

CODE2

**Cogeneration Observatory
and Dissemination Europe**



D2.1 Awareness Case Study **ITALY**

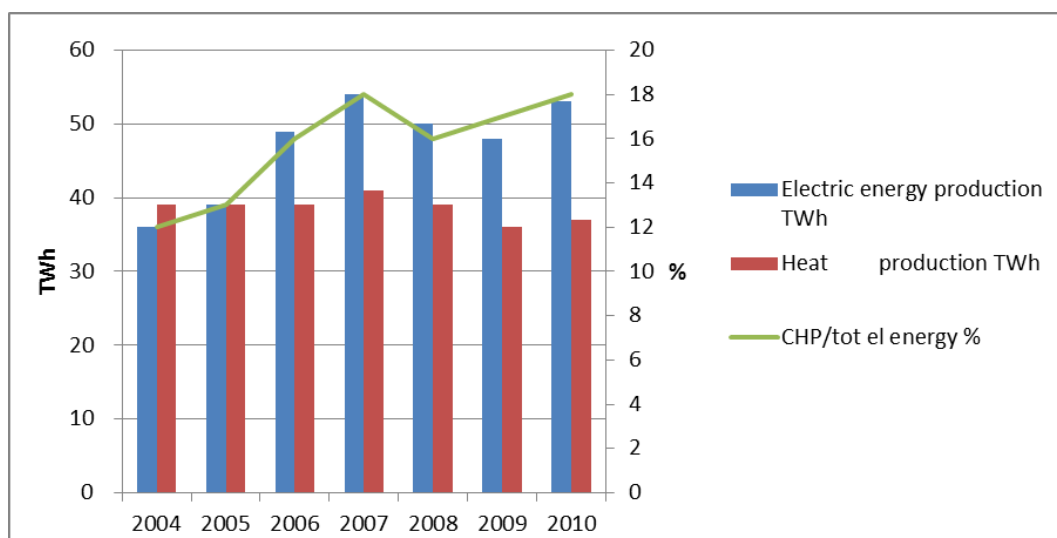
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Chapter 1: Introduction

Italy has been chosen for the awareness study among the South Western region countries for the following main reasons:

- Already in 1998 the proportion of cogenerated electricity in total electricity in Italy counted for 17,3% against 2,5; 11,2; 8,4 respectively for France, Spain and Portugal and in absolute terms was 9,5 GW of cogeneration capacity second only to Germany. This data demonstrates how long cogeneration has been important on the Italian energy market and how rooted it is in the industrial, administrative, territorial and political context
- The same ranking applies, with exception of Portugal but with a much less capacity, in the following years until 2010 despite an alternating fluctuation due to the economic crisis
- As regards particularly high efficient cogeneration (CAR in Italian) Italian electrical production shows a growing trend of absolute values and ratio



In the Italian park of CHP installation two Best Practice cases have been chosen

- Policlinico di Milano (Lombardy)
- Teleriscaldamento Pinerolo (Piedmont)

because the former is an example of integration of trigeneration plant inside an old hospital structure placed straight in the center of the city so presenting a direct impact on urban environment with CO₂ and NO_x reduction, the latter constitutes a valid example of District Heating where the CHP plant uses biogas coming from three different sources: landfill connected to the plant by a 3 km biogas pipeline, anaerobic digestion of organic fraction of solid urban waste and wastewater treatment plant and the useful heat is also used for the anaerobic digestion plant itself.

Chapter 2: Awareness of CHP in Italy

1. Policy support to CHP

Awareness of any phenomenon is normally based on the level of stability, given a certain time range, of the phenomenon itself and of the constraints that frame it. With the changes which have occurred in the last few years now complete finally the present legal aspects defined by the Ministerial Decrees of August-September 2011 could be considered completed, meaning that new criteria to recognise High Efficient Cogeneration have been settled according to the European directive 2004/08/EC and incentives for High Efficiency Cogeneration have been defined. The incentive is based on a system of White Certificates which validity is 10 years for production plants and 15 years for plants coupled with District Heating. The base value of White Certificates is affected by a coefficient depending upon the power of the plant to take into account micro and small generation.

