CODE 2

Cogeneration Observatory and Dissemination Europe

European Policy Report

January 2015

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CODE 2 European Policy Report

Executive Summary

Cogeneration of heat and electricity (also known as combined heat and power; CHP) saves at least 25% of the fuel needed for separate production of heat and electricity. The European Union has highlighted the advantages of CHP in achieving its energy efficiency aims and included it first in the Cogeneration Directive (2004/08/EC) and then in the Energy Efficiency Directive (2012/27/EC).

The CODE 2 project has identified four major barriers to the wider uptake of CHP:

- Currently heat and power markets do not consistently reward CHP operators for the system-level energy savings made;
- Barriers to entry persist for distributed generators;
- Regulatory and legislative uncertainty add significant risk and cost to new investments, and;
- A lack of adequate focus on primary energy savings and heat in EU energy efficiency policy risks moving CHP to the margins of policy action.

The Energy Efficiency Directive (EED) contains many elements that could assist growth in cogeneration, but significant take-up of CHP across Europe is unlikely to happen without a continued focus from the EU on improving legislation and particularly on ensuring that CHP is empowered to play a strong role in the ancillary services and electricity markets.

At the time of writing, gas-fired CHP, which constitutes the majority of Europe's installed capacity, is facing particular difficulties due to a combination of high gas prices and low electricity wholesale prices. As a result much CHP is not running. This has the knock-on effect of increasing CO_2 emissions whereby more electricity is produced using conventional power plants. This comes at a time when reinvestment in installed plants is under consideration and the opportunity can be taken to reinvest while modernising plants to meet the new demands of the electricity market.

Introduction to the project

The CODE 2 project

The CODE 2 project is co-funded by the European Commission through Intelligent Energy Europe (IEE) and the project partners (http://www.code2-project.eu/). Between 2012 and 2014 CODE 2 partners carried out an important market consultation with cogeneration experts in 27 European Union Member States to generate proposals to promote CHP. The European Roadmap and the partnering Policy paper summarise the findings of 27 National CHP roadmaps.

This project builds on the experience of the previous CODE project (www.code-project.eu).

The project aims to provide a better understanding of the key markets and policy interactions around cogeneration, and to accelerate cogeneration's penetration into industry (including SMEs) and at the domestic level. It specifically considers the implementation of the Energy Efficiency Directive 2012/27/EU (EED) as an opportunity to promote CHP in EU Member States.

Throughout the period of the project, a range of national experts and policymakers in each Member State were consulted. Workshops on CHP and the implementation of the EED were held in Ireland, Poland, Belgium, Slovenia, Germany, Italy and Greece.

CHP in Europe's Energy and Climate Policy

Adoption of the cogeneration, or combined heat and power (CHP), principle greatly improves the efficiency of using primary energy for the generation of heat and electricity. Modern CHP is around 25% more efficient at producing heat and power than separate production. CHP is embedded in the EU's economy today, providing 15% of its heat needs and 11% of its electricity needs. The EU is a global leader in CHP and is currently exporting its skills and products worldwide. The CHP sector employs over 100,000 people in Europe, providing knowledge- , engineering- and skills-based job opportunities with a supply chain spreading to SMEs in the engineering, project development, construction and design sectors. Users of CHP help the European Union to achieve its energy and climate change objectives, taking their chance in a turbulent electricity market while managing their core business of medicine, food processing, education, space heating or refining.

Economy-wide opportunities of CHP

The CODE 2 projections for CHP's contribution to achieving the EU's energy and climate goals are shown in Table 1.

Table 1: The potential energy contribution and efficiency gains from CHP in 2030.

EU totals from CODE2 roadmaps[1]	2030
EU Total CHP Heat Delivered [2]	1260 TWh (108 Mtoe)
EU Total CHP Electricity Delivered	750 TWh (64.5 Mtoe)
EU Total Electricity Delivered [3]	3,650 TWh (55.8 Mtoe)
Primary Energy Savings (TWh) (replacement of condensing power, refurbishment of old plants, and new builds)	**870 TWh (74.8 Mtoe)**
CO_2 savings	**350 Mt**

[1] PES and CO_2 emission reductions refer to further savings from the new CHP plants compared to the existing installed fleet in 2012. The Roadmap figures were obtained using the substitution method, described in Annex I of the CODE 2 European Cogeneration Roadmap: http://www.code2-project.eu/wp-content/uploads/CODE-2-European-Cogeneration-Roadmap.pdf

[2] Average 0.6 power to heat factor was used, higher than 0.44 average factor in 2012 due to expected CHP technology improvements.

[3] European Commission, 2013. EU Energy, Transport and GHG emission trends to 2050 (Reference scenario 2013)

The 27 individual CODE 2 Project Member State roadmaps[4], and the summary CODE 2 European CHP roadmap[5], highlight that, in 2030, new and upgraded CHP capacity could be saving Europe 870 TWh of primary energy per annum, representing more than the total gross inland energy consumption of the Czech Republic, Slovakia and Slovenia together in 2030 (830 TWh)[3]. These primary energy savings are equivalent to 350 MT of CO_2 savings (see Table 1), representing 16% of CO_2 emissions in the energy sector[6] .

Where a successful economic model exists for the user, these savings come with advantages for the business, utility, organisation or individual running the CHP plant. The European economy as a whole benefits from strengthening the core European engineering skills and industries which manufacture, design and supply CHP in Europe, and Europe would benefit from a stronger home market to drive further competition and innovation.

CHP in European Legislation

Within the EU's 2030 Climate and Energy Policy Framework[7], support for the CHP principle is part of the broader European energy efficiency agenda and has been explicitly re-emphasised in the EED. European legislation has had a specific role in encouraging the wider use of high-efficiency CHP in the European Union since 2004, when the CHP Directive 2004/08/EC was introduced as a measure for improving security of supply and energy efficiency. The Directive standardised the methodology for calculating the efficiency of CHP plants, allowing plants which could demonstrate a 10% minimum primary energy saving, defined as high efficiency, to be promoted and supported by Member States in applications where barriers to market or market failures still persist. In 2012, the 2004 CHP Directive was superseded by the Energy Efficiency Directive 2012/27/EC (EED) which introduced more specific measures, particularly via its Articles 14 and 15. The Renewable Energy Sources Directive 2009/28/EC[8] (RES), the Energy Performance of Buildings Directive (EPBD) – via the "high efficiency alternative systems"[9] concept – and the energy-related Products Directive (ErP) 2009/125/EC within LOT 1 boilers[10] encourage and clarify the legislative framework for CHP, while several additional Directives touch upon CHP as a topic.

