

CODE2

**Cogeneration Observatory
and Dissemination Europe**



D5.1 Final Cogeneration Roadmap

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Introduction and Summary

The CODE2 project¹

This roadmap has been developed in the frame of the CODE2 project, which is co-funded by the European Commission (Intelligent Energy Europe – IEE) and will launch and structure an important market consultation for developing 27 National Cogeneration Roadmaps and one European Cogeneration Roadmap. These roadmaps are built on the experience of the previous CODE project (www.code-project.eu) and in close interaction with the policy-makers, industry and civil society through research and workshops.

The project aims to provide a better understanding of key markets, policy interactions around cogeneration and acceleration of cogeneration penetration into industry. By adding a bio-energy CHP and micro-CHP analysis to the Member State projections for cogeneration to 2020, the project consortium is proposing a concrete route to realise Europe's cogeneration potential.

Draft roadmap methodology

This roadmap for CHP in Latvia is written by the CODE2 partner Jozef Stefan institute based on a range of studies and consultations (see Annex 7). It has been developed through a process of discussion and exchanges with experts². The roadmap was written over a longer period in the 2014. The national policy framework around CHP continues to evolve in Latvia and at the time of publication of this roadmap (November 2014) several items considering revision of the support scheme are under discussion and this should be taken into account when using the material in the roadmap.

Acknowledgement

Jozef Stefan Institute and the CODE2 team would like to thank all experts involved for their contributions to develop this roadmap, which has been valuable regardless of whether critical or affirmative. It has to be stressed that the statements and proposals in this paper do not necessarily reflect those of the consulted experts.

¹ For more details and other outcomes of the CODE2 project see: <http://www.code2-project.eu/>.

² Discussions with policy authorities and experts took place on the several CA-EED meetings and later on in 2014 with more experts' phone conversation and mail exchanges of information.

Summary

Latvia is among the top 3 MSs in EU by its higher than 40% share of high efficient cogeneration (CHP) in total gross electricity production due to a very intensive recent development with a more than doubling of the CHP capacity in the period 2006 – 2013. CHP plants mainly using natural gas contribute more than half of the Latvian electricity generation beside more than 45% share of hydro generation. Latvia is still a net importer of electricity at the level more than 15%. Cogeneration fits well to the ambitious national goals to increase the use of renewable energy sources (40% share till 2020 and to 50% share till 2030) and energy efficiency to decrease current high energy dependency. Fast recent CHP growth and high penetration of cogeneration especially in district heating as a result of proper CHP position in the national energy policy with incentive support framework are key drivers for general high CHP awareness in Latvia. How to preserve the current volume of CHP generation and further future development is a huge financial challenge in current unfavourable energy market conditions which have increased the requested CHP support intensity and enlarged the needed financial resources.

The CHP roadmap path would deliver up to 1 TWh/a of primary energy saving (PES) and 0,5 million tonnes of CO₂ reductions are achievable till 2030. Increase of sustainable CHP electricity generation by new CHP units mainly using RES for up to 0,9 TWh would decrease Latvian import dependency but not increase the primary energy supply. Fast and effective revision of the current CHP support scheme, providing the least feasible support to preserve the long term operation of CHP plants using natural gas and continuation of successful investment subsidies for increasing efficiency of district heating systems are key actions needed and will request adequate financial resources.

1. Where are we now? Background and situation of cogeneration in Latvia1.1

Current status: Summary of currently installed cogeneration in Latvia

With a higher than 40% share of cogeneration in total gross electricity production and very intensive recent development with a more than doubling of the CHP capacity in the period 2006 – 2013, Latvia is among the top 3 MSs in EU. Hydro and mainly natural gas based CHP electricity generation provide more than 80% of the total electricity generation and 60% of the district heat supply in Latvia.

A minimum solid fuel share and an around 60% energy dependency (above average of the EU28³) is distinctive of Latvian primary energy supply with almost equal shares of renewable energy (biomass and hydro), oil fuels and natural gas. **(Figure 1)**. A natural gas and hydro energy are the main energy resources (each has round 40% share) of the about 6 TWh of total gross electricity generation (Figure 2) and 7,5 TWh of the gross electricity demand. The import of electricity is close to 20%.

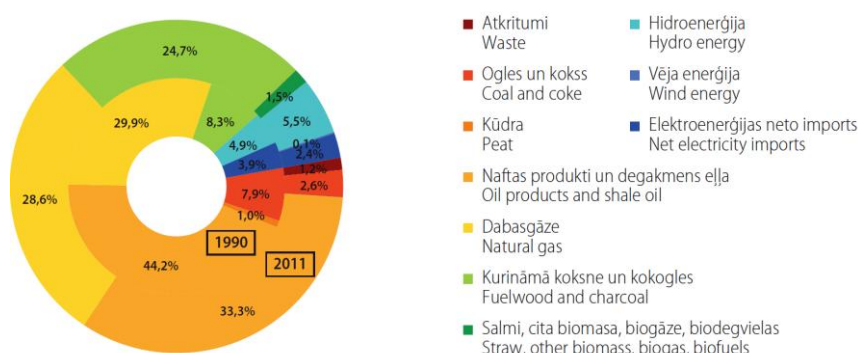


Figure 1: Latvian primary energy consumption in the year 1990 and 2011⁴

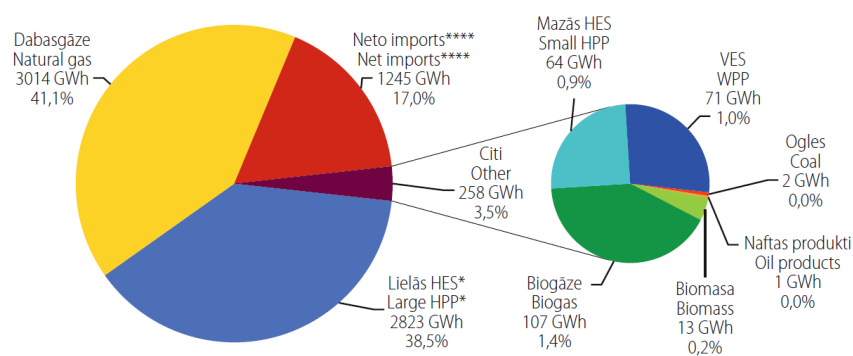


Figure 2: Structure of electricity supply in 2011⁴

With a more than 40% share of cogeneration in total gross electricity production, Latvia is among the top 3 MSs in the EU as all thermal electricity generation is produced in the CHP plants (Table 1). Total installed CHP capacity has more than doubled since 2006 and reached 1.252 MWe in 2013⁵ (the

³ Between 12- 24% in the period 2007-2012, the lowest in EU28 after negative dependency of Denmark, Eurostat, 2011.

⁴ Source: Latvian energy in figures 2013 [1].

⁵ Source: Central Statistical Bureau of Latvia.

number of the CHP plants has increased from 43 to 166 in this period) and the electricity generation increased for 60% to 3,2 TWh in 2013.

Combined cycle turbine on natural gas is a prevailing technology in 4 largest public district heating CHP plants with almost 85% share in total CHP capacity and more than 60% in CHP electricity and heat generation in 2013. Gas engines are most often used in smaller CHP units (<20 MW) where among the 162 existing CHP plants there are only 46 autoproducers CHP plants.

CHP generation concentrated in a small number of bigger CHP units is the main reason for rather big oscillations in CHP electricity and heat generation as shown in Figure 3.

Table 1: Eurostat data on cogeneration in Latvia in the period 2006 – 2012

CHP	Installed electrical capacity [GW]	Total heat supplied [TWh]	Total electricity generated TWh]	Total % of gross electricity production
2006	0,59	3,3	2,1	42,6%
2007	0,57	2,7	2,0	40,9%
2008	0,53	2,3	1,8	33,6%
2009	0,26	1,4	1,1	19,7%
2010	0,87	2,9	3,0	45,0%
2011	0,88	2,6	2,9	47,4%
2012	1,00	2,4	2,1	34,5%

Source: Eurostat 2014.

