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The Utilities Industry: new business models and perspectives

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ABSTRACT

Introduction

The Utilities industry is going through a period characterized by high dynamism, not only nationally but also at an international level. More specifically, a deep transformation can be reckoned as traditional business models based on public and monopolistic systems are rapidly changing and utilities are encountering a more intense competition among competitors.

The liberalization process, new regulations, company merges and outsourcing activities lead to a disruption in the utility industry; companies are now forced to introduce new business models and strategies in order to survive in the market. The way they act suggests how companies are more concerned about their strategic decision in an industry that favors business dimensions and operational efficiency; those activities aim at maximizing value creation either upstream or downstream.

Therefore, nowadays, adopting marketing and pricing strategies is essential to consolidate companies clientele. The variety in the strategic choices adopted by utilities is due to more freedom in terms of legal and political constraints, which were obstacles for companies autonomy in deciding their business strategy.

The new regulatory environment significantly enhances the degrees of freedom of firms; as a consequence, on one side the liberalization process is seen as a threat, on the other side it is considered as an instrument that creates new business opportunities not only for incumbents but also for new entrants. This condition induces incumbents to seek for new development processes and to reshape their business in terms of strategy, organization and culture.

Companies, in fact, are facing new challenges as regulators, customers, and other stakeholders are seeking for new requirements and their expectation in the segment is

rapidly increasing. To traditional challenges such as costs and the complexity of maintaining infrastructure systems, emerging threats shall be added and they are likely to impact on the stability of the industry itself. Rising in technology, growth in demand and fierce competition are some of the main topics being faced nowadays by utilities companies.

This thesis perfectly fits this context and aims at analyzing the current market condition of the utility industry. Therefore, the overall goals are identifying the main drivers that have lead to transformation and describing innovative business models for the companies. The thesis is articulated in nine chapters and more attention will be given to the energy sector.

Chapter 1. Utilities Industry

1.1 Definition

By definition, the term "Utilities "refers to companies that are committed in the production and the delivery of public services:

- Natural Gas;
- Electric Power;
- Water;
- Sewage;
- Telephone;
- Transportation.

Those services play an essential role in what can be considered as an economic and social progress and they must be accessible universally. Moreover, by the time they are commodities, they are always demanded, regardless of how fast or slow the economic growth goes; this characteristic impacts on the utility industry as whole, since it remains one of the most stable at least in terms of stake market.

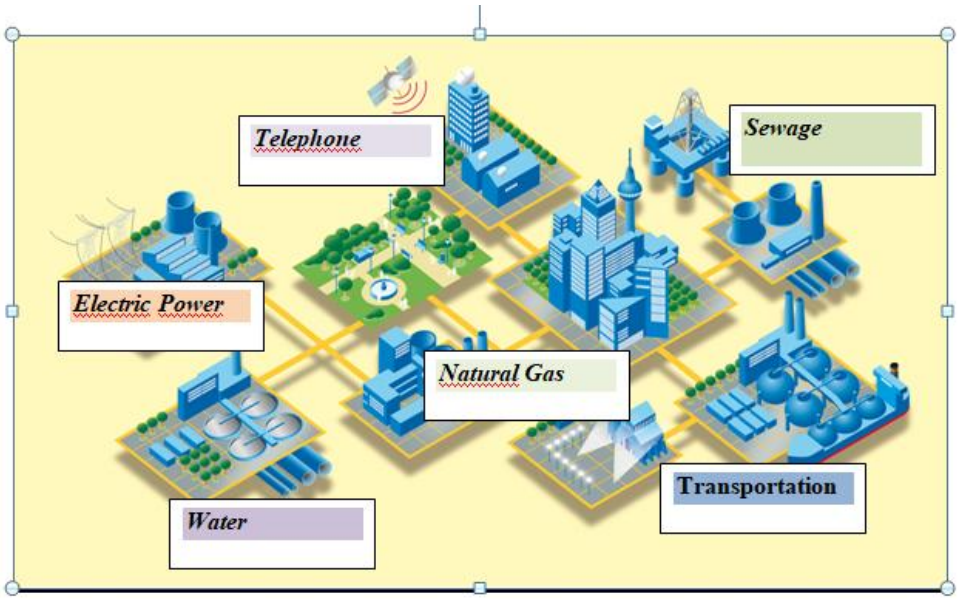


Fig. 1 -Utilities

1.2 General Framework

Within the same industry, several markets can be identified; market segmentation is used for better characterizing each segment in terms of competition and profitability. In order to provide a complete view of the utilities industry, it is necessary therefore, to apply a sort of segmentation based on three different factors:

- Segmentation by geographical area;
- Segmentation by product;
- Segmentation by property.

In fact, different issues, threats, opportunities and strategies, to be taken into account, often correspond to a different segment.

1.2.1 Segmentation by geographical area

The geographic prospective specifies the territorial scope in which utilities organizations operate. The territorial scope can take three different dimensions:

- Local dimension is a reality that characterizes most of the companies in the Italian market and the organizations operating in several EU and EXTRA-EU countries. In fact, their business is strictly related to the territory in which they have their origins and its community. The old municipal utilities, for instance, belong to this category;
- National dimension includes utilities that are operating in only one nation. They cover a social and economic function and are often public.
- International dimension instead, refers to organizations that have enlarged their territorial scope over national boundaries for a while already. Multiples reasons underlie this choice. For example, financial facilities, strategic synergies, more contractual power are some drivers that have induced utilities like E.ON and the Spanish Endesa to have an international connotation.

1.2.2 Segmentation by product

The strategic choice of the organizations goes under the business perspective; those choices are related to the type of services that can be offered. More specifically, utilities can adopt four different strategies on the bases of their portfolio:

- Mono-Utility;
- Bi-Utility;
- Multi-Utility;
- Multi-Service.

First of all mono-utilities differentiate from the others for a strategic focus as they address only one activity, be it electric power, natural gas or sewage. Linked to this focus, there is a growing interest of companies to enlarge their territorial scope and to vertically integrate.

With regard to bi-utilities, the offer services in two different sectors, as they often take advantage of the synergies resulting from that mix. It can be carried as an example the interaction existing between gas and water in managing the network infrastructure as well as the synergies between electric and gas sectors in the activities of provision and sales.

Multi-utilities are characterized by the joint provision of three or more services in order to create synergies especially in the distribution and sales stages. It happens either by using the same infrastructures or trademarks, unifying clients or centralizing the administrative activity and it concerns more horizontal integrations.

Instead, multi-services play a much broader role as their overall goal is to become the only suppliers of multiple services which are not necessary public and subject to regulation. Those companies are more clients-oriented as their aim is to build a direct relationship with the client based, for instance, on loyalty programs through insurance policies or telecommunications services.

1.2.3 Segmentation by property

By segmentation by property, it is meant the economic entity that runs the business. It is to say that companies are often under public control and even if they are private they are subject to a set of rules which affect utilities freedom to operate. Five possible scenarios can be presented:

- A company with a wholly public shareholding;
- A company with majority public shareholding;
- A company public controlled but quoted on the stock exchange;
- A company mainly controlled by private;
- A company totally private.

Companies with a wholly public shareholding and with a majority public shareholding differ for the amount of share capital owned by local authorities. The first scenario is characterized by 100% of share capital owned by local authorities; in the second category instead, only half of it is owned by local authorities while the reaming part is split between private members such as employees or financial institutions.

For a company that is public controlled but quoted on the stock exchange, the only difference regards the choice of private partners which are selected through the stock exchange; the last two options are just a minority in the sector.

1.3 Main Players

A2A S.p.A

A2A is an Italian company engaged in production, distribution and sale activities of electricity, in gas distribution and selling, in waste management and district heating; moreover, it is involved in water integrated cycle. Nowadays, A2A is one of the major local multi-utility groups in Italy; it is to say however, that, despite the fact that its customers are mostly based in the north of Italy, its portfolio of assets covers the whole peninsula. A2A can count, in fact, on an installed electric energy capacity of approximately 6.400 MW, a company electricity portfolio of 48.843 GWh and a gas portfolio of 5.567 of million cubic meters. The company strategy is mostly based on growth activities as the overall goals are to cross national boundaries and straighten its domain along Europe. In this regard, the group is expected to make several investments.

In addition A2A has started to focus on environmentally friendly programs and on sustainability: not only the group produces a significant portion of energy from

renewable sources such as hydro plants, biomasses and waste-to-energy plants but it is also engaged in maintaining its infrastructures efficient and to enhance energy saving.
Consumers still remain a key priority for the multi-utility; by the time A2A Energy has emerged, the founders have tried to create value for the company's stakeholders in a way to shape future strategic decisions with respect to their needs. A2A Energy is born in fact, with the aim to better deal with challenges coming from an uncertain market as a result of its liberalization. Hence, under A2A Energy, the company provides its clientele with gas and electric commercial offers in the free energy market.

Acea S.p.A

Acea , leader in the hydro sector, is one of the primary Italian multi-utilities and operates in various sectors: energy production, distribution and selling, water integrated service, with management of water systems, sewage and water purification. The company, first called AEM (Azienda Elettrica Municipale), was founded in Rome in 1909 with the aim to generate and distribute electric energy to public and private lighting. During the fascist era, AEM expanded its domain in the water sector and 1964 it became the only operator in the area of Rome. In 2000, the company launched an investment program of 750 million of euro that lasted 10 years, aiming at improving distribution networks; meantime, Acea leadership in the sector has continued to consolidate.
Nowadays, Acea is a public limited company that offers its services to private and business consumers, both in the open market and in the protection regime (AEEGSI tariffs). The ownership of the group is divided into three separate entities: "ente territoriale Roma Capitale" holds 51% of the stakes, "Suez group" owns 12, 5% and the remaining part is split between entrepreneurs and other minors shareholders.

From a strategic point of view, the company is focused on economic, social and environmental responsibilities. It is in fact, essential for the group to create profits by providing at the same time, high-quality services, that safeguard the environment and their stakeholders.

From an economic perspective, Acea closed 2016 with revenue of 2.832,4 million of euro and a net income of 262, 3 million of euro, by employing approximately 5000 workers.

Enel S.p.A

Enel was founded in 1963 with the objective to produce, distribute and sell electric energy in the national territory. In the 60' Enel was engaged in massive investments in order to meet electricity demand resulting from the economic boom. In the 70' instead, the institution was forced to introduce new strategies in its business in order to tackle the oil crisis: energy saving and diversification strategies were some of those. In the 80' the idea to be environmentally friendly led the firm to totally reshape its production systems. Renewable sources in fact, have started to be a core competence for the operator and currently, approximately 41,6% of the electric energy is generated with no CO2 emissions.

By the time the partial liberalization of the energy has occurred, Enel has started to be a public limited company, acquiring over 1270 companies in the sector. At this time, the operator was forced to split generation, distribution and sale activities and to cut production capacity.

The group is quoted in Milan stock exchange and their main stakeholder is "Ministero dell'Economia e delle Finanze". Nowadays, Enel is the leader with regard to energy and methane gas production, distribution and sale activities: the company, in fact, has over 32 million consumers in Italy and approximately 61 million end- users in over 40

countries; It can boast an installed capacity of 39.882 MW and a production of 79 TWh per year. As for the overall goal, Enel is engaged in strengthen its presence outside Italy.

Eni S.p.A

Eni is an Italian firm that operates in the energy and gas sector by providing services in the protected regime and in the open market. Despite the fact that the birth of Eni "gas e luce" as a public institution is dated in 1953, its origins are traced back in 1926. In the post war years, Eni "gas e luce" played a crucial role in the industrial development of the country and, thanks to new agreements and activities, the group gained a prominent position internationally.

Nowadays, Eni is a public limited company and is quoted in Milan and New York stock exchange. Its strategy is oriented on future investment plans and is engaged in the enhancement of the network infrastructure in order to import, transfer and distribute gas in Italy; moreover, the company aims at straighten storage capacity.

Sorgenia S.p.A

Sorgenia was founded in 1999 and since that time, it has started to operate in the electric and gas sector, dealing directly with the whole chain of production from provision to sale activities. To this day, Sorgenia is the primary private Italian operator in gas and energy sector with approximately 500.000 consumers in the whole peninsula. The group is now focused on strengthening its position as leader by:

- consolidating its clientele, especially in the domestic segment with competitive offers;
- reducing energy importation;
- improving energy efficiency ;

- employing renewable sources by focusing more on wind and photovoltaic.

Moreover, Sorgenia high values environmental issues, sustainability and energy efficiency; group growth is in fact, based on a conscious and correct energy usage.

Edison S.p.A

Edison is the eldest Italian company in the energy market. It was established in 1894 and by that time, it was the first in opening a thermoelectric plant in Europe and providing public lightening and tram electricity in Milan. In 1962, when Enel was founded, Edison ceased its activity in the energy sector; only in 1999 it returned to provide energy to eligible customers. Thanks to its engagement, in 2012, Edison was reckoned as the Italian company with the best reputation internationally.

Currently, the group is the one of the major players in the Italian market in the production and distribution of energy, gas and crude oil, with over 4.000 employees in Europe, Africa and Middle East.

The group can count on an installed capacity of 11, 5 GW: energy comes from a combined cycle gas power plant, hydroelectric plants, wind, solar and biomass plants. In addition, Edison is willing to improve its engagement in renewable sources, investing either in Italy or abroad. The company key priorities are to consolidate international infrastructures aiming at improving storage capacity in Italy and exploring new businesses.

1.4 Segmentation Matrix

In "*The segmentation matrix", tab 1.2*, it has been summarized what stated till now; each utility is in fact, segmented according to the criteria described before: geographic presence, type service and property. This, aims at creating an overview of the utility

industry and at defining how companies differentiate in terms of operational choices in Italy .

It can be noticed that the majority of Italian utilities are present also outside the nation; this is due to the fact that business dimension is an important aspect to care about. In addition, all of them can be classified as multi or bi-utilities as under multiples services, several advantages lay down, and they are public limited companies.