[4] http://www.code2-project.eu/code-regions/
[5] http://www.code2-project.eu/european-overview/
[6] According to the 2013 PRIMES Reference Scenario http://ec.europa.eu/transport/media/publications/doc/trends-to-2050-update-2013.pdf
[7] http://ec.europa.eu/energy/2030_en.htm
[8] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0028&from=EN
[9] DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, of 19 May 2010 on the energy performance of buildings
[10] Lot1 regulations include Commission Regulation (EU) No 814/2013 and Commission Regulation (EU) No 813/2013 of 2 August 2013

Barriers to realising the energy savings potential of CHP in Europe in 2030

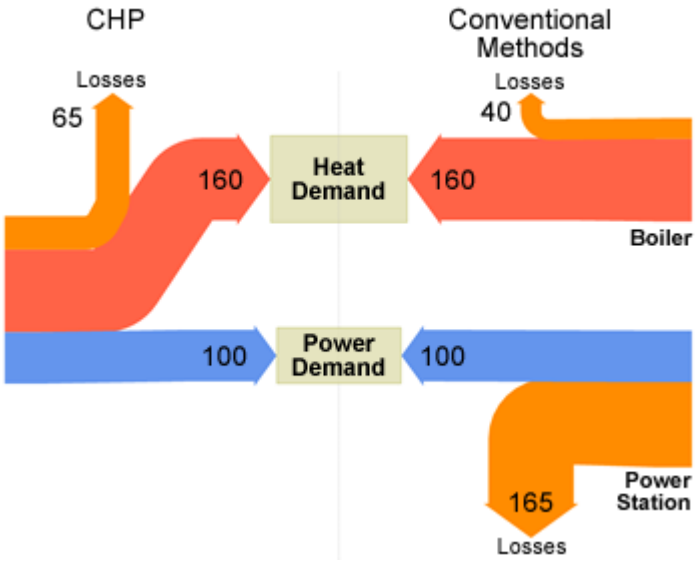
During the development of the member-state roadmaps and then again in developing the European roadmap, several significant barriers emerged which would have to be removed if the potential for 2030 is to be achieved. The barriers fall broadly under four headings and across both market and policy concerns. While different member states can claim to have largely overcome one or more of the barriers, all four need to be in the mind of any EU or national-level policymaker interested in an effective policy structure for CHP. All four barriers need to be considered in developing and reviewing EU-level policy if CHP is to deliver on energy efficiency objectives and strategic goals.CODE 2 identified the following four broad barriers which are relevant for policymakers to consider in developing a policy framework for CHP at the European level:

1. **The energy markets themselves do not consistently reward CHP for its energy efficiency as well as long and medium-term cost savings. This is partly due to a lack of awareness of the opportunities of CHP solutions.**
2. **Barriers for distributed generators in accessing and operating on the electricity network remain.**
3. **Regulatory and legislative uncertainties add very significant risk and cost to projects.**
4. **The lack of an appropriate focus on primary energy savings and heat in the European Energy Efficiency policy, which has only recently started to be recognised.**

1. The energy markets themselves do not consistently reward CHP for its energy efficiency gains which occur at the energy system level, hence there is an economic barrier to new customers taking on CHP and ongoing challenges for those running CHP plants.

The principle of cogeneration is to maximise the efficiency of fuel used in the electricity and heat generating process by using the heat emitted in the process of generating electricity for a useful economic purpose. The cogeneration principle also extends to generating electricity and cooling and electricity and mechanical work.

Key principle behind cogeneration: maximising the efficiency of the energy system



The adoption of a CHP plant cuts a significant fraction of the power system losses arising from the generation, transmission and distribution of electricity in thermal power plants. A CHP operator has to have an economic use for heat. The most familiar are district heating, industrial processes, or space heating of homes and commercial premises.

CHP technologies are well enough established and the applications well enough understood for there to be no significant technical barriers to CHP's wider use. CHP customers who have a suitable application (a demand for heat in excess of 4,000 hours per year) and where there are no non-technical barriers tend to adopt CHP on economic grounds and once it is in place, find that it is reliable and meets their needs. The energy services sector and a number of traditional utilities have begun to offer a management service to a potential CHP customer looking for a managed service of the CHP plant and/or the electricity network interaction.

The most important factor in the adoption of CHP by a new customer, and hence in triggering its wider uptake in the economy, is that the CHP must be an economic proposition in the first place. This means an adequate return on the investment over the lifetime of the plant and a sufficiently well-defined investment risk. While there are some organisations which for corporate social responsibility reasons – or sometimes for reasons of energy autonomy – may prioritise a CHP solution, they will not take on the technology without a sensible business case to do so.

Market and Awareness Actions to improve the economic case for CHP

- The market for CHP is still under-developed. While there are several reasons for this there is no doubt that awareness must be improved among target groups, through energy agencies and energy and climate actions in cities and with industry and SMEs. Policy should initiate or encourage and support appropriate measures. The European Commission which seeks energy system efficiency benefits through CHP should give more weight to this issue.
- The electricity market has changed. The penetration of intermittent renewable electricity sources is increasing. Manufacturers and packagers of CHP plants are already responding and considering the new design requirements to better fit the new market demands. CHP designs will adapt to the new electricity market more confidently and faster when the shape of that market is clarified. There is a significant interaction between the firmness of policy direction and the design investment decision.

Policy Actions to improve the economic case for CHP

There is no **market** value for the primary energy savings of CHP at the **system level**. In existing energy market structures, savings at the system level remain a "public good". Any policy that aims to stimulate more investment in CHP as part of an energy and climate policy strategy must develop a policy framework that addresses this failure. The aim must be to make CHP an economic proposition in enough of its possible applications to achieve the desired energy saving and CO_2 reduction aims of the EU member state.

Approaches to CHP support in member states fall into four broad categories (Table 2): tax assistance, market-based certificate schemes, feed-in tariffs, or premium and capital support. Of these, approaches which lower the operating risk of the CHP, rather than support the capital, are the most effective for larger plants. For smaller units and certainly in the SME or district heating sectors, access to capital is an important consideration and should be taken into account.

Table 2: National support schemes rewarding CHP[11], according to 2011 EED Impact Assessment and 2013 MS reports[12]

	Feed-in Tariff/ guaranteed purchase price		Certificate scheme		Capital grants		Energy tax exemption		Accelerated fiscal allowance for investment		Business tax exemption	
	Impact Assessment 2011	New Report	Impact Assessment 2011	New Report	Impact Assessment 2011	New Report	Impact Assessment 2011	New Report	Impact Assessment 2011	New Report	Impact Assessment 2011	New Report
Austria						■						
Belgium			■	■	■	■			■	■		
Bulgaria	■	■										
Cyprus	■	■			■	■						
Czech Republic	■	■			■	■						
Denmark	■	■			■	■					■	■
Estonia	■	■				■						
Finland		■			■	■	■	■				
France	■	■					■	■	■	■	■	■
Germany	■	■			■		■					
Greece	■	■			■	■						
Hungary	■											
Ireland		■			■				■	■		
Italy				■	■		■					
Latvia	■	■			■	■						
Lithuania	■	■			■	■						
Luxembourg	■	■			■	■						
Malta												
Netherlands					■	■	■	■	■	■		
Poland			■	■	■	■						
Portugal	■	■			■							
Romania												
Slovakia	■	■			■	■						
Slovenia	■	■			■		■					
Spain	■	■			■	■						
Sweden				■			■					
United Kingdom	■	■			■	■	■	■	■	■	■	■

[11] The German support scheme for CHP is a bonus paid on each unit generated. It is not a feed-in tariff.

[12] European Commission, 2014. Commission Staff Working Document Progress Report on energy efficiency in the European Union (SWD(2013) 541) (pp 272). Retrieved from: http://ec.europa.eu/energy/efficiency/doc/end_use/swd-2013-541.pdf

The two European Union Member States which have most consistently supported CHP in the last ten years and which have succeeded in its promotion are Belgium and Germany. The Flemish region of Belgium (2/3 of the Belgian population), for example, uses a market-based certificate approach while Germany uses a premium approach on all cogenerated electricity. These systems implicitly recognise that the energy efficiency of CHP is not rewarded through normal trading on today's energy markets. The schemes introduce either market-based or government support-based additional funding for energy efficiency (See Annex 2 DE, IT, UK, Flanders).