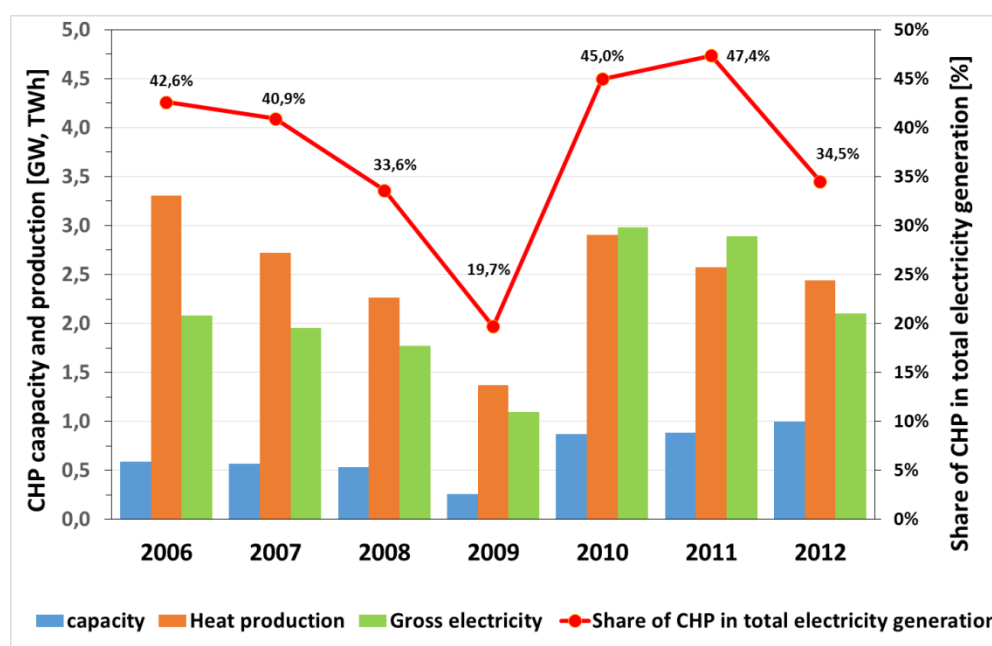


Figure 3: CHP capacity, generation and share in total electricity generation in the period 2006 – 2012 (source Eurostat)

With a more than 90% share the natural gas is the major fuel used in CHP plants beside slowly growing share of wood biomass and biogas⁶. (Figure 4). CHP plants have supplied close to 60% of the

⁶ 2013 CHP statistics: Natural gas: 1141 MWe, 2670 GWh electricity; biogas: 51,3 MW, 287 GWh electricity and biomass 54,3 MW, 208 GWh electricity.

total produced heat in widespread district heating systems which supply around 70% of the household's heat demand and approximately 22% of the total heat demand in Latvia⁷.

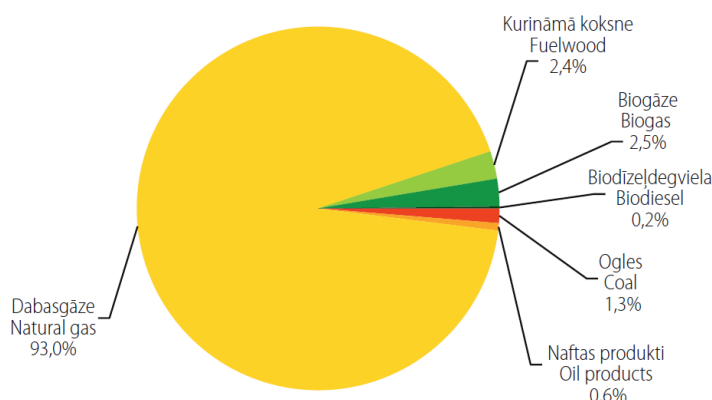


Figure 4: Structure of fuel consumption in CHP plants 2011¹

Prevailing hydro and cogeneration based electricity and heat supply results in the extremely low carbon intensity of energy produced in Latvia. The state owned company “Latvenergo”, which is providing electricity for more than 98% of consumers, has reported the average 0,12 tCO₂/MWh CO₂ intensity of whole electricity production and 0,29 tCO₂/MWh, particularly for its natural gas cogeneration plants in 2013⁸.

1.2. Energy and Climate Strategy of Latvia

An increase of the use of renewable energy sources (RES) and increase of the energy efficiency are key strategic goals of energy and climate policy based on the Sustainable development Strategy of Latvia. Turn toward the electricity generation from RES will significantly contribute to the set ambitious target of 40% RES share in final energy consumption till 2020 and 50% till 2030 and decrease of the current high import dependency.

Sustainable development Strategy of Latvia until 2030 (Latvija2030)⁹ set the energy independence and security of energy supply as the strategic priority. Special emphasis is on the:

- **increase of the use of renewable energy sources (RES)** with the goal to achieve a 50% share of (RES) in the final energy consumption by 2030 and to increase the electricity production from RES¹⁰.
- **improvement of the energy efficiency** in manufacturing sector, residential, public and other sectors of final energy users.

⁷ Second National Energy Efficiency Action Plan of Latvia 2011 – 2013.

⁸ 2013 Sustainability and Annual Report, Latvenergo http://www.latvenergo.lv/files/news/01_LE_Sustainability_and_Annual_Report_20132013.pdf

⁹ The main national long-term development planning document, approved by the parliament in 2010.

¹⁰ Latvia is well on track to achieve set target as achieved share of RES in the year 2011 was 33,1% only minimum bellow set interim target 34%.

The National development plan of Latvia for 2014–2020 (NDP2020), approved in 2012, presents the highest national-level medium-term planning document and is closely linked with the Latvia2030. The NDP2020 defines the energy as one of the essential factors in ensuring the competitiveness and independence of the national economy. The utilization of RES is set as an important measure to decrease energy dependency, imported energy and contribute to the balanced energy mix in Latvia. The goal of the greenhouse gas emissions reduction was set as a decrease of emission intensity from 1,69 t CO₂ equivalent in 2010 to 1,13 tonnes of CO₂ equivalent per 1000 LVL in 2020.

Latvia's **Long-term Energy Strategy 2030 – Competitive Energy for Society** (Strategy 2030)¹¹ is the latest strategic document which updated the existing policies, targets and plans for the long-term development of the energy sector in the changed economic environment by economic crisis. Improving energy efficiency remains the national priority, as it can significantly contribute to the cost-effective reduction of risks associated with security of energy supply, sustainability and competitiveness, creating new jobs and promoting growth. Beside the goal to establish a competitive economy and increase of security of energy supply, sustainable energy is a key priority with the key goals on promotion of renewable energy sources and energy efficiency where to cut in two the buildings energy intensity is the key priority followed by the goal to increase energy efficiency in district heating systems.

Latvia may increase its emissions not covered by the EU ETS by 14% compared to 2005, according to the Effort Sharing Decision.

1.3. Policy development in Latvia

The mandatory procurement of electricity and purchase by the fixed purchase price or capacity payment for larger CHP units are the current key support instrument for cogeneration in Latvia beside investment subsidies for RES CHP investments. Huge increase of the support costs stopped the new entrance to the scheme, which is under revision and it is expected that in the future it could be provided for the cogeneration on renewable energy sources only.

Cogeneration fits well to the all Latvian strategic energy policy goals and has already long tradition of CHP support as first scheme was established already in 1996. Current feed-in tariffs support for CHP was set by the Energy Law (2005) and later Cabinet Regulation No 221¹² and is composed of the next two elements:

- 1. Preferential Feed in tariffs¹³** - mandatory procurement of electricity - sell of the excess produced electricity at the fixed purchase price
- 2. Guaranteed payment for installed capacity** – for CHP units with capacity above 4 MWe.

¹¹ Document was considered by the Cabinet on 28 May 2013.

¹² Cabinet Regulation No 221 of 10 March 2009 „Regulations regarding electricity production and price determination upon production of electricity in cogeneration” with several later amendments.

¹³ The public trader (from 01.04.2014. AS „Energijas publiskais tirgotājs”) purchase electricity from merchants, which have been granted the right to sell electricity produced in high efficient cogeneration within the scope of mandatory procurement for electricity prices which have been determined in accordance with the price formulas in Cabinet Regulations 221.

Preferential feed in tariff

Preferential feed in tariff for CHP units with electric power above 4 MW_{el} consists of the energy and capacity component (Table 2) and is paid for the period of 15 years¹⁴:

Table 2: Preferential feed-in tariff for CHP units with electric capacity above 4 MW

Electric capacity	Energy Component	Capacity Component
	(EUR/MWh).	EUR/MW/year
above 4 MW – below 20 MW	Equal to hourly spot price of electric power stock exchange	153.527
20 MW – below 100 MW		118.235
above 100 MW		102.304

Preferential feed-in tariff for CHP units with electric capacity below 4 MW is paid for the period of 10 years and is determined according to the next formulas for calculation of the purchase price:

Type of used fuel in CHP	Formula
<ul style="list-style-type: none">Renewable energy sourcePeat	$C = \frac{T_g * k}{9.3} * 4.5$
<ul style="list-style-type: none">Other fuels	$C = \frac{T_g * k}{9.3} * 3.4$

Where are:

C – Tariff price for electricity produced from CHP without value added tax (EUR/MWh);

T_g – the end user natural gas tariff approved by the regulator without value added tax, (EUR/1000 Nm³)¹⁵;

k – price differentiation coefficient, which depends on the electric power of CHP unit (varies within the range from 1.24 for CHP units with electric capacity below 0.08 MW down to 0.965 for CHP units with electric capacity 3.5-4 MW).

