# II REACHING THE TARGETS

Part II details the main elements of the EED, providing a background for each of the subject areas, the requirements of the EED and recommendations for effective implementation and monitoring. Because many subject areas are covered by more than one article, each is treated separately here. Part II starts by reviewing Energy Efficiency Obligations, then follows with the public sector and energy audits, and ends with a discussion of supply side efficiency and demand response.

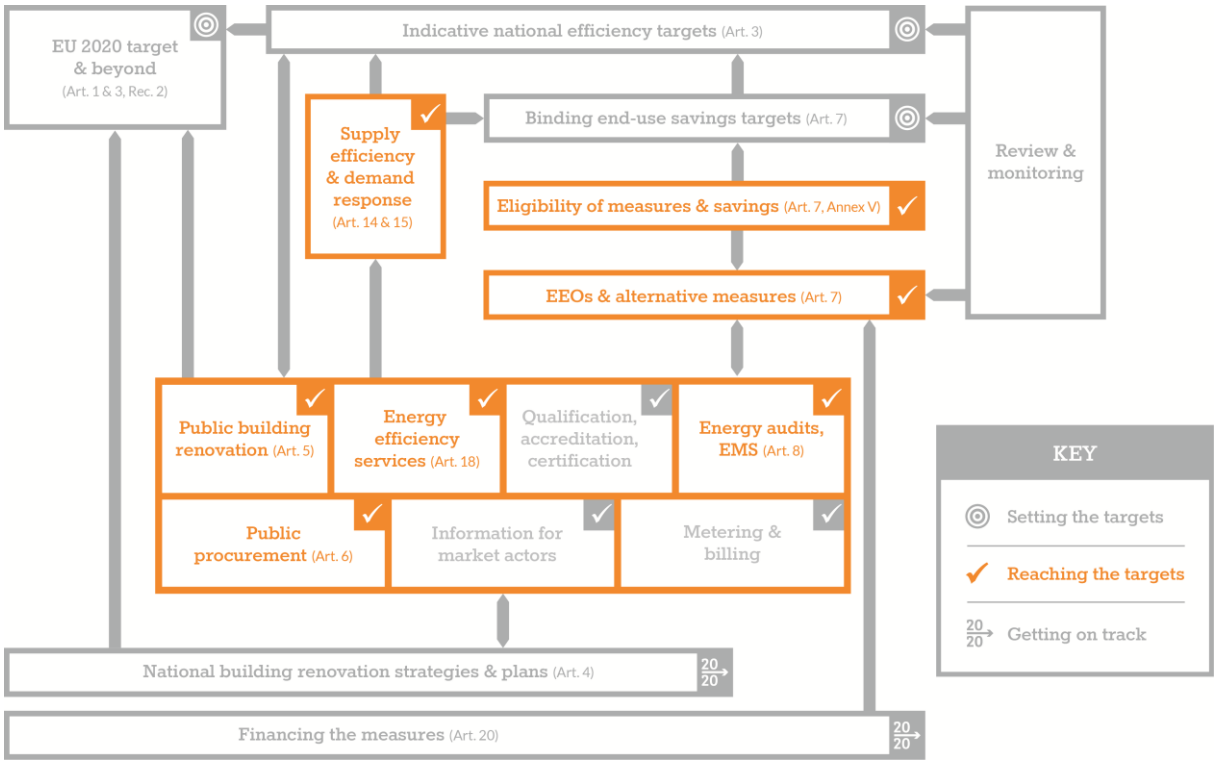


*Figure 16 – Guidebook Overview Map: Reaching targets and objectives*

# II.7 Supply side efficiency and demand response (Articles 14 and 15)

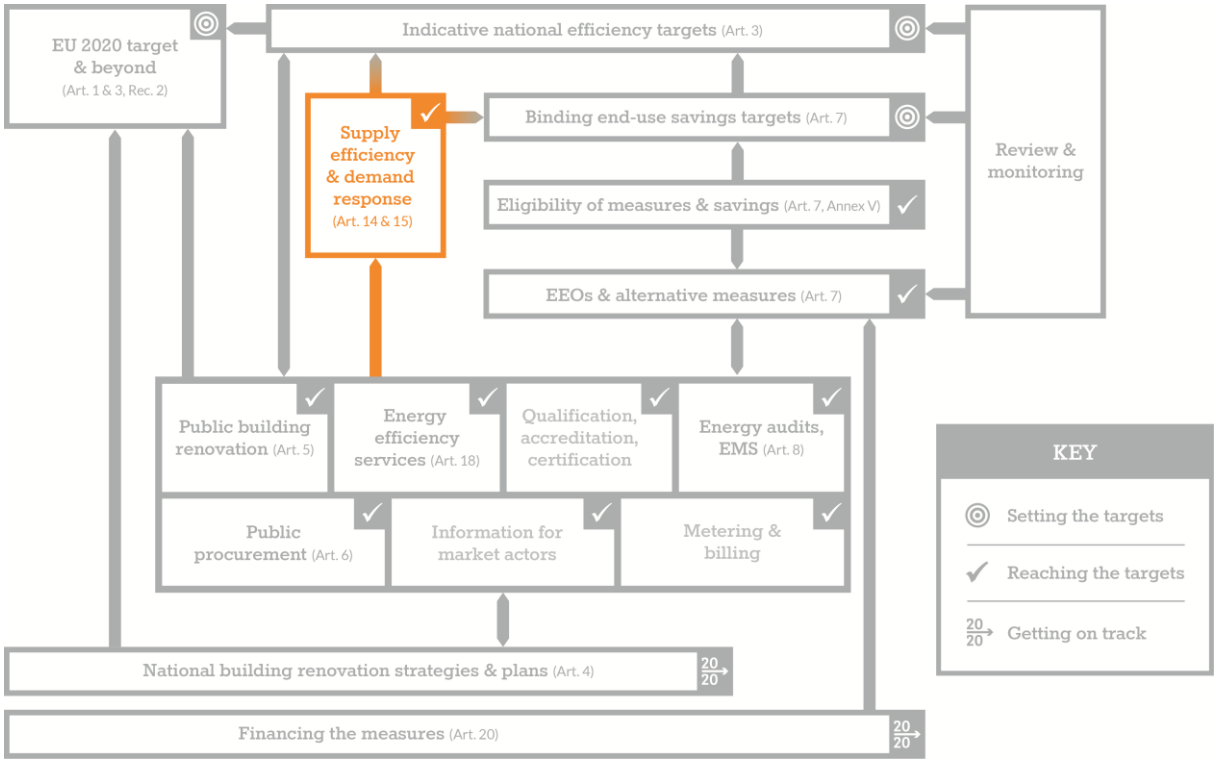


*Figure 24 - Guidebook Overview Map: Supply side efficiency and demand response*

## II.7.1 Summary

The guiding principle when applying Article 14 for the promotion of efficiency in heating and cooling should be to save primary fuels. MSs should recognise the value of the "integrated approach" referred to in the text and make sure that this is fully applied when carrying out their comprehensive assessments (CA) at national level by December 2015. Cost-benefit analysis (CBA) should become a dynamic and enabling instrument. Therefore we recommend that:

- spatial planning rules are linked to national level CA to ensure an "integrated approach";
- the scope is broadened and installations below 20 MW are captured by CA and CBAs to promote decentralised production of energy; and
- CBAs are done in a participatory way, include socio-economic aspects, use robust data and lead automatically to action in case of positive results.

A new element of the EED is the introduction of demand response provisions. Today, many EU energy markets are either non-existent or inaccessible to demand side participation due to a lack of awareness and an unclear regulatory framework in most MSs. As a consequence, the demand response potential is largely untapped. Demand response offers a quick, cost-effective and energy efficient capacity resource. It can substantially reduce the need for investment in generation by managing the energy consumption patterns on the customer side in response to the supply requirements of the grid. While Article 15 contains many positive attributes, there are few firm requirements on increasing demand response activity. MSs should regard Article 15 as a package of complementary recommendations which, if implemented in a coherent way,

will give the greatest chance of a well-functioning, energy- and cost-efficient energy market and supply. We therefore recommend that:

- distribution and transmission system tariffs are set in a transparent manner and to empower consumers and those incentives are removed which are detrimental to improving energy efficiency activity, in particular demand response and EEOs carried out by energy companies; and
- clear provisions are provided for demand response actors and those able to provide other energy efficiency services to be included in market design to improve overall network efficiency.