The main benefits the new regulation offers to high efficiency CHP plants are:

- Dispatching priority on grid
- Net metering for plants under 200 KW_{el}
- Incentive prices for electrical energy produced in cogeneration plants under 10 MW
- Release of Green Certificates for plants coupled with District Heating
- TWC (Tradable White Certificates)

With this system in place now Italy has a clear and hopefully stable normative and economic frame to start real activities to raise awareness towards all the stakeholders involved from the investors to the customers passing through ESCO's and policy makers

General public	The broad public is ever more informed on topics relating to energy and, in descending order from the most popular, green energy, energy saving, energy efficiency, distributed generation, cogeneration. The last term is too technical and less immediate. However in the last two years it is becoming more common and particularly micro-cogeneration appears in newspaper articles, radio-television programs, web sites even non-specialised ones. , Micro -CHP is felt somehow to be closer to the public interests.
Media	The attention paid by media on cogeneration is growing fast but always from the perspective of the wider energy efficiency frame. The focus is anyway on micro-cogeneration leaving larger cogeneration applications to the most professional magazines and media
Policy	The legislative activities on national and regional parliaments have been subject of strong increase in recent years as well as the presence of policy makers to public debates and congresses. In these senses there is increasing policy awareness driven by the decision to streamline and speed up the adoption process of all the European directives.
Energy industry	The energy industry has understood the role and the importance of CHP and is

	progressively adapting and cooperating in the networks interface definition.
Industry	CHP is a well known concept in term of its potential applications. Depending on the size of the enterprise and the type of possible installation, the internal resources very rarely are in the position to translate their needs into a project without external support.
Other potential user groups (commercial, hotels, ...)	Other sectors show a varied degree of awareness on CHP technology and the promotion of CHP plants is left to machinery producers and ESCOs. In any case good levels of awareness are found in big concentrations, both residential and touristic, commercial and hospitals.
Energy consultants	Engineering companies or even Engineering offices dedicated to thermo-mechanic engineering project design are not very frequent but some can be found with good knowledge of CHP.
Planners	In the presented Case Studies the role of the Planners of the Technical Office of the local Administrations has been very important and the relations were profitable. In general it can be stated that for works integrated into the territory the cooperation with territorial planning is fundamental while their understanding of CHP is normally functional.
Installation companies	Normally installers, except for packaged applications, as could be for micro-CHP, are not consulted directly by clients. Clients seeking energy solutions tend to be referred by ESCOs or Engineering companies.
Architects	CHP solutions are known only from the functional and authorisation points of view.
Academia area	Energy efficiency and cogeneration matters are normally included within Facility Management courses in many technical schools or within Energetics faculty in the Polytechnic universities, but it doesn't result at the moment in any specialised degree course
Environment NGO's	Awareness in cogeneration is good but technical knowledge is lacking.
Banks, leasing	The market is not yet very open to external financing but ESCOs. Other than for other renewable energy sources, the level of operators is not adequate.

2. Associations

The world of associations in Italy is large and sometimes overlapping but it gives an idea of the interest in CHP and of the industrial Associations and of their level of awareness and the capability of dissemination and training they provide to their associated and to the entire community.

- The main Associations dealing with CHP are: ITALCOGEN, is part of ANIMA, Federation of National Associations of Mechanical Industry. It groups manufacturers and distributors of CHP plants. Main task of the nonprofit Association is to support members in technical, normative, promotional and economic matters. Furthermore it organises

training courses for operators and maintenance staff and takes part in round tables and in most of the events in the sector. ITALCOGEN is a member of COGEN Europe,

- COGENA-ASCOMAC is part of CONFCOMMERCIO, Italian General Confederation of Enterprises, Professional Occupations and Self-employment: it is the largest enterprise-representative in Italy. It groups enterprises pertaining to the sectors of construction, distribution and engineering of machines and plants for renewable sources and cogeneration. ESCOs, companies of energy service, energy management and project managers which design, realise, manage and finance turnkey plants of electric generation and cogeneration are also part of COGENA. They publish a periodic newsletter, thematic documents and audio-visual materials, as well as organising popular, strategical and professional courses.
- AGESI, Association of Enterprises operating in Facility Management and Energy, represents at national and European level the enterprises of the Facility Management sector and makes efforts to ease the penetration of such technologies into the private economy and public administration through actions aimed at raising the awareness of the counterparts.
- ASSOESCO – National Association gathering the Energy service companies, provide engineering support in energy efficiency and cogeneration projects and in fund raising

The level of awareness and preparedness of these associations, together with other similar, is very high and all of them show also a remarkable capability to make a push force towards policy makers and institutional bodies.