	Geographic presence	Type of Service	Property
ACEA Spa	• Italy(Lazio,Toscana, Umbria, Campania)	• Water • Electric Energy • Gas • Environment	• Public Limited Company
A2A	• Europe(Italy, England, Spain, Greece and Montenegro)	• Electric Energy • Gas • Environment	• Public Limited Company
EDISON	• Europe • Africa • Middle East	• Electric Energy • Gas	• Public Limited Company
ENEL	• Europe • North America • South America • Africa	• Electric Energy • Gas	• Public Limited Company
ENI	• Europe • Asia and Oceania • Africa • America	• Oil • Electric energy • Gas • Lubricant	• Public Limited Company
SORGENIA	• Mostly Italy	• Electric Energy • Gas	• Private

Table 1.2- Segmentation Matrix

Chapter 2. Natural Gas

For a long period of time, natural gas sector was characterized by highly vertically integrated companies and a monopoly condition. Only in the latest years, the deregulation process has occurred and free competition has been achieved in a way that the main players are now free to compete and customers are allowed to select by themselves their own providers. At this regard, in fact, three different markets can be depicted: the open market addresses to all consumers who can opt for the most advantageous commercial offers coming from multiples sales companies; the protected market which includes only domestic customers and condominiums, dedicated to residential use, with annual consumption below 200.000 smc; and the default service which is activated by the distributor after end users remain with no gas providers. This is due to some particular events.

2.1 Supply Side

The chain of production of natural gas incorporates the whole production cycle which moves from gas generation / provision which happens often abroad, to final distribution and sale to end users.

In Italy, natural gas industry is organized in three main phases:

- Gas provision;
- Network infrastructure;
- Marketing.

2.1.1 Gas Provision

Provision mainly refers to the importation of natural gas; this happens through contracts with operators outside Italy which own gas fields. However gas provision can takes place in two different manners.

Production consists in extracting gas from underground; it is a deregulated activity and the main player in the sector is Eni SpA (90,04%).

Importation is the injection of gas produced abroad (Algeria, Russia, Holland, North of Africa) in the Italian market. Importation is deregulated and Eni(64,1%), Enel (14,6%) and Edison (9,5%) are the main players.

2.1.2 Network Infrastructure

Network infrastructure includes storage, shipment and distribution activities.

1. Storage: unlike energy, gas can be stored when its quantity results to be more than the one consumed. This activity is still regulated and its main operator is Stogit SpA;
2. Shipment: gas shipment is made through gas pipelines or thanks to carriers where gas is liquefied and kept in the liquid state at low temperatures. The primary Italian methane pipeline network stretches for approximately 30.000 km and it is presented broadly in the national territory with the exception of Sardinia. Snam owns the 96% of the network while few operators own local networks, especially in Marche, Abruzzo and Molise.
3. Distribution*:* it consists in transferring natural gas through local pipelines till the end consumer. As well as storage, also distribution is regulated. There exist approximately 560 distribution companies, among them Italgas S.p.A and Enel Gas Distribuzione.

2.1.3 Marketing

Selling gas to end user is an activity free from regulation. Consequently the sector is highly competitive with over 300 enterprises.

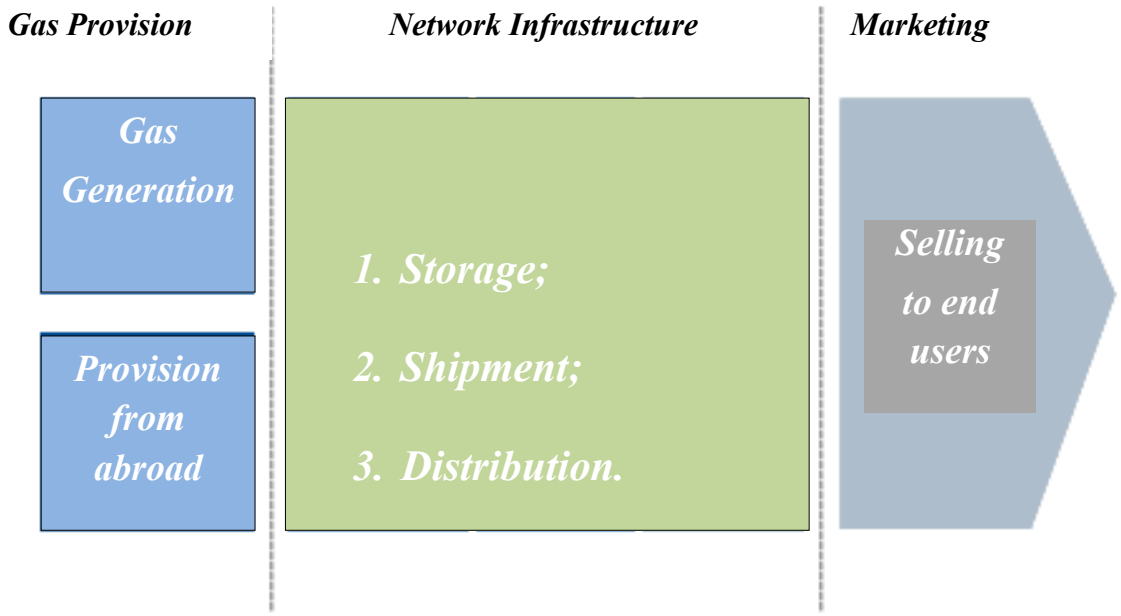


Fig 2.1- Chain of Production

Chapter 3. Electric Energy

Electric energy sector is going through a transformation phase; what was a regulated industry is now becoming a competitive one. In the past, power generation was a highly vertically integrated sector where investors used to own many of the stages of the chain of production from generation to distribution and sale. Nowadays, however, many new companies are slowly taking part into the industry by starting to produce and market wholesale and retail electric power. Electricity is an essential service that, due to its unique characteristics, requires specific moves from regulators since it is not a tangible good and it cannot be stocked, stored or transfer if not when it is consumed.

By the time it cannot be easily stocked and delivery is practically instantaneous, companies have to deal with two difficulties:

- To find the right balance between the quantities demanded and the one supplied. At this regard, as it is not possible to establish the due amount in advance, coordinators are required;
- To transfer electricity from the production area to the one where it is consumed. In this case it is required a shared infrastructure which imposes limitations in quantity.

3.1 Demand Side

As it is shown in the *figure 1*, electricity demand can be segmented in four main sectors: agriculture, factories, tertiary and domestics. At this regard, factories and tertiary sector are the ones which dominate and cover together approximately 75% global Italian demand, agriculture counts only for 2% while domestics have a moderate impact on demand, equal to 22%.

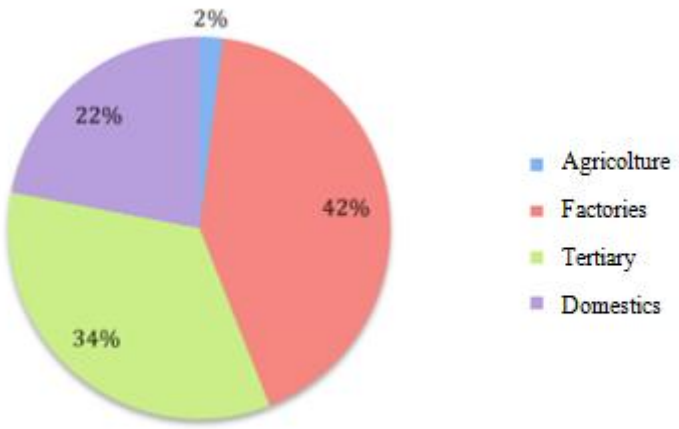
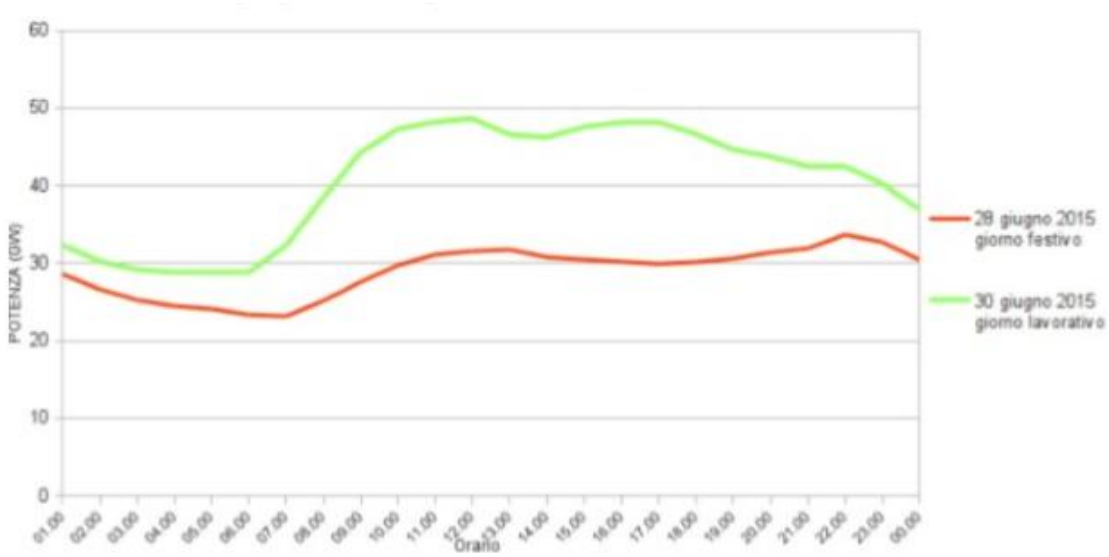


Fig 3.1- Electricity Demand Per Sector

It is to say however, that electricity demand is not constant over time but it exhibits fluctuations not only during the year but also within weeks and hours of the day. At this regard, it is possible to detect peaks in consumption in which quantity demanded is above the average. More specifically, the *graph 3.2* shows how volume needed per day differs based on hour and day of analysis (working days and public holidays are considered): during the day and working days electricity demand increases. This is due to the fact that offices, shops and factories are open; vice-versa, demand for energy decreases in the evening and in public holidays when economic activities slow down.

Those differences have unavoidable repercussions for the price of energy. However, despite what it looks like, electricity demand is characterized by low elasticity since there are no real substitutes available.

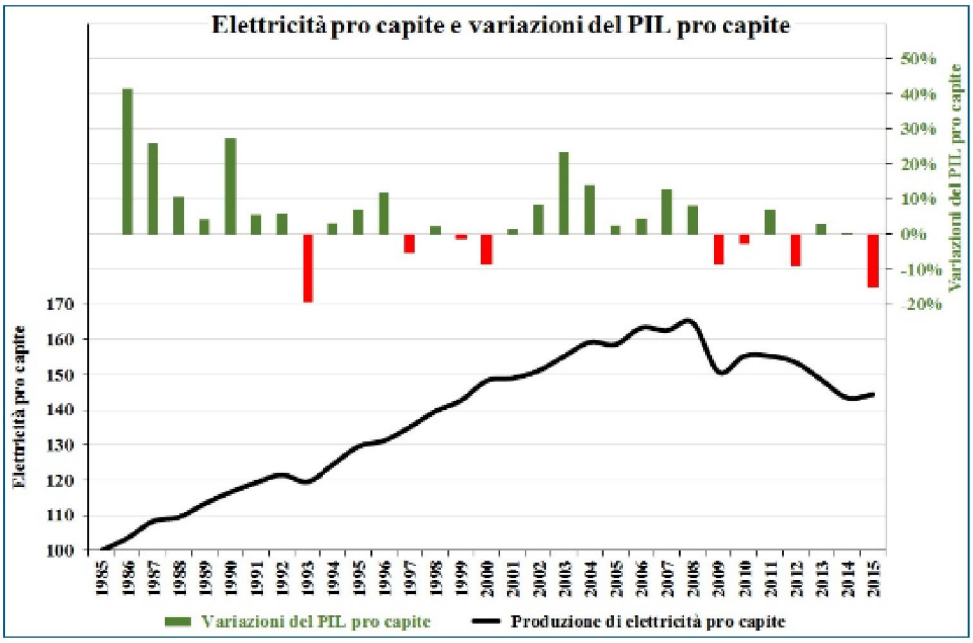


Graph 3.2 -Demand Variation Over Time

Factors that mainly drive fluctuation in electricity demand are economic, industrial aspects and weather conditions. For instance, during summer season, rises in temperature, positively lead to an increase in the request for energy by consumers who are luckily to enhance electricity devices deployment.

With regard to economic and industrial aspects, instead, it has been detected a strong correlation between GDP and electric demand. At this regard it can be carried out as an example the crisis of 2008 when, Lehman Brothers, one of the most powerful banks in New York was forced to declare bankruptcy. The financial crisis turned to an economic and industrial crisis and since national electric demand depends primarily on those activities, the electric power industry was impacted as well.

Therefore under a reduction in the electric demand may lay an economic downturn. Demand and GDP, however, do not move together but the latter develops at lower rates. *The Graph 3.3* shows the trend of GDP and Electricity per capita for a period of 30 years from 1985 to 2015. It can be verified that to a significant drop in the electric production there is an unequal match in the GDP.



Graph 3.3- Electricity and GDP Variation Per Capita

3.2 Supply Side

The chain of production describes the main activities necessary to turn the raw material into the end service. An interconnected power system in fact, is a complex infrastructure that may be subdivided into the following major subsystems:

- Generation;
- Transmission and sub-transmission system;
- Distribution & Metering system;
- Retail & Market.