In terms of the main reporting and monitoring requirements under the EED, all new or to be refurbished thermal generation installations or district heating/cooling networks over 20 MW shall be subject to a CBA by 5 June 2014 at the latest in accordance with Part 2 of Annex IX. Additionally, MSs must make available the comprehensive assessment of the potential for high-efficiency cogeneration and district heating and cooling to the European Commission by 31 December 2015.

## II.7.2 Background

Article 14 deals with the promotion of efficiency in heating and cooling, and Article 15 addresses efficiency aspects of the transformation, transmission and distribution of gas and electricity, including the operation of energy markets.

The promotion of cogeneration was addressed by the combined heat and power (CHP) Directive (2004/8/EC), which will be repealed on 5 June 2014. It required MSs to quantify their CHP potential, but did little in practice to promote the use of CHP. It is important to note that before the EED, district heating and cooling (DHC) technologies did not benefit from promotional legislation at EU level. As a consequence it was estimated that an untapped potential of 25 Mtoe within the EU remained for CHP at the time the EED was being developed. The definitions, reference values and methodology of the CHP Directive have been carried over (as a harmonised set of criteria at EU level) to the EED.

Regarding the generation, transmission, distribution and supply of gas and electricity, the EU decided in 2009 to do away with the fragmented framework of energy market rules in each MS and replace them with a common set of rules to create a fully operational internal gas and electricity market.

These rules, encapsulated in the Third Internal Energy Market Package and its constituent Gas and Electricity Directives (2009/73/EC and 2009/72/EC) are designed to ensure fairer competition among market operators and higher consumer protection. However, they did not do much to promote or incentivise energy efficiency. There is little reference to the need to ensure the energy market is the right "size" (that consumption is kept as low as possible), nor is there much real incentive to use demand side resources to facilitate the operation of energy markets.

A strong implementation of the EED has the potential to fill this gap and to create the missing link in the Third Energy Package for an energy efficient optimisation of the grid.

Articles 14 and 15 of the EED offer a number of opportunities to embed efficiency more systematically in decision-making regarding the design of heating and cooling systems and the transformation, transmission and distribution of energy. There is a clear need to improve efficiency in all these aspects, noting that:

- The overall efficiency of the energy transformation sector is still low and progress has been very slow;
- Energy efficient supply solutions such as DHC networks and High Efficiency (HE) CHPs are not properly considered and supported at national level;

- Most national decision makers do not have a clear picture of the level and geographical distribution of energy demand and supply on their territory. In fact MSs hardly take an integrated approach to their energy supply and end-use sectors when designing national policies, as they rarely factor in heating and cooling demand and supply dimensions into their power assessment and forecasting exercises;
- As regards the operation of gas and electricity networks, the traditional top-down thinking still prevails. In many countries, the electricity system is operated in a centralised and dispatchable way which can be a problem for new players like decentralised power producers and demand service providers;
- National electricity regulatory authorities are not tasked with overseeing improvement in energy efficiency or maximising demand response potential. As essentially nobody has this overall responsibility, the "efficiency first" principle is completely absent from the system;
- Development of demand response programmes in MSs is almost non-existent to date despite general acknowledgment and evidence from other countries that they would improve the efficiency of the energy market and bring environmental benefits to the grid;
- As energy production is shifting towards renewables, and in particular towards more electricity from variable renewable sources, the paradigm should shift to promoting demand that can be flexible;
- The EU and MSs are starting to consider whether a system of capacity payments should be introduced to ensure continuous match-up of supply and demand. If such a system is eventually introduced, it is vital that it adequately rewards demand side resources in a non-discriminatory way compared to providers of supply side solutions; and
- At present energy price signals do not reward or promote efficiency, as they do not reflect the real cost of energy – in general- or at particular times.

## II.7.3 Requirements

### II.7.3.1 Efficient supply of heating and cooling

The essential premise of Article 14 is that MSs need to carry out a CA by December 2015 of the potential for implementing high efficiency (HE) co-generation and efficient DHC and report the results to the Commission. This assessment should include both territory level CBA, on the basis of which MSs will facilitate the development of HE CHP and DHC installation cost-benefit analyses.

MSs will also mandate the carrying out of cost benefit analyses whenever existing thermal electricity generation installations, industrial installations or DHC networks are planned or substantially refurbished.