Guaranteed payment for installed electrical capacity of the CHP unit:

Larger CHP with capacity above 20 MWe units may qualify for obtaining a payment for the electric capacity for 15 years if achieved primary energy saving is at least 10% and the number of capacity operation hours exceeds 3000 hours annually. The monthly payment for the installed capacity is determined by the next formulas:

¹⁴ The use of electrical capacity of CHP unit shall be at least 1200 hours annually and achieved primary energy savings above 10%. The time period of applying feed-in payment is 15 years.

¹⁵ The last amendments adopted in April 2014 have introduced the maximum value 277,46 EUR/1000 Nm³ for the purchase price of natural gas applied for feed-in tariff calculation.

Type of used fuel in CHP	Formula
<ul style="list-style-type: none"> solid fuels 	$M = \frac{224459}{12} * P$
<ul style="list-style-type: none"> natural gas or liquid fuels 	$M = \frac{136186}{12} * P$

where are:

M- guaranteed payment, in EUR per month and

P – installed gross electric capacity, in MWel.

By amendments to the Cabinet Regulation No 221 entered into force on 1 November 2010 the possibility of applying the support was stopped for CHP plants that use fossil fuels or peat.

The costs of the mandatory procurement of electricity produced is covered by all end users of electricity in proportion to the amount of electricity consumption. The rise of natural gas prices in recent years contributed to the substantial growth of support intensity and together with the increased number of supported CHP plants caused significant raise of the electricity prices for consumers. To stop further cost growth by the expected new producers' entrance to the scheme, from 10.9. 2012 until 01.01.2016 the scheme is closed for new submissions and only projects which have already received the permits are eligible to enter the scheme (a lot of permits have been issued in recent years). With the latest amendments the payment of the support for the existing CHP plants older than 10 or 15 years will stop in 2017¹⁶.

Currently the support scheme is under revision with a goal to create a stable investment environment compliant with the State aid guidelines and to limit further increase of support costs for the final electricity consumers. Only support for the renewable cogeneration is foreseen.

Investment subsidies were available in the financial perspective 2009 – 2013 for the development of cogeneration units using renewable energy sources financed by the European Union Structural Fund. Continuation of the activities is foreseen also in the period 2014 – 2020.

1.4. Exchange of information and awareness in Latvia

Fast recent growth and high penetration of cogeneration especially in district heating as a result of proper CHP position in the national energy policy with an incentive support framework are key drivers for general high CHP awareness in Latvia. High level on cogeneration awareness of energy utilities with proper support of domestic CHP engineering and technical services enables incentive environment for a new CHP investment. Positive attitude of banks for financing the CHP projects due to profitable and secure support level is an important factor to overcome the current lack of financial resources and emerging ESCO services in Latvia.

Good awareness of the benefits of cogeneration, among the different socio-economic actors, is one of the basic conditions to create an active CHP market. This is necessary to achieve the full potential

¹⁶ It is the transition period for all older CHP plants without time limits for the support eligibility (time limits introduced in 2012).

of CHP. Good awareness goes hand in hand with well-informed customers. Awareness among professional and influencers that inform and advise the other groups support policy makers to create and provide effective frameworks for a functioning market. For the purpose of this analysis, the actors on the CHP market, were classified into four social-economic groups, shown in Figure 5. The level of awareness was assessed for each of the actors and rated 1-5, (1 poor and 5 Active market), as shown below. The detailed comments on each group are described in Annex 1.

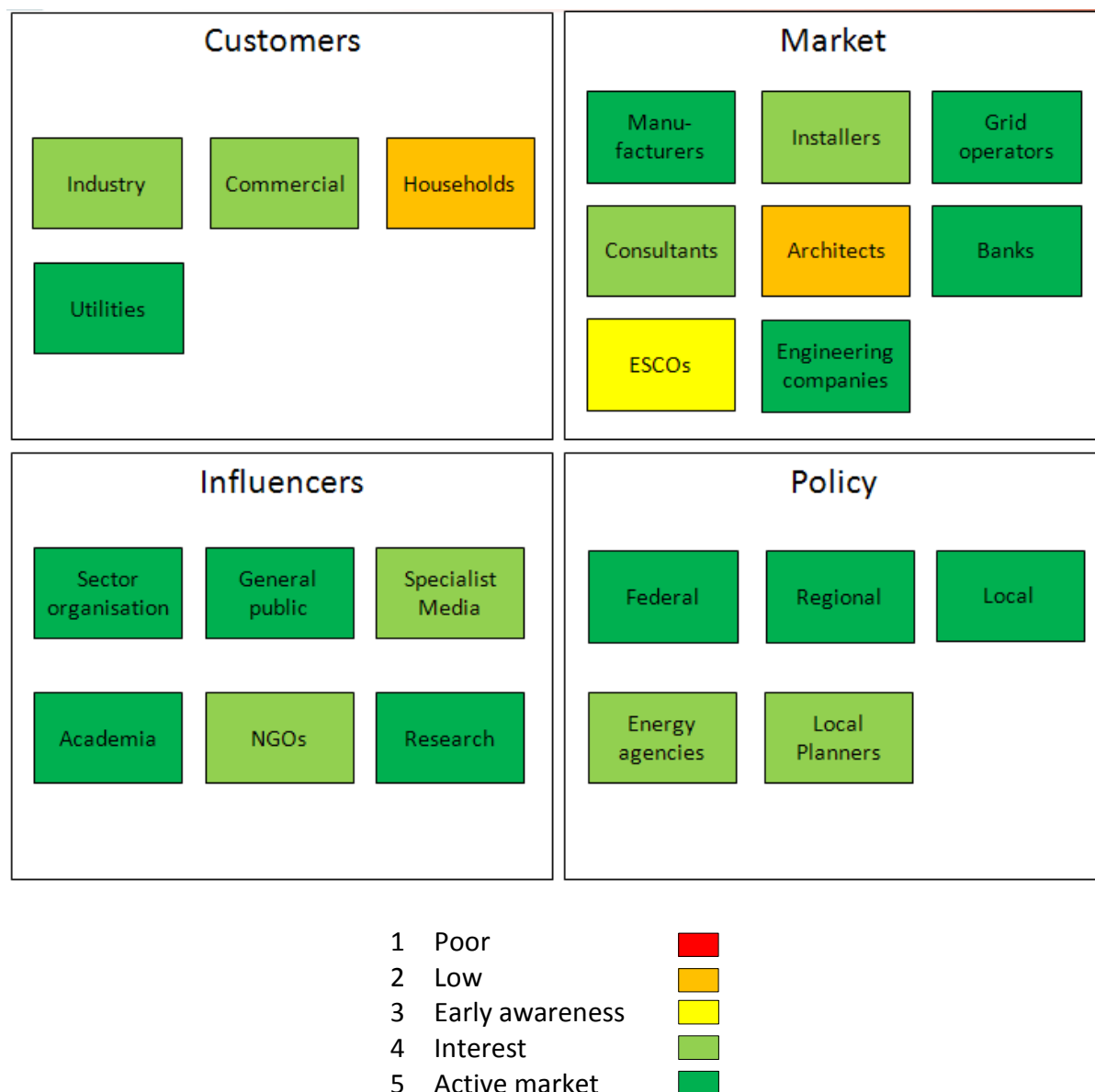


Figure 5: Assessment of four groups of the socio-economic actors' awareness of cogeneration in Latvia

Customers

Fast recent growth of cogeneration especially in the district heating sector and a prevailing share in electricity generation in Latvia is the main reason for high general awareness of CHP in Latvia. Investment's growth in medium and small scale CHP applications in industry and services are influencing awareness in these sectors with a special role of small and medium enterprises (SMEs) as the number of huge industrial plants in Latvia is very limited.

Market players

District heating utilities (public and private companies) and industrial companies are key CHP investors, well supported by skilled domestic engineering and technical service companies and project providers and developing local CHP manufacturing (gas engine production). Banks have a positive attitude to the CHP investments due to secure and profitable support payments. Emerging ESCO market is not yet offering a proper support for CHP projects in spite of the lack of financial resources for CHP investments especially in industry.

Influencers

Latvian District heating association and other interest associations have an important role in the successful discussion with the government and other authorities considering actual CHP issues. Very good cogeneration education programmes on Riga Technical University and research institutions is a very important factor for high educated technical staff and awareness in the engineering area with an important influence also on high general awareness on cogeneration in Latvia.

