

CODE2
Cogeneration Observatory
and Dissemination Europe



*Cogeneration awareness study
- European summary*

Awareness of cogeneration in regional lead Member States of the CODE 2 project



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Chapter 1 Introduction

The European Union argument for the wider adoption of cogeneration in Europe is that the combined generation of heat and electricity uses less primary fuel than the separate production of the same quantities of heat and electricity. Hence at the member state level the wider use of CHP should lead to less primary fuel use, lower import costs possibly, and enhanced security of supply. However sales of CHP to customers rely on a commercial proposition and a functioning market for the application and in many member states large sections of the market remain undeveloped.

For a market (in marketing terms) to exist there needs to be an awareness among the potential customer group of the product, in this case the cogeneration plant. A market is a self-referential group who by experience /word of mouth/ input from advertising/ wide general acceptance of a product become aware of a product's benefits and limitations. The buying decision at the individual customer level needs to be triggered by an exploration of the offering and the competing solutions resulting in a buying decision. The sale is driven by a clear value returned to the customer. The product has to combine a needed set of benefits at a price which is acceptable to the customer.

The purchaser of cogeneration is looking for some or all of the following:

- Lower energy operating costs, now and anticipated in the future
- Higher security of personal supply
- Improved image/non tangibles/ societal positioning
- Compliance with regulations

A buying decision is the result of a set of complex interactions, involving the supplier, the supply chain and the customer. External conditions influence the process as do the market structure and the policy structure. A mature market for a product is characterized by a high degree of awareness among all the relevant players in the market and ongoing buying and selling activity.

Chapter 2 Cogeneration awareness assessment in pilot Member States: method

The CODE 2 project will establish a cogeneration roadmap for Europe. The roadmap will identify the best approach to improve energy efficiency in member states through cogeneration and will take into account the interactions between policy, the industry, the market and social society.

The project partners used their own member state for the first analysis of awareness: Italy, Slovenia, Germany, Belgium (Flanders) and Greece. These are the member states where the partners are based, for which they have access to the best information and containing Germany and Belgium, two of the most forward thinking states on cogeneration in Europe:

The project partners used qualitative interview techniques with experts and market participants to look at 4 levels of the socio-economic environment actors for cogeneration. The list is not exhaustive but contains all the most relevant players.

- **Customers:** utilities (& DH), industry, potential users
- **Market and supply chain:** installation companies, planners, energy consultants, architects, technology and equipment providers, banks/leasing, energy agencies
- **Policy structure:** energy and climate legislators and all levels of government
- **Influencers:** media, general public, academics, environment NGOs, associations