There is an immediate legislative need to revisit the policy framework around CHP during the ongoing implementation of the EED in Member States. Key dates are:

- 31/12/2015: Comprehensive assessment of the potential for the application of HE CHP (based on Cost Benefit Analyses).
- 30/04/2017: Reporting in National Energy Efficiency Action Plans.

For any Member State wishing to encourage the development of additional CHP, verifying that CHP is economic in the most attractive applications and then introducing suitably structured measures to address this is central to success.

The opportunities for improving within the existing EED structure the economic framework around CHP lie in:

- Article 7: include CHP measures as complying with the energy efficiency obligation (France, Italy and Slovenia are among the member states that currently do so). This represents a market-based solution for CHP support.
- Article 14: Comprehensive assessment which fully and proportionately quantifies the system-level benefits of CHP and then introduces measures to address the economic shortfall at the project level. This represents a government regulation or support opportunity within the existing EED structure.
- Article 15.1: Member states shall "ensure that national regulatory authorities provide incentives for grid operators to make available system services". Encourage the use of high efficiency sources such as CHP in the electricity Balancing and Ancillary Services markets. This provides a market-based route to making the economic proposal for CHP more attractive to CHP operators which would sell both electricity and electricity network services.
- Article 18: Member states shall promote the energy services market and access for SMEs to this market. Energy services companies have an important potential role in enabling the greater uptake of CHP by including CHP in their offering.

2. Barriers for small and distributed generators in accessing and operating on the electricity network remain among a range of non-economic and economic hurdles. These barriers persist in many member states despite EU legislation addressing them dating back to 2004.

Non-Economic Barriers to CHP usually relate to the inherently distributed nature of cogeneration compared to the traditionally large centralised generation providing power to the electricity network at the Transmission System Operator (TSO) level. Cogeneration by comparison is embedded with the heat demand which it serves as part of society and the economy and although the very large plants are connected at the TSO level, the large majority of CHP installations are connected at the Distribution System Operator (DSO) level (> 80% of the CHP fleet is under 10MWe in electricity generating capacity).

Initial connection to the electricity grid is subject to local DSO requirements, which have their own specificities. There are over 300 DSOs in Germany and over 30 in the UK. The information is not standardised and network tariffs and connection charges vary. Physical connection possibilities and costs vary. The network information largely resides with the DSO (a selling and contracting partner) so the speed and effectiveness of the interaction with a distributed generator has a high dependency on the DSO concerned. For larger CHPs connecting at the TSO level, the difficulties follow a similar pattern.

Market and Awareness Actions to improve network-related issues for CHP

The CHP industry should step up its role in the development and maintenance of new network codes under the EU's third energy market liberalisation package[13]: providing information and expertise, and ensuring that the important and changing role of distributed generation is taken into account in this cross border-focused legislation and that the requirements placed on CHP generators are proportionate to their size. More challenging is that the CHP industry must also ensure that the new codes reflect the benefits of distributed CHP as a high efficiency and "dispatchable" generator in the emerging new low-carbon network.

Industry should take an active role insisting through industry associations and other bodies at the member-state level on an interpretation of the new EED in Member States which is supportive of both the letter and the spirit of the Directive regarding connection and operating procedures for HE CHP on the DSO and TSO networks.

[13] The third package for an internal EU gas and electricity market includes: Directive 2009/72/EC 13 July 2009, Directive 2009/73/EC of 13 July 2009, Regulation (EC) No 713/2009 of 13 July 2009, Regulation (EC) No 714/2009 of 13 July 2009, Regulation (EC) No 715/2009 of 13 July 2009 .

Policy Actions to improve electricity-network related issues for CHP

There are several examples of Member States in which the process of network connection has been systematised with a specified time limit for completing defined stages. In Flanders, the grid user can demand the completion of the grid connection within a certain period after the payment of this connection. There are strict response periods to confirm the correct application for a grid connection and to respond with an offer for the grid connection. A detailed example of the situation in the Netherlands is included as an Annex. However, in many member states the level of transparency and reliability of these charges and associated processes remains challenging for CHP operators and the bureaucracy appears disproportionate, particularly for smaller generators.

Options for addressing network-related challenges of CHP at member-state level via EED implementation:

- Article 15: This article focuses on the energy efficiency of the electricity transmission and distribution networks. It increases the responsibilities of regulators for improving energy efficiency on the networks and lays down specific requirements regarding CHP in general and also micro-CHP.
- ANNEX XI: Energy Efficiency criteria for energy network regulation and for electricity network tariffs.
- Wherever possible, standardise procedures surrounding connecting new distributed generation to the electricity network.
- ANNEX XII: Energy Efficiency Requirements for Transmission System Operators and Distribution System Operators.
- Wherever possible, standardise procedures surrounding connecting new distributed generation to the electricity network.

Options for addressing network-related challenges of CHP at European level:

- The European Regulator should be asked to articulate their approach to improving efficiency on the networks at the European level considering the requirements of the EED.
- In finalising the new European Network Codes, the European Regulator should report how the compliance of the Codes with the EED has been ensured at the European level.

3) Regulatory and legislative uncertainty adds very significant risk and cost to the running of CHP plants and to developing new projects. This is impacting CHP investment costs particularly at a time of cyclic reinvestment in European plants.

Ongoing instability in the electricity sector triggered by large growth in non-controllable renewables interacting with global energy markets, as well as an economic crisis, have made high regulatory and legislative risk a significant barrier for investment in CHP. The 2014 changes to the Energy and Environmental State Aid Guidelines have added to the uncertainty facing project developers and investors in several Member States. These major challenges are occurring with a policy background of sudden changes of policy at member-state level, and an apparent shifting away from a primary energy focus of EU energy efficiency policy towards energy savings at the end-user level. Losses in generation, transformation and distribution are not addressed when focusing on end-user energy savings. This uncertainty significantly impacts investment costs in a sector where the role of policy support has already been highlighted (see point 1 above).

CHP is impacted by a wide range of policies concerning energy and electricity. Care needs to be taken that legislative changes designed to bring about specific action in the electricity sector and not necessarily designed to change the policy conditions for CHP do not in fact impact CHP with unintended consequences.

Market and Awareness Actions to improve regulatory and legislative certainty for CHP

Industry should be active in providing information to policymakers regarding regulatory and legislative matters. The more present and active the customer group and the CHP industry sector remains in policy at all levels, the more likely it is that a stable policy environment can be created for the sector. In the Czech Republic, for example, the Energy Regulatory Office (ERU) has established a CHP project team: a team of experts and stakeholders to design a system of support for cogeneration in the Czech Republic. This is an important example of cooperation of different CHP market actors with the common goal of developing and maintaining a financially reasonable, sustainable and predictable CHP support environment.

Policy Actions to improve regulatory and legislative certainty for CHP

CHP sits alongside all other electricity generators as regards the impact of global fuel prices and significant changes in the European electricity sector. The pain is a shared experience.

The general policy lesson seems to be that policies where the length of operation and the mode of review are clearly planned are more successful in moving markets with long investment times than policies which are continually changing or are short-term with no clear decision and change process.

A link between the specific CHP policy action and a clear long-term national objective is an additional stabilising factor.

The success of the German CHP incentive schemes which are well structured in extent and duration still could not resist the upsets in the European electricity market as a whole. However the impact of these changes has been to slow rather than halt progress, as investors seem to be taking a longer term view of the current problems, keeping the longer term national goals and the continued support of government in mind.