Policy makers

Cogeneration awareness is on a rather high level as it is well positioned in the national energy policy and goals and results in broad incentive support framework. Future reshaping of the support framework more focused on the renewable CHP and announced stop of the fossil fuel CHP support will have a key influence on the future CHP development. Due to high CHP penetration and limited available potential the contribution of actual implementation of EED is not considered as very important.

1.5. The economics of CHP in Latvia

Current CHP support still enables required profitability for medium and large scale CHP projects with already issued permits using renewable energy sources and natural gas although the future of new natural gas CHP is rather uncertain due to the stop of the support for CHP plants that use fossil fuels. Micro CHP units are not yet competitive in current market conditions and level of the support.

A cogeneration plant is a large investment and its feasibility is most of the time measured by its financial parameters, such as internal rate of return (IRR), return on investment (ROI) or payback period. An important factor is the capital cost of the cogeneration unit and its maintenance compared to a standard boiler. The most significant parameter, however, is the spark spread. This is the theoretical gross margin of a gas-fired CHP from selling a unit of electricity, having bought the fuel required to produce this unit of electricity. The support systems described in Chapter 1.3 should improve the business case for CHP installations.


Assessment of current market conditions for new CHP investments proves a very active CHP market in spite of on-going revision of the support scheme in Latvia (Table 3). Proper support framework for

a new CHP investment is still enabled¹⁷ for medium size and larger CHP projects on renewable energy sources and natural gas¹⁸ whereas coal is not the tradition in Latvia. Small scale and micro CHP market is not yet established due to high investment costs and high natural gas prices, as such electricity generation is not competitive to current very low electricity market prices at the current support level.


Table 3: Market economic situation of CHP in major user groups

Latvia	Micro		Small & Medium		Large		
	<i>up to 50kW</i>		<i>up to 10 MW</i>		<i>more than 10 MW</i>		
	NG	RES	NG	RES	NG	Coal	RES
Industry							
District heating							
Services							
Households							

Legend:

 **"normal"** CHP Investment has **good economic benefits**, return on investment acceptable (8-10%) for the investors, **interest for new investment exists**; there are no significant economic barriers for the implementation.

 **"modest"** CHP Investment has **modest/limited economic benefits** and return on investment (5-7%), **limited interest for new investments**.

 **"poor"** CHP Investment has **poor or negative return on investment or is not possible due to other limitations**, **no interest/possibilities for new investments**.

 **Not applicable** for the sector

NG **Natural Gas** or appropriate fossil fuel

RES **Renewable energy sources** (wood biomass, biogas, etc.)

¹⁷ For CHP projects with already issued permits that can still enter to the scheme.

¹⁸ Coal is not the strategic

1.6. Barriers to CHP in Latvia

Current unfavourable energy market conditions have increased the requested CHP support intensity and enlarged the needed financial resources which caused a huge financial burden for the final electricity prices and competitiveness of Latvian economy. How to preserve the recently augmented CHP generation and assure further CHP investments are key Latvian challenges. Lack of financial resources for financing the feed-in supports and CHP investment subsidies is the key barrier for continuation of successful Latvian CHP development.

In the second CHP progress report presented to the EC¹⁹, the Latvian government has indicated that they did not identify any significant non-regulatory (technical) barriers except high investment costs and problems with attracting appropriate amounts of funding, which was assessed as the most serious barrier, particularly for local governments. Shortening the time necessary for administrative procedures was noted as an advisable measure.

Even though a recent very positive Latvian cogeneration development which proved the absence of serious barriers for new CHP investments, it has also negative circumstances on the future CHP investment environment. The key cogeneration challenge beside further new development is how to preserve current CHP generation which is mainly linked with the financial aspects. Based on the recent market assessment and expert opinion we have identified three still existing barriers for faster and stable CHP development, listed in a descending order of importance:

Barrier 1: The existing feed-in tariff has been suspended by 1 January 2016 and the future support uncertain due to ongoing scheme revision

Fast CHP growth in last decades together with unfavourable energy market conditions and necessary high support intensity became a huge financial burden for the final electricity prices and competitiveness of the Latvian economy. To stop further growth of CHP financial obligation, the existing feed-in tariff will be suspended by January 2016 and only new CHP units with all issued permissions can enter to the scheme. Currently the support scheme is being revised and for the future only support for the CHP units using RES is foreseen. Stop of the payment of support for the older CHP units is set for 2017. At the same time a new tax for all electricity producers included in the support scheme was introduced in January 2014.

Transition period of the support scheme revision with uncertain future level of the support and planned reductions pose huge uncertainty and risks for the CHP investors.

¹⁹ Information report: Regular report by the Republic of Latvia on increasing the share of high-efficiency cogeneration pursuant to Articles 6(3) and 10(2) of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC.

Barrier 2: Unfavourable energy market conditions for further development of the natural gas based CHP generation

Current low electricity market prices on the integrated regional Baltic electricity market²⁰ and growing natural gas prices cause high support requirements even for the operation of existing CHP plants. Such electricity and natural gas price ratio is extremely unfavourable for natural gas CHP unit's investments which are losing competitiveness in the market and compared to the CHP units using renewable energy sources. **Turn toward the use of renewable energy sources is necessary and reasonable although at least minimum market based support for the existing natural gas CHP should still be provided also in the future. It will preserve current CHP generation and enable new especially small scale CHP investments in the established good natural gas infrastructure in Latvia and decrease the electricity import dependency price risks.**

Barrier 3: Lack of financial resources is restricting new CHP investments in smaller district heating systems

Current lack of financial resources is one of the important barriers for faster exploitation of still existing CHP potential especially in smaller district heating systems which are still running by inefficient old heat only boilers supply. Although awareness of Latvian banks on CHP technology is on a relatively high level, deficiency of own funds in today demanding economic environment is an evident obstacle for new CHP investments. Emerging ESCO market is not offering adequate financial support for the implementation of profitable CHP projects in stable industrial companies and SMEs.

Without further providing especially the EU funds and other financial resources for investment subsidies and soft loans, the new investments will be restricted significantly due to the lack of own financial resources of the investors.

2. What is possible? Cogeneration potential and market opportunities in Latvia

Several assessments proved the existing potential for further growth of CHP and increase of CHP electricity generation for up to 1 TWh. Evident economical CHP potential will be re-assessed within the EED prescribed comprehensive assessment till the end of 2015. Recent fast growth of RES CHP electricity generation proves huge bio energy CHP opportunities assessed also by the recent CODE2 analysis. Although a potential for micro CHP applications has not yet been assessed, good natural gas infrastructure offers a proper environment for development of micro CHP units in SMEs outside the district heating area if necessary new incentives would be introduced in Latvia.

Following the latest National energy efficiency action plan [3], a new comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling will be prepared in due time till the end of 2015 and in the meantime the results of the

²⁰ Latvia is from 3rd of June 2013 part of the regional Nord Pool Spot market (<http://www.nordpoolspot.com>) which has the largest influence on the local electricity prices. The average price of electricity during the past 12 months has been EUR 49.17 per megawatt-hour (www.enefit.lv).

previous CHP potential assessments in Latvia are the most relevant source on the existing cogeneration market potential.

In the **CHP report to the EC 2009**²¹: undeveloped average heat load potential of the heat supply systems during the heating period was assessed to approximately 550 MWth (app 500 MWe):

- **400 MWth till 2016** in larger and smaller towns
- **70-80 MWe** by biomass and biogas

In spite of the significant growth of CHP heat supply, more than 40% (3,3TWh) of the heat supply in district heating was still provided by heat only boilers in 2010. More than 300 MWe of a new CHP capacity was installed in the period 2009 – 2013, but not all the assessed CHP potential has been exploited yet.

Recent information from the web page of Ministry of Economy²² says that Latvian energy policy should be focused on, in order to promote co-generation, particularly renewable energy, including biomass and utilizing high-efficiency cogeneration plants for the development of Latvian cities where the existing cogeneration potential is estimated at **400 MWth**. Significant cogeneration potential also exists in the local heat supply which has no influence on the CHP district heating loads.

Regarding the presented information we can conclude that evident CHP potential for increase of the current CHP electricity generation for up to 1 TWh exists in Latvia, which fits to the key energy policy goals and could significantly contribute to the decrease of electricity import dependency.

Current and expected energy market and economic conditions till the year 2030 seem rather uncertain and it is very difficult to assess realistic CHP market potential, but the presented information and the recent successful CHP investments in Latvia prove the evident CHP market potential especially in district heating. Additional interesting potential exists also in other distributed CHP generation in services and SMEs, especially in case of a faster economic crisis recovery and new incentives for these sectors.