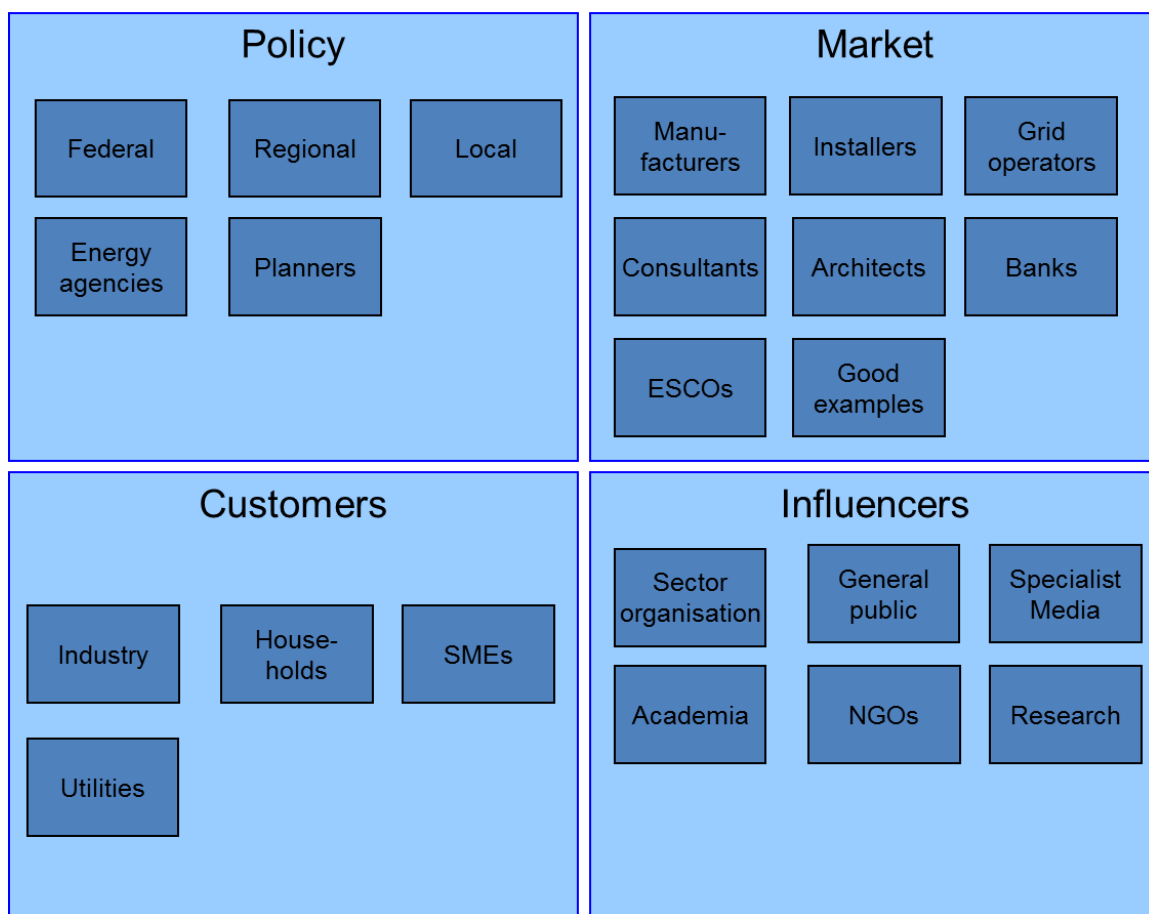


Figure 1. Cogeneration market model showing the Actors and their exchanges and roles

Each of the identified actors was then assessed for its current awareness of cogeneration. The level of awareness was then rated from 1-5 and colour coded: 1 poor and 5 active, as below.

- | | | |
|---|-----------------|---|
| 1 | Poor | ■ |
| 2 | Low | ■ |
| 3 | Early awareness | ■ |
| 4 | Interest | ■ |
| 5 | Active market | ■ |

The results can be seen in Figure 2 below

Chapter 3 Awareness of CHP in Germany, Italy, Belgium, Greece and Slovenia






Among the three customer groups considered: utilities (including DH), industry, and potential user groups the energy industry is the most aware across these member states, with a good level of awareness and signs of adaptation and progress. Industry is signalled as interested, and seems to have the knowledge in many sectors but currently despite a level of interest it is not active. The fundamental issue is that cogeneration investment competes for investment with the central processes of the industry itself. The cogeneration investment is therefore facing a high hurdle for acceptance. Potential customers who are in non-traditional groups for cogeneration (including here the food sector) are considered to be at the low awareness stage where no real market can be considered to exist yet. The picture regarding customers is remarkably uniform across the member states analysed.

Looking at the evaluation of awareness in the supply chain it is striking that in all member states the manufacturers and suppliers are clearly active. Projects are being realised with strong direct input from the manufacturers and equipment suppliers with seemingly little input from the other channels which could conceivably play a role in the case of Italy, Slovenia, Greece and Germany. The exception to this is Belgium where every part of the supply chain in the traditional cogeneration market appears to be active. The exception to this is the new micro CHP sector. The impact and readiness of other technical channel and supply chain players varies between states. Installation companies and planners are considered only to play an effective role in Belgium and Italy, but don't feature significantly in the process in Slovenia, Germany, or Greece. The role of architects is not considered helpful or significant in any country's market process. The role of ESCOs is member state specific and but very active in Germany and Slovenia. The role of banks and financial institutions is very strong in both Germany and Belgium.