Options for addressing the regulatory and legislative challenges of CHP at the European/ Member State level

- Article 3 EED: Increase the transparency of the existing links between CHP and the 2020 and 2030 energy and climate policy frameworks. Member States should link the achievements under Article 14 and Article 15 directly to the PES target set in Article 3. In monitoring member-state reporting, the European Commission should reinforce the need for a Primary Energy Savings (PES) measurement and tracking through NEEAPs.
- EED implementation and NEEAPS: Member states should comply with, and the European Commission should enforce, the timeframes and deliverables of the EED and other CHP-related legislation. In framing legislation, member states should consider that it contains clear timeframes for operation and review, and review processes that allow stakeholders and investors to adequately make provisions for any agreed changes.

4. European Energy Efficiency policy lacks an appropriate focus on primary energy savings and heat. The absence of good data and the policy focus which results from that is a significant barrier to developing good CHP policy.

The CHP principle delivers Primary Energy savings, i.e. fuel use savings, within the energy transformation processes of creating heat and electricity. These Primary Energy elements are recorded as Gross Inland Consumption (GIC) in European statistics under Eurostat. The GIC measure (Figure 2) represents the quantity of energy necessary to satisfy Europe's (inland) consumption. Final Energy statistics which record the various end-use consumptions do not show the substantial conversion losses (32%) across the energy system.

This lack of attention given to primary energy savings (GIC) leads to a similar lack of focus on energy efficiency in the energy transformation sector as a whole. Focusing on final energy risks losing the system-level focus needed to drive energy efficiency opportunities such as demand response in the electricity sector and CHP in the energy and heat sectors which provide system-level efficiency.

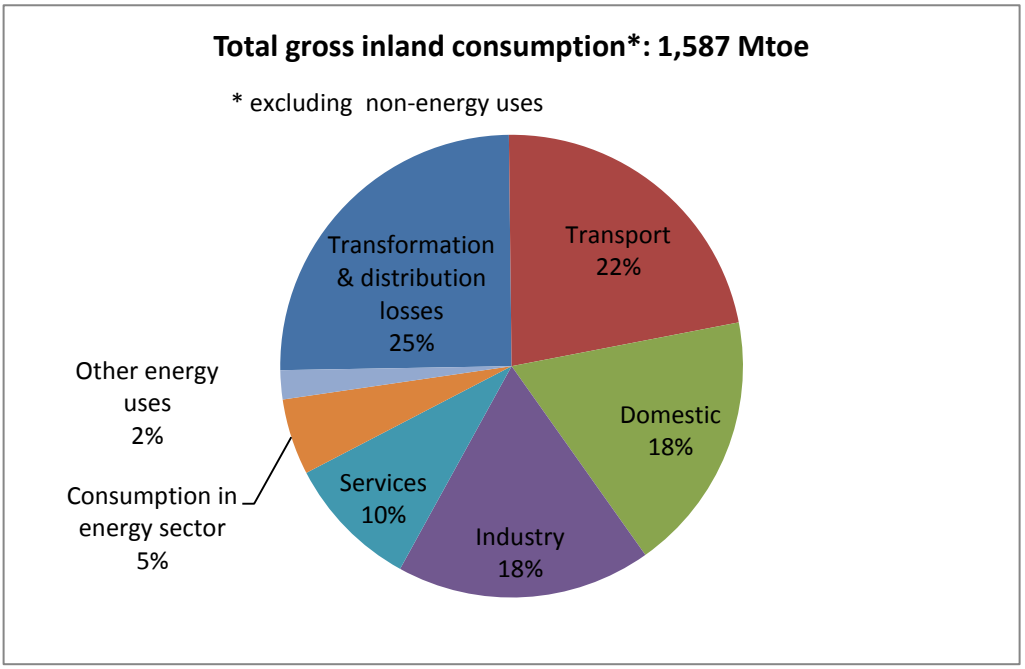


Figure 2: Primary energy consumption EU28 in 2012 (Mtoe)[14]

Despite the importance of losses in transformation in the EU energy sector (See Figure 2, 2012)[15], there is a risk of a decreased focus on primary energy savings in EU policy due to the structure of the EED. This in turn reflects as a risk for investors in CHP, who are uncertain of EU legislators' ongoing commitment to the sector. The lack of focus on electricity network and generation efficiency is a significant barrier to the growth of CHP and for the continuation of existing CHP systems.

Likewise the historic absence of a real analysis of heat in the EU's energy policy discussions is another missing element of the policy mix for CHP growth. In 2014 heat entered the discussions under the banner of security of supply and if this is followed through with the integration of heat into the EU's energy policy framework, it should be a positive step for the efficiency of the transformation sector and for CHP. 55% of the EU's primary gross inland energy consumption is used for space and water heat, and

14European Commission, 2014: EU energy in figures
http://ec.europa.eu/energy/sites/ener/files/documents/2014_pocketbook.pdf

[15] EE action plan of 2006: In the impact assessment of the EED the losses in the transformation sector were highlighted in a simple bar chart showing that the sector was only 44% efficient. A much more graphic approach from the EE Action plan was used in the original where the actual numbers rather than percentages were used (Figure 2). The figures have not changed much since 2005. The same pie chart in 2012 would show transformation losses at 25% and valuing 397 Mtoe.

a
significant amount of this is for high temperature heat in industry. However, understanding of where this demand is located, its temperature, its characteristics, and the options for delivering it within the EU's energy and climate objectives, are still at an early stage.

For both EU policymakers and industry itself, inconsistent reporting of CHP, heat and electricity by member states through Eurostat remains a serious concern. In the case of Greece, for example, the CHP-delivered electricity reported by Eurostat was 2,467,856 MWh (2010) and LAGIE (the market operator) reported that high efficiency cogenerated electricity was 125.07 MWh (2010). The source of the difference is that the LAGIE number is High Efficiency CHP only, and does not include cogenerated electricity from non-HECHP units or auto-producers. Neither final number clarifies the position of high efficiency CHP in Greece.

Market and Awareness Actions to improve certainty for CHP

- There is a poor level of awareness among key market groups, including policymakers, of the role of CHP in the European economy and the variety of its applications. This hinders appropriate policy development and the omission of CHP from appropriate consideration at the regional and national level.
- The absence of thinking and planning for heat leaves CHP providers approaching the market case-by-case and severely challenged in developing proposals that link several heat demands to make one connected demand or identifying new customers for excess heat capacity. Industry itself should do more to work with policymakers on understanding the market implications and potentials for heat.
- Industry can be criticised for its own lack of good data on the CHP sector and in this regard an effort from the industry itself would be a good next step.

Policy Actions to improve CHP

The study and understanding of how we use heat as a society is at an early stage, although recent work in member states such as Denmark, Germany and the UK is considerably improving understanding and stimulating discussion around the main issues to be tackled.

Article 3: PES linking to actions directly to actions in Articles 14 and 15

- Step by step: Using Article 14 of the EED, the EU determines characteristics of heat demand across Europe for all sectors in sufficient detail to allow modelling of supply and demand with attention to temperature and temporal characteristics.
- Study integrated supply options to reveal system integration opportunities, network integration opportunities and energy efficiency opportunities.
- Move towards a more integrated approach to energy planning so that demand rather than supply is the focus of planning.

- Ar
  ticle 24 (6) of the Energy Efficiency Directive states that starting from April 2015 Member States will have to report data for production, capacity and fuels used for cogeneration and district heating and cooling. Implementation of this article is fundamental to good member-state policy around CHP.

The CODE 2 roadmaps stress the need for an ambitious and rigorous implementation of the EED in order to realise the identified potential. However the reality of member-state implementation of EU policy is that it is seldom either of these, leaving EU legislators facing the challenge of what to do next.