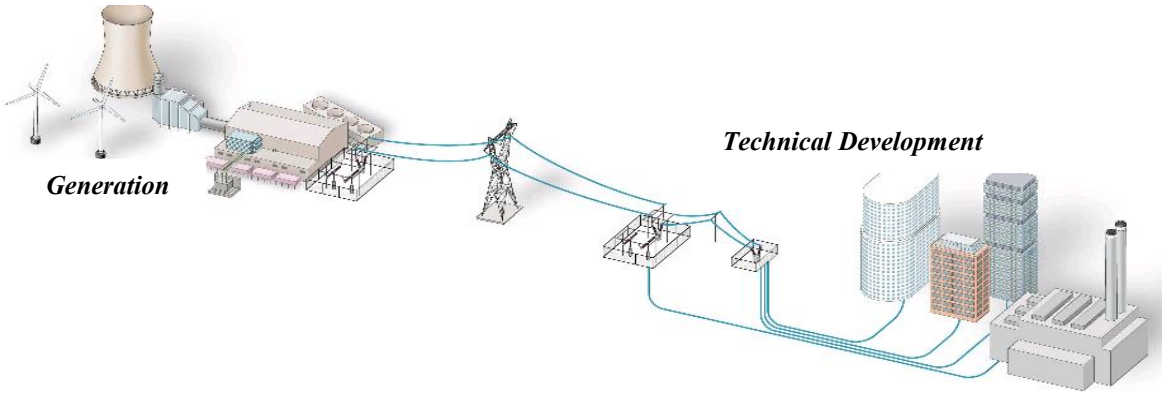


Fig. 3.4 - Chain of Production

3.3.1 Generation

There are two ways to obtain electric energy: it can either be acquired from other entities or generated by companies themselves through a mix of generation technologies such as hydro plants, thermal plants or renewable energy sources (wind, thermal solar, biomass, wave and tidal power etc). Under the choice of a mix of generation technologies, economic reasons have to be included first; different technologies offer in fact, different combinations of fixed and variable costs. In addition, also strategic, political and environmental reasons can be detected. For instance different generation technologies impact in a very diverse ways on the environment.

3.3.2 Transmission & Distribution

Once energy is generated, it must be transferred, thanks to the electric grid, to end-users who may be located long way from the plant. As a consequence, the electric power travels at extra high-voltage (EHV,380-220kV) and high voltage (HV,150-132kV) in the transmission network in order to reduce energy losses along the journey.

Distribution network, instead, regards the endpoint of the chain of production where electric power travels at medium and low voltage in order to reach consumers or end-users. A primary objective of all distribution networks is therefore, to maintain a very

high level of continuity of service (absence of interruptions) and, in case it is not possible, to minimize the duration of the interruptions. Multiples are the events that lead to voltage dips or overvoltage: for instance natural events like, lightning ,wind or ice and, physical accidents as, faults resulting from vehicles hitting pole, may be the causes of several damages. Despite the fact that considerable effort is made to minimize damage possibilities, the elimination of such problem is not yet achievable.

3.3.3 Dispatching

As electric power is not available to be stored, distribution, production and transmission require high coordination. This role of coordinator is assigned to TERNA who manages the all process and verifies that the system is balanced. For this reason, dispatching is the heart of the chain of production: it ensures that the power generated is maintained in constant equilibrium with power consumed/ demanded , otherwise a power deviation occurs. In order to control power equilibrium in-real time, the production system must have enough flexibility in changing generation level. In addition it must be able instantly to handle both changes in demand and interruption in generation and transmission which should not be perceived by network users.

Chapter 4. Electricity Market

In Italy, the electricity market, which refers both to the electric energy and the balancing market, has encountered a period of significant transformations both in its structure and its legislation: what was a state monopoly has, in fact turned into an open market. This change from an electricity industry with one vertically integrated monopolist to an open market (deregulated and with competitive activities) has been phased in steps.

The final outcome is however, an industry where three different situations coexist: the open market, the protected market where energy provision is ensured according to ARERA prices and the safeguarded market which address firms with no energy suppliers.

4.1 Liberalization Process

The deregulation process can be split into three main phases.

In the first phase, in 1999, production, importation and selling activities have been deregulated. Since July 2004, the second phase, only non-household users have been able to deal with a deregulated market and to be free to decide which utilities provider to be supplied from, according to the most advantageous commercial offer.

In June 2007, the third phase, the deregulation process was fully completed, and freedom of choice was given to any user (end-user).

The impact on the industry was massive; what was a monopolistic condition turned into an open market where different strategies regarding prices and services coexisted. In addition, since then, distributors and sellers integrated in the same corporate group(either gas or energy) have no longer been allowed to adopt the same trademarks and have been forced to "unbundle" communication policies and commercial activities in order to encourage competition and transparency.

To go more into details, from a legislative point of view, the deregulation process regards three main legislative degree:

I. “Decreto Bersani”;
II. "Decreto D'Alema";
III. "Decreto Marzano".

4.1.1“Decreto Bersani”

The issuing of n 79/99 legislative decree, marks the begging of the deregulation process. The legislative decree, "Decreto Bersani", has in fact, led to the liberalization of the whole chain, from production to sale and distribution, with the exception of transmission and dispatching, activities in which there still exists a natural monopoly and regulation is still required. Regulation is, by definition, the direct or the indirect control by the Government over the behaviour of private or public enterprises and occurs when government believes that operators would behave in a way that is contrary to the government's objectives. The overall goal of a regulatory function is therefore, to improve welfare, that is the aggregate benefit provided to consumers and operators including externalities.

With regard to demand, "Decreto Bersani" recognizes two end consumers: the eligible-clients, who are willing to conclude supply agreements with any producer, distributor or trader indistinctly, and non eligible-clients, whose freedom of choice is very limited since they are forced to conclude supply agreements only with the distributor operating in their territorial scope.

4.1.2 "Decreto D'Alema"

In order to favor the open market a new decree, "Decreto D'Alema"(July 29th, 1999), has split Enel into three companies: Elettrogen (acquired by Endesa), Interpower (acquired by Acea) and Eurogen (acquired by Edison).

4.1.3"Decreto Marzano"

The third step in the liberalization process comes with law nr. 239 in 2004; with " Decreto Marzano", a complete deregulated market was established and since the first day of July 2007, every end-users have been considered eligible customers.

With "Decreto Marzano", also competences in terms of energy safety ,and environmental issues have been settled. In particular plain carbon was promoted, and electric energy, generated from renewable sources, was raised in the amount.

Fig 4.1- Liberalization Process

4.2 Electric Stock Exchange

The wholesale trading for electricity takes place through the Italian Power Exchange (IPEX) where the price of electricity is established and there is the match between what is demanded and supplied.

The exchange proceeds as follow: producers are free to sell the energy generated to “eligible customers” or to traders. Traders can either use the energy acquired directly or resell it to “eligible customers”, the latter case is more common. The mechanism that drives the IPEX is on auction and aims at creating a concurrent market where not only all consumers are protected but also the possibility of black-outs is minimized.

4.2.1 Electricity Market

As it is described in *fig 4.2*, electricity market can be split into the day-ahead market (MGP) and the intra-day market(MI). MGP opens nine days before the day ahead to which offers are made for and closes every day at 9.00. Until that time, participants set a quantity and a price for which they are willing to sell/buy. Once there is a match between the quantity and the price proposed , the offer is accepted and valued at PUN(Unique National Price). The MGP is also a useful driver to define the feeding in of electricity into the network and the off-take of electricity.

In the (MI) instead , traders have the possibility to modify their purchase or sale agreements with respect to the ones of the day-ahead market. After MGP is concluded and results have been disclosed, MI session takes place by 10.30 to 14:00. Both the markets are based on an auction's system , so contractual arrangements do not happen continuously and GME acts as a key player. However, unlike MGP, in the latter the offers are valued at the zonal price.

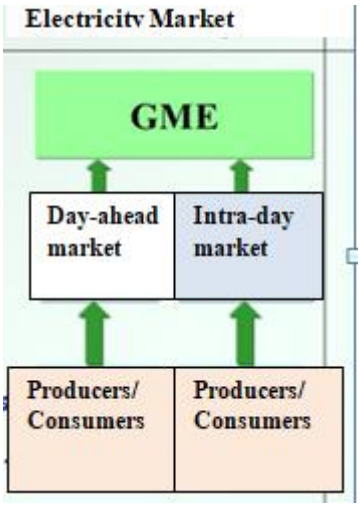


Fig 4.2 - Electricity Market

4.2.2 Balancing Market

Thanks to the balancing market (MSD) TERNA S.p.A is able to manage and control the whole system either in term of cross-zonal congestion, stocks and real-time balancing. This is why TERNA S.p.A plays the main role.

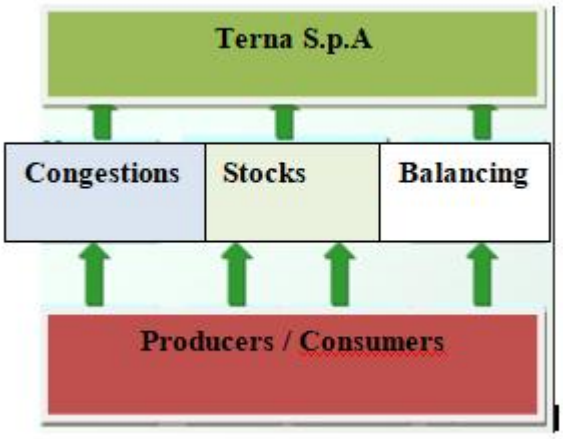


Fig 4.3 - Balancing Market

4.3 Main Actors

In this section, the focus will be given to the main players of the electricity industry.

- **ARERA**– Authority for electricity, gas and the environment: ARERA is an independent entity with 5 commissioners, established as a result of the legislation n 481, 14 November 1995 and fully operational since April 23, 1997; regulation and controlling of electricity, gas sectors and the environment are among its duties. More precisely the authority is obliged to ensure that the objectives of the legislation n 481 are met:

    1. service must be homogeneous and therefore, it must be spread and accessible;
    2. a "stable, transparent and without uncertainties" tariff system has to be defined;
    3. promotion of competition (where possible) and consumer protection must be favoured;

- **GSE -** Electric Services Operator: the transmission system operator is mainly responsible for the promotion, encouragement and development of the use of energy from renewable sources in Italy; till November 2005, GSE was known as GRTN and transmission and dispatching (activities now belonging to Terna S.p.A) were among its duties. Nowadays GSE ensures economic assistance to operators that exploit renewable sources since those sources are still too expensive to have a wide diffusion. With no financial support, therefore, they would remain unused.

  AU and GME are under GSE control.

- **AU -** Single Buyer: the single buyer has to ensure the provision of electric energy to the captive customers; it supplies energy to domestic customers and small-size businesses which are still in the protected regime. AU does not only ensure that the network is safe and reliable, but it concludes sales agreements with distributors in order to apply one tariff to captive customers, according to directives of authority for electricity and Gas. For instance AU can directly buys electric energy on IPEX, through auction.

- **GME -** Electric Market Operator: GME is responsible for the organization and management of electric market in Italy; it ensures, in fact, transparency and equity in the transactions. The aims is to encourage competition with regard to production and sale but also to promote a maximum level of efficiency with regard to dispatching of electric energy. Going more into details, day- ahead, intra-day, dispatching and forward market are all under GME' s control.

- **AGCM -** Antitrust Authority: AGCM is also known as Antitrust Authority; it is an Independent Authority established in October 1990. The primary AGCM

mention is to preserve competition by favouring affordable prices, improvements in the service and by protecting consumers.

- **TERNA:** Terna S.p.A manages the high voltage national transmission network in Italy, owning more than 98% of the whole national electric infrastructure. Since transmission and dispatching are the activities that go among his duties, Terna is engaged 365 days per year, 24 for 7, in ensuring that the energy demanded and offered are balanced.

4.4 Financial Analysis

In Italy, Enel and Edison are the main operators, counting for 88,4 TWh and 11,8 TWh (Report, 2016), respectably. It is to say however, that the latter suffered from a loss in sales of approximately 5 KWh with respect to 2015. This is due to the fact that Edison experienced a fall in its portfolio of clients (several non-domestic clients ceased their contracts). It is to underline instead, how Enel still owns a sustainable competitive advantage and remains the leader in the sector. This is mostly due to path dependency, customer loyalty and brand awareness that Enel has acquired since 1962. As first mover in the energy industry, its historical background can boast over 50 years of knowledge in Italy and this is one of the reasons for the trust that it has gained from its customers. Eni, the third group in the market, marks out a condition that is almost stable and its sales fall in a range between 5 and 15TWh, together with Hera, Axpo Group, Acea, Gala, A2A, E.On , Metaenergia and Sorgenia.

From the energy production side, 36.8% of the whole net generation comes from renewable sources; more precisely for Enel, it amounts to 39%, for Edison to 15.8 % and for operators falling between 5-15 TWh, it is approximately 14.7%.

To go more into details, tab shows the contribution of the main groups in the last two years: with the exception of Enel and Axpo whose market share has slightly decreased, the other operators experienced an increase in their market shares. In particular Edison and A2A are the ones that have registered the most significant growth: Edison contribution moved from 6.4% to 7.7 % while A2A's shifted from 3,1 % to 5,2 %; the reasons beyond the latter improvements are linked to the acquisition of Edipower by the group.

