation. If the CBA is positive, there is a strong case for investment but there is no obligation on the investor. As there are very few new plants being built so far no CBA applications have been received. Sweden has also prepared a guidance document for the implementation of a CBA.

Several issues were raised during our discussions:

- Uncertainty regarding the availability of industrial waste heat is an issue due to risks related to the shutdown of industrial production due to economic or other reasons.
- Questions exist with regards to the issue of plants for which the outcome of the CBA is positive, but nevertheless there are no plans for implementation – should these be notified to the European Commission?

More information is available in [Sweden presentation](#).

3.3 Comprehensive Assessment draft – Denmark

Bjarne Juul Kristensen presented the results of the work with the CA in Denmark. Following a comprehensive political energy agreement in March 2012, several sectorial and cross-sectorial analyses of the Danish energy system were conducted. These included a district heating and a scenario analysis. A district cooling analysis has also since been undertaken and together these three analyses form the basis of the Danish comprehensive assessment.

Developing the comprehensive assessment

Drawing together findings from different analyses was essential for delivering coherent and comprehensive assessment results and conclusions.

A cross sectoral scenario analysis has been implemented to identify possible technical paths towards a fossil-free energy system by 2050. Several scenarios (wind, biomass, hydrogen, Bio+ and "Reference") have been evaluated. For each scenario the most cost-efficient energy system in 2050 is constructed, following which back-casting to 2035 and 2020 is undertaken (Figures 8 and 9).

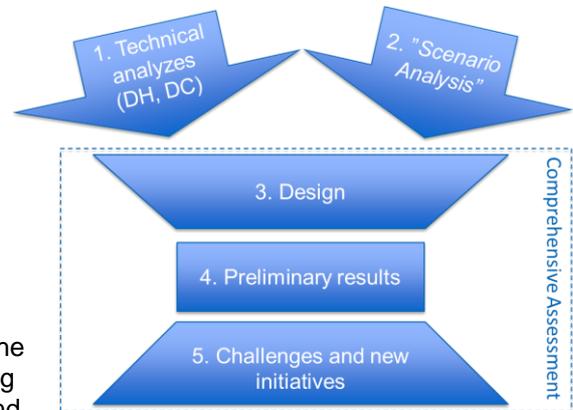
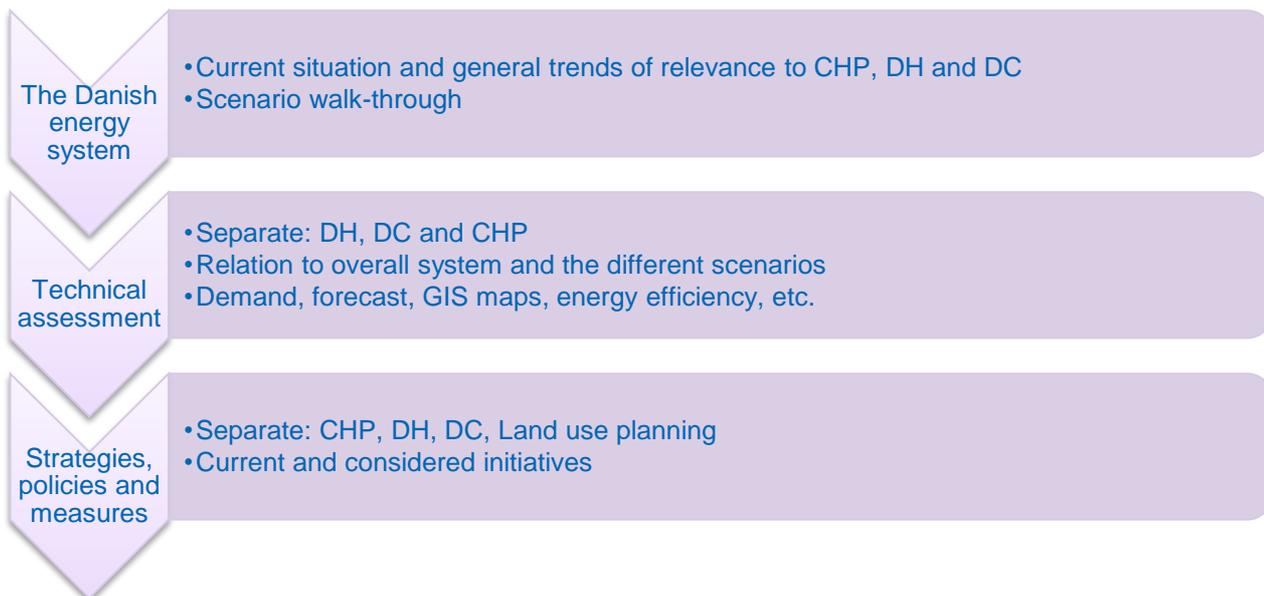