3 *Industreis and SMEs*

Industries of medium and large capacity and those presenting an energy intense character normally have good sensitivity to energy efficiency and the means to accomplish it, also cogeneration, not only from an economic aspect but also as regards the benefits to environment in which they operate and the people. The internal management is in the position to assess an investment and the options for its realisation, either by themselves or together with external engineering companies or entrusting the project directly to an ESCO. In general these projects are complex and require tailored solutions that are not usually met through simple purchases of parts on the market. The case of SME's is even more complicated because of the variety of applications included many supported by specific internal competence. This is where the presence of external consultants is very helpful and often decisive particularly for the support they can provide in terms of feasibility technical, economic and overall financial assessment. Consultants participating in the Associations with an interest in cogeneration generally possess a good level of awareness and skill in cogeneration. Generally outside those linked to an association the preparedness of engineers and technicians has to be assessed case by case and related to the type of installation.

4. ESCOs

The involvement of ESCO's in all the aspects relating to cogeneration investments in Italy is very high. Starting from the phase of dissemination and raising of awareness during commercial contacts, to the phases of assessment of feasibility studies run together with the clients, and on to the design, construction, commissioning and maintenance. This relationship for many clients is a necessary condition for a project because, even being aware of the implications of a cogeneration plant, they don't have the competence, the willingness (or are in the impossibility as often public administrations) to assume risks, and over all they normally don't have the capital needed for the investment which will be provided by ESCO's or by third parties through ESCO's. In general ESCO's are closer to the clients than pure financial institutions due to fact that they offer a global vision on the job.

5. Financial institutes

From the present survey it appears that financial institutions have great difficulty to work together with clients to find financial solutions for investment in complex projects that, , depend upon many concurrent factors, as normally is the case of cogeneration. This is the case regardless of the size and the cost of the project. On the other hand banks are already prepared with already made packages, possibly sizable, to interface problems presenting a clear and checkable economic profile, such as wind and solar projects.

6. Education

Energy efficiency and cogeneration matters are normally included within Facility Management courses in many technical schools or within Energetics faculty in the Polytechnic universities, but this has not resulted at the moment in any specialised degree course. The co-participation of the industrial and academic worlds is encountered only in a range of financed European or national projects. C.N.R. –National Research Council – is very active in research in this sector with its Department of “Energy and Transport”. ENEA - National agency for new technologies, Energy and sustainable economic development – has set specific departments for energy efficiency, renewable energy and research of electrical systems, carrying out many CHP projects. ENEA offers its services to enterprises and public administrations on energy problems and has a large production of popular and research documentations also available through web and audiovisual media.

7. Policymakers

There are several bodies, agencies and associations that make reference directly or indirectly to the State organisation as regards the electrical market in general and the CHP market in particular. All these bodies are of great importance not only for the institutional functions they exercise in the field of competence, but also as holders and carrier of awareness.

- MISE – Ministry of Economic Development
- Ministry for the Environment, Land and Sea

- Four limited companies, belonging to MEF – Ministry of Economy and Finance
 - GSE, Gestore Servizi Energetici (Energy Services Management)
 - GME, Gestore Mercati Energetici (Energy Markets Management)
 - RSE, Ricerca Sistema Energetico (Energy System Research)
 - AU, Acquirente Unico (Sole Purchaser)
- AAEG – Independent Authority for Electrical Energy and Gas, with functions of regulation and control
- FIRE – Italian Federation for Rational Usage of Energy. Independent nonprofit technical-scientific association, entrusted by MISE

Apart from these organisations there is a plethora of local bodies and agencies which are very active on their territories that are the really interested parties for CHP intervention.

