POLITECNICO DI TORINO

Master Degree
in Engineering and Management

Master Degree Thesis

The new core challenges for electric utilities in an increasingly dynamic electric market

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INTRODUCTION

Years ago, nobody would have imagined the incredible benefits attributable to the use of electricity. Nowadays it is an essential good that none of us can do without: we are all more or less consumers of electricity. The most interesting point is that in an increasingly competitive market from consumers we are becoming customers. Electricity from an essential commodity is evolving in a product/service. These profound changes require traditional electric utilities to review their strategic positioning in order to successfully face new challenges and to seize the right opportunities.
With the aim of analyzing the previous issue, the following thesis is mainly structured in the following sections:

- Chapters 1,2,3 offer an interesting overview of the increasingly dynamic energy world, focusing on the last phase of the value chain: the sale of electricity to the final customer. Starting from the analysis of the major macro trends taking place such as a progressive market liberalization, a continuous digitalization, a new kind of energy consumer and the entrance of new players, the main strategies that can be pursued by the electricity utilities in a constantly evolving market are outlined on a theoretical basis. In particular some new potential business models and basic core competences to be developed are explained.
- Chapters 4,5,6,7 expand in a more practical way the theme of the previous section. The focus on the actual strategy of four electric utilities (Enel, Edison, Engie, Sorgenia) in the Italian market is important to reflect on some potential concrete methods to react to a changing market and to remain competitive. These particular companies have been chosen because, with their diversity, well represent the possible different kind of organization:
    - Enel is an historical multinational company symbol of the nationalization of the Italian market;
    - Edison is another historical company acquired by the French incumbent EDF;
    - Engie in Italy belongs to a business unit of the Big French multinational company, whose brand is relatively young and represents the world largest independent utility company;
    - Sorgenia is the first not incumbent company in the Italian free market.
- Chapter 8 provides an interesting comparison of the four electric utilities (Enel, Edison, Engie, Sorgenia) in terms of economic performance, operations and strategy.
- Chapters 9 takes into consideration the English and French market. In particular, an analysis of the most innovative and far ahead players in the energy sector is provided as proof of the international changes and reactions in the electricity market.

1 CHAPTER - "Main trends affecting the electricity retail market"

In this chapter will be analyzed the following three main trends affecting the changing energy market: a progressive liberalization, an increasing digitalization and the growing diffusion of a new type of energy consumer.

1.1 Liberalization of the electricity retail market

1.1.1 Liberalization of the electricity market in Europe

The process of liberalization of energy markets, initiated in some European countries between the end of the 1980s and the beginning of the 1990s through the creation of organized electricity markets, started at Community level with Directive 96/92/EC of the Parliament and the European Council. It aimed at providing the Member States of the Union with a set of common rules in order to promote the creation of a European energy market also through the dissemination of competitive structures in the electricity sector. Italy was among those European states starting a liberalization program.

1.1.2 Italy: path toward the complete liberalization of the electricity market

After the establishment of ENEL (1962), the structure of the Italian electricity system remained unchanged until the beginning of the 1990s, with the distribution of the market illustrated in Figure 1.1.