Figure 8: CA design according to Annex VIII of the EED



Results, challenges and new initiatives

1. CHP

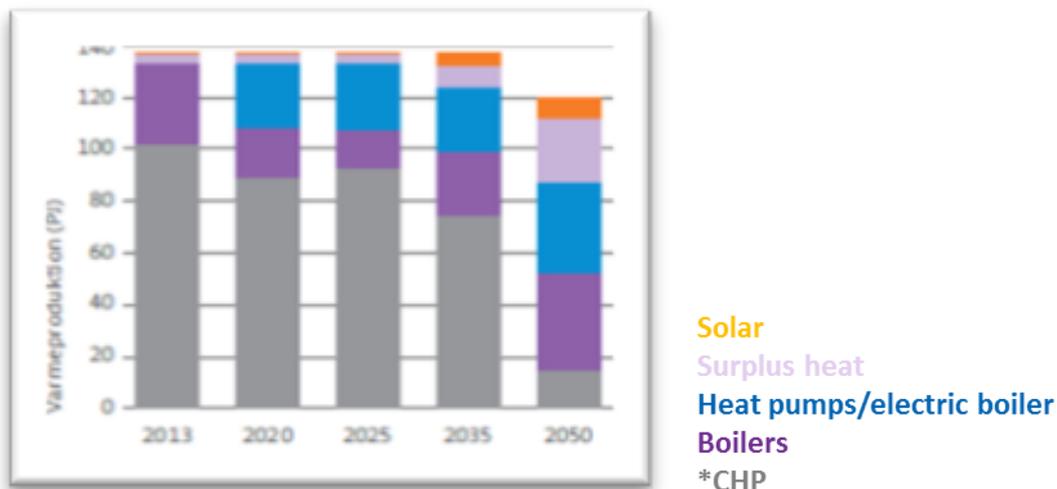
- The role of CHP will decrease in all circumstances
- Some in particular smaller plants face increasing heat prices (few full-load hours)
- Current support schemes for CHP production (natural gas) expire by 2018 and increases pressure to find new solutions, e.g. power-to-heat-solutions

2. District heating (DH)

- ≈ 50% (199 PJ) of demand is met by DH (2013)
- Potential for up to 70% (189 PJ) by 2020
- Ongoing regulation through socio-economic evaluation (CBA)

- Individual solutions (e.g. bio-boilers and heat pumps) are becoming more competitive – especially for new dwellings
- “Close race” between individual natural gas supply areas and DH areas, this is regulated by the Heat Supply Act and socio economic criteria
- Demonstration programme and taskforce unit established for promoting electric large heat pumps for district heating purposes

Figure 9: District Heating Analysis - heat generation



3. District cooling (DC)

- Large untapped potential:
 - Economically competitive and technically feasible
 - Smart grid advantages
 - Possible synergy and energy savings with combined production of DH and DC, compared to separate production.
 - Main barriers: knowledge, organisation and regulation
- New regulation put in place in June 2014
- Development is monitored, and further initiatives are considered by the government

Figure 10: Wind and Biomass scenario power generation



CA enabled better documentation and new knowledge on the key important heating and cooling aspects:

- Economic / financial viability of extension of DH-distribution (competition with individual natural gas and individual heat pumps)
- Economic optimised DH-production depends of overall development of Danish energy system
- Opportunities and barriers regarding development of DC

More information is available in [Denmark presentation](#).

**For more information please email
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The Concerted Action for the Energy Efficiency Directive (CA EED) was launched by Intelligent Energy Europe (IEE) in spring 2013 to provide a structured framework for the exchange of information between the 29 Member States during their implementation of the Energy Efficiency Directive (EED).

For further information please visit www.ca-eed.eu or contact the CA EED Coordinator Lucinda Maclagan at lucinda.maclagan@rvo.nl



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