Belgium is unique in highlighting good awareness among all the influencers. For the rest of the member states in the group the general public and the broad media are reported as having a low or poor awareness of cogeneration although some specific interest in micro cogeneration is evident. There is disappointingly low awareness among academics outside Belgium. The influencing groups who seem to be aware of CHP are those who have a policy interest namely the NGOs and the industry associations.

Government and policy makers are clearly active and aware in Germany, Belgium and Slovenia. In Italy there is early awareness driven by the European legislation on cogeneration, while in Greece the awareness is judged low as little action is taken for cogeneration beyond the general actions on energy efficiency. In those countries where energy agencies are active they seem to be important players for cogeneration.

Key

- Poor 
- Low 
- Early awareness 
- Interest 
- Active market 

Group	Germany	Italy	Belgium	Greece	Slovenia	Comment
Customers						
potential user groups	CHP is still little known.	Varied degree of awareness good in both residential and touristic, commercial and hospitals. ESCOs help	Associations provide tools for new customers to assess the opportunity	CHP is quite well known in some of these groups. Nevertheless there are only a few examples of completed CHP system installations.	CHP is well known in certain sectors but availability of capital is low. The market is to a high extent ESCO driven, but mainly for units up to 1 MWe.	Early market still
Industry (EE industry and cars, food) Moving to interest	CHP is well known in principle, but there is a lack of technical, economic and legal know-how to implement it despite good business case.	Cogeneration is known but availability of capital to invest in it (compared to other business priorities) is limited and progress is slow.	CHP manufacturers are present and active on the market and in their trade associations. Associations provide tools for new customers to assess the opportunity	CHP is well known in principle, but there is a lack of know-how to implement it despite a good business case. Economic crisis impact	The level of awareness about CHP is among energy managers in industry in general rather high, though the CHP projects are often not implemented due to the lack of capital	Initial or market interest
energy industry	Increasingly high priority for cogeneration, mostly good image, some opposition from traditional central power station owners. Gas industry is an important driver for micro-CHP.	Progressively adapting. The role is understood.	Frequent exchanges with other sectors at regional and country level. Image good.	Increasing use of cogeneration, which holds a good image, particularly with the younger staff.	The cogeneration is known and well developed in district heating systems	Interest and action when financial situation allows
Market and supply chain						
Installation companies	CHP is known in principle, but often detailed know-how is missing	Install packages. Consultation done through ESCOs	good	only a few installation companies in Greece	The awareness about CHP is on a quite low level.	No conclusion

Planers	CHP is known in principle, but often detailed know-how is missing.	Engagement is functional. However in the case studies presented their support is crucial	Good awareness	CHP is known in principle, but often detailed know-how is missing	CHP is in principle known, but the project initiators are technology providers not planers.	Split : either in market and good or not there
Energy consultants	CHP is known in principle, but often detailed know-how is missing.	Low occurrence of knowledgeable practises	Good awareness	CHP is known in principle, only.	CHP is in principle known.	No conclusion
architects	CHP solutions are mostly known only superficially. Focus on solar thermal, heat pumps and pellets.	Functional knowledge		Little practical knowledge.	Low level of awareness about CHP.	Poor
Technology and equipment providers	Technology providers are key actors		Technology providers are key actors	Technology and equipment providers are key actors, although they don't have a strong presence in Greek market. (5)	CHP technology providers act as its main promoters, planers and often also as ESCOs.	These people are driving the business
banks; Leasing	no major problems for CHP financing are reported; special credit programs with favourable terms are offered from the state KFW bank	Poor	Good	There are major problems for CHP financing. Although a few years ago financing of CHP systems was secured, nowadays due to economic crisis it is minimized.	poor	Extreme split. Two best have good support
ESCOs	high awareness, growing know how. ESCOs are playing a key role for CHP dissemination in industry, apartment houses, commercial etc.					