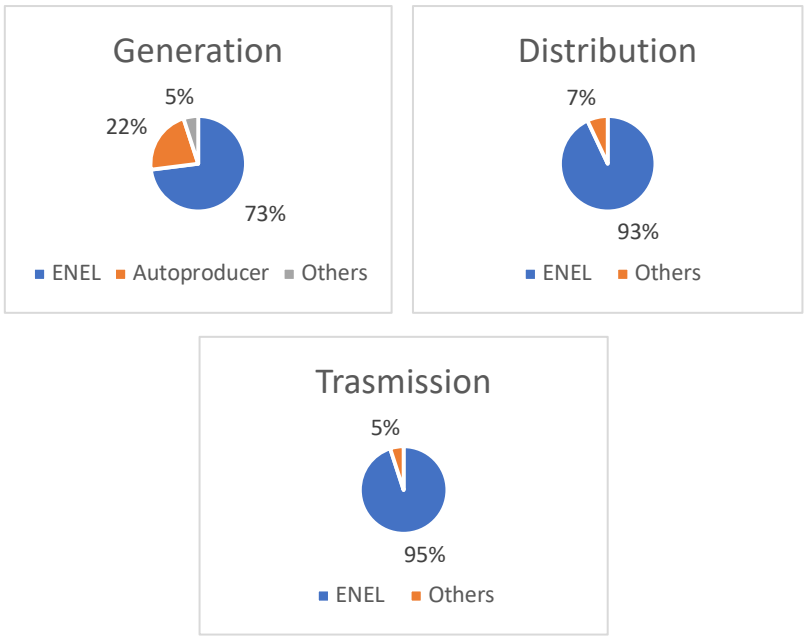


Figure 1.1 - Structure of the Italian electricity system (1962 -1990s)

The first important step from nationalization to a wider liberalization has been the approval in 1999 of the legislative decree 79/99, known as "Decreto Bersani" (transposition of European Directive 96/92/EC). Its main function has been the imposition to ENEL to create independent societies for the generation, transmission, distribution and sales to clients who bought on the market [1].

1.1.2.1 Generation

The legislative decree acted mainly on two points:

1. It imposed a threshold on ENEL's electricity production equal to 50% of the energy produced in Italy;
2. It imposed on the former monopolistic operator the sale of the production capacity to other subjects in order to create electric operators.

The direct consequence has been the progressive reduction of the ENEL weight in the national overall generation as shown in Figure 1.2:

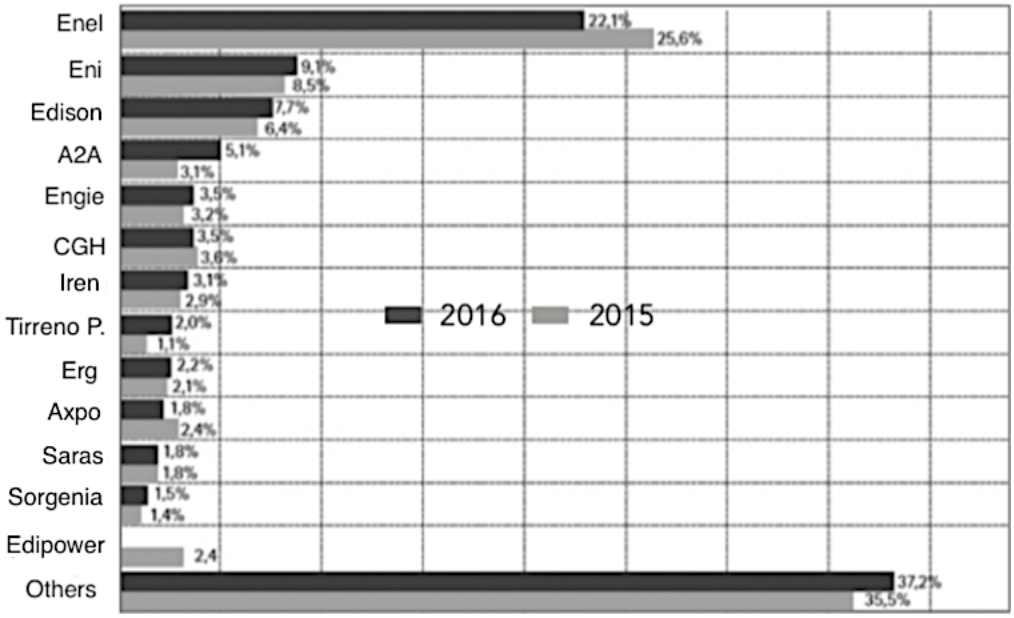


Figure 1.2 - National overall generation (2015-2016)

1.1.2.2 Transmission

The decree established that this phase should be managed under a national monopoly; this because the repeatability of the grid by the various electric producers would have been economically disadvantageous. This brought to the institution of TERNA, completely independent from ENEL since 2004 with the listing of 50% of TERNA's shareholding and on the subsequent sale by ENEL of an additional 13,86% of the share capital held by TERNA to institutional investors.

The tariffs that TERNA requires to provide its service are determined by standards issued by the Authority for the Regulation of Energy Grid and Environment (ARERA).