Bio energy

Recent very fast growth of electricity generation from biomass by

- **biogas**: 51,3 MWe, producing 287 GWh electricity in 2013 and
- **wood biomass**: 54,3 MWe producing 208 GWh electricity in 2013

boosted CHP electricity generation in units using renewable energy sources and their share already exceeds 15% of the total CHP electricity generation. Regarding a new policy priority on bio CHP generation, important further growth is expected in the future.

Analysis on Bio CHP potential carried out within the CODE2 project, based on the “score cards analysis” proves the huge growing role of bio CHP generation till the year 2030 (see Annex 3 for the details)²³ which could significantly exceed the analysis expectation. By huge acceleration in the last three years, estimated current heat generation from bio energy CHP is close to the expected volume in 2020 and could exceed significantly the projection till 2030. Analysis was influenced by the minimum bio energy generation till 2010 but the recent development completely changed the whole environment for bio CHP in Latvia which became the key strategic energy policy goal.

²¹ Report of the Republic of Latvia on the implementation of Directive 2004/8/EC [4]

²² <http://85.254.134.201/em/2nd/?cat=30174> (last update April, 2014)

²³ Appropriate support mechanisms, high share of district heating heat supply, biomass availability and high awareness result of clear strategic policy goals on renewables.

Micro CHP

The CODE2 micro CHP potential analysis estimated the very limited market potential for micro CHP units on around 60 units per year in the year 2020, majority of them of size ± 40 kWe in services and only first sells of ± 1 kWe in households. At least households CHP development is very uncertain due to high current technology and fuel costs although in case of the expected decrease of investment costs, the sales of micro CHP units in 2030 could exceed 300 units per year. Good natural gas infrastructure in Latvia enables also the development of dispersed micro CHP units using natural gas if market conditions would provide the requested profitability for these units. Additional incentives are necessary to trigger this potential where the already started model of net-metering for the smallest RES units²⁴ is the first incentive step in this direction.

3. How do we arrive there? The Roadmap

Following current ambitious energy policy goals and orientations of Latvia, cogeneration can play a very important role for efficient use of renewable energy and natural gas and sustainable supply of heat to the efficient district heating systems. Cogeneration can significantly contribute also to other energy policy priorities as diversified sustainable energy supply, decrease of the electricity import dependence, mitigation of the import risks and ensuring a stable energy supply to the consumers.

3.1. Overcoming existing barriers and creating a framework for action in Latvia

To assure adequate necessary financial resources and preserving a long term stable and predictable incentive legal framework for cogeneration is a key priority necessary for keeping the current volume and enabling further future CHP development in Latvia. Fast and effective revision of the current CHP support scheme and continuation of successful economically feasible investments for increasing efficiency of district heating systems are key actions needed.

Action 1: Preserving long term stable, incentive and predictable legal framework for cogeneration

Huge financial burden of CHP support is the key reason that the successful CHP support scheme is being revised currently. The objective of this reform is to establish a stable CHP investment environment and to limit further increase of mandatory procurement costs for the consumers which are two divergent goals. **Adequate solution will require a very professional approach and dialogue of all involved actors to form a new cogeneration framework which will assure proper incentives and confidence of investors. Fast and efficient scheme revision is of huge importance in the current very uncertain transition cogeneration framework to keep benefits of the established CHP investment dynamics for the national economy²⁵.**

Action 2: New incentives to empower CHP position on the energy market

As current energy market prices do not enable economic conditions for a profitable operation of CHP units using natural gas without adequate support, additional market income is requested to

²⁴ Applicable for units with less than 3x16 A fuse requested for connection.

²⁵ To preserve established new companies and new jobs linked to the CHP investments and operation in Latvia.

preserve the operation of recently installed CHP units. Flexible CHP units on natural gas with predictable operation could effectively provide different ancillary services for the grid which would improve their economic conditions with limited additional public funds.

Latvia as part of the very effective, liquid and well organised regional Nord Pool Spot market has very good opportunities²⁶ to study and develop different new options how to enable simple and fast access of CHP units to the ancillary service market (balancing energy, demand respond, reserve capacity, virtual power plants, aggregation of smaller capacities, etc.). Better integration of CHP units in the grid operation would strengthen the grid operation stability and enable a higher share of intermittent RES electricity generation (actual growing wind generation) and is an important step toward smart active electric grid of the future. Balanced involvement of all stakeholders (Ministry, Regulator, grid operators, research, local industry, etc.) is a prerequisite for successful implementation of this task before the planned stop of the current support for older CHP plants in 2017.

The least feasible support which will preserve the operation of CHP plants using natural gas should be provided till 2017 as a combination of market and other instruments also with regard to the strategic goal of decreasing the Latvian electricity imports.

Action 3: Intensify the support for increasing the efficiency of the District heating systems

Efficient and competitive district heating system are a prerequisite condition for further operation and development of more than 90% of CHP units in Latvia. To overcome the lack of financial resources for necessary investments to increase the efficiency and competitiveness of the district heat supply continuation of successful investment subsidies programmes is crucial for:

- Development of CHP units using renewable energy sources
- Reconstruction and construction of sustainable heat sources (increase of efficiency, switch from fossil to renewable fuels, reduce impact on the environment, etc.)
- Reconstruction and construction of transmission and distribution of heat systems (reduction of heat losses²⁷, further network extensions, etc.)
- Incentives for the connection of new consumers to efficient district heating supply systems

Ministry of Economy should continue and intensify successful investment subsidies and other financial instruments for increasing efficiency of heat supply systems in the next financial perspective (2014 – 2020).

²⁶ Elspot day-ahead market and Elbas intraday market which enables objective and precise price signals.

²⁷ The benchmark of 10% network heat loss was set till 2030 [4] .

3.2. Possible paths to growth in Latvia

At least 20% or 0,9 TWh increase of current CHP electricity generation is proposed by the CHP road map implementation. Majority of close to 175 MWe of new CHP capacity would be installed in district heating and using renewable energy sources. Moderate CHP development is expected also in other sectors and SMEs. The current share higher than 40% of CHP electricity generation in final electricity demand could be preserved till 2030.

According to recent very positive trends of high efficiency CHP electricity generation and the assessed evident market potential we can objectively expect further moderate CHP growth toward 2030 with a prevailing use of renewable energy sources.

With the proposed **CHP roadmap** implementation we can strengthen further CHP development and significantly contribute to the Latvian strategic energy climate targets. Economic potential for CHP growth is evident, although before the implementation of comprehensive assessment of actual potential we can reasonably take part of the past assessed potential based on next assumptions:

- **Increase of CHP share in the district heat supply from current 60% to 75% till 2030:** by replacement of the 300 MWth capacity of the existing heat only boilers with the CHP units (134 MWe, 80% heat supply from RES CHP units, **electricity generation for at least 0,5 TWh_e**,
- **40 MW_e of new CHP plants installations in other sectors-** mainly in industry and services- and **provide 0,2 TWh_e of additional electricity generation.**

The proposed CHP development would increase current 3,2 TWh CHP electricity generation to 3,6 TWh till 2020 and to 3,9 TWh till 2030. as shown in Figure 6 and the following energy and environmental indicators for roadmap impact assessment.

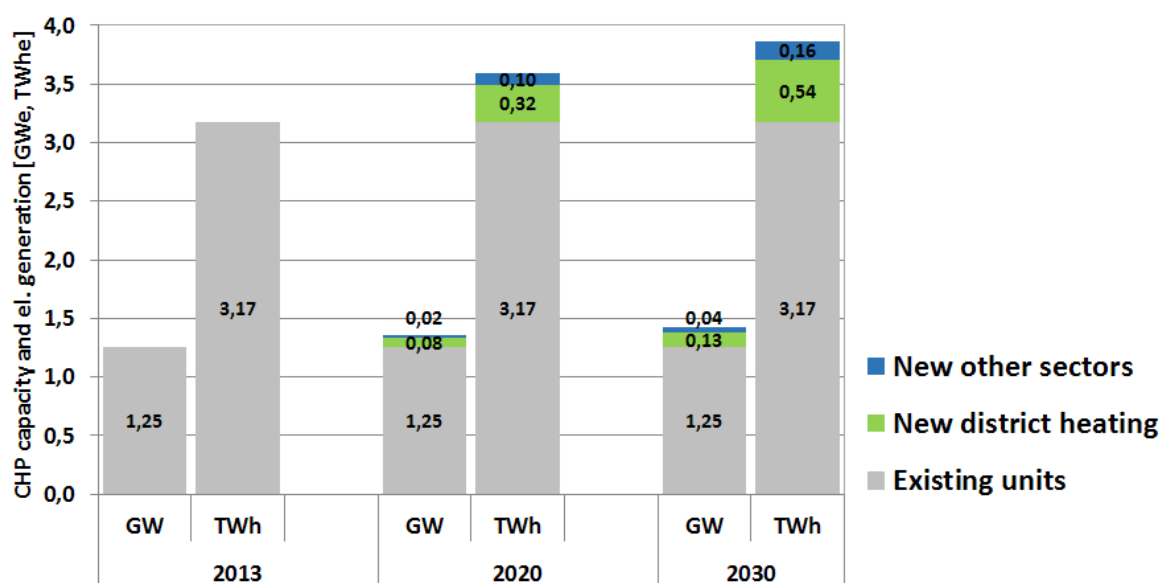


Figure 6: Target path to the CHP growth till the year 2030

- **CHP electricity generation:** increase for 0,7 TWh_e or more than 20% compared to the current high efficiency electricity generation in the year 2013, with the major contribution of district heating CHP plants but moderate growth of CHP also in other sectors and SMEs.
- **Share of cogeneration electricity in gross electricity consumption:** preservation of current high CHP 42% share toward 2020 and 2030 considering expected growth of electricity demand.