Energy agencies	One of main actors in promoting CHP				One of main actors in promoting cogeneration	Good where these are active
Policy structure						
Policy	Against the background of the "Energy Transformation" good CHP image. high priority for all parties in the parliament.	More activity in the past years resulting in more awareness. The driver is the 2004 Directive	Effective implementation of EU legislation and good understanding among policy makers at all levels. Cities very involved. Accurate CHP record kept.	There has been a successful campaign in the field of Energy efficiency. Nevertheless, there have been few steps concerning CHP systems	Good support and understanding at central level	
Influencers						
general public	For the ordinary citizen CHP was and is mostly still a "far-away-technology" except for micro-CHP.	Cogeneration relatively unknown but micro has entered the popular press	Hot topic in energy . Micro CHP awareness high.	Almost unknown but beginning awareness of micro	General public awareness about cogeneration in Slovenia is low.	
Media	CHP is still little known in wider media. In environmental media known.	Micro growing but otherwise nothing	CHP covered in wider media and academic press.	CHP technology is quite well known with specialist press. Popular media mentioning CHP still little	There is almost no information regarding CHP in media for the general public. Professional media focuses mainly on small scale/micro-CHP.	
academic area	Only a minority of universities and technical colleges deals with CHP; good knowledge only in a few institutes.	Basics included but no degree courses	Included in some courses as option. Research students often need help from industry to support them	Good knowledge not widespread. Only some of the polytechnics/technical colleges/universities deal with CHP.	Not very active	
Environment NGOs	Good image: decentralized, environmentally friendly, citizen close.	Awareness is good.		Generally good image	Medium level of awareness.	

Associations And supplying industries			Association supplying industry: supplying industries and their associations play a very important and boosting role: <i>green</i>	Strong regional associations bridge gap between regional govt and institutions and the industry.	Good awareness. (5)	Josef Stefan Institute – Energy Efficiency Centre (JSI-EEC), Economic interest grouping of natural gas suppliers (GIZ DZP), Slovenia District Energy Association (SDDE)	
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Figure 2. Using the model groupings of customers, market and supply chain. Policy structure and Influencers, member states market Actors were rated for the awareness of cogeneration

Chapter 4 Awareness of different actors of cogeneration in Belgium and in Germany

Belgium (Flanders)¹

Of the pilot group the one member state which exhibits sustained growth in CHP in several sectors is Belgium and within that Flanders is a significant part. Cogeneration in Belgium has grown on average 8.5% per year over the period 2004-2010, compared to average European growth of 1.4%² Examining the awareness in Flanders gives potential insight into the role that awareness may be having in assisting market sales of cogeneration.

Germany^{3 4}

This country has a long history of cogeneration across all sectors and has made recent strong policy moves towards growing cogeneration. **CHP capacity 40,736 MWel. Significant increases were recorded in the municipal (+6.3 TWh/y) and industrial CHP plants (+4.2 TWh). On the other hand the production of non-municipal CHP public utilities sector decreased by 3.7 TWh. Significant increase of CHP electricity from bioenergy from 0 (2004) to 5.9 TWh/y (2010).** Analysing awareness in Belgium and Germany together should reveal those elements of awareness among actors that exist in a market where activity is growing (and sustained?). These may give useful insight into the role of awareness in promoting cogeneration.

Looking at the awareness's scores under this analysis for Belgium and Germany to the general picture presented in Italy, Greece and Slovenia certain points stand out. Belgium shows an overall strong awareness (active) corresponding to good market conditions across all actors.

¹ VITO, 2012. Inventaris duurzame energie in vlaanderen 2011; deel II: WKK.(Flanders).Cogeneration region Wallonne (directive 2004/8/EC).(Wallonia) Direction générale Energie, 2011.CHP Supplementary Reporting for European Union Countries Under the EU DIRECTIVE 2004/8/EC, 2011.(Brussels)

² Ref the impact assessment of the EED

³ http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/document/_downloadImage.do?ident=24839.