1.1.2.3 Distribution

The decree gave to this phase the characteristic of a local monopoly: in relation to a geographical area defined by the territory of a municipality there is only one electricity distributor that is responsible for carrying out this service. In theory, any company that meets the requirements could take this service under concession. Distribution tariffs are determined by law.

Figure 1.3 shows the current distribution of electric energy for each distribution society (2016) [2].

OPERATOR	DOMESTIC USERS		NON DOMESTIC USERS		TOTAL USERS	
	DISTRIBUTED ENERGY (GWh)	COLLECTION POINTS (X1000)	DISTRIBUTED ENERGY (GWh)	COLLECTION POINTS (X1000)	DISTRIBUTED ENERGY (GWh)	COLLECTION POINTS (X1000)
e-distribuzione	49.294	25.117	175.607	6.316	224.901	31.433
Unareti	1.711	922	9.306	208	11.016	1.130
Areti	2.765	1.309	7.036	316	9.801	1.625
Ireti	827	552	2.692	136	3.520	689
Edyna	349	170	2.099	63	2.449	233
Inrete Distribuzione Energia	387	199	1.793	62	2.180	261
Set Distribuzione	377	247	1.653	63	2.030	310
Megareti	254	130	1.405	37	1.658	167
Servizi a Rete	112	54	1.020	18	1.132	72
Deval	136	107	722	27	858	134
AcegasApsAmga	227	131	571	32	797	163
ASM Terni	99	52	341	14	440	66
Other operators	813	448	2.758	129	3.570	578
TOTAL	57.351	29.440	207.002	7.420	264.353	36.860

Table 1.1 - Electric energy distribution for each distribution society (2016)

1.1.2.4 Sale

In the period between January 1, 2000 and July 1, 2007 electricity users in Italy were clearly divided in the following two groups:

"Clienti Vincolati": according to the legislative decree n. 79/99, art. 2 c. 7, "*is the end customer who, not falling within the category of eligible customers, is entitled to stipulate supply contracts exclusively with the distributor who exercises the service in the area where the users are located*". These are customers who are not allowed to operate on the free market, but subject to regulated tariffs by ARERA.

"Clienti Idonei": according to the legislative decree n. 79/99, art. 2 c. 6, "*is the natural or legal person who has the capacity, agreed to this decree, to stipulate supply contracts with any manufacturer, distributor or wholesaler, both in Italy and abroad*". As a consequence, they are the clients allowed to operate on the free market, choosing their own supplier. They have the right to purchase electricity or gas from any qualified operator present on the market and to obtain the transport of this energy on the transmission and distribution networks.

The transition from first to the second group has been done in a progressive way using as discriminant the annual electric energy consumption of the different users: the customers who consumed more (mainly large industrial users such as steel mills or cement factories) were the first to be able to choose from those who buy electricity, then gradually the market has expanded to customers who consumed less. In particular, the first threshold was

quantified at 3,42 MW (30 GWh/y), which from 1 January 2000 was reduced to 2,28 MW (20 GWh/y) to reach only 1,03 MW (9 GWh/y) from 1 January 2002. From 1 July 2004, this band has expanded further allowing all VAT holders to access the free market.
The last barrier to liberalization fell on 1 July 2007 when it was also possible for domestic users to purchase electricity on the free market.
The Decree has allowed the sale of electricity to be realized through two methods:

- Bilateral contracts, made directly between the seller and the buyer;
- Negotiation in the Power Exchange, carried out between the seller and the buyer through a telematic platform.

The sellers are either electric companies that produce the energy they sell or trading companies that, although they have no generation capacity, resell energy that they buy from other operators or that they import from abroad. Buyers are all those who can access the free market.
Moreover, other two services were introduced:
1) *"Servizio di Maggior Tutela" or "Protected Market"* [3]:

- it is reserved to all customers that have never changed their electricity supplier (in charge of selling electric energy) after 1 July 2007: in particular is aimed at domestic users, companies connected in low voltage with less than 50 employees and an annual turnover not exceeding 10 million euros or for public lighting;
- the economic conditions continue to be decided by ARERA;
- the procurement function continues to be performed by the "Acquirente Unico";
- the local distributor has also the function of electricity supplier. Since the main Italian distributor is ENEL, it is currently the main operator offering this type of service.