Impact of current policy framework across member states

The long-term view of CHP is currently (2014) clouded by the ongoing changes in the electricity market which are affecting all players and creating large market uncertainty. At the point of introduction of the EED, the effects of the original CHP Directive 2004 were still young in many member states. The sector has been under constant change now for 10 years which has inevitably made investors cautious.

However where a member-state government has had clear objectives for the sector, there has been progress. In Germany for example several drivers foster CHP growth: the dedicated CHP law and binding target focus on improving energy efficiency in buildings, strong GHG emission reduction objectives, and the commitment to phase out nuclear energy by 2022. The main support scheme consists of a feed-in premium and EU ETS bonus for fossil-fuel CHP and a feed-in tariff offered to renewable-based CHP. In addition, micro-CHPs below up to 20 kWe benefit from a capital grant ranging between €1425-3325.

In 2014 the German CHP law entered a review process to assess whether additional support is necessary to achieve the 25% CHP target.

The likely impact of the EED on the existing barriers

All of the CODE 2 roadmaps show a potential positive impact for the EED in addressing and reducing elements of the major barriers. The EED provides a structure to make progress in terms of heat planning, assessment of CHP potential and the removal of non-economic barriers which are nonetheless barriers to market growth for CHP. The EED requires Member States to introduce "adequate measures "to promote CHP where their analysis reveals a socio-economic benefit at the member-state level.

	Barrier	EED article	Potential Impact
1	Market failure to reward energy efficiency savings	14: Promotion, CBA, measures 15: Balancing and DRM 7: Energy efficiency obligation 18: Energy Services 20: EE National Fund	Good
2	High regulatory risk		Poor
3	Economic and non economic barriers to DG	8: Audits 9: Metering 12: Small consumers 15: Energy transformation	Good
4	Policy focus on Heat/Primary Energy Demand	3: Report PES 14: Comprehensive Assessment 24: National EEAP reporting	Good heat/Poor on Primary Energy

However the EED has by necessity been written in a way that grants member states considerable latitude in how they apply Articles 14 and 15 which are most relevant to CHP. The CODE 2 national roadmaps show a considerable gap in awareness and market 'maturity' between the different Member States, which represents a considerable awareness, market and policy barrier to growing CHP. The level of flexibility in the EED may lead Member States, because of these barriers, to judge CHP delivery to be too difficult compared to other energy efficiency choices where the barriers to market delivery are lower, having been lowered to some degree by additional legislation (RES, ErP or EPBD). This is a significant challenge for the CHP industry and EU legislators alike.

Member-state policymakers wishing to move CHP forward will find the EED a useful tool in the hands of those member states that are already persuaded, but in EU countries that are yet to be persuaded of the potential benefit, this legislation will not suffice.

Recommendations for first policy steps to realise 2030 cogeneration potential

The CODE 2 roadmaps show the opportunity that lies within the EED to mobilise member-state effort in the main barrier areas for CHP (1-4 above). However it also suggests that certain policy links which are present in the EED need to be reinforced by DG Energy in the monitoring of EED implementation and that indeed if this is unsuccessful additional efforts regarding the policy framework around CHP will be required if the projected primary energy savings are to be achieved.

The main actions at national level are:

- Create clear links within the EED reporting to the wider deployment of CHP and the associated primary energy savings (Article 14,15 results linked to Article 3 target) in NEEAP reporting.
- The Article 3 national EE indicative target being reported in PES, full enforcement of which is mandatory.
- The inclusion of CHP in the set of measures stemming from Article 7 to be encouraged.

The monitoring of the NEEAPs by the European Commission should ensure that the Member States clearly identify that they have met the following EED provisions:

Article 14: Member State CBA includes a full consideration of the societal benefits of CHP.

Article 14: That there is a clear micro-CHP analysis in the NEEAP report.

Article 15: That the electricity market, network efficiency and network tariff and access requirements in the Article and the requirements of the Associated Annexes have been fully met.

SME Sector

The SME sector was a particular focus of interest for the CODE 2 project. It is also an area where both the market and policymakers have considerable efforts still to make if cogeneration is to be more widely adopted. Action on all four main barriers is necessary for the SME sector where the need for a clear reliable financial return is fundamental to any progress. The additional challenge to overcome for the SME sector is the low purchasing power and difficulty in finding affordable finance in this sector.

For SMEs the main additional actions are:

- Create SME-oriented access to information on CHP and easy tools for assessing applications quickly for possible CHP applications: the "How to" guides and the online tool developed in the frame of the CODE 2 project for SMEs (to make a first-pass calculation on the viability of installing CHP) shall be properly disseminated.
- Industry to create suitable materials and communication links for the clusters initiative of DG Enterprise around SMEs.
- EU funding (for technical assistance and project development assistance) such as the ELENA fund could be the key step to identifying viable projects. The CHP and SME sectors should consider co-operating to establish schemes to ask for such assistance from the EU.
- Of particular importance to SMEs in the implementation of the EED are:

  Article 15 and Annexes XI and XII. Barriers for small and distributed generators in accessing and operating on the electricity network must be addressed. Solutions providing procedures and tariffs proportional to the size of installations should be brought forward by the DSOs. Processes should be standardised to allow the participation of SMEs in a non-bureaucratic and fixed cost fashion.

- Access to finance: For SMEs to finally engage with CHP means for most having reliable access to affordable capital with a suitably secure return. There are several EU-level funding institutions which aspire to lend to the green energy sector and they face the ongoing challenge of successful interaction with SMEs. In this respect the efforts of DG Enterprise and of regional bodies and cities in their organisation around energy should include action on the need for cost-effective intermediaries to aggregate and demand loans to connect with the larger EU funds which are available.

Micro-CHP Sector[16]

Micro-CHP products are available from most EU boiler manufacturers and a group of specialist suppliers. The market is progressing slowly helped currently by the high retail electricity price in many EU member states. The sector is a source of considerable technical and business model innovation with most recently the emergence on the market of fuel cell micro-CHP units. However, effective policy support is still needed for the sector to overcome the high product costs of the early market and to encourage home growth in these products, where European technology is in a leading position globally.

Micro-CHP is a step change in energy efficiency for much of the existing building stock where renewables have difficulty progressing due to building constraints.

[16] Micro-CHP is defined within CODE 2 as in Directive: Energy Efficiency Directive 2012/27/EU (EED)).Micro CHP is defined in the Directive as having a capacity of less than 50KWe.

For micro-CHP the main additional actions are:

The EED has several legislative requirements for micro-CHP. The ones most likely to positively impact the sector are:

- Article 7: Encourage the explicit use of micro-CHP.
- Article 14: Carry out a robust assessment of the potential for micro-CHP across the member state and put suitable measures in place to realise the potential identified.
- Article 15 and Annexes XI and XII: Implementation of the 'install and inform' process for micro-CHP at national level and reductions of bureaucracy, and increased transparency for micro-CHP operators.

Eco Product Design & Energy Labelling Directives (EPD)

- Revisit as soon as possible the position of micro-CHP products within the space heaters (Lot1) Eco-design and Energy Labelling Regulations[17] to ensure that their energy efficiency relative to other heat producing products is fully represented. As the only products in Lot1 that produce electricity in addition to heat, the efficiency gains of micro-CHP technologies should be fairly assessed and accounted for.

CHP Industry:

- Reduce product cost as rapidly as possible.
- Ensure a fully competent supply chain to deliver the micro-CHP products.