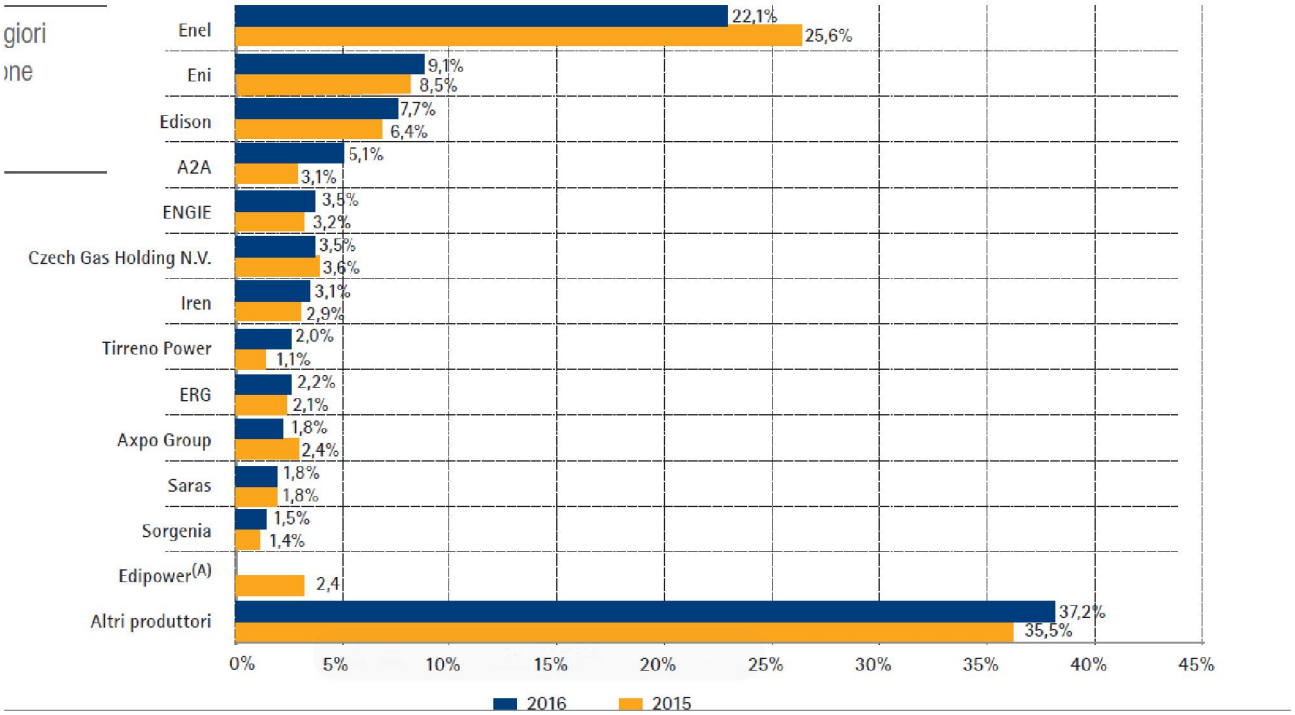


Fig 4.4 - Financial Analysis

The Herfindahal-Hirschman (HHI) index (year 2016) regarding the gross generation, underlines a fall in 2016. It, in fact, counts for 718, with respect to the one of 2015 which was 831.

Chapter 5. Rate Regulation

Price negotiation has been impacted by the liberalization process as well. At this regard, nowadays, eligible customers have the possibility to negotiate the price related to energy generation through bilateral contracts with wholesales and producers or through exchange contracts on IPEX. At the same time, captive end users are subjected to a unique price imposed by the Authority of Energy and Gas, this price normally varies every three months. In addition, distributors are free to offer different types of tariff options to their clients. Fixed and variable quotas allocation (the first independent from consumption, the latter changing with consumption), time frames of consumption, ways of payment, meter and invoicing are some of the parameters in which distributor is allowed to define multiple tariff options. However, regulators have to deal with two important tasks related to tariff, "the revenue requirement", that is how much revenue a utility is allowed to earn during the next award period and the rate structure that lead to the required revenue, for instance the prices to be charged to different end users. As a consequence, electricity tariff should be able to guarantee recovery of the total regulated cost for each activity.

5.1 Cost Typologies

As price for electricity must cover all the cost items related to energy provision, the overall price can be obtained by the summation of several components which remain the same both for captive end users and for eligible customers: Variable, fixed and power costs.

5.1.1 Variable Costs

Variable costs depend from the quantity of energy consumed and are expressed in euro/kWh. They include energy costs, charges for the dispatching of energy, transmission, distribution and metering costs , systems charges and taxes.

Furthermore, variable costs can be differentiated according to three time-frames:

- The first time frame (F1) is valid from Monday to Friday, from 8.00 to 19.00, National public holidays are not included;
- The second frame (F2) is active from Monday to Friday, from 7.00 to 8.00 and 19.00 to 23:00, National public holidays are not included;
- F3 instead, covers all the hours of the day of Sunday and National public holidays and the time intervals that go from 00.00 to 7.00 and 23.00 to 24.00, from Monday to Saturday. To carry out an example, in a protection regime, consumption for domestic clients is split in F1 and F23, the latter covers both F2 and F3 (19.00 to 8.00 of the working days, all Saturdays, Sundays and National Public holidays).

5.1.2 Fixed Costs

Fixed costs are the portion of price (euro/year), which has to be paid indistinctly only for the fact that the point of delivery is active, no consumption is required. Therefore they are paid for each POD that includes transmission distribution and metering costs and system charges.

5.1.3 Power Costs

Power costs, which include transmission, distribution and metering costs, are the amount to be paid proportionally to the installed load, and are determined also if there is no quantity consumed. The price is expressed in euro/KW/month and, as it happens for fixed costs, the annual price is applied to bills according to pro-quota month or die. For

instance if the installed load is 3 KW and unit price is 0.5500 euro/kW/month, the monthly fee for a consumer will count for 3 x 0.5500 = 1.65 euro.

5.2 Price Composition

More generally electricity bill is structured according to four main components:

- Energy price;
- Network service;
- General System;
- Taxes;

As it is figured in the *fig 5.1*, most of the expenses come from energy costs; network service and general system charges have almost the same impact on the average price while taxes represent only a small component.

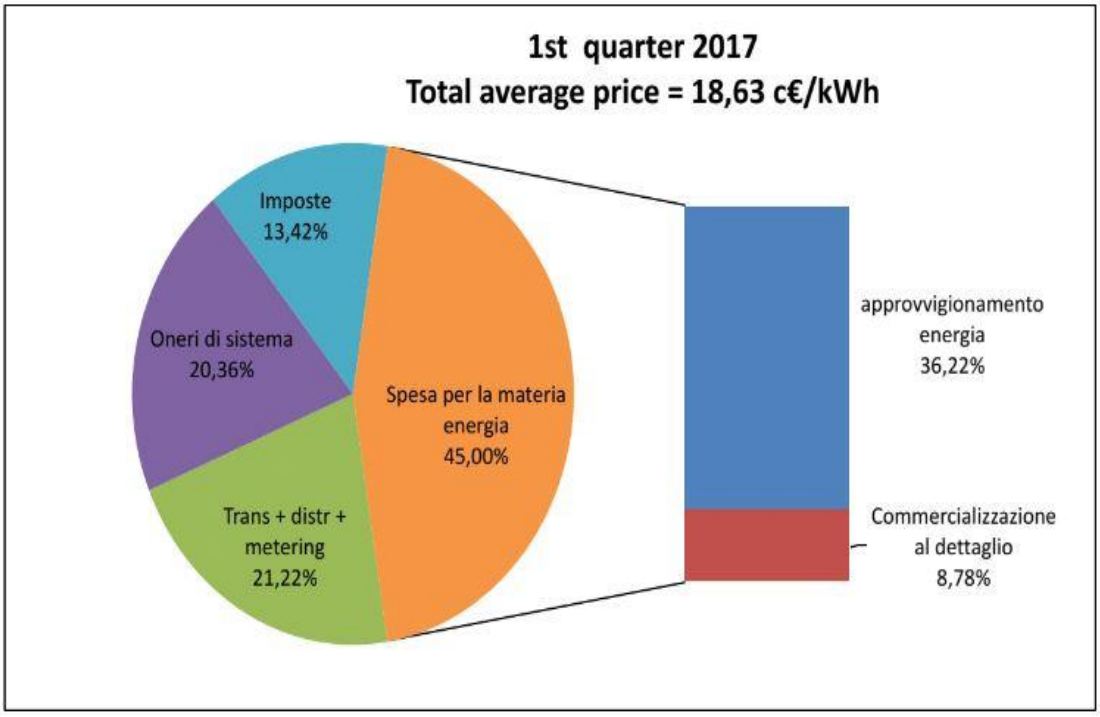


Fig 5.1 - Price Composition

5.2.1 Energy Price

By definition, price for raw energy concerns all the activities carried out by the seller in order to provide energy to end users. Therefore, the overall price results from the sum of the above components:

- Energy (PE) is equal to the cost incurred in order to acquire electric energy, the one that is then, re-sold to the end users. PE, therefore takes into account not only the energy consumed but also network losses. In addition, whether the meter is designed for, the price can vary according to different time frames or be unique for all the time intervals;
- Dispatching (PD) covers the costs necessary to ensure that energy being fed into and out the grid is continuous balanced ;
- Equalization (PPE) ensures that what is paid by consumers in a protective regime is what is truly sustained by their providers. For the above reason PPE can have either a positive sign (when costs incurred are less than the one estimated) or a negative sign (when costs incurred overcome the ones estimated);
- Commercialization (PCV) is equal to fixed costs resulting, mostly, from marketing activities ;
- DispBT.

5.2.2 Network charges

Network charges include transportation, distribution and metering costs plus UC3 and UC6 components. The structure of network charges is trinomial as there exists a fixed quota per PCC, a power quota per power used and a variable quota for withdrawal energy; the weight of the three parts, however, varies with the voltage level and the connection parameters.

5.2.3 General system charges

General system charges comprise amounts which were invoiced in order to cover activities of general interest for the electricity system and, as a consequence, they are paid by all the end users, indistinctly. The overall price incorporates the following components: A2 (nuclear decomm.), A3 (renewable sources), A4 (Ferrovie dello stato), A5(R&D), AE (Energy intensive support), AS (fuel poverty), UC4(small island), UC7 (energy efficiency), and MCT. They are almost all, applied with a variable structure, approximately 95% ,with the exception of A2, A3, A5 which are variable and fixed.

It is to say however, that by 2018, general system charges will vary in their structure and be made only by two components: ARIM and ASOS.

5.2.4 Taxes

IVA and consumption taxes (excise taxes) are part of this field. Exercise taxes are applied to the energy quantity that is consumed; for instance domestic consumers with a power below or equal to 3 KW have same benefits.

IVA instead is applied to the total amount in the bill. For domestic users IVA is equal to 10% while for non-domestic customers is by far 22%.

Chapter 6. External Analysis

6.1 Porter five forces

In order to have a complete overview of the whole utility industry, it is necessary to apply the Porter's Five Forces Analysis; it is a business analysis tool which, based on five main competitive forces, helps defining an industry structure; that is its weaknesses and strengths, the level of competitiveness, attractiveness and profitability margins. According to Porter, in fact, firms must be considered as part of a value chain that links it to upstream suppliers and downstream customers, and as part of a competitive context made of current and prospective rival companies. In this scenario, when a utility is able to perform better than its competitors, it will benefit from higher contribution margins and profits, and it will probably gain a competitive advantage with respect to rival firms. Moreover if a utility will succeed in avoiding imitation by competitors and keep this lead over time, competitive advantage will be said to be sustainable.

Porter five forces are reported as follow:

- Threat of New Entrants;
- Power of Suppliers;
- Power of Buyers;
- Availability of Substitutes;
- Competitive Rivalry.

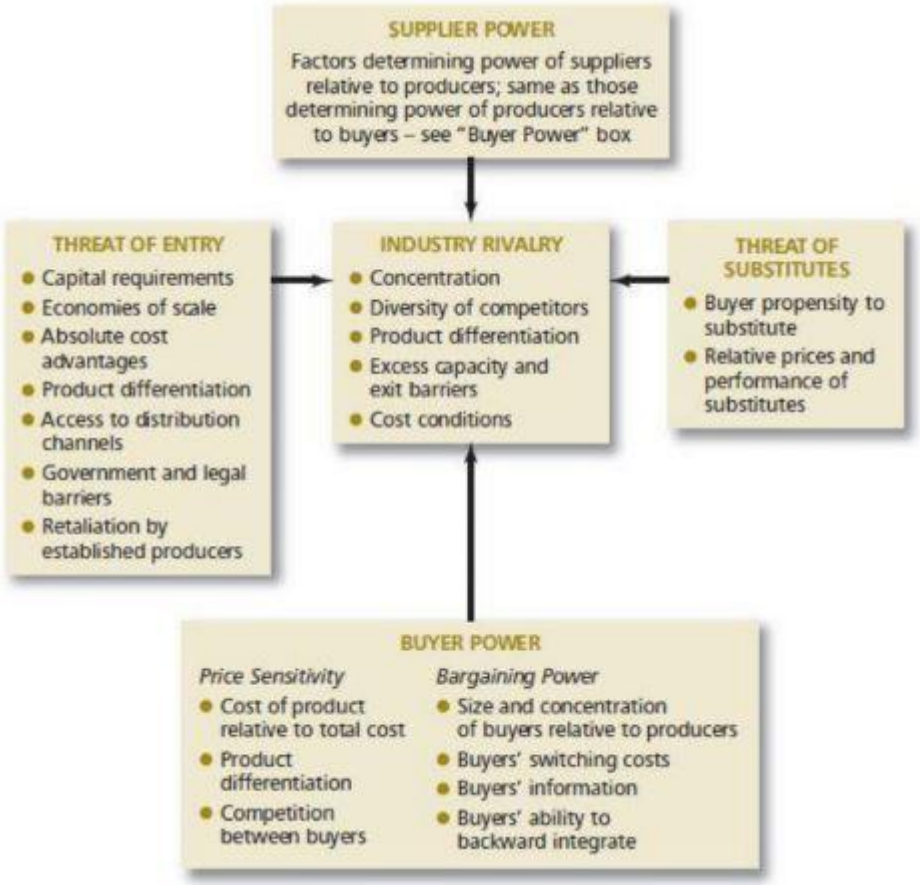


Fig 6.1- Porter Five Forces Framework

6.1.1 Threat of New Entrants

Threat of new entrants is reckoned as medium- low: new utilities, willing to enter into the market, have to face very high barriers which include regulatory approval and capital expenditure. At this regard, it is to say that utilities are dealing with a high capital intensive industry and hence, it demands huge investments. A newcomer, who wants to enter in the industry as generator in fact, incurs in high fixed costs, mostly due to the opening of new plants and their maintenances, and a big upfront capital requirement. In addition, obtaining regulatory approvals still remain the major bottlenecks.