Beyond these organisations it's worth to cite that other independent bodies function as strategic and standardisation organisations, such as

- CTI – Thermo-technical Committee, federated to UNI – National standards Body, organised in sub-committees between which “Rational usage and management of energy”, “Systems and machines for energy production”, “Cogeneration and Polygeneration”.

All these organisations are to be considered policy makers in all senses because of their institutional power of decision or their capacity to influence such decisions and present a high degree of awareness.

Chapter 3: Case Studies Business Model

Both case studies presented here have been realised and are managed by ESCO's, which is the approach mostly adopted for CHP plants commissioned by Public Administration. ESCOs seem to be key to awareness in this sector.

Pinerolo

In the first case, Pinerolo plant, the customer is selling biogas to the ESCO which transforms biogas in electricity and heat used in the bio-digester process, and in the district heating of the facilities of the city of Pinerolo. While the customer is investing in the biological process of the bio-digestion and developing the district heating pipeline in the city, the ESCO is investing and continuously updating the cogeneration plant to follow heat demand and optimising the use of biogas. The ESCO has the obligation to use all the biogas made available by the Customer and the economic value generated by the project is shared.

Policlinico Milano

In the second case, a hospital in Milan, the ESCO is also charged with gas purchase but the model remains practically the same. This business model is called “ESCO with Energy Performance Contracting”. The mechanisms applied may be different but normally the ESCO finances the entire project, owns the system, and incurs all costs associated with its design, installation and maintenance while is entitled of white certificates. The ESCO sells heat and power to the client at a specified rate that offers some savings over current energy

expenditures, or can enter into an energy savings performance contract with the client. In this case the ESCO and the client agree to share the cost savings generated by the project, while ESCO guarantees the performance of the CHP system. This contractual form mitigates the risks associated with CHP for facility owners, and allows operation and maintenance of the intervention by ESCO specialists. For these reasons this model is often chosen in public sector projects.

The case studies here presented are somehow similar if we look at the stakeholders involved, namely ESCO's from one side and public administration from the other one and both with the direct fruition of the city inhabitants. The success of the operations has triggered awareness of a range of actors. From the experience of these cases, the relationship between awareness and results appears to be a dynamic one, namely that results raise awareness that in turn triggers investments and results and so on. In Pinerolo plant every year (October) a guided visit tour of the cogeneration plant and a debate is organised with a large participation of people, even children. This is a good sign of the acceptance and satisfaction of the city and of officials and executives from external administrations. Also a sign of general interest in how to face and solve urban energy problems.

Chapter 4: Awareness of CHP in Italy

In Italy the relationship between State, Regions and Local Bodies is rather complex and in fact a discussion is currently on the table to modify the Constitution to give back to the State some competences in energy matters: as regards relevant national infrastructures and strengthening territorial and local involvement in the choices relating energy settlements. This is happening through an information “public debate” and pre-emptive coordination with the Regions in order to reduce uncertainties and legal arguments. Given that the interventions regarding efficient energy, like CHP plants, often show a positive return, one could expect that decisions and investments should be taken up by the market. The path is nevertheless hindered by several different barriers to the adoption of efficiency technologies. These vary according the sectors. Table 1 is drawn from a study¹ referring to energy efficiency but that we consider on a first approximation is valid for the specific case of cogeneration

¹ Energy and Strategy in Italy – White Paper 2012 - Assolombarda

sectors	Interest & sensitivity			Financial aspects			Accessibility	
	Awareness	Lack of focus	Agency	Payback risk	Payback time	Investment	Product	Support
residential	Yellow	Grey	Grey	Grey	Yellow	Red	Grey	Yellow
services	Yellow	Red	Grey	Grey	Yellow	Yellow	Grey	Yellow
public administration	Grey	Yellow	Red	Grey	Grey	Yellow	Grey	Grey
industry	Grey	Red	Grey	Yellow	Red	Grey	Yellow	Grey
transport	Grey	Grey	Grey	Yellow	Red	Red	Grey	Grey
barrier importance	Grey	Grey	Yellow	Red				