The EED requires MSs to approach heating and cooling at country level in an integrated way, by assessing both heat demand and the potential for HE CHP and efficient DHC to meet this assessed demand cost-effectively.

The CA of the potential for the application of HE CHP and efficient DHC should be based on the requirements set out in Annex VIII, which include:

- Description of heating and cooling and demand forecast for the next ten years (the base year would probably be 2013);
- A heat demand map of the national territory;
- Identification of heating and cooling demand that can be met with CHP, including micro-CHP;

- Identification of additional HE CHP for refurbishment of existing and new generation and industrial installations; and
- Strategies and policies that may be adopted up to 2020 and 2030 to realise the potential identified.

This CA should also take into account the outcome of the national reports on the CHP potential published in the framework of the implementation of the CHP Directive 2004/8/EC[1].

The cost-benefit analysis at territory level establishes the following key elements:

- System and geographical boundaries;
- An integrated approach to demand and supply options;
- A baseline;
- Alternative scenarios (to include only HE CHP, efficient DHC or efficient individual heating/cooling); and
- A method of calculation that includes:
    - assessment and comparison of total long-term benefits of heat or cooling supply options;
    - net present value as evaluation criterion; and
    - time horizon recommendations: 25 years for a gas-fired power plant, 30 years for district heating systems and 20 years for heating equipment such as boilers.

The EED requires that, in areas where the benefits are greater than the costs, MSs shall "take adequate measures for efficient DHC infrastructure to be developed and/or to accommodate the development of high-efficiency cogeneration", based on the positive outcome of the CA and territory-level CBA, and adopt authorisation/permitting decisions based on the positive outcome of CA and installation-level CBA.

It should be noted that these minimum requirements of the EED do not guarantee that a positive CBA will be followed up with action. Please see chapter II.7.4.1 for recommendations on how to ensure that the potential for CHP and DHC is fully tapped.

There are a number of opt-out cases that can be granted by MSs:

- In areas where the outcome of the territory-level cost-benefit analysis proves negative, MSs may exempt installations from carrying out individual CBA.
- Power plants may be exempted by MSs from the requirements of this Article if they fall into one of the following categories:
    - peak load and back-up electricity generating installations (less than 1,500 operating hours per year);
    - nuclear power installations; and
    - carbon capture & storage (CCS) installations.
- MSs may also lay down thresholds for exempting individual industrial installations or DHC networks (either planned or substantially refurbished) exceeding 20 MW thermal input from carrying out an installation-level CBA. Such rules must be communicated to the Commission by 1 January 2014.

[1] OJ L 52, 21.02.2001, p. 50-60.

**Important EED Annexes**

I - General principles for the calculation of electricity from cogeneration – no change compared to the existing legislation

II - Methodology for determining the efficiency of the cogeneration process – no change compared to the existing legislation

VIII - Potential for efficiency in heating and cooling – methodology for the Comprehensive Assessment on CHP potential

IX - Cost-benefit analysis methodologies for promotion of high efficiency cogeneration and district heating and cooling

X - Guarantee of origin for electricity produced from high-efficiency cogeneration

XI - Energy efficiency criteria for energy network regulation and for electricity network tariffs – promoting distributed generation and demand response

XII - Energy efficiency requirements for transmission system operators and distribution system operators – guidelines for transmission system operators (TSOs) and distribution system operators (DSOs) on informing and setting a reasonable timetable for new producers of high efficiency cogeneration to be connected to the grid