Those conditions become weaker if a newcomer is willing to enter into the market only to offer the final service to the end- user: in this scenario in fact, competition is rapidly increasing. However, brand name recognition and customer loyalties are still relevant

obstacles that new entrants have to overcome, since trust and popularity are aspects very difficult to build.

In the electricity sector, for instance, Enel almost acts as a monopolist thanks to its circle of clients that the company has collected through years. The competitive advantage that Enel has gained also leads to more economy of scale and to an easier access to channels of distribution for the company. In line with this strategy, incumbents may also play retaliation, offering very advantageous tariffs, concentrating on marketing activities and limiting the access to channels of distribution.

6.1.2 Power of Suppliers

Power of Suppliers can be defined as moderate- high, especially with regard to utilities generators: suppliers are very small in numbers and have a significant control over generation companies. They in fact, partially dictate the price. It is to say however, that the intensity of this force has to do with vertical integration; the most vertical integrated utilities, either upstream or downstream, are more luckily to benefit of this power.

6.1.3 Power of Buyers

After deregulation, buyers (the end-users) have acquired a medium high power in the utilities industry over time; this power is today, still increasing. In fact, since utilities are now free to offer diversified commercial offers, also consumers have no constraints in opting for the more advantageous ones. At this regard, it is important to remind that, public utilities provide services that are commodities where competition is still based on price and not on product differentiation.

In addition, end users have no switching costs and therefore if price increase they can decide to opt for a different provider**.**

6.1.4 Availability of Substitutes

As utilities are dealing with services that result as commodities, no substitute products are available. Despite the fact that the end products, for instance electricity or gas, remain the same and demand is almost inelastic, growing alternatives in terms of generations can be observed. Along those alternatives, governments are moving significant incentives in order to obtain energy from renewable sources which are widely available and environmental friendly. It is to say however, that in Italy, they are not as diffused yet.

At the same time, industrial groups are starting new programs to develop small generators in order to allow users to bypass traditional power grids or to limit the use of the grid when prices rise too much over time.

6.1.5 Competitive Rivalry

After deregulation, utility industry is becoming highly competitive and rivalry among companies is getting increasingly fierce.

Several new companies, especially in the latest stage of the chain of production, are in fact, entering into the market and as a consequence, utilities are forced to fight for market shares mostly through price reduction in order to have economy of scale. It is clear that this strategy has a negative impact on the industry as it tends to drive its profitability down.

In addition, since the end products are commodities, competitors try to differentiate, offering value-added services or customized products.

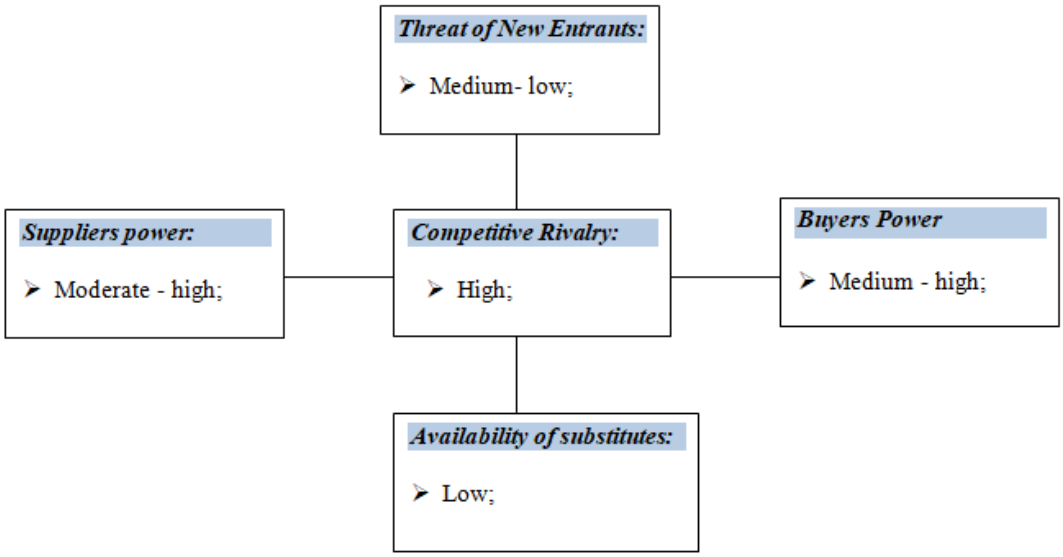


Fig 6.2 - Porter Five Forces Analysis

6.2 Key Success Factors

This part helps to understand the KSFs that a global utility operator should accomplish in order to gain and sustain a competitive advantage. Then, it is possible to evaluate if the firm can compete in the industry in a profitable way but, it all starts from an "Analysis of the Demand" and an "Analysis of Competition" as in *Fig. 6.3*.

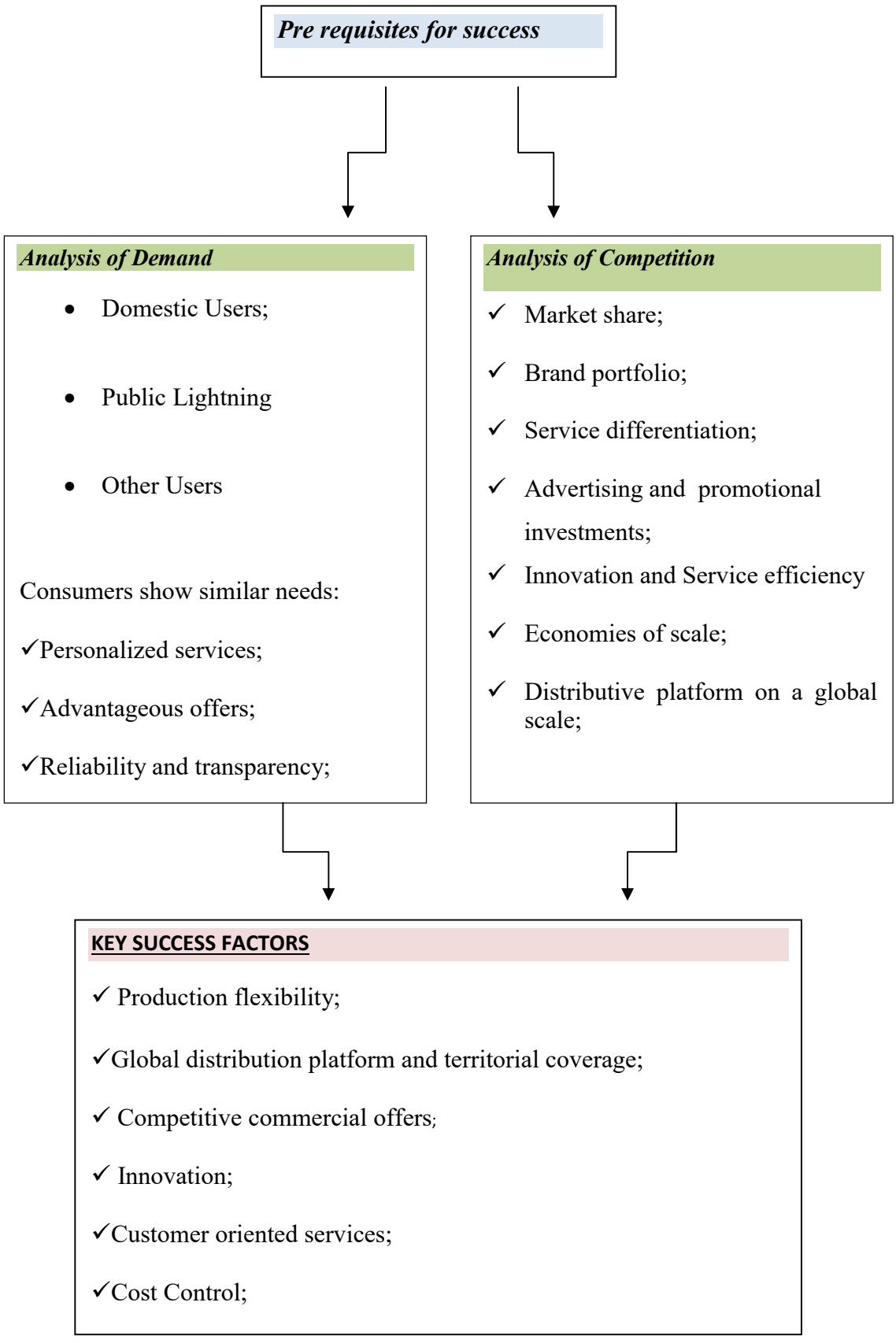


Fig. 6.3 - Key Success Factors

Focusing more on key success factors:

- **Production flexibility:** this feature describes the attitude of a firm to be adaptable to changes in the way the service is generated; for instance, energy can

be obtained in several ways. Being flexible in production, gives firms an advantage in case of quick changes in the environment in order to answer speedily to the new trends of the market.

- **Global distribution platform and territorial coverage**: a solid logistics platform represents a key competitive advantage in supporting the business model based on the strategy to be present worldwide. In order to do that, alliances or collaboration with local firms can be useful, in particular to overcome what can be defined as regulatory barriers.
- **Competitive commercial offers:** consumers seek for convenience; they both want high quality and affordable services. To charge also a convenient price, process innovation and cost control become far more important.
- **Innovation:** innovation can better differentiate services from others and this, puts customers, in a condition where they can either reinforce their loyalty to a brand or to switch to a more valuable one.
- **Customer oriented service**: a good customer service is one of the most important aspects, an enterprise can count on. This is due to the fact that it puts the enterprise in direct contact with its customers; the aim is to try to satisfy the latter in the best manner. In details, an efficient customer-oriented service may include: large and expert sales forces, team managers dedicated to assist the main distribution chains, multi-language call centres to manage customers, customized services by using specialized software, storing data and creating as much as possible accurate customer profiles to further customize the service (Big Data).
- **Cost control**: cost control is essential for firms; it is surely linked to the exploitation of economies of scale and geographical dimension of the company.

Chapter 7. Internal Analysis

As previous stated, in the last decades, utilities are going through a deep transformation process. All those changes are paving the way to growth and development opportunities either with regard to innovative ways to produce and offer services and to enlarge the territorial scope over the national boundaries.

The type of services provided by companies remains an important aspect to be considered in order to analyze the strategic choices of public utilities. Those services, as they represent a social and an economic issue, are subject to the public interest: society itself, in fact, requires a service that is continuous, equal in terms of treatment and high flexible. Utilities are, therefore, obliged to keep up with advances in technology that often lead to industry disruption and to stand through the latest needs of a society that is continuously reshaping itself. Obligation to operate in continuity, according to regulations and capacity, obligation to carry a service that is available to everyone, and tariff obligations are some of the main factors that impact internally on company's strategy. Regulatory and commercial choices, in particular, affect the capacity to create revenues and, by extension, financial and operational applications. As a consequence, utilities strategic choices are strictly dependent from rules and authorities decisions which concern all the main areas (price, quality, etc.) where producers are willing to differentiate. To make the situation worse, national, local and community rules are most luckily to overlap and companies are forced to adopt a strategy in an uncertain and constantly evolving environment. As well as regulations, three main aspects can impact on utilities internal strategic decisions:

- Network Infrastructures;
- Environmental Challenges;
- Globalization and New Players.

7.1 Network Infrastructure

Network infrastructure plays a key role in companies strategic decisions, since it has an impact on management, financial and social aspects. At this regard, for instance, it is necessary to take into account all the main phases of the supply chain linked to gas distribution. Transportation network, storage, distribution and sales activities are interconnected thanks to network infrastructures, most commonly gas pipelines, which require maintenance and specific operations; the same can be said for electric, water and telecommunication sectors, plus railway and motorway networks. What is clearly evident, is that all those services are available thanks to the existence of a solid infrastructure.

It is, therefore, a primary interest to enable everyone who is willing to provide a service, to access to the network according to the third party access. Third party access policies require in fact that "owners of natural monopoly infrastructure facilities to grant access to those facilities to parties other than their own customers, usually competitors in the provision of commercial relevant services, on commercial terms comparable to those that would apply in a competitive market".

With regard to network infrastructure, it can be reckoned a transition phase where a vision purely based on a physic prospective is turning to be a more technology oriented one, with the aim to satisfy demand and its needs. Growth in competitions requires in fact, the introduction of flexible technologies that are able to immediately satisfy customers' needs and adapt to their constant evolution: the strategic choice is now to shape the offer based on customers' segmentation criteria.

In this scenario, ICT has a central role as, it supports development strategies in terms of network management and remote control, data and information processed and used not only in relation to the infrastructure but to the single customer as well.

Smart electronic meters, diffused by Enel, can be carried as an example: they allow collecting punctual and individual data on energy, the quantity consumed by clients, as well as they offer the possibility to apply differentiated commercial offers based on consumption bands.

As *fig 7.1* underlines, technology development process is not linear, but it is subjected to phases of evolutionary and revolutionary progresses.

More specifically, an evolutionary progress can be described through a given s-curve, while revolutionary progress will be experienced by the utility industry only when an innovation determines a transition from an old s-curve to a new one.

In order to understand how an S-curves works, some examples can be carried out with regard to metering systems. As show, when traditional metering systems have emerged, performances were usually quite low, until a sufficient degree of maturity has been reached. At this point, their performances have started to increase at a significant speed, until a technological limit has been incurred. By the time it was no possible to overcome several limitations, which were intrinsic to the technology itself, firms who wanted to improve their products had to embrace new technical solutions. In this case, a shift from one curve to another occurs.