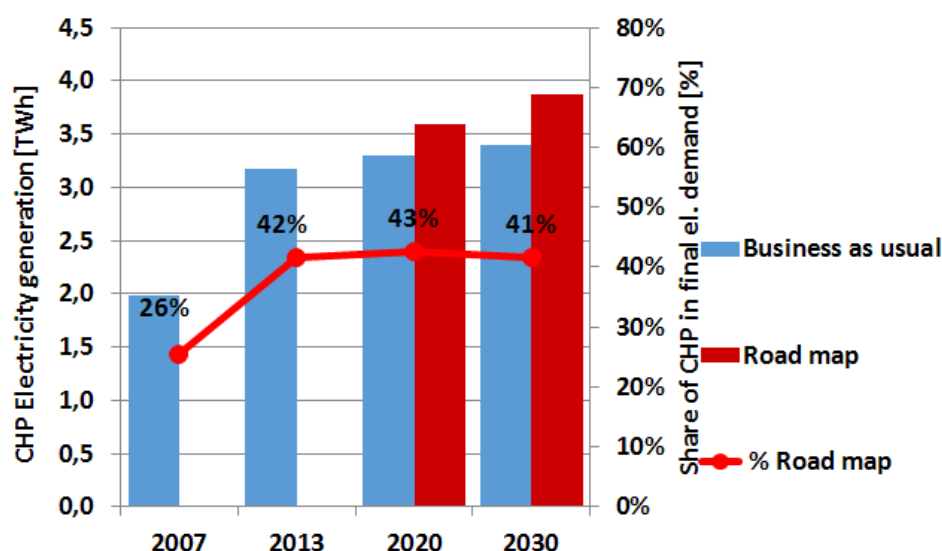


Figure 7: CHP Roadmap Electricity indicators

- **Share of renewable energy sources:** more than 80% of heat and more than 60% of electricity generation produced from renewable energy sources.

Future development of cogeneration could be even greater or by using different technologies²⁸ as we consider the proposed roadmap economic potential rather conservative, especially in faster economic growth and more favourable energy market conditions till the year 2030.

3.2. Saving of primary energy and CO₂ emissions by the CHP roadmap of Latvia

Potential CHP primary energy savings could contribute up to 1 TWh or up to 10% of the indicative national target of primary energy savings till the year 2020 and reduce CO₂ emissions for up to 0,5 million tons of CO₂ till the year 2030. Growth of CHP generation will enable efficient and sustainable domestic electricity and heat generation mainly from renewable resources and significantly contribute to the decrease of Latvian import dependency.

²⁸ Especially use of RES CHP technologies is rather uncertain due to recent fast development (faster market availability of wood biomass gasification would even speed up development and increase the volume of RES electricity generation).

Within the CODE2 project two approaches for the assessment of primary energy savings (PES) and CO₂ emissions savings are used to demonstrate advantages and contribution of CHP technology to the reduction of energy use and CO₂ emissions:

1. **Methodology prescribed by EED** (according to Annexes I and II)²⁹
2. **Substitution method** – new developed method for the assessment of actual achieved savings³⁰

New CHP generation proposed by the Roadmap would contribute around **1,0 TWh PES (3,7 PJ)** calculated by the EED methodology or **1,4 TWh (5,1 PJ)** by the substitution method as shown in Table 4³¹ if we consider that increased CHP production will mainly replace current condensing electricity generation from natural gas.

Even if all new CHP electricity generation replaced the import of electricity³², real achieved PES would still be positive (0,1 TWh) with the established the most efficient additional domestic CHP sustainable electricity generation mainly from using RES.

The assessed PES potential of CHP up 1 TWh till the year 2020 or up to 10% of the 8 TWh set indicative national target of primary energy savings in the year 2020 in NEAP 2014 [4] proves that the implementation of CHP roadmap can contribute significantly to the foreseen national goals for the year 2020 and additionally contributes to the new goals for the year 2030.

By using the same approach, potential real achievable CO₂ savings by the substitution method are 0,5 Mio.t of CO₂, much higher than only 0,05 Mio.t CO₂ savings by EED methodology³³ as shown in Table 4. If the new CHP generation is replacing the import of electricity, achieved CO₂ saving is 0,1 Mio.t of CO₂³⁴.

By increasing the volume of the new CHP investment, potential CO₂ savings would be even higher.

²⁹ **EED method** is used at a member state level today for national reporting to the European Commission and at project level for determining if a specific CHP plant is highly efficient. In the methodology, the efficiency of each cogeneration unit is derived by comparing its actual operating performance data with the best available technology for separate production of heat and electricity on the same fuel in the market in the year of construction of the cogeneration unit using harmonized reference values which are determined by fuel type and year of construction.

³⁰ **Substitution method** has been developed within the project and estimates the amounts of electricity, heat and fuel which are actually replaced by additional new CHP based on a projection of the supply base changes in the member state supply over the period are calculated. The situation in 2030 is compared to the current status in the country.

³¹ Methodology consider that CHP is replacing the existing condensing electricity generation from natural gas and heat generation in local boilers on natural gas.

³² Assumption is not based on the real generation efficiency of imported electricity as in the imported electricity it is accounted in energy balance without transformation losses.

³³ CHP plants using renewable energy are not achieving CO₂ savings by EED methodology (compared to separate renewable generation), but in reality they are replacing current prevailing fossil generation.

³⁴ As imported electricity is not increasing the national CO₂ emissions, all saving is result of the increased efficiency of heat generation.

Table 4: Saving of primary energy and CO₂ by the Latvian CHP roadmap till 2030

	Substitution method		EED method	
	Business as usual	Roadmap	Business as usual	Roadmap
PE saving	0,5 TWh/a	1,4 TWh/a	0,4 TWh/a	1,0 TWh/a
CO₂ saving	0,3 Mio t/a	0,5 Mio t/a	0,0 Mio t/a	0,05 Mio t/a
- per kWh_{el}*³⁵	1,15 kg/kWh _{el}	0,77 kg/kWh_{el}		

³⁵ This value represents the CO₂ reduction of the power generation. It includes the avoided CO₂ emissions from fuel savings for separate heat generation in boilers; it must not be confused with the considerably lower CO₂ emissions of the substituted condensation electricity or with even lower emissions of compared power production according to the BAT approach in accordance with the EU CHP directive reference values.

Annex 1: Stakeholder group awareness assessment

Users	
Industry	CHP is known and used especially in energy intensive industry, but the number of units is limited. Lack of financial resources is a key barrier for new investments in modernisation of the old steam technology by the introduction of new CHP technologies.
Utilities	The cogeneration has grown very fast since 2000, larger and smaller district heating systems and utilities are very well acquainted with the technology.
SMEs	Several small scale CHP units implemented in SMEs recently are increasing awareness of CHP technology, especially of gas engines on natural gas and biogas.
Households	CHP technology is well known through district heating applications as micro CHP is not yet an economic option for households in current market conditions
Market and supply chain	
Manufacturers/ Technology providers	Gas engine manufacturing is developing in Latvia and a lot of know-how on CHP engineering, operation and maintenance exists as well.
Installation companies	By growing small scale CHP applications in recent years, installation companies are getting more and more acquainted with the CHP technology.
Grid operators	Well regulated connection and administrative procedures cause no specific connection problems for CHP.
Consultants	Consultants and engineering companies on the larger scale are very skilled with CHP (not yet in general on the small scale level).
Architects	Architects are less acquainted by cogeneration as it is not yet applicable on the micro level.
Banks, leasing	Stable and profitable CHP support is very attractive for financing CHP investments by national and international banks.
ESCOs	Emerging ESCOs market has not yet developed wider services for CHP solutions.