⁴ <http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeIdent=2851>

There is strong awareness among all influencers and the policy awareness is strong. There is still market awareness lacking in the wider customer sectors but this could be attractive for companies to develop against the overall positive background. The general awareness level shows exactly the kind of potential for customer referencing to take place that creates a mature market. Informed influencers are in place who can impact the customer decision as well as the policy structure decisions, while a strong supply chain and financing offer is there to support new projects.

Hence in Belgium after five years of sustained growth there is an active mature market across a range of application. The question in the case of Belgium is are all of these players necessary to generate sustained growth or indeed are a few core to creating a market and the rest are drawn in over time?

Through discussion with main actors in the Flemish market a plausible version of how the market grew has been recorded:

The critical early point of awareness in Belgium happened at the level of the utilities and industry. They became aware of the advantages of energy efficiency and reduced energy costs. This led to a boom in installed capacity in the early 90's.

When electricity and gas prices became unfavourable for CHP in the 2000's only a few new projects were realised. On policy level this was also a turbulent period with the liberalisation of the energy market. In order to promote CHP again, the government reviewed the legislation. Awareness at governmental level was necessary for this to happen and a Platform was started to bring together all potential parties in the process of developing CHP:

- information on volume of possible reduction of primary energy.
- Demonstration projects were needed to inform the technical and operational people of the companies using heat in their processes of the viability of the techniques (availability).
- Then the system to promote CHP had to be worked out by the authorities, who should implement a fair system to support the introduction and further evolution of the use of CHP techniques. In Belgium this responsibility is both at federal and at regional level.

Important was also an evaluation and correction of the support system

- A clear follow up of the realization in the different sectors so as to be able to evaluate (together with the Platform) the needed adaptations to the policies.
- Introduce timely the vision of what should happen in a second generation of CHP's (renovation).

Gradually the other actors in Figure 3 became aware of CHP.