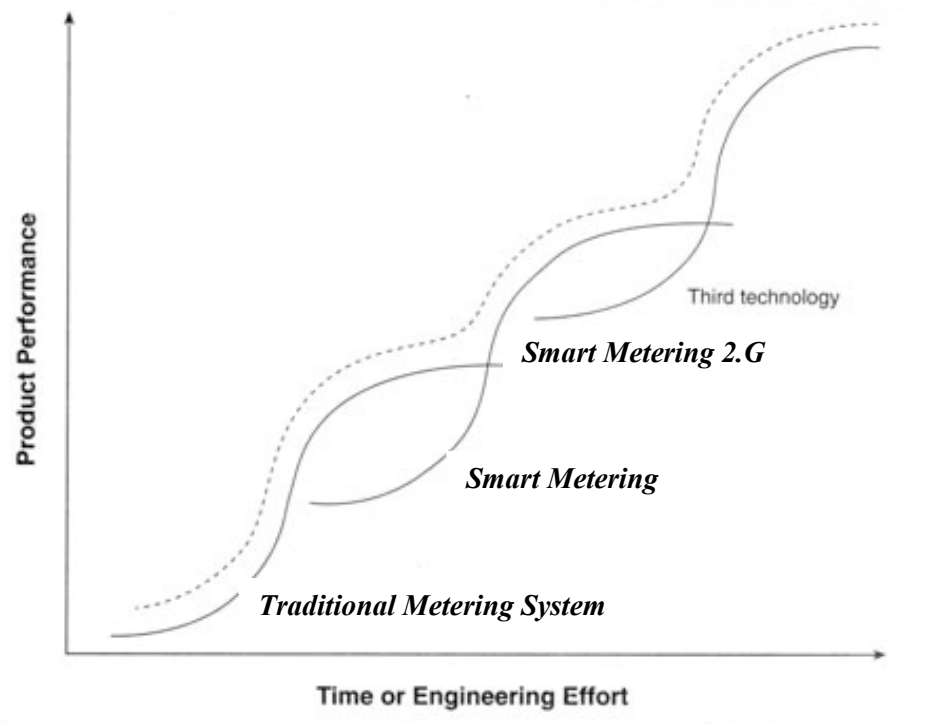


Fig 7.1 - Technology Roadmap

To sum up, technologies diffusion impacts on the whole industry as follow:

- the natural monopoly is nowadays coming to an end as it is becoming easier to enter into the market at least in some phases of the chain of production (for instance, sale activity);
- production processes as well as services offered to consumers are changing;
- what is offered is becoming more differentiated.

7.3 Environmental challenges

Strategy regards environmental issues as well; in the latest years in fact, society is becoming more concern about environment and how utilities operations have a negative impact on it. Since nowadays adopting technologies that limit emissions and pollution is inevitable, companies are considerably conditioned in their operational choices.

For instance, in the sewage sector, high long-term investments are required in order to reduce the use of landfill sites; moreover, devoting more attention to recycling and

district heating is increasing in popularity as they promote energy saving measures and reduce deliveries of polluted gas in the atmosphere.

7.4 Globalization and new players

Globalization is the last element that affects business strategies: following the liberalization of the industry, in fact, companies and investors have the opportunity to penetrate in foreign markets, overcoming their national boundaries. In this scenario, utilities are more willing to increase their sizes and acquire an international connotation. Globalization however brings more competitions and new threats: big companies can conduct a more aggressive strategy and since they are supported by greater available funds, they may cause small utilities bankruptcy.

In Italy, globalization, on one side, has straightened established companies while, on the other, it has favored newcomers such as E.On, British Gas, Edf, Suez, Edesa.

Chapter 8. Utilities Strategic Choices

In order to face threats of newcomers and measure up to foreign multinationals, utilities can counts on several options.

More specifically, in order to gain the first mover advantage in what nowadays can be considered as a disruptive industry, companies can adopt mainly two strategies:

- in case of companies who perceive a high capability to predict future trends, but a low capability to influence them, strategy takes the form of planning;
- in case of companies who perceive both a high capability to predict future trends and a high capability to influence them, strategy takes the form of vision.

With this scenario in mind, utilities have signed a number of alliances and agreements as they are reckoned as primary ways to overcome internal barriers, especially related to know-how and lack of competences, to gain new customers and increase utilities portion of market share.

In fact, either in Italy or abroad, acquisitions and alliances are employed to implement the development strategies reported above:

- pursuing only financial opportunities;
- integrating Upstream and downstream;
- developing synergies;
- diversification strategies.

8.1 Acquisitions

The acquisition becomes very common as strategy mostly in the first phase of liberalization, when big operators seek for fast growth opportunities. In this scenario in fact, being a first mover is considered a crucial element in order to exploit all the opportunities offered by liberalization and, at the same time, to face all its threats.

Utilities focus is therefore, more oriented on gaining a solid base of customers through acquisitions, just before liberalization mechanism is completed. This prospective explains the significant number of acquisitions that have characterized, primary, the energy sector: large companies, in particular, the former national monopolists, on one hand, own significant financial resources, on the other hand, they have no need to seek for alliances, at least in the domestic market. For these utilities, in fact, it is not strategically remarkable to search for financial partners as they are able to self-finance their high value activities.

To carry on an example, several firms in Sweden, United Kingdom and Austria have been acquired by E.On (German energy company). In addition, the Spanish Endesa and the French Edf have invested in Latin America.

With regard to acquisitions, two main targets can be presented:

- acquisition of companies operating in the same sector but in foreign countries;
- acquisition of companies operating in different sectors.

It is to say that the first type of acquisition aims at internationally expanding the business while the second is more built on a diversification strategy. The two strategies mainly differ as, in the latest one, acquisitions are made not only with the intention of a fast growth but also in order to acquire know-how and new competences.

Enel can be reckoned as a classic example since it has made acquisitions both abroad and, at a domestic level but in a different sector (gas company).

Nevertheless, it is remarkable to say that acquisitions come with some criticalities.

First of all acquisitions are characterized by a complex process that involves significant transaction costs. The process usually entails four steps. At first, the acquirer must scout for target firms that might have the desired competencies and be open to be acquired. Then, it must perform technical and business due diligence to estimate the true value of the target firm, under the dual perspective of a collection of technological assets and of an ongoing business. Finally, it must negotiate the terms of the acquisition and integrate the acquired firm.

Integration means blending the two organizations together in a way that they perform as a single entity; it implies therefore, that the organizational routines which define both companies will have to be modified so that the acquiring firm can fully benefit from new competencies. Because of path dependency, the integration process is complex and may yield uncertain outcomes, especially when the acquired company is large. In this case in fact, the new organization will have to deal with considerable inertia coming from both organizations, thus potentially impairing the potential synergies or delaying them significantly. Moreover, integration may fail if resource retention strategies are not correctly defined and key employees of the acquired firm, either because of uncertainty, or because they don't like the idea of working for the new firm, decide to leave.

For the above reasons, the post-acquisition phase is crucial: the main utilities have to focus on the assets they have acquired and have to develop ad-hoc business models which can overcome integration issues.

Positive effects on utility performances, are therefore, conditional on companies ability to fulfill the integration process both in reference to assets related to production

(shared infrastructures and common services) and assets dealing with marketing (customer base, trademark, brand).

8.2 Alliances

As utilities industry is characterized by high dynamism, fierce competition and an international prospective, alliances are acting as a strategic method in order to reach the critical mass for growth and competiveness, to cope with high investments and to easily acquire the know-how and new competences which, by the time liberalization has occurred, are becoming necessary.

Liberalization in fact, requires a larger business size which is a necessary condition in order to survive in a highly competitive market; local utilities are therefore, concentrating around the largest operators in the sector, especially with regard to the energy sector: Hera, for instance has aggregated several utilities around SeaBo, while AEM and AMSA in Milan and ASM in Brescia are part of A2A Spa. Hence, local utilities are increasingly aware of the need to overcome the disadvantages, coming from small business dimensions, and of the necessity to cooperate on financial resources, productive assets and marketing activities.

Public utilities of larger dimensions are, as a consequence, aggregating smaller operators around themselves in a way to create local business networks. Those actors in fact, play the role of strategic centers with regard to new local business networks.

8.2.1 Alliance typologies for local utilities

According to what are local utilities main objectives, several types of alliances can be presented:

- alliances aiming at improving economy of scale and expanding the territorial scope; local utilities operating in neighboring areas fall in this scenario, as their

overall goal is company size growth through the enlargement into new geographic areas;

- alliances aiming at acquiring know how and complementary competences; those are necessary conditions for achieving economy of learning and differentiation. At this regard, local utilities seek for new technical and commercial skills which cannot be developed internally; those skills have therefore, to be found in industrialized specialized partners. Alliances between local utilities and ICT organizations are included in this category;
- alliances aiming at sharing risks and financial investments. They usually occur when an increase in production capacity is required;
- alliances aiming at vertical integrating or at creating stable and more advantageous conditions to run the business. This strategy falls in between the total integration process, which is characterized by the acquisition, and the mere contractual relationship that normally exists between customers and suppliers.

  Several are the benefits to local utilities as they are now allowed to access to their partners' know-how and competences and to have a competitive advantage during provision phase.

8.2.2 Alliances Downsides

Corporate ventures, joint ventures and non-equity based strategic alliances, have however, their downsides. First of all, when utilities are bounded by contractual and not institutional linkages, the outcome of the relationship will depend on the strength that the contract has in specifying and directing the actions to be taken by each party. Unfortunately, contracts are known by economists to be incomplete and difficult to enforce. This provides room for opportunistic behavior and free riding, thus leading to poor results. Free-riding means that one party exerts less effort than it should, in the

expectation that some other party will compensate for this behavior. The greater the number of participants, the greater will be the incentive to free-ride and therefore the likelihood that it might occur.

Secondly, in corporate ventures, the investee could also risk to turn into a captive supplier to the focal firm, thus reducing the returns to its other shareholders.

To conclude, partnerships are not that easy to manage, partially because they are substantially new activities in the utility sector. Lack of a common strategic vision, organizational barriers and too different business models can lead to failure in ventures. Moreover, political and social issues are other factors which must be equally taken into account. Local utilities are, actually, responsible to handle collective interests and it is up to supervisory authorities to ensure that local utilities act according to proper behaviors.

Chapter 9. Utilities Business Models

In order to fit in the current scenario, utilities have to build their business models around two majors components:

- Digitalization;
- Green Economy.

This paragraph is made therefore, in order to deepen some aspects and topics which have been repeatedly mentioned in the previous chapters, due to the importance they have in the evolutionary process of the industry. However, in order to create a new business model, it is important to take into account first, what can be considered as a " Blue Ocean".

9.1 Blue Ocean Strategy

Blue ocean strategy is an approach coming from Kim and Mauborgne's book in 2005, where two kinds of markets are defined: the red ocean and the blue ocean.

The red ocean represents the "current industries , competition and boundaries"; in this market in fact, rules are well-defined and competitors strive to gain market share of the existing demand between the rivals. As a consequence, by the time this market gets crowded, the likelihood of making profits falls dramatically.

Blue ocean instead, aims at making competition relevant by tapping into a completely new market space in a way that the organizations focus is now to add value to buyers and thus, to open an uncontested market space.

In order to start to build their own business model, utilities should therefore, address the path formulation plan described above:

- look for alternative industries;
- look for strategic groups;

- look across a chain of buyers;
- look across complementary product and service offerings;
- look at the functional-emotional orientation of an industry;
- look across time.

9.1.1 Look for alternative industries

It is to say that companies usually compete not only with other firms in their own industry but also with companies that produce alternative products or service. As previous stated, utilities offer services that have mainly no substitutes but that can differ in the way in which they are generated. Microturbines or fuel cells for instance, could overcome traditional systems or restrict the use when prices are too high. More specifically, nuclear power, ethanol, solar and wind power are the main substitutes for oil and gas energy. It is to say, however, that alternative forms of energy have, to this point, proven to be an uneconomic substitute; they are less efficient and more expensive (or, in the case of nuclear power, completely restricted from expanding) than fossil fuels. As a consequence, utilities should address more effort on improving the current methods and seek for new alternatives to generate energy.

9.1.2 Look for strategic groups

Strategic groups are group of companies within the utility industry that pursue a similar strategy. Those groups can commonly be classified according to two dimensions: price and performance. Once a jump in price occurs, often a jump in some dimensions of performance may follow. In order to create a blue ocean it is important to understand which factors influence customers' decision to trade up or down from one group to another. Since utilities offer a service which can be classified as a commodity,

performances do not really differentiate and consumers are often oriented on strategic groups that are applying a more convenient price.

9.1.3 Look across a chain of buyers

To build a blue ocean strategy, utilities have to focus on the chain of buyers who are directly and indirectly involved in the buying decision and more specifically, how new value can be unlocked shifting the attention from one target group to another. Utilities address their services mostly to three target groups: domestic and non domestic users, public lightning, and other uses. Each of them has to be treated in a different way; this is due to the fact that to different target groups correspond different needs and opportunities.

9.1.4 Look across complementary product and service offerings

Unexploited value often lays inside complementary services and products offered by utilities. In order to find out what buyers seek for in terms of complementarities, utilities should consider all the issues and aspects related to the service they offer, before, during and also after its use.

9.1.5 Look at the functional-emotional orientation of an industry

Competition in an industry tends to converge either on emotional or functional appeal; while emotional appeal is based on emotional utility a buyer receives in the consumption of the service, the latest refers to functional utility buyers receive. Therefore, once public utilities understand in which of the two the market is mainly oriented, they can either start to compete on emotional appeal by stripping functional elements or compete on functionality by adding emotional elements. With regards to utilities, it is to say that when consumers buy the service companies offer, they are more luckily to be interest in its functionality. For instance time of delivery, safety and

continuity in the service are attributes that could be improved in order to guarantee a better function.