2) *"Servizio di Salvaguardia"* [4]:

- it is the supply dedicated to users powered by medium voltage or to low voltage companies with more than 50 employees or an annual turnover of more than 10 million euros which, following the entry into force of the free energy market, haven't already chosen a free market supplier or, for whatever reason, they have remained without it;
- the suppliers are chosen through a tender organized by the "Acquirente Unico";
- the economic conditions are defined by each operator on the basis of calculation methods established by the Decree of the Minister of Economic Development and are intended to cover the costs of procurement, dispatching services and marketing costs.

Approved by the government in April 2015, between stops and deferrals, the draft law on competition has had a tortuous path, concluding its process at the beginning of August 2017. It represents the last step toward an higher and higher liberalization of the electric market.
Indeed, one of the innovations introduced, subject to controversy inside and outside Parliament, is the end of the Protected Electricity Market, set for July 1, 2020, involving around 20 million domestic customers and 4 million small and medium-sized enterprises, currently under the protection regime. The overcoming of the greater protection is conditioned to the achievement of six objectives:

1. the operation of a site for the comparability of commercial offers;
2. compliance with the timing of switching from one supplier to another;

3. compliance with billing and settlement times;
4. the operation of the integrated information system;
5. the implementation of the "brand unbundling" discipline, which it requires active companies both in the sale of electricity and in the management of a distribution network, a communication policy that clarifies the distinction between the two roles, starting from the adoption of two different brands;
6. the protection of families in economic distress.

The achievement of the objectives indicated in points 1, 4, 5 is decisive for the effective opening of the market, as the sale to end customers is much more concentrated than that on the wholesale market. In addition, the following three measures were included:

- introduction of a safeguard service: it is regulated by the Energy Authority, assigned with insolvency procedures for territorial areas and under conditions that encourage the transition to the free market. The main aim is to guarantee continuity of supply to certain types of customers who, after overcoming the enhanced protection regime, are without a supplier;
- introduction of “Tutela Simile”: it gives the possibility to the accredited operators of the free market, to stipulate with the customers of the protected market a one-year contract at a rate guaranteed by the Authority itself. At the end of this period, customers can freely choose to renew the contract or change supplier. In this way customers can experiment offers similar to the ones of the free market;
- since January 1, 2018 all electricity sellers must include in their offers also the PLACET (Free Price at similar Conditions of Protection): it is a predefined offer, aimed at families and small businesses at pre-established contractual conditions defined by the Authority, but at prices freely set by the seller.

1.1.3 Result achieved: the actual state of liberalization

In 2016 the total consumption of electric energy has been 295,5 TWh, signing a growth in contrast to the downward trend of the two-year period 2012-2014, even if still lower than the period before the 2009 economic crisis (Figure 1.3).