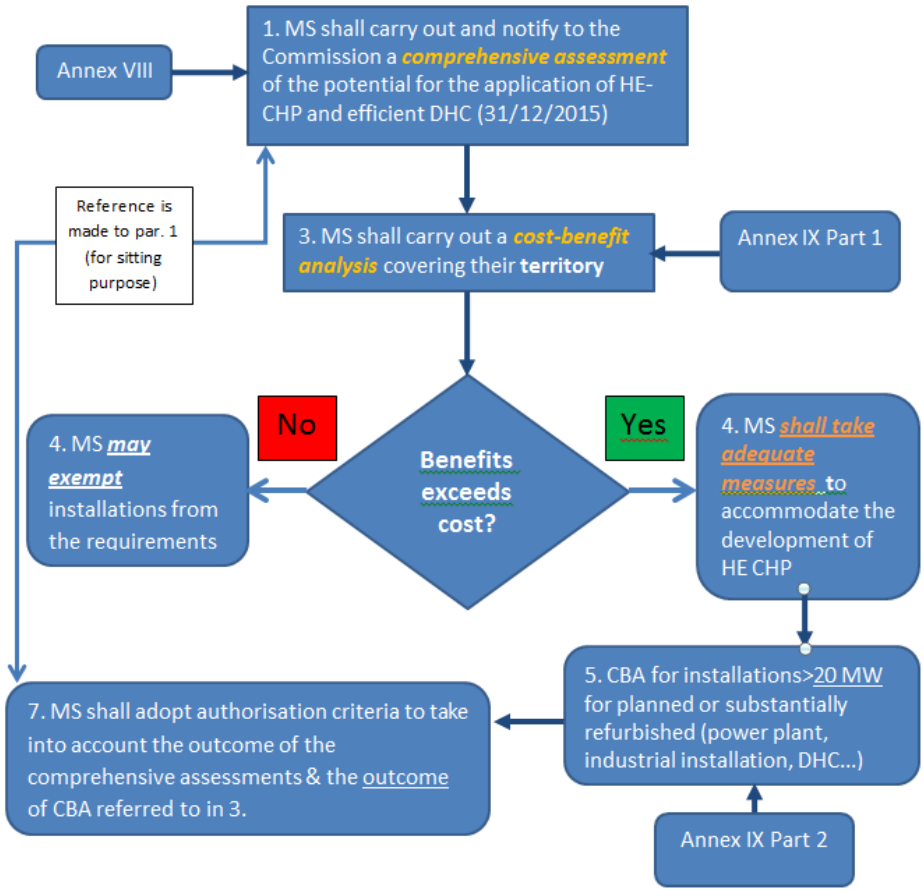


*Figure 25 - Flowchart for the decision making steps under Article 14, COGEN Europe*

### II.7.3.2 Demand response and efficiency of distribution and transmission

Gas and electricity infrastructures in all MSs have a substantial potential for higher energy efficiency that needs to be unveiled. Article 15 sets out a number of requirements intended to promote efficiency in the transformation, transmission and distribution of energy and to remove those incentives in transmission and distribution tariffs that are detrimental to the

overall efficiency (including energy efficiency) of the generation, transmission, distribution and supply of electricity.

Specifically, Article 15 sets out that:

- In each MS, regulatory authorities shall "pay due regard" to energy efficiency when implementing any measure to develop and improve the network infrastructures;
- It suggests that incentives be granted to Distribution System Operators (DSOs) and Transmission System Operators (TSOs) for them to develop efficient programmes and services consistent with both the Third Energy Package and climate and energy package objectives, including the deployment of smart grids;
- MSs must remove any incentives in tariffs that are detrimental to efficiency or which might hamper the participation of demand response in balancing markets and ancillary services procurement;
- By the end of June 2015, MSs shall ensure that an assessment is undertaken of the energy efficiency potentials of their gas and electricity infrastructure, and that "concrete measures and investments are identified for the introduction of cost-effective energy efficiency improvements in the network infrastructure, with a timetable for their introduction"; and
- A framework will be established for access to the grid and dispatching of electricity for HE CHPs. It requires that, while the security of the grid is ensured, TSOs and DSOs:
    - Guarantee the transmission and distribution of electricity from HE CHP;
    - Provide priority/guaranteed access to the grid for HE CHP; and
    - Provide priority of dispatch of electricity from HE CHP.

Note that CHP cannot take priority over variable RES-E when ranking different types of generators, as MSs must ensure that priority access or dispatch for energy from variable renewable energy sources is not hampered. The two can be equal.

MSs are also invited (but not obliged) to particularly encourage priority and ease of access to the grid by small-scale and micro-cogeneration units and require TSOs and DSOs to reduce the connection and system charges for HE CHP that is sited close to demand points. This could be achieved by:

- Ensuring that national electricity regulators "encourage demand side resources, such as demand response, to participate alongside supply in wholesale and retail markets", and to "treat demand response providers, including aggregators, in a non-discriminatory way". Suggestions include defining technical modalities for participation of these providers in such markets;
- Encouraging demand response, balancing and other operational services, for instance by ensuring a market for energy sold at hourly cost and by eliminating entry barriers to new operators. A relevant entry barrier is the access to data on grid balancing conditions;
- Allowing and regulating the availability of time tariff schemes for final consumers; and
- Allowing time and price signals to create the right context for evaluating investments on grid efficiency and sustainability. For CHP units, comprehensive and reasonable costs and timetables for grid connection (transparent and non-discriminatory) shall be set at national level.