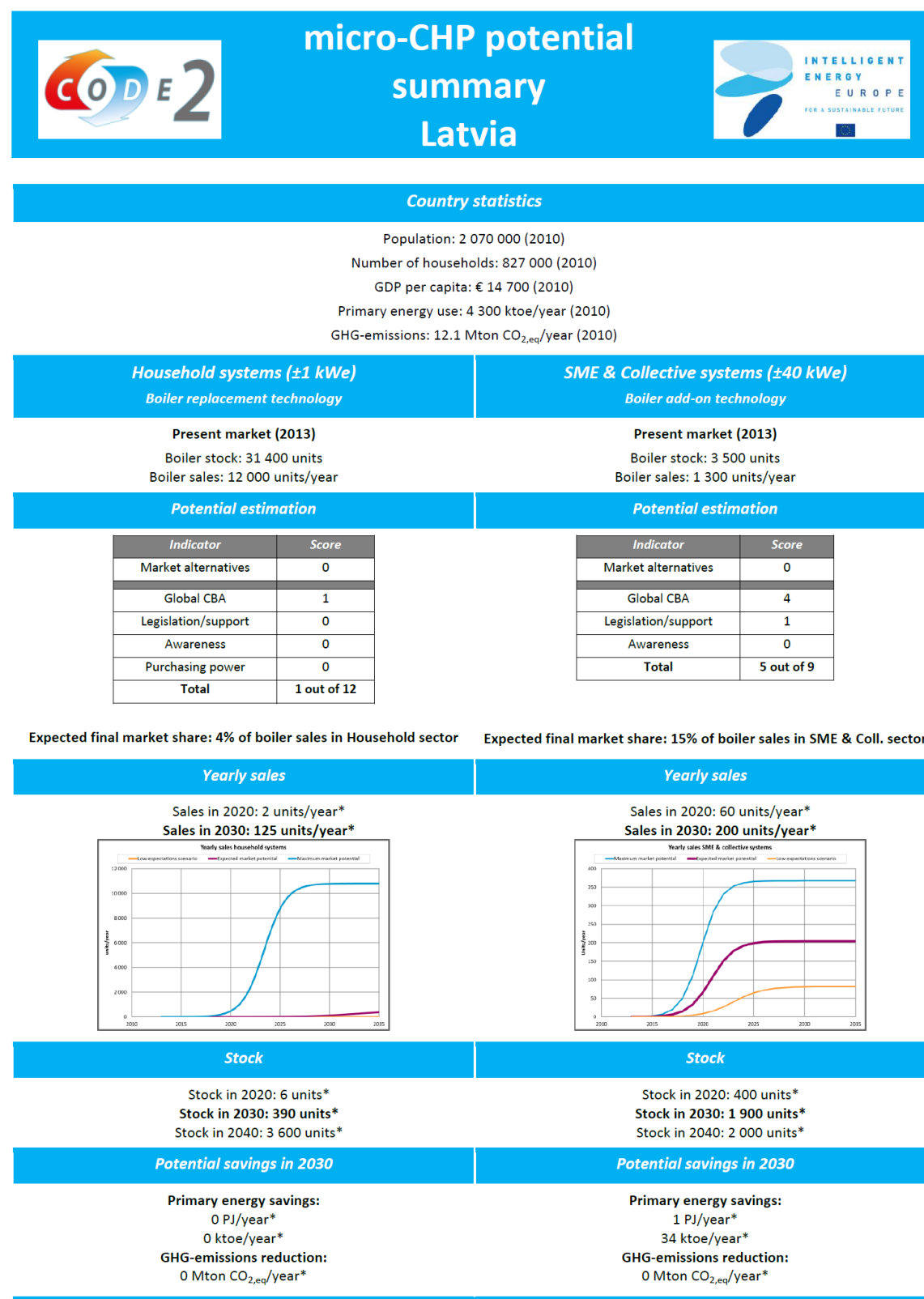
Policy	
Policy makers on different levels	Cogeneration awareness is traditionally on a high level and the cogeneration is well positioned in the national energy policy and strategic documents and supported by different instruments.
Energy agencies	Energy agencies know CHP but are not very active in the promotion.
Planners	CHP is a well-known technology and often used in regional and municipal

	planning (district heating systems).
Influencers	
Sector organisations	Several interest organisations have been established in recent years, where Latvian District Heating Association has a special dominant role as the most recognized, most active and most comprehensive professional organization in the field of heating and cogeneration in Latvia.
General public	General public awareness about cogeneration in Latvia is on a rather high level due to high CHP penetration in district heating systems. Increase of the support costs for RES and CHP electricity generation raised some negative attitude in public.
Media	Media has in general a positive attitude to the district heating and cogeneration, strong influence of natural gas branch is perceived in the communication.
Academic Research area/	CHP has a very strong support in research and education institutions (Riga Technical University, etc.)
NGOs	More and more involved in CHP activities.

Legend:

	Active CHP market		Low CHP awareness
	Interest in CHP		Poor CHP awareness
	Early CHP awareness		

Annex 2: Micro CHP potential assessment



*Corresponding to the expected potential scenario.

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micro-CHP score card Argumentation



The score card is used to assess the relative position of an EU country based on current regulations, markets and economics. The score itself functions as input to the implementation model to 2030.

±1 kWe systems (Households) <i>Boiler replacement technology</i>	±40 kWe systems (SME & Collective systems) <i>Boiler add-on technology</i>																										
Scorecard	Scorecard																										
<table> <tr> <th>Indicator</th><th>Score</th></tr> <tr> <td>Market alternatives</td><td>0</td></tr> <tr> <td>Global CBA</td><td>1</td></tr> <tr> <td>Legislation/support</td><td>0</td></tr> <tr> <td>Awareness</td><td>0</td></tr> <tr> <td>Purchasing power</td><td>0</td></tr> <tr> <td>Total</td><td>1 out of 12</td></tr> </table>	Indicator	Score	Market alternatives	0	Global CBA	1	Legislation/support	0	Awareness	0	Purchasing power	0	Total	1 out of 12	<table> <tr> <th>Indicator</th><th>Score</th></tr> <tr> <td>Market alternatives</td><td>0</td></tr> <tr> <td>Global CBA</td><td>1</td></tr> <tr> <td>Legislation/support</td><td>1</td></tr> <tr> <td>Awareness</td><td>0</td></tr> <tr> <td>Total</td><td>2 out of 9</td></tr> </table>	Indicator	Score	Market alternatives	0	Global CBA	1	Legislation/support	1	Awareness	0	Total	2 out of 9
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Global CBA	1																										
Legislation/support	1																										
Awareness	0																										
Total	2 out of 9																										
Market alternatives	Market alternatives																										
<i>There is strong competition of other heating technologies in households: district heating systems in towns, wood biomass (cheap heating source) and heat pumps.</i>	<i>There is strong competition of other heating technologies in services: district heating systems and other renewable energy sources (wood biomass, heat pumps, etc.).</i>																										
Global CBA	Global CBA																										
<i>SPOT: 11 years</i>	<i>SPOT: 11 years</i>																										
Legislation/support	Legislation/support																										
<i>As current support for CHP is limited on use of renewable energy sources, micro CHP project in households are not yet feasible for the economic implementation.</i>	<i>Current support is offering incentives for CHP on renewable energy sources only which are usually not feasible for implementation on micro level in service sector.</i>																										
Awareness	Awareness																										
<i>Due to the too high investment costs and not sufficient support for the economic implementation, current awareness of micro CHP technologies for households is still very low or poor on all levels. Manufacturers are not yet active in the market.</i>	<i>Due to lack of micro CHP practice examples and high investment cost, awareness of micro CHP is still on the low level.</i>																										
Purchasing power																											
<i>GDP: € 14 700 per year</i>																											

Annex 3: Bio CHP potential assessment

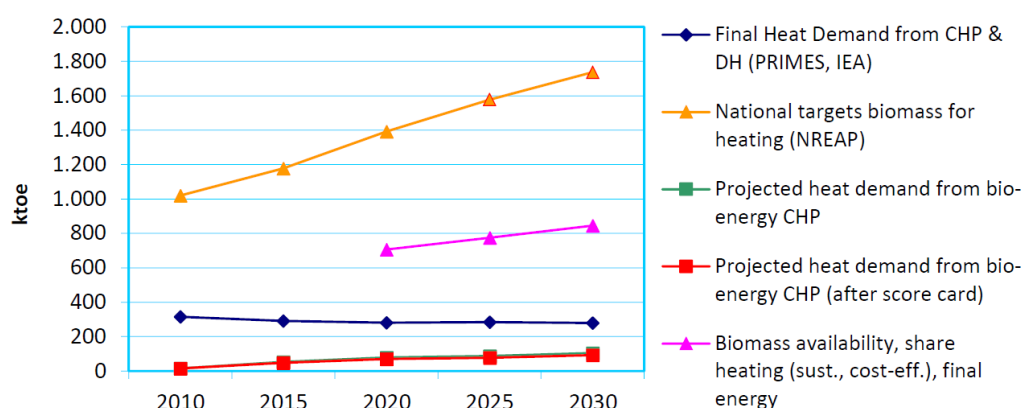


Bio-energy CHP potential analysis Latvia



Figures (projections)	2010	2020	2030
Final heat demand from CHP and DH (PRIMES, IEA), ktoe	315	282	279
(Projected) heat demand from bio-energy CHP and DH (after score card), ktoe	15	71	92
Bio-energy penetration rate in CHP markets (2009: EEA, Eurostat)	4,8% (2009)	25,3%	33,1%
Biomass availability, share heating (sust., cost-eff.), final energy (Biom. Futures), ktoe		706	845