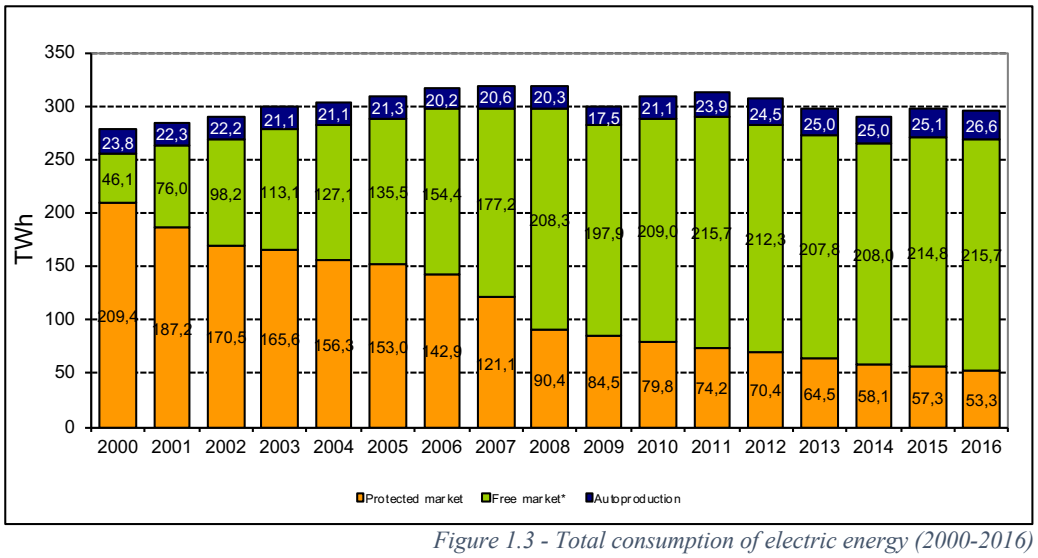


Figure 1.3 - Total consumption of electric energy (2000-2016)

The reduction in energy consumption is due in part to the economic crisis and partly to an improvement in the primary energy intensity index.
On the one hand it can be noticed an increasing trend for consumption coming from the Free market (which include also the safeguard market) and auto-production. On the other hand, the Protected market is becoming less and less relevant.
In the next few years it is possible to hypothesize an increase in electricity consumption coming above all from auto-production (thanks to an higher and higher penetration of renewable sources), supported by the environmental sustainability policy promoted by the European Union, which aims at the electrification of consumption as a key tool to encourage the process of decarbonizing the economy.
Considering the retail market of electric energy, in Italy in 2015 have been sold to the final market a bit more than 253 TWh to roughly 37 millions of clients. To date, ten years after the process of liberalization, about 65% of customers are still on the service of protection even though there has been over the years a progressive increase in customers on the free market (today around 34%). The number of customers served in the protected market amounted to around 24 million (20 million domestic and 4 million non-domestic) who purchased around 57 TWh of energy. The approximately 12 million customers in the free market (of which 9 million domestic and 3 million non-domestic) bought 192 TWh of energy corresponding to 76% of the total sold (Figures 1.4/1.5).

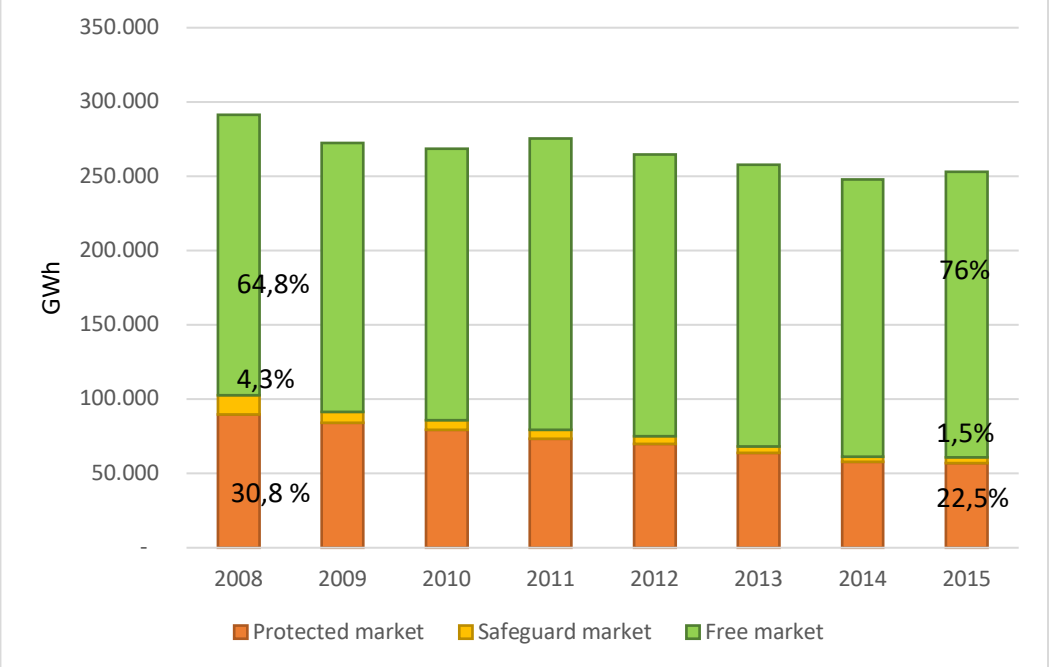


Figure 1.4 - Volume of electricity sold to the final markets (2008-2015)