9.1.6 Look across time

In every industry, trends have a significant role in shaping strategies and future goals; by looking across time in fact, from a value the utility market delivers today to the value it might deliver tomorrow, new blue oceans can be created and public utilities can better shape their future.

9.2 Digitalization

Nowadays all sectors are undertaking a digital revolution; in order to favor the "Digital Disruption" in the utility industry, it is necessary to shape strategies, to change business paradigms and to address the digital culture. At this regard in fact, society at large, has changed their buying behaviors and brand-new needs have emerged.

Utilities decision to focus their business around smart devices comes therefore, from several impositions which depict the current situation in the Italian territory.

As a result, these types of innovation can be classified as demand pull. In this case in fact, firms, observe the demand for improved products that comes from the market and from society at large, and explicitly direct the development of technologies to respond to these needs. To go more into details, the circumstances that have induced Italian utilities to innovate are multiples and are described as follow:

first of all, it is to say, that Italy has a remarkable past in the energy sector, especially with regard to cutting-edge technologies. Consequently companies are willing to maintain this supremacy;

in addition, in a market in which competition is fast growing thanks to deregulation, distributors, sellers and end-users are always more demanding. For instance sellers are

seeking for a higher volume of metering data in order to be able to differentiate in terms of commercial offers, end-users want personalized contracts, and distributors require advanced devises to be compliant with ARERA.

Those devices are therefore, pulled by technology, market and stakeholders needs.

9.2.1 Smart Metering 2G

Smart metering 2G can be described as a digitalized metering which, thanks to its functionalities, enables utilities to carry out several major operations such as switching of suppliers and inactivation of the service, without having to rely on personnel on the ground. These devices are primary helpful as they collect plenty of information with regard to customers consumption, as they are able to control for network leakages and allow to transfer more info to SII.

Even nowadays, systems of remote have favoured end users, by providing more efficiency in terms of invoicing. At this regard, it is to say in fact, that Italy is reckoned the top country with respect to network efficiency and for the number of remote devices already installed, according to data coming from ARERA. Those technologies, however, date back to 2001 and hence, they need to be substituted with 2G systems in order to keep up with new demand. Unfortunately, smart metering 2G, requires a solid infrastructure and high speed networks linking, all of which Italy have not yet available. In addition, despite the fact that meter 2G would use a wireless or wired connection, ARERA has established the employment of a Power Line Carrier (PLC) communication also with regard to the second generation. Communication is therefore, extended over the power lines between meters, concentrator and grid of the system. In this scenario, devices of first generation perfectly fit in but smart metering 2G installation results to be useless, due to the impossibility to transfer data daily which still remains the main goal of utilities operators. As a consequence, companies, with Governmental support,

have to make several improvements in their infrastructures, given that, this change provides benefits for all the stakeholders (end users, distributor, seller) indistinctly. New meters in fact, would make it possible to:

- improve invoicing phases in terms of frequency in which billings are computed and in terms of accuracy in computation;
- manage data hourly for all points of delivery;
- redefine switching procedures in a more efficient way by accelerating commercial processes;
- introduce prepaid options. In this way, payments are made before consumptions are recorded;
- dispose of more granular data with regard to measures. In this condition, it is possible to develop offers with tariffs that differ within hour.

Smart metering 2g, hence, is proposed to be an instrument able to disrupt the existing industry and to introduce changes not only with regard to metering service but to all the major processes in the sector. In fact, meter readings are estimated at more than 1.200 billion per year with 95% of POD (point of delivery) validated within 24 hours. As it is figured in *the fig 9.1*, actually, data will follow two distinct paths:

- in chain 1, validated data are available to seller within one day;
- in chain 2, non validated data will be immediately available for the end- user that can either monitor its consumption daily and estimate the quantity to be paid.

Those data are far more higher with respect to 1G devices where meter readings count only for 450 million per year. Moreover, one of the most significant changes regards consumption curves as they are now turned to be quart of hours- not only for end users

with power higher than 55KW but for all consumers.

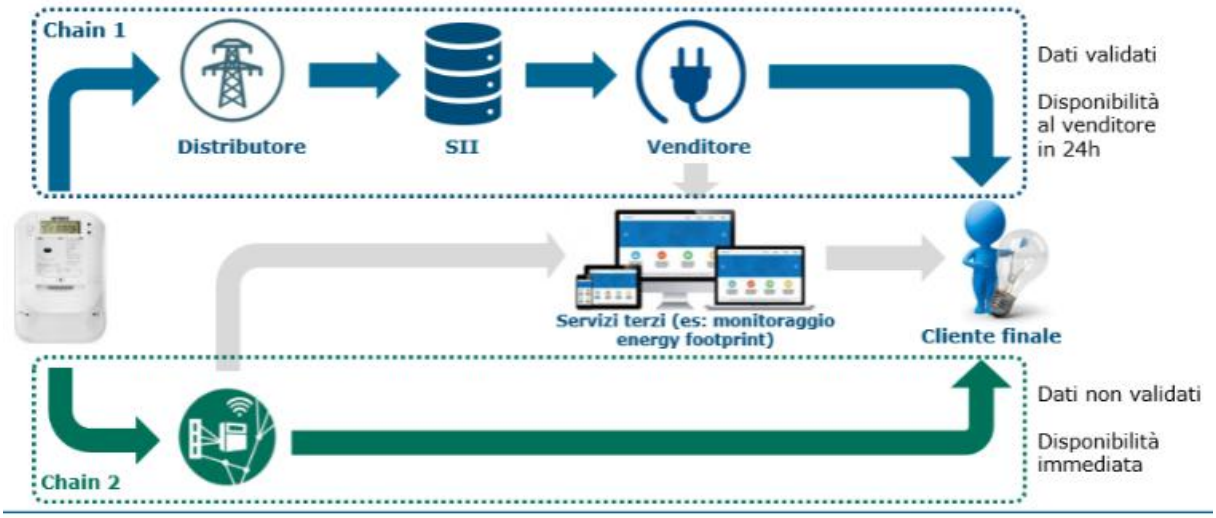


Fig 9.1 - Data Paths

9.2.2 Smart Grid

The current situation in Italy bodes well for the implementation of an energy system perfectly able to satisfy this technology innovation: smart grids. More specifically smart grids are already part of present days but under this intelligent system great potentials lay down, which have not been fully exploited yet. It is important to point out that "smart grid" describes a revolutionary concept of energy infrastructures usage that goes beyond the simple transmission, distribution and employment of energy to the end-user. Smart Grid aims in fact, at integrating through communication systems, all the stakeholders' part of the network in a way to be able to work and handle itself, autonomously: smart house, smart cities and buildings are future features characterized by machine to machine technologies (M&M) which are turning into reality.

To carry out an example, in the town of Benevento (Italy), smart house has just been launched and introduced as "nZEB", the house of the future which is able to produce energy autonomously and to self regulate indoor temperature in relation to the outdoor conditions. Its energy consumption is approximately zero and owns the characteristics

that all the private buildings should have in Italy, by the 31th of December 2020. That is to say, it is build with environmental friendly materials, which ensure thermal insulation either in winter and in summer seasons and high performance windows frames. In addition, as it has been stated, "nZEB" autonomously generates the electric energy needed thanks to solar panels and it is equipped with a geothermal system for heating.

Moreover, "the house of the future" is equipped with the hi-tech systems and internet of things: for instance, household appliances notify about their energy consumptions and a sensor system is able to monitor concentration of pollutants such C02 and then, auto-regulate the vent. It is remarkable to mention how the hi-tech core of the building is a control box connected to a tablet from which householders can manage locks, temperature and lightening from remote. Smart grids appear to be, hence, necessary in order to deal with the challenges that utilities are going through in terms of aging infrastructures, growth in demand and employment of renewable sources. At this regard, for instance, International Energy Agency (IEA) has imposed that in the next ten years to each dollar utilities invest in generation phase, almost a dollar in infrastructure development must be spent

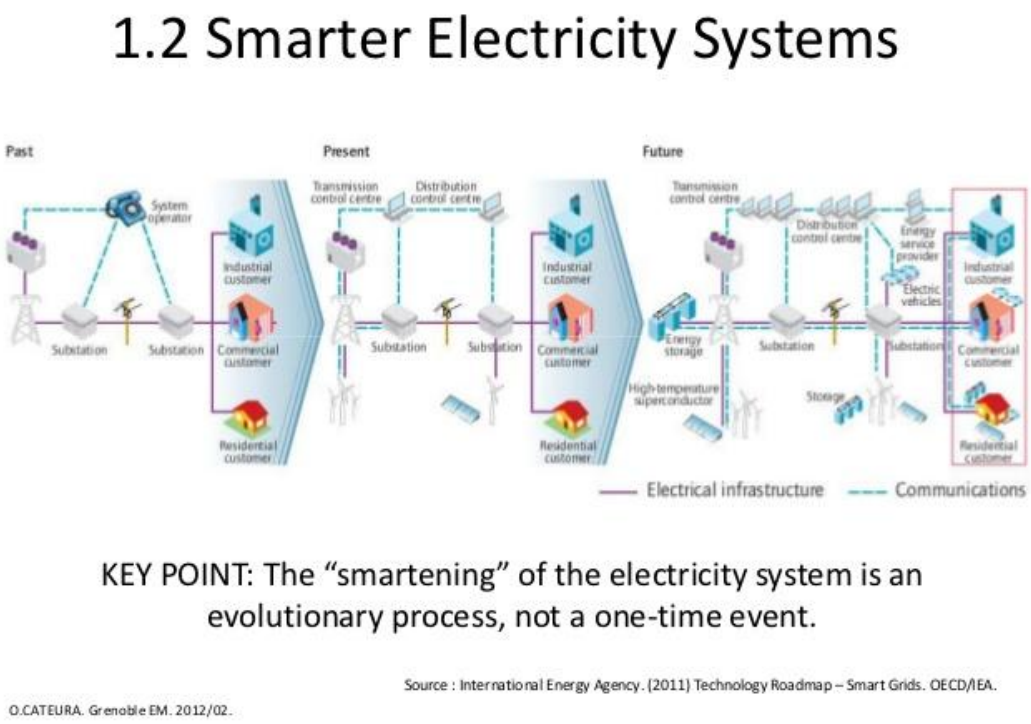


Fig 9.2 - Technology Roadmap

As it is depictured in the *Technology Roadmap,* Smart Grids require several devices to be employed; some of these technologies have been already developed while others are not on the market yet.

- Wide-area monitoring and control aims at supervise in real time components and system performances. It addresses interconnection over large geographical areas;
- advanced operating systems support personnel, with regard to data generation, in taking decisions and increase network reliability;
- Information and communications technologies deal with data transfer;
- Renewable and distributed generation integration marks the transaction from the old traditional model, characterized by a unilateral network, to a distributed energy system in which multiple energy sources and exchange networks are exploited .

Fig 9.3 - Traditional Model vs New Model

- Transmission enhancement application is built in order to control transmission networks and maximize efficiency in terms of energy transfer;
- Distribution grid management aims at improve infrastructure managements. More specifically it permits to reduce black outs and repair times;
- Advanced metering infrastructure (AMI) is crucial as it includes smart metering 2G and its functionalities;
- Electric vehicle charging infrastructure are able to manage ways of payment and recharging with regards to electric vehicles;
- Customer-side system.

9.3 Digitalized Business Models

What result from this scenario is that agility, comfort and demand-supply imbalances management will lead to a disruption; consumers are luckily to turn into "prosumers", taking part actively, to the production process. They in fact, are now aware of their energy consumption each quarter of hour and as a consequence, may require and address commercial offers in accordance to new parameters. Meanwhile, sellers, having now the possibility to access to meters, will be able to compete only if they are willing to adjust their business models in a way to fully exploit these innovations: being

compliant with their clientele requirements and expectations and being able to manage big data without incurring in failures are the first issues that have to be addressed. More in general, all the operators in the chain of production are required to invest in IT systems and infrastructures in order to manage those massive volumes of data generated.

Utilities new business models therefore, must be shaped around the characteristics described as follow.

1. Data centricity: working in the digital era means that massive volumes of data (Big Data) are generated and managed. It is necessary to access to those data in order to improve, reshape and implement companies business.
2. Customer centricity: customers are now becoming used to a new level of service with highly personalized and the most advantageous commercial offers. It is necessary hence, to focus on consumers needs and to offer them the best service experience and quality; velocity, availability of information and easiness of use are the main requirements.
3. Innovation: utilities are required to enlarge their R&D centers and "buy innovation "from the outside world regardless if it happens through patents, know-how or technologies. They must, hence, adopt an open innovation model.
4. Velocity and agility: those aspects require as first, advanced working equipments and secondly, the willingness to be risky and always exploring new paths despite what can turn into a failure .

9.5 Green Economy

"Green Economy" can be defined as a new business model based on sustainability and aimed at reducing environmental pollution; it focuses hence, on the whole society

welfare and not only the one linked to economy. At this regard, more attention is given on how utility activities impact on the environment as natural resources are running out, due to overpopulation and environmental disasters.

Green Economy mostly deals with :

- Energy efficiency;
- Resource efficiency;
- Eco-innovation;
- Renewable sources;

9.5.1 Energy efficiency

Energy efficiency incorporates technologies and processes, that enable a reduction in terms of energy used; as a consequence the overall goal is to cut expenses and to maximize the outflow of resources.

9.5.2 Resource efficiency

Resource efficiency deals with sources and materials consumption. For instance, with regard to materials, waste have to be recycled or disposed without causing damages on the environment and the population.

9.5.3 Eco-Innovation

Eco-Innovation addresses all innovation typologies that aim at reducing environmental impact. Three different innovation typologies can be observed: product which can be designed for the environment, process that aims at preventing pollution and system innovation in which multiple actors are involved such as university R&D centers, government, consumers and suppliers.