Bio-energy CHP potential analysis Latvia



Framework Assessment (Score card)	Score	Short analysis
Legislative environment	+ 2 (of 3)	Lack of optimized and simplified procedures for issuing permits, certificates, licenses; High investment cost for local communities (owner of DH)
Suitability of heat market for switch to bio-energy CHP	+ 2 (of 3)	Decrease of DH in last decade Small share of industry in final energy consumption
Share of Citizens served by DH	++ 3 (of 3)	64% citizen served by DH 59% share of heat from CHP in total heat produced in DH

National supply chain for biomass for energy	++ 3 (of 3)	High solid biomass potential Low price of wood in comparison to natural gas
Awareness for DH and CHP	++ 3 (of 3)	High % of DH and CHP Bioenergy promotion Latvian biomass association

Comments on country analysis

General comments

- The national framework assessment through the scorecard results in a good score (13 of 15 possible points).
- Thus, it is projected that the growth potential for bio-CHP until 2030 will be exploited to 87%.
- The possible bio-CHP penetration rate in 2030 (2030 dot of green curve) under ideal framework conditions is seen at 37,3% (the country's RE target according to RED (28/2009) is at 42% in 2020)
- The share of bio-fuels in CHP (bio-energy penetration rate in CHP markets) is expected to grow from 4,8% (2009) to 33,1% (2030)
- The national biomass availability (cost-efficient, sustainable; pink curve) is sufficient to enable the projected growth; however, these biomass resources include types of biomass which are currently not usually used in CHP, but are expected to be utilisable by 2030
- For the fuelling of the expected bio-CHP, the shown biomass resources are sufficient, but for meeting the national targets for biomass for heating, biomass has to be either imported or taken from sources not meeting strong sustainability criteria.

Specific issues

- The projected development of CHP heat demand (PRIMES, blue curve) foresees almost constant figures until 2030
- National targets for biomass for heating (yellow curve) see a strong and constant growth in the coming years
- The growth projections of the bio-energy CHP heat demand (green and red curves) apply the average growth rates of both the blue and the yellow curve (weighting 50:50)

Annex 4: Assumptions used in the economics of CHP

A detailed economic analysis of four standard CHP cases was implemented in all pilot roadmaps and optionally in non-pilot roadmaps.

As requested detailed economic data for economic analysis of four standard CHP cases were not available or are not sufficiently reliable for making objective conclusions about the CHP profitability and comparison of economics with other member states, detailed calculation table is not included in this report.

Annex 5: Assumptions used in the market extrapolation

Roadmap scenario				
Installed capacity (MWe)	2013	2020	2030	2030-2013
Existing units	1.252	1.252	1.252	0,0
New district heating		80	134	133,9
New other sectors		24	40	40,0
Total CHP	1.252	1.356	1.425	173,9
Economic potential		104,3	173,9	
existing + reconstruction		77%	77%	
New		23%	23%	
Total new CHP investment		104,3	173,9	
Electricity generation [TWh]	2013	2020	2030	2030-2013
Existing units	3,17	3,17	3,17	0,00
New district heating		0,32	0,54	0,54
New other sectors		0,10	0,16	0,2
Total CHP	3,2	3,6	3,9	0,70
Economic potential		0,4	0,7	
of that biomass		63%	0,4	
New district heating		77%	77%	
New other sectors		23%	23%	

Annex 6: Methodologies used to calculate the saving of primary energy and CO₂ emissions under the roadmap

Substitution method

This method has been developed in the CODE2 project. In doing this, two other approaches have been considered: 1) the “replacement mix method”³⁶ from the Munich FfE institute, which however cannot be used directly for a long term comparison as needed in CODE2; 2) a method used to calculate the CO₂ saving resulting from a voluntary commitment of the German industry for CO₂ reduction³⁷, however this method has been considered as too simple. Therefore the following more differentiated approach has been developed:

Based on an estimate of the increase in cogeneration electricity the thereby caused decrease of CO₂ emissions and primary energy consumption is estimated. In this approach, an attempt is made to determine the actual quantities saved compared to the base year (e.g. 2010). Hence it refers to the actual saving of fuels for the production of the amounts substituted by modern CHP plants

- a) of electricity and heat in the replaced or retrofitted old CHP plants
- b) of electricity in power plants
- c) of heat in boilers.

The savings result from a combination of three effects:

- CHP effect
- Technology effect (improved CHP technologies)
- Fuel switching (e.g. lower carbon content of natural gas compared to coal, CO₂ neutrality of bioenergy)

The results show the savings actually induced by the expansion of CHP compared to the situation in the base year.

This approach differs fundamentally from the methods for checking the high-efficiency according to the CHP Directive or in accordance with ANNEX II of the EED (Directive 2012/27/EU on energy efficiency), in which a comparison between CHP and the best available Technology (BAT) of separate production of electricity and heat produced is carried out strictly on the same-fuel basis.

This procedure is considered to be inappropriate to deliver an estimate of the actual fuel saving quantities by CHP over a longer period, which is considered a relevant value, representing the contribution of CHP to the long-term objectives of the EU to reduce CO₂ emissions and primary energy consumption to be meaningful. The BAT approach of the CHP Directive has been developed to verify the high efficiency of individual plants, but not to determine actual saved CO₂ emissions and primary energy quantities by CHP expansion.

In fact, the CHP expansion is closely associated with a replacement of old cogeneration technologies by new ones and a change in the structure of fuel away from coal to natural gas and bio-energy. These three developments,

- replacement of separate generation by cogeneration
- replacement of old cogeneration technologies by new ones
- replacement of carbon-rich by low-carbon fuels,
- can be usefully seen only as an integrated process.

To account for the uncertainties in particular with regard to fuel shares and technology development, a window of possible developments with an upper value and a lower value of emission reduction and savings has been determined. The different levels of results are due to assumptions about key parameters such as

³⁶ 10. FfE Forschungsstelle für Energiewirtschaft e.V., Energiezukunft 2050; <http://www.ffe.de/die-themen/erzeugung-und-markt/257>

³⁷ The calculation has been made by the VIK Verband der Industriellen Energie- und Kraftwirtschaft e.V., 2010, Unpublished.

current share of electricity from cogeneration, which is replaced by electricity from new or retrofitted units, fuel shares in the replaced CHP plants, power plants and boilers as well as in the new CHP plants.

The results have been calculated based on the following input values: growth of CHP power production, share of current old CHP to be replaced by new installations and retrofitting, fuel efficiency and electric efficiency of new CHP and replaced CHP for different fuels, electric efficiency of replaced power from conventional power plants for different fuels, heat efficiency of replaced heat from boilers, corresponding fuel shares.

EED method

The Primary Energy Savings methodology of the EED is used at a country level for national reporting to the Commission, and at the project level for determining if CHP is highly efficient. In the methodology, each cogeneration unit is compared with the best technology for separate production of heat and electricity on the same fuel on the market in the year of construction of the cogeneration unit and the harmonized reference values are determined by fuel type and the year of construction.

The underlying principle is that, knowing that regularly new investments have to be made in new energy production units, it is necessary to compare CHP with the centralized production installation which could be built using the same fuel rather than assuming a displacement of a different fuel or introduction of a new fuel. It is a logical approach when looking at the decision making process of investors or a member state government. By investing in or supporting CHP, a certain electricity generating capacity will be produced by CHP and NOT by centralized production based on the same fuel (= principle of 'avoided production').

For the timeframe of the roadmap (between 2010 and 2030), and especially in countries where there is no overcapacity, it is relevant to compare installing a certain capacity (at the national level) of CHP compared to installing new capacity with another technology (power plant + gas boiler). Older installations, being replaced with state-of-the-art technology, is a typical reinvestment decision. New CHP-plant (or combination of smaller installations) would not necessarily lead to less production in older production installations, but would rather pre-empt investments in e.g. new CCGT investments.

Annex 7: Sources

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