[17] Commission Delegated Regulation […] with regard to the energy labelling of space heaters […] (No. 811/2013) & Commission Implementing Regulation with regard to ecodesign requirements for space heaters and combination heaters (No. 813/2013)

Annex: Detailed member-state case studies illustrating successful policy approaches around CHP.

1) Germany:

The German support mechanism for CHP has created significant interest from new potential users and stimulated investment in the sector

Barrier 1: Finance: the support mechanism, which is varied across sectors to provide adequate but appropriate support, creates an economic proposition across a wide range of applications.

Barrier 3: Regulatory risk: While there have been several adjustments to the support scheme, the German commitment to a CHP target – with suitable terms for support, has served to minimise the perceived legislative and regulatory risk.

Summary report by KWK kommt U.G.

Name of policy/ Measure:	Kraft-Wärme-Kopplungsgesetz (CHP law)
Ref:	http://www.bafa.de/bafa/de/energie/kraft_waerme_kopplung/ http://www.gesetze-im-internet.de/kwkg_2002/index.html
Objective of policy/ measure:	§ 1 Purpose of the Act "… is, in the interest of energy conservation, environmental protection and achieving the climate protection targets of the Federal Government to contribute to the increase in electricity generation from combined heat and power in the Federal Republic of Germany to 25 % by 2020 by promoting the modernisation and construction of combined heat and power plants (CHP plants), supporting the market introduction of fuel cells and the funding for the construction and expansion of heating and cooling networks as well as the construction, extension of heat and cold storages, in which heat or cold from CHP plants is fed."
Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	• Bonus payments on CHP net electricity produced in new and modernised plants, amount depending on plant size: - for up to the first 50 kWel → 5.41Cent/kWh - for the exceeding amount up to 250 kWel → 4 Cent/kWh - for the exceeding amount up to 2 MWel → 2.41 /kWh - for the exceeding amount → 1.8 Cent/kWh (if ETS obligation 2.1 Cent/kWh) For micro-CHP up to 50 kWel 10 years. For other CHP plants 30,000 full operating hours (foh). Modernised plants (> 50 kW): If modernisation cost are ≥ 50%

	of the cost of a new installation; otherwise (if ≥ 25%) 15.000 foh. • Electricity fed into the public grid is paid by the grid operator according to market prices or directly sold on the market. • Additionally a fee for "avoided grid cost" according to the general grid cost rules is paid by the grid operator: this is not special support for CHP. • Support for investments in heating and cooling networks if 60% of the heat or cooling comes from CHP or waste heat. • Support for heat (and cooling) networks €100/m and max. 40% of investment (<= 100 mm diameter) or 30% (> 100 mm diameter). • Industrial waste heat is treated as CHP heat. • Support of heat storage infrastructure €250/m^3 up to 30% of investment costs and capped to €5 million (incentive for flexible CHP operation with regards to growing supply of fluctuating wind and solar electricity). • Overall budget allocated €750 million/year. • The payments are allocated to final electricity consumers over the electricity bills. • Runtime of the law up to 2020.
What has been achieved :	Increase of CHP share in total electricity production 2003 to 2013 from 13.5 % to 16.2 % (2013: 96 TWh/a). But note that the increase is mainly due to additional bio-CHP which has been supported by the Renewable Energy Law (EEG). This increase has been judged as insufficient to reach the 25% target up to 2020 in the monitoring study from October 2014. The main reasons for this are the extremely low electricity market prices which have been discouraging investments in new CHP since 2011 and even threaten the existence of CHP plants already in operation.
Time period:	2002 to 2013 (with substantial amendments in 2009 and 2012)
Cost:	From 2002 to 2013, €6.6 billion has been spent.
Lessons learned:	The consequences of the update of the CHP law in 2015 are currently being discussed and considered. The CHP law evaluation study concludes that the target of 25% CHP electricity in 2020 will not be achievable without a significant increase in support payments. To fill the lack of about 50 TWh per year 2 to 3 x 10^9 € support per year will be necessary, which means 4 to 6 cents per kWh. Periodical adaptations to electricity market prices are advised amongst others. Incentives to shift the CHP electricity production in times with high electricity prices are also discussed. Finally special support for bio-energy CHP via higher bonus payments compared to fossil-fuel CHP is claimed by bio-energy associations.
Comments on how transferable measure is:	The general structure and mechanisms are broadly accepted in Germany. The law is relatively simply designed and is estimated to be easily transferable to other countries. But lessons learned should be considered.

2. Flanders

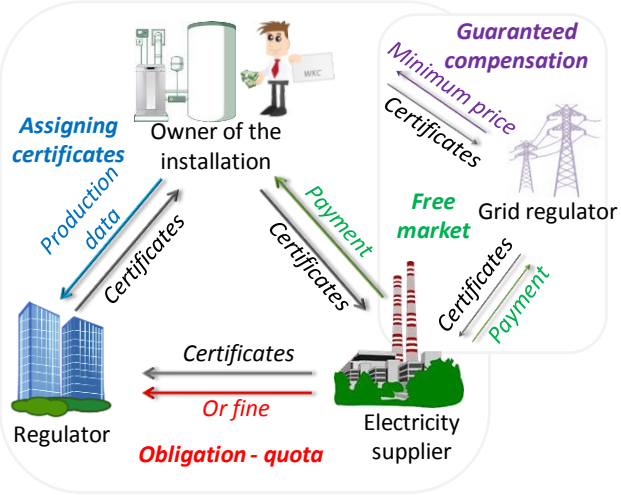
The Flanders support mechanism for CHP has created significant interest from new potential users and stimulated investment in the sector. It is a market based certificate scheme.

Barrier 1: Finance: the Flanders scheme has succeeded in attracting new capacity into the market. Flanders, Wallonia and Brussels all use a form of certificate scheme to successfully promote CHP.

Barrier 3: Regulatory risk: the use of a floor price for certificates and a clear market approach have operated as a reduction on regulatory/legislative risk on the market. This even when there have been several adjustments to the scheme itself.

Summary report by COGEN Flanders

Name of policy/ Measure:	**Energy Decree** (Vlaanderen, 2009)
Ref:	
Objective of policy/ measure:	To create a legal framework for CHP policy in Flanders and to include CHP within a certificate scheme as an incentive for the growth of the CHP sector.

Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	*Principle of the certificate systems in Belgium* A CHP certificate is a tradable product that proves that an installation makes an amount of primary energy or CO_2 savings by using CHP, compared to a reference installation. The owner of a qualitative CHP installation receives every month a number of certificates from the local energy regulator. He can then sell them to the electricity suppliers for a price determined by the free market. In order to maintain the market, electricity suppliers have to buy a number of certificates, regulated by quota. The owner also has the option to sell his certificates to the grid regulators for a minimum price.  The Energy Decree regulates several CHP-related topics: • It defines high efficiency CHP in Flanders; • it regulates the general principles of CHP and green electricity certificates as well as guarantees of origin; • it regulates the responsibilities of the electricity suppliers and grid operators regarding priority access to the grid, the costs of grid connection and responsibility to stimulate rational energy use, and; • defines the reporting obligations of the Flemish Government, including an energy balance with the production of electricity and heat by CHP per sub-sector and energy source. The Energy Resolution (Vlaanderen, 2010) arranges the implementation of the Decree which was revised in July 2012. The implementation of the certificate system was also changed in 2012.

3. Italy

The Italian support mechanism for CHP has triggered significant interest among new potential users and stimulated investment in the sector. It is a market-based certificate scheme.