The table suggests that awareness of energy efficiency is felt as a barrier only in residential and services sectors, where there is a clear lack of information and where proper actions are expected, while in public administration and industry awareness is not a barrier, because these sectors are nowadays the preferred target of the market and people in these sectors are normally well informed and prepared. It appears from the study, and is confirmed by our interviews, that the level of awareness is in general acceptable, especially among industries and their associations, large concentrations as commercial centers and hospitals and public administrations or consortia especially in District Heating applications. The new PEN (National Energy Plan) contains several references to cogeneration demonstrating that policymakers are aware of high efficiency cogeneration and this is reflected in the measures and actions recently proposed. Financial institutions on the contrary don't show the same interest in energy efficiency as they do in other forms of energy investments, such as photovoltaics. The reason could be that financing investments in certain renewable technologies is more sure and more easily assessed than financing savings that depend on different factors, some inherent in the management of the activity and some others even exogenous. In general the principal element effecting the decision to invest in cogeneration is always the economic and financial case being more important than, awareness and knowledge included, unless there are other non-economic parameters of uncertainty and bureaucratic nature which result in unacceptable risk or timescales.

Annexes: Two Case study factsheets on Pinerolo and Policlinico Milano

Genergia Pinerolo

Biogas CHP for district heating

Main CHP project indicators

Heat capacity (total)	MW _{el}	3
Electrical capacity (total)	MW _{el}	3,150
Technology	Motor engine	
No. of units	3	
Manufacturer	Caterpillar	
Type of Fuel	Biogas	
Heat: yearly generation	GWh	16,7
Electricity: yearly generation	PJ	32.400
Year of construction	2004	
Total investment costs	EUR	2,7 mio
Financing	Own funds	
State support	Investment subsidy Soft loans Feed-in tariff X Green Certificates Tax reduction X White certificates	
Location	Pinerolo (Turin) Italy epiantoni@genergia.it	

General description of the case

The CHP plant uses biogas coming from three different sources: landfill connected to the plant by a 3 km biogas pipeline, anaerobic digestion of organic fraction of solid urban waste and wastewater treatment plant.

The useful heat is used for the anaerobic digestion plant and for the district heating of the city of Pinerolo.

The 50.000 t/y digestion plant can produce about 7.000 t/y of compost.

Success factors

The key success factor was the use of the cogenerated thermal energy for industrial and district heating.

The population is motivated to accurately separate municipal waste and provide high quality organic fraction because of the benefits of district heating and compost production they get in return.

The new plant needed for the waste management in the area was therefore highly supported by the population (no NIMBY opposition).

Main barriers

Bureaucracy in the authorisation process.

Conclusions

The project has proven the following:

- the technical and economical feasibility of an integrated plant from waste management to CHP returning benefits to population;
- the effective cooperation between an industrial user and an ESCO (energy service company).

The project has been awarded by “Bioenergy Best Practices “ prize.

Picture



Ospedale Policlinico di Milano

Health

Main CHP project indicators

Heat capacity (total)	MWel	2,8
Electrical capacity (total)	MWel	3
Technology	Motor engine	
No. of units	2	
Manufacturer	Jenbacher	
Type of Fuel	Natural gas	
Heat: yearly generation	GWh	16
Electricity: yearly generation	GWh	13
Year of construction	2010	
Total investment costs	EUR	2 Mio
Financing	Contracting	
State support	Project financing 9 years by ESCO Siram Spa	
Location	Milan	

Picture



General description of the case

Trigeneration plant with 1 MW absorption chiller with black-out emergency function to guarantee greater electrical continuous supply.

Success factors

Reduction of CO2 emission equal to 837 ton/year.

Energy saving equal to 1060 MWh/year.

The SIRAM plant integrates a system for the abatement of NOx by means of a SCR (Selective Catalytic Reduction) system.

Main barriers

Great care has been taken to overcome the difficulties arising from the insertion of the plant in an urban context inside the hospital premises (already existing and operating and generally very old and historical).

Delays for administrative and authorisation practices (fire, ambient, fuel customs, etc.)

Conclusions

After a rather long commissioning and running, the plant is providing very good result in terms of global energy saving.