**Look out!**

To ensure the uptake of demand response participation, smart meters must be able to measure consumption according to time of use periods. MS should therefore mandate that smart meters be technically capable of this to avoid locking in the opportunity for demand response for the lifetime of those meters.

**Look out!**

**Network Codes developed by the European Network of Transmission System Operators (ENTSO-E)**

In 2011 the EU mandated the establishment of European Network Codes as a prerequisite for the creation of an internal energy market. These codes would notably ensure security of supply and further integrate low carbon generation. The development of these network codes by ENTSO-E creates this unique opportunity to fulfil the following Article 15 objectives: enhancing security of supply, decarbonising the energy sector and deploying demand side participation.

Among the Network Codes developed by ENTSO-E, the Demand Connection Code aims at defining the grid connection requirements of demand-side facilities (including end users and/or their household and industrial appliances) which are considered as necessary for the preservation or the restoration of electricity network stability.

This Code is seen as a first opportunity to move away from the old top-down approach of increasing supply to face the increase in demand. This Code has been identified as a priority in the Commission communication on the internal energy market and should be finalised in 2013.

It must be ensured that the Code embraces the fundamental principles stated in Article 15 that all demand response service providers are treated in a non-discriminatory way and that demand side participation should be rewarded appropriately. "System services to network users" determined by the system operators should indeed be offered and not made mandatory. Emphasis should be put on voluntary and rewarding demand response services to ensure comparable treatment of demand side with supply side.

## II.7.4 Legal checks and recommendations

### II.7.4.1 Efficient supply of heating and cooling

**Legal checks**

1. Confirm that the comprehensive assessment of the potential for high-efficiency cogeneration and district heating and cooling contains all information set out in Annex VIII by 31 December 2015.
2. Check that, from 5 June 2014, all new or to be refurbished thermal generation installations or district heating/cooling networks over 20 MW are subject to a cost-benefit analysis in accordance with Part 2 of Annex IX.

**Good practice recommendations**

1. Link spatial planning rules to national level CA to ensure an "integrated approach".

The most effective way to apply the integrated approach would be to strongly link spatial planning rules to the EED. Therefore, the planners of thermal electricity generating and industrial installations should be given guidance on where best to site these in terms of heat demand and supply.

2. Conduct CBA in a transparent and participatory manner and include socio-economic costs.
3. Where a CBA returns a positive result for the use of CHP and/or DHC, its application should be automatic and the adequate measures shall aim to alleviate the risk for CHP operators associated with power markets for their heat load units.
4. Parameters and price assumptions for the CBAs should be taken from harmonised European sources (*Energy trends 2030* and DG Environment for pollutant emissions costs) and agreed with national stakeholders.

5. Treatment of Article 8, which deals with energy audits and energy management systems, should consider the evaluation of the implementation of CHP and/or DHC at installation level (energy saving potential and technical possibility).
6. The scope of Article 14 should be expanded to capture more installations below 20 MW and promote decentralised production of energy. Those installations should be covered by the CA and the CBA at installation level.

While the scope of Article 14 sets requirements for installations with a thermal input greater than 20 MW, there are benefits for MSs to expand the scope or at least some parts of the new legal environment brought by the EED (i.e. carrying out the CBA at installation level and adopting authorisation criteria to build on the CBA outcome) to installations with thermal input of less than 20 MW. It is worth recalling that significant heat and supply point definition of 20 GWh a year equates to only a 4 MW combustion installation operating 5,000 hours per annum.

**Description of successful implementation indicators**

To complement these recommendations related to supply, monitoring the following indicators would help implementers, decision makers and CHP and DHC stakeholders track their evolution and propose appropriate action:

- Amount and share of cogenerated electricity in total electricity production;
- Cumulative amount of CHP capacity;
- Share of cogenerated heat in total heat consumption;
- Proportion of the assessed national CHP potential being realised; and
- Progress towards achieving the identified economic potential.