Barrier 1: Finance: The support mechanism of white certificates, which is part of a wider use of certificates to stimulate low-carbon investment, has created an economic proposition across a wide range of applications.

Summary report by CODE 2 Partner FAST.

Name of policy/ Measure:	M.D. 20/7/2004, 2/1/2013, 5/9/2011
Ref:	http://www.autorita.energia.it/it/ee/def.htm http://www.efficienzaenergetica.enea.it/industria/politiche-e-misure/i-certificati-bianchi.aspx
Objective of policy/ measure:	The White Certificates (WhC) system is one of the tools used by the Italian Government to achieve the objectives set by the EU's Energy Efficiency Directive 2012/27 / EU: 20% reduction in energy use by 2020. With the entry into force of DM 5/9/ 2011, a new type of WhC (the so-called "HE CHP WhC") can be attributed to high-efficiency cogeneration, similar to WhCs attributed to energy saving measures with some peculiarities for CHP.
Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	• An eligible party (DSO or volunteer) may apply for a WhC by presenting an energy efficiency project and, if the project is accepted, the party receives a number of WhCs corresponding to the recognised saving (one WhC correspond to one *toe* of saving). Every party with WhCs on their account can then trade the certificates on the market. WhC trading allows the obligated parties to obtain sufficient WhCs to reach their targets, expressed as primary energy savings assessed using tons of oil equivalent (toe) • With the entry into force of DM 5/9/ 2011, WhC s are also attributable to simple producers of electric power through CHP plants. • Every year that HE CHP requirements are met, the CHP installation is entitled to release of "HE CHP WhC" based on primary energy saved calculated according to a (rather complicated) formula provided by the Decree. • HE CHP WhCs are recognised for a maximum period of 10 years or 15 in the case of plants combined with district heating. • The price of WhC s is fixed by the reference market and continually increased in the scheme's first six months,

	reaching 144 €/toe, attributing a greater value to energy efficiency projects which can find a significant support for investments.
What has been achieved :	• The WhC target started at 0,2 Mtoe/year in 2005 and will reach 7,6 Mtoe/year in 2016, covering more than 60% of the national target set by the 2006/32/EC directive. After the first phase dominated by public sector applications, the industry sector applications have started to rise under the effect of the "tau" coefficient , the multiplier introduced to the formula in 2011 that adds to the yearly additional savings the discounted future savings for technologies with a lifespan of more than 5 years, including CHP installations. The result has been dramatic: in 2013 around 95% of the certificates granted to new projects have been related to energy efficiency in the industrial sector, not referring only to CHP. • As regards HE CHP WhCs, the evolution of the release of certificates is outstanding: ○ 2008: 5.237 (2%) ○ 2009: 3.600 (1%) ○ 2010. 72.400 (27%) ○ 2011: 51.700 (19%) ○ 2012: 136.600 (51%)
Time period:	2004 to 2013
Lessons learned:	The mechanism of WhCs is generally accepted by the industrial sector and by industrial CHP installations in particular. Enea (the body assessing the conformity of projects for WhC release) judges that WhC is the system that contributed most to generating energy savings (approximately 35,000 GWh/year between 2008 and 2012). The last trend indicates a clear shift towards projects in industrial and large service sectors. This is evidently a good indication for industrial competitiveness, but it could also be a sign that the complexity required by the procedure and the continuous monitoring effort it is rarely compatible with those small and medium-sized operations that are typical for SMEs, which constitute the backbone of Italian economy.
Comments on how transferable measure is:	The diversity of the mechanisms, tools and actors put to use by each European country to monitor and measure energy savings from different sectors and applications implies that caution is necessary in consider whether schemes like the Italian WhC are practically transferable from one country to another. It would be advisable to first carry out an initial phase of stating minimum common rules for measuring parameters and obligations where possible in order to build towards a potential common scheme.

4) SLOVENIA

Barrier 1: Finance: The support mechanism is tailored according to the needs of Slovenia's energy and climate objectives and has been successful in growing CHP.

Barrier 3: Regulatory risk: The clear time lines and obligations of the support scheme help to minimise perceived regulatory and legislative risk for investors.

Summary report by **JSI**

Name of policy/ Measure:	**CHP feed-in support scheme**
Ref:	https://www.borzen.si/en/Home/menu2/Centre-for-RES-CHP/Centre-for-RES-CHP
Objective of policy/ measure:	**Support of CHP electricity generation from renewable and fossil energy sources when generation costs exceed the electricity market price (2009-2014).** The key goal of the support is to increase the energy efficiency and security of energy supply. CHP support was introduced by the Energy Law (2008) and fits Slovenia's national energy policy goals: to achieve secure, sustainable and competitive energy supply by supporting different measures, among which: • use of renewable energy sources, and; • prioritising energy efficiency over energy supply. The CHP support scheme is an important measure for achieving Slovenia's climate and energy goals for 2020: • 25% share of RES; • 20% increase of energy efficiency, and; • 20% decrease of GHG emissions.
Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	CHP support scheme approved in 2009 is the main CHP support instrument in Slovenia, managed by Borzen (the centre for RES/CHP). The level of support depends on the: • Type of fuel: biomass, biogass, waste, fossil fuels. • Unit capacity: 6 size classes from up to 50 kW until 200 MWe. • Number of working hours: up to 4000 and above 4000 h/year Other key facts of the support scheme: • CHP plants running on fossil fuels are eligible to receive the support for 10 years, and 15 years if they run on RES fuels. • The level of support is annually adjusted to natural gas, biomass and electricity market prices. • CHP plants can choose between two types of support: ○ **"guaranteed purchase"**, where Borzen takes over the total produced electricity (the

<table>
<tr><td></td><td>producer is included in the special balance group, operated by Borzen), only for units up to 1 MWe.
○ "premium" as a difference between the full ("guaranteed purchase") price and the market price, which is determined ex ante on a yearly level awarded to all net produced electricity (producer sells electricity on the market or consumes it on site).
• Reconstructed plant eligible for proportional part of the support if a reconstruction cost exceeds 50% of the new plant investment.
• Support scheme is financed through dedicated add-on charges on the network fee bills of all users of electricity in Slovenia.
<table><tr><th>Support in 2014</th><th>Span of premium
(€/MWh)</th></tr><tr><td>Fossil fuels</td><td>51 – 205</td></tr><tr><td>Wood biomass</td><td>80 – 303</td></tr><tr><td>Biogas</td><td>26 – 127</td></tr><tr><td>Landfill gas</td><td>22 – 60</td></tr><tr><td>Bio. Waste</td><td>34 – 38</td></tr></table>Details: https://www.borzen.si/Portals/0/SL/CP/Podpore_en.pdf</td></tr>
<tr><td>What has been achieved :</td><td>Increase of CHP share in total electricity production in the period 2009-2012 from 6.74% to 7.53 %.
Total new installed CHP capacity of 126 MWe in 300 units:
• 70 MWe fossil CHP;
• 34 MWe biogas CHP;
• 21 MWe wood biomass CHP;
with close to 500 GWh yearly electricity generation.</td></tr>
<tr><td>Time period:</td><td>2009 to 2014 (limited support to district heating CHP since 2002)</td></tr>
<tr><td>What is cost:</td><td>Value of the paid support: €51 million in 2013.</td></tr>
<tr><td>Lessons learned:</td><td>Support has very successfully triggered the CHP potential in smaller district heating systems (CHP in almost all systems where natural gas is available) and partly evident in services. The response of industry was limited due to economic crisis and lack of financial resources. Several other positive economic benefits have been perceived:
• The beginning of CHP engine manufacturing in Slovenia;
• origin of several new CHP project and service providers;
• huge development of ESCO services for CHP;
• evident macroeconomic benefits through taxes and established new jobs (benefits similar to the yearly costs of support).
Lessons learned:
• Adequate, stable and secure support is essential for CHP investment.
• Yearly adjustment of support level to natural gas, biomass and electricity market prices is very important in current very dynamic and unfavourable market conditions (support needed also for old refurbished</td></tr>
</table>