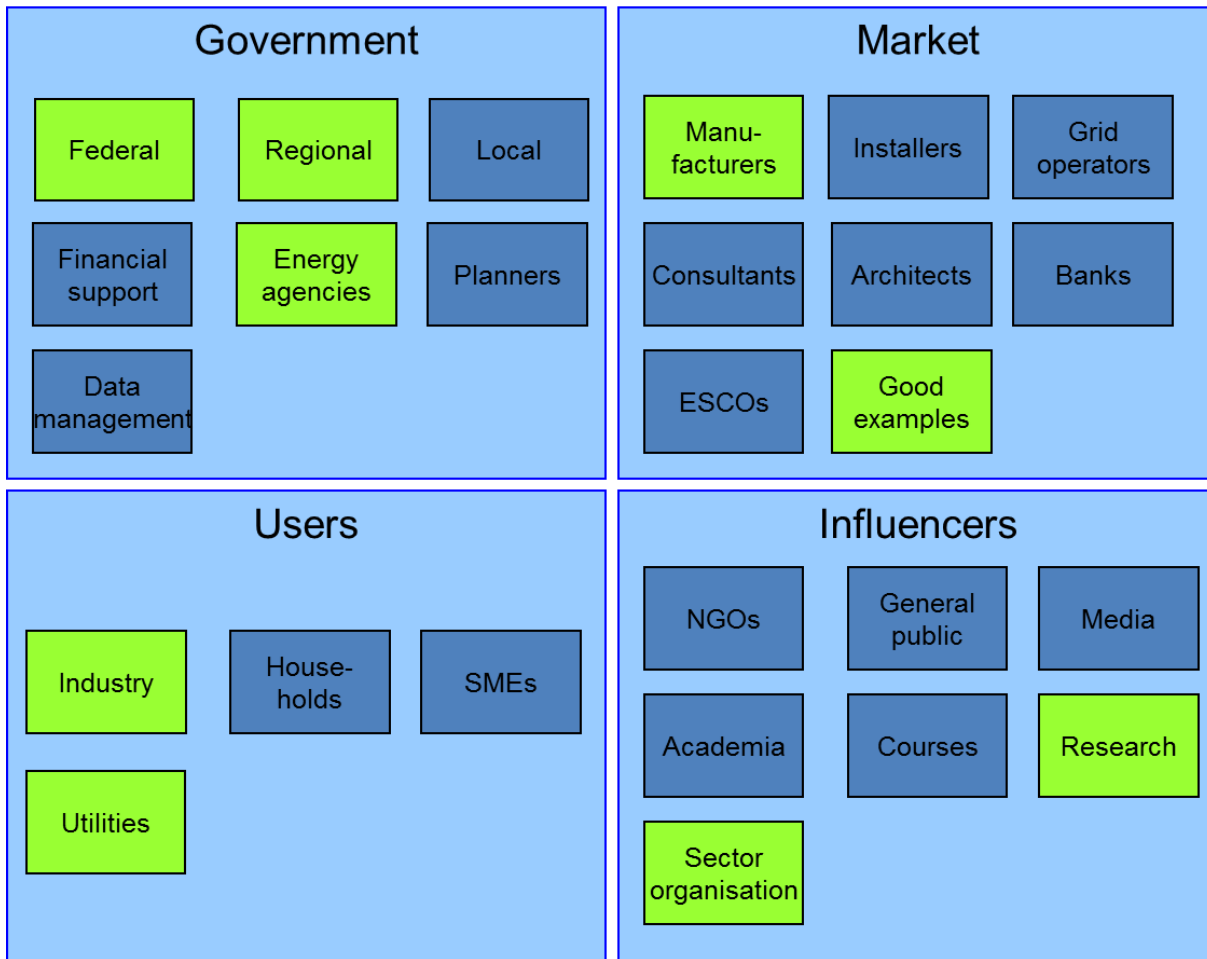


Figure 2 Awareness of different actors

Germany presents a picture closer to the norm of the other sampled states. The policy awareness is good but the influencers on the policy makers are not well informed or aware in general outside the NGOs and trade associations. Hence the wider influencer group who can impact public acceptance and perhaps policy development are not necessarily informed about CHP. The supply chain to deliver new projects is delivered by a strong supplier group and firm bank/financial support. The customer group is overall less aware than in the case of Belgium with the wider market, yet to be addressed.

The awareness analysis shows Germany only slightly more developed in awareness than the majority of member states. Germany has more in common with the other member states reviewed than with Belgium. The exceptions to this is the clear existence of all of three elements 1) Good policy awareness 2) financial support availability and 3) active technology providers. This core also exists in Belgium but does not exist in any other member state analysed. The NGOs and trade associations are also clearly active in both cases.

Within the analysis other questions arise

- Is it possible that the absence of a good technical supply chain puts too much strain on the industry to grow the market. Is the dominance of the manufacturers in supplying CHP restricting the market?

- Do we need to activate the academics to bring skills on cogeneration into the general education of energy professionals, in order that multiple channels to market can be established?
- Can a strong role for energy agencies be duplicated in other member states and would it help?
- Are all the players highlighted as important also necessary or are some secondary?

Chapter 5 Interim conclusions and recommendations

Interim conclusions:

- Relatively good policy awareness (and in some cases good awareness) in the pilot member states group studied.
- The energy sector is seen as being well aware of CHP and any lack of market response cannot be due to awareness.
- CHP including micro-CHP is supported strongly by the gas industry in Germany (and UK and NL?)
- The other market sectors still need work if they are to constitute a cohesive mature market.
- Financial proposition as in Be and Germany is important
- The low level of awareness in the technical supply chain is surprising and a barrier to growth of the sector.
- Dedicated CHP associations are important drivers for CHP awareness and co-ordinated progress
- Resources applied by the manufacturers in building the market is driving the market
- The influencer groups of media and general public who could act on the market as a whole and the policy makers are generally poorly aware.
- Academia is sadly not well aware and this may be having an impact on a weak supply chain where the mass of the work falls on industry itself to support new projects

Interim recommendations:

For comparison with other member states to test their awareness and for use in the road map awareness section:

- Use Germany as a minimum set of awareness to trigger strong action.(suppliers strong, finance in place, good policy awareness and support, strong industry initiatives)
- Use Belgium as the positive end point of what a mature market would look like