**Good practices in practice**

Germany passed a CHP law in summer 2012, with a target of 25% of generated electricity to come from CHP installations by 2020 (up from 14.5% in 2010).

The KWKG (combined heat and power law) features a series of policy instruments to more effectively tap into the national potential for cogeneration:

- Support for cogenerated electricity through differentiated bonus (premium) payments depending on the capacity of the CHP plant. In short, bonuses for new and refurbished plants will range between 1.8 and 5.41 cents/kWh (see table below). It should be noted that the bonus received by CHP operators is complemented by payment from DSOs on the basis of both the avoided purchase cost of electricity from the generation mix and the distribution grid losses;
- The total level of support to the sector is capped at €750 million/year;
- Micro CHP up to 50 kW electricity operators (defined as mini-CHP in Germany) will be able to choose between receiving support for ten years and 30,000 full operating hours;
- Micro CHP up to 2 kW electricity operators (very small CHP in Germany) can opt for a one-time payment equivalent to the amount of 30,000 full time operating hours;
- Reaffirmation of the priority access rule for cogenerated electricity (in full parity with renewable energy sources);
- Promotion of the construction and expansion of heating and cooling networks operated with heat from CHP plants. Heating networks will receive €100 per meter, up to 40% of investment for pipelines below 100 mm in diameter and up to 30% for pipelines above 100 mm in diameter; and
- Support for heat storage infrastructure by €250/$m^3$, up to 30% of investment costs and capped at €5 million.

| elektr. power (proportional*) | Bonus per kWh | Support duration |
|---|---|---|
| ≤ 50 kW | 5,41 Cent<br>optional for ≤ 2 kW: one times payment for 30.000 foh** | 10 years or optional 30.000 foh** |
| ≤ 250 kW | 4 Cent | 30.000 foh |
| ≤ 2000 kW | 2,41 Cent | |
| > 2000 kW | 1,8 Cent | |
| from 2013 for ETS plants | 2,1 Cent | |

From 2013, EU-ETS CHPs get an additional 0.3 cent (cost compensation).

A review of the impact of the German CHP Law will be carried out in 2014, and new measures might be put in place if CHP market development trajectory is not on track for achieving the 25% target by 2025.

### II.7.4.2 Demand response and efficiency of distribution and transmission

**Legal check**

1. Ensure that MSs remove any incentives in tariffs that are detrimental to efficiency or which might hamper the participation of demand response in balancing markets and ancillary services procurement.

**Good practice recommendations**

1. Ask that MSs enact the requirement for TSOs and DSOs to facilitate the connection to the grid of small and micro-CHP.
2. For network operators, simplify the micro-CHP installation process by adopting a simple notification "install and inform" process.
3. Reduce the connection and system charges for HE CHP units sited close to heat demand points.
4. The action plans following the MS assessment of EE potentials by June 2015 should include bringing all parts of the network up to best available technology (BAT) standards in accordance with the Directive on industrial transmissions (2010/75/EU) and the Directive on integrated pollution prevention and control (2008/1/EC), and national requirements for all newly built installations to meet these requirements after a certain date.
5. Ask that MSs develop clear rules for markets that enable demand side participation in a non-discriminatory fashion.

These rules should in particular strive to ensure that demand side resources receive the real market value for their participation so that benefits are properly shared amongst all network users. Equal treatment of generation and demand is key. For instance it is clear that the non-use of electricity at certain times of the day has a value that should be rewarded appropriately. The introduction of a real market approach to demand response is therefore necessary. With increasing intermittent renewable energy sources in the future, we need to stress the responsiveness of balancing in the future for both demand side management and conventional electricity supply.

6. Simplify rules to allow participation in markets in order to adapt to the specificities of demand side providers. Enablers for active demand side participation must be implemented.

This is particularly true for residential consumers. Today, most markets are modelled for generation side participation because legislations have been written for power generators, with the idea that they would always provide more capacity. This has generated regulatory barriers and limitations to the penetration of third parties. Very few MSs have started developing the adequate framework to incentivise the end-users to participate in demand response programmes. When developed, rules are more adapted to very big industrial players who have the capacity to deal directly with the TSOs and DSOs. Aggregators could play a fundamental role as facilitators for private consumers to enter the market.