	plants). • Regular evaluation and adjustment of the support level to the actual investment costs is very important in new growing CHP markets (decrease of project inv. costs). • **Stopping of new entrants to support scheme in September 2014 due to transition period for establishing new tendering entrance procedure in 2015; this had the effect of stopping all larger CHP projects as early as the beginning of 2014 and has halted all projects afterwards, imposing huge uncertainty on the CHP market. The tender procedure for small-scale CHP projects could be a huge additional administrative barrier especially for micro-CHP units.**
Comments on how transferable measure is:	The similar structure and methodology for setting the level of CHP support is already used in Czech Republic, Slovakia and some other countries and could be further transferred.

5) Netherlands

Barrier 2: Connections and tariffs: CHP is well established in the Netherlands and clear parameters exist for new connections and tariffs. This transparency helps investors to estimate and plan projects, lowering overall transaction costs.

Summary report by Energy Matters

Name of policy/ Measure:	Activiteitenbesluit (Regulations for small and medium-sized heat generators under the *activities legislation*) and procedures for grid connection.
Ref:	http://www.infomil.nl/onderwerpen/klimaat-lucht/stookinstallaties/kleine-middelgrote/1-regelgeving-0/
Objective of policy/ measure:	§ 1 Purpose of the Act "Regulations for small and medium-sized heat generators (less than 50 MWth) are laid down in het Activiteitenbesluit paragraph 3.2.1. With this policy measure, a mention to the authorities is enough to be allowed to perform certain activities like generating power if the activities can be placed under the Activiteitenbesluit. If not, then permits are needed." In general, the next step after the formal mention would be to contact the grid operator, who is required to connect the CHP to the grid."

Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	• For systems up to 50 MWth running standard fuels (i.e. natural gas, propane, pellets):
	  ○ No permits needed, just a mention
	  ○ Emission requirements exist
	• For systems larger than 50 MWth running standard fuels (i.e. natural gas, propane, pellets):
	  ○ Permits are needed
	  ○ (Strict) emission requirements exist
	
	The following obligations of grid operators are important:
	- Obligation of grid operator to provide a connection to the grid (Article 23 electricity law)
	- Obligation of grid operator to transport the required amount of electricity from and to the connection (Article 3.1.1 Network code electricity)
	
	Artikel 23 Elektriciteitswet
	1. De netbeheerder is verplicht degene die daarom verzoekt te voorzien van een aansluiting op het door hem beheerde net tegen een tarief en tegen andere voorwaarden die in overeenstemming zijn met de paragrafen 5 en 6 van dit hoofdstuk. (…)
	Artikel 3.1.1 Netcode Elektriciteit
	De aangeslotene heeft recht op transport van elektriciteit

	door heel Nederland tot een hoeveelheid ter grootte van het op de aansluiting gecontracteerde en beschikbaar gestelde vermogen."
Comments on how transferable measure is:	The process of connecting CHP to the grid is relatively simple in the Netherlands. If the system meets the conditions outlined above it has to be formally mentioned to the authorities and to the grid operator. The underlying legislation is unfortunately not simple. It involves environmental legislation, energy legislation and the network code.

6) Czech Republic

Barrier 4: Policy Linkages: The industry-government process for decision-making around CHP has led to a consistent approach to the sector which in turn has generated growth.

Summary report by **JSI**

Name of policy/ Measure:	**CHP feed-in support scheme**
Ref:	http://www.eru.cz/en/cr
Objective of policy/ measure:	**Key goals for the support of cogeneration are to increase energy efficiency and to decrease greenhouse gas emissions. Support for the necessary retrofit and replacement of existing old district heating CHP plants is a key priority.**
Description of policy/measure : (enough detail to allow an independent policy expert to assess and start rough calculations) authority which implements measure:	CHP support scheme (a universal scheme, not targeted at specific sectors) in the form of green premiums ("green bonus") which are organised as follows: • **Four categories according to the installed electrical capacity** (up to 200 kWe, from 200 kWe to 1 MWe, from 1 MWe to 5 MWe and over 5 MWe). • **For categories up to 5MWe each category is split into three operating hour classes** (3000, 4400 and 8400 hours per year). For units above 5MWe the hour classes do not exist. • **The premium level is differentiated according to the Primary Energy Savings (PES)** with minimum support for plants which have PES below and up to 15% savings and higher support for sources above 5MWe and PES greater that 15%. • **Special extra rates** (bonus additional to the basic rate of green bonus) are used to support CHP electricity generation from renewable sources (solid biomass; also gasification and co-firing, biogas, mine or drained gas, etc.). • **Support is also applicable to modernised old CHP plants** with proven improved performance. The premium levels are set yearly by the Energy Regulatory Office (ERU) based on market conditions (reflecting actual electricity and natural gas prices). The system operates as a form of price regulation conducted by the ERU where a price decision is applied to the whole market and not as a support mechanism subject to direct state aid.

Support in 2014	**Premium** *(app.€/MWh)*
Fossil fuels	2 – 75

<table>
<tr><td></td><td>
<table>
<tr><td>Wood biomass</td><td>17 – 90</td></tr>
<tr><td>Biogas</td><td>98</td></tr>
<tr><td>Landfill gas</td><td>41</td></tr>
</table>
Details: http://www.eru.cz
</td></tr>
<tr><td>What has been achieved :</td><td>Stable CHP market with at least 20 MWe yearly investments in small and medium-scale fossil-fuelled CHP and huge Increase of electricity generation from RES in the period 2004-2013:
Wood biomass: from 0.5 TWh to 1.7 TWh
Biogas; from 0.04 TWh to 2.2 TWho</td></tr>
<tr><td>Time period:</td><td>Ongoing</td></tr>
<tr><td>What is cost:</td><td>-</td></tr>
<tr><td>Lessons learned:</td><td>The support scheme has enabled substantial CHP development in the Czech Republic with the several positive benefits for the economy:
Gradual and balanced development of CHP in all sectors.
Very positive effect of CHP for the competitiveness and economic operation of district heating systems.
Establishing powerful CHP manufacturing where several companies have exceeded the national market and are becoming global CHP players.
Additional incentive for the development of ESCO services.
Evident macroeconomic benefits through taxis and established new jobs (benefits similar to the yearly costs of support).
Lessons learned:
Adequate, stable and secure support appropriate for the optimal projects only is essential for CHP investment.
Yearly energy market price adjustment of the support level significantly reduces risk for investors.
CHP project team: a team of experts and stakeholders established by the Energy Regulatory Office (ERU) to design and discuss the system of support for cogeneration in the Czech Republic is a good practice example of cooperation of different CHP market actors with the common goal of developing and maintaining a financially reasonable, sustainable and predictable CHP support environment.
Uncertain future support due to the long and not yet finished notification procedure with DG Competition imposes huge uncertainty on the CHP market.</td></tr>
<tr><td>Comments on how transferable measure is:</td><td>Measure could be easily further transferred.</td></tr>
</table>