9.5.4 Renewable sources

Renewable sources are usually employed in electric energy generation and differ as each source requires a different technique to be implemented in order to generate energy. It is to say that the renewable sector is the most concerned with regard to growth and development

as the advantages observed are not only related to the environment itself; in fact, their usage has an impact on the economy and on price variation.

The future market penetration of a specific energy source is strictly related to how it economically performs: more specifically investment cost, operation and maintenance cost and fuel and generation cost play a significant role in decision making. At this regard, in order to forecast the future development of RES technologies it is necessary to focus on a country-specific situation, as economic conditions of the various technologies vary across the EU. In addition, governments and other authorities have several instruments in their power in order to support RES diffusion among which, feed-in tariffs, feed-in premiums and quota obligations are the more commons in EU.

To go more into details, in order to estimate how RES technologies perform and if they can penetrate in the market, their potentials have to be consider under four circumstances:

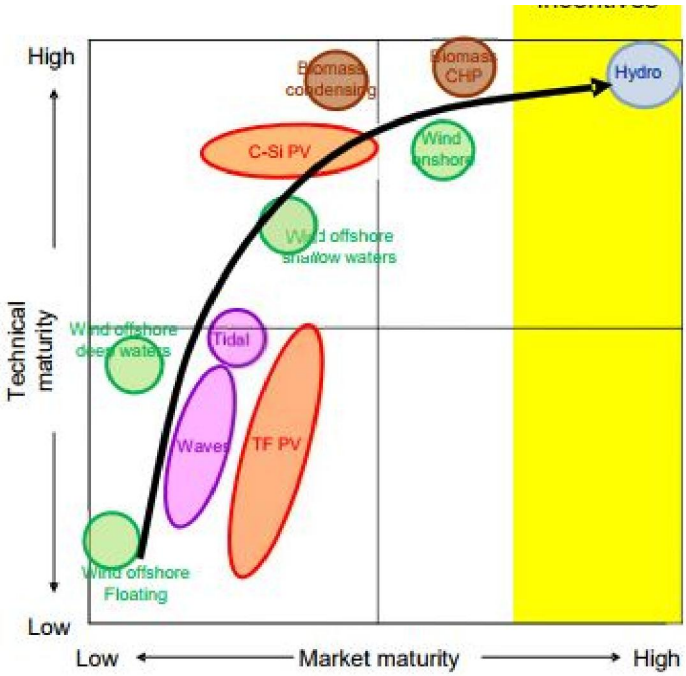
- theoretical potential;
- technical potential;
- realizable potential;
- mid-term potential;

Theoretical potential is more related to physical parameters such as the energy flow resulting from a certain energy resource within the region. It can be seen as the upper limit of what can be produced from a certain RES from a theoretical point-of-view. Technical potentials are nothing more than technical boundary conditions which can

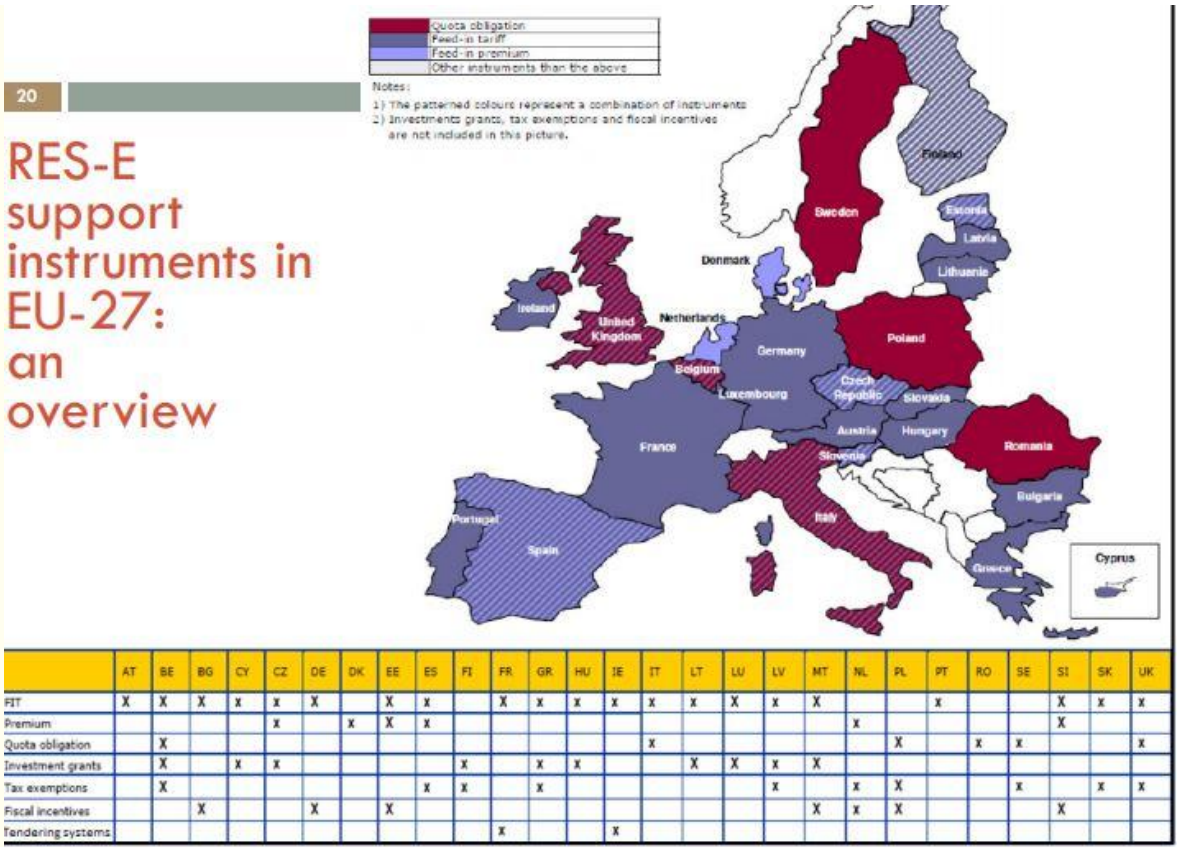
vary according to the context and to the period of time; for instance efficiencies of conversion technologies, overall technical limitations are considered to be technical potentials.

Realizable and mid- term potentials instead represent the maximal achievable potentials assuming that all existing barriers are overcome and all driving forces are active. The latest however, counts for the year 2020.

Against this background, as it is represented in the tab above, it is clear that hydropower has reached both a market and technical maturity. Hydropower in fact, is reported to be the greatest contributor to renewable electricity in the EU, performing 38% of total renewable electricity production. It is to say however, that the relative importance of hydropower suffered from a decrease after 2005, when it still generated 70%. This is due to the fact that wind and solar energy started to develop rapidly over this period : wind accounted for 31 % of renewable electricity while solar energy accounted for 11 % of renewable electricity in 2015, compared with 0.3 % in 2005. One distinction to make regards wind onshore and wind offshore; the first has reached both a technical maturity and market maturity; the latest instead, is still in a premature stage, wind offshore floating for instance does not perform well in terms of innovations and is still premature market.



Graph 9.4 - Renewable Sources Roadmap



	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK
FIT	X	X	X	x	x	X		X	x		X	x	x	x	x	x	X	x	X			x			X	x	x
Premium					x		x	X	x											x					X		
Quota obligation		X													x						X		x	x			x
Investment grants		X		x	x					x		x	x			X	X	x	X								
Tax exemptions		X							x	x		x						x		x	X			x		x	x
Fiscal incentives			X			X		X											X	x	X				X		
Tendering systems											x			x													

Fig 9.5 - RES support instruments in EU: an overview

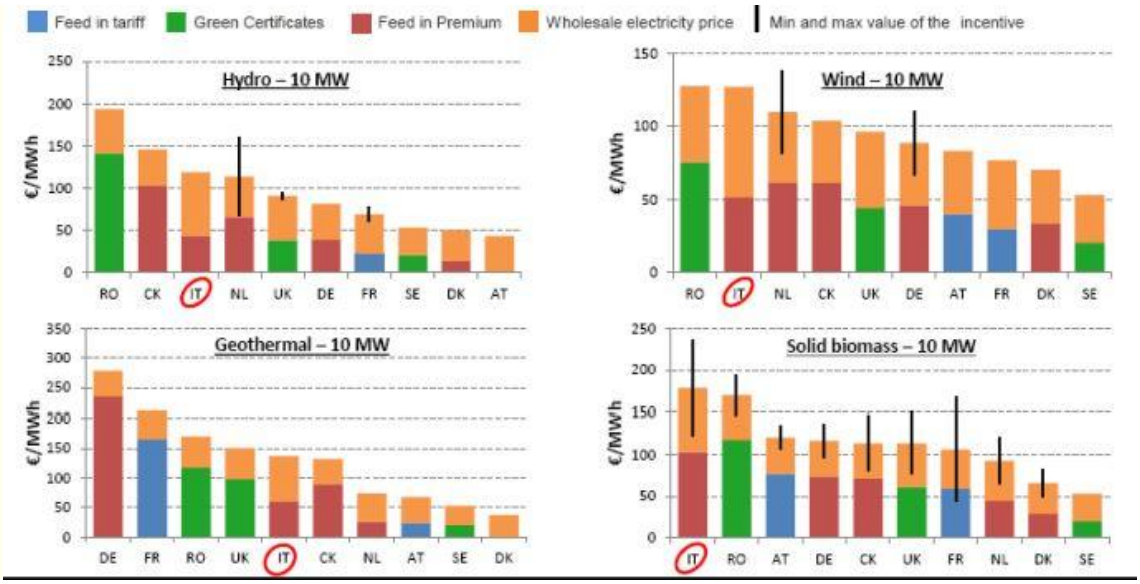


Fig 9.5 - RES support instruments in EU: costs

Chapter 10. Conclusions

As it has been stated in the thesis, utility business models are under threat like never before; in what can be defined a dynamic and disruptive environment, utilities have to adapt to survive and gain a real first-mover advantage. In order to achieve their goals, all new risks have to be taken into account and utilities must take advantage of the opportunities coming from new science and technology. In the latest years in fact, the energy sector experienced turbulences and an unstable market; oil prices as well crashed to 2003 levels, while gas prices globally observed historic lows. To make things worse, oversupply, stagnant electricity demand, commodity price weakness are conditions that leave companies with little prospective of recovering and with no any restructuring plans.

Hence, utilities must be able, to directly deal with the disruptive forces in a way to adapt their portfolios and undertake cost- based refocusing as strategy.

With this scenario in mind, from my point of view, four key priorities can be detected and addressed.

To start with, the balance of capital investment and "blue ocean" markets. The way in which energy is produced is rapidly changing as a result of technology innovation and at the same time a new typology of consumer is taking part in the sector: prosumers who fall in between consumers and professionals. Those shifts can be considered both structural and long term. As a result, if companies do not take action, they could experience traditional revenues shrink. Therefore Utilities are, expected to invest in energy infrastructures approximately trillions of dollars in order to meet future demand and replace retiring assets. This means that risk management across assets life cycle is reckoned as a top priority in order to avoid overruns and delays. To carry out an example, plant closures are situations which occur often nowadays due to weak power

prices and limited budget. Innovation and capital become crucial aspects to be considered if utilities want to take advantage of new opportunities. Also new skills in order to manage IT, distributed resources and customer interaction are required.

Another priority concerns coping with interest rate variations. Interest rate movements are an important task to be taken into account by utilities as companies always go into high debt and are often likely to invest in capital projects. In the past, thanks to low interest rates, utilities did not encounter so many difficulties in financing operations and, at the same time, in paying out dividends. Nowadays, however, this scenario is starting to change: in the US, the Federal Reserve has decided to hike interest rates, nevertheless, rate rise will be slow and gradual; the same can be said for Europe where, in any case, the timetable of rate rise is less obvious. Earnings diversification and low-cost production are essential strategies to be adopted in order to benefit from a market gradually turning into a buyer's oriented one. As a consequence, companies are more aggressively focusing on cost control and capital efficiency. Trying to compete on cost is anyway prevented by the increased cost competitiveness of new technologies, which are likely to impact on capex and asset valuation.

Furthermore, adopting smart and M2M technologies might be another priority to be considered. In the following years what is expected is the enhancement of smart technologies. This is due to the fact that utilities are moving to a business more and more focused on a digital concept. Digitalization will first lead to a reduction in back-office costs, by the time information is delivered online to customers and it will secondly give utilities more chances to differentiate. A revolutionary concept is related to smart grid technologies: they allow to track consumer usage and to connect to smart meters. As a result, energy efficiency is bound to be improved and utilities are more capable to run electricity network. Simultaneously, however, being agile starts to be an

essential requirement that utilities must have if they want to survive in the sector. To give an example, the telecommunication sector is now offering multi services under a single internet-based platform (central heating, home security and energy management). It is clear that smart technologies are causing a disruption in the industry and facilitating the entrance of new competitors, often from outside sectors. At this regard, a shift in mindset is required by incumbents who need to develop interactive relationship with their customers in order to keep up with digitalization.

Finally a necessary priority to keep in mind is focusing on customer engagement and insights as smart technologies are paving their way, also end-users inquisitiveness. Customers in fact, are looking for utilities offering ad hoc services: by the time they have access to more choices in terms of how and when they can use energy, they require a more personalized experience. Therefore the investment in big data analytics needs to be at the forefront of utilities' decision-making. Being aware of what creates value for consumers turns to be critical in order to survive in a vulnerable market.

To conclude, the world evolves at a faster rate with respect to our capacity to understand its dynamics and alterations. Several utilities are not able to forecast future changes before they occur and, as a consequence, are forced to build their business on adaption; with this scenario in mind, only those who are able to predict future trends, will enjoy a competitive advantage and turn into real leaders in its sector.

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