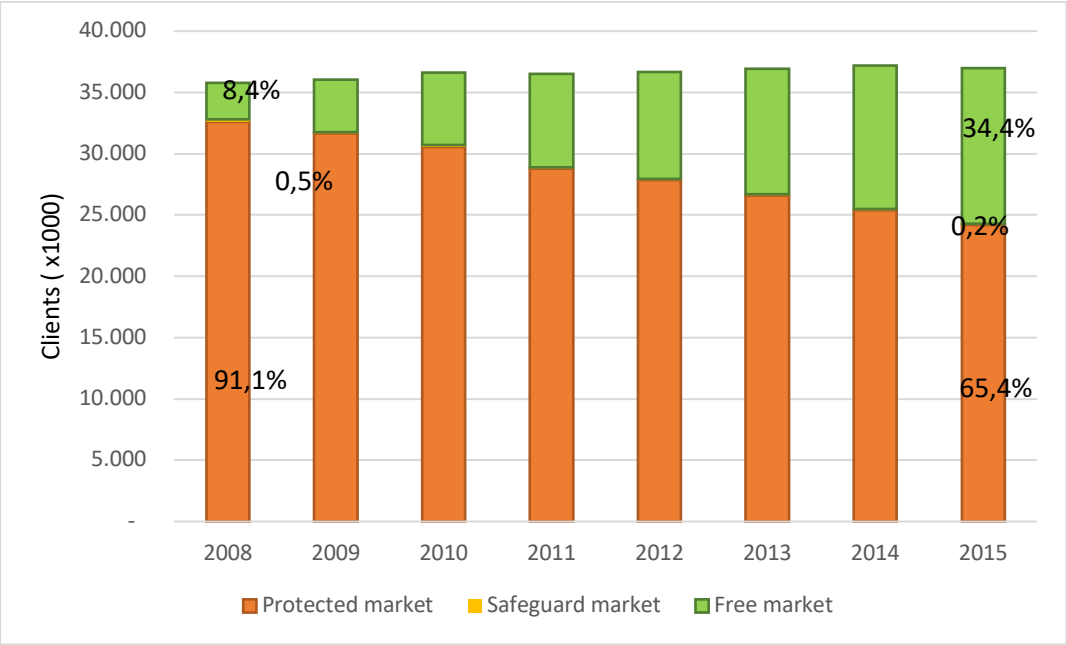


Figure 1.5 - Number of clients for each type of final market (2008-2015)

Considering the number of operators active in the different markets, in the last years there has been a deep increase in the number of companies operating in the free market (Table 1.2).

Number of active companies	2014	2015	2016
Protected market	136	135	131
Safeguard market	2	2	2
Free market	450	487	542

Table 1.2 - Number of companies operating in the electricity market (2014-2016)

The most significant increase in the number of companies operating in the free market occurred in the smallest class of operators (with sales below 0,1 TWh) where the number of sellers rose by 40 units, from 222 in 2014 to 262 in 2015. The first sales class (volumes above 10 TWh) has three operators (+1 vs 2014) while the number of companies with sales between 5 and 10 TWh remains unchanged at seven. The class with sales between 1 and 5 TWh has grown by two units: two companies have gone out and four have entered [5].

As highlighted by ARERA "the increase in sales on the free market recorded in 2015 went almost entirely to the benefit of the larger operators. The comparison with the quantities sold in 2014 shows, in fact, that the first class sold 9 TWh more, the intermediate classes recorded a loss, totaling 3.7 TWh, while the last class sold 0,5 TWh more." (Table 1.3)

	2010	2011	2012	2013	2014	2015
Number of active suppliers	193	196	230	275	320	359
Oltre 10 TWh	4	3	2	3	2	3
5-10 TWh	4	9	8	7	7	7
1-5 TWh	20	19	23	23	23	25
0,1-1 TWh	65	63	56	60	66	62
fino a 0,1 TWh	100	102	141	182	222	262
Volumes sold (TWh)	182,8	196,1	189,5	189,7	186,6	192,4
Oltre 10 TWh	77,9	70,9	55,4	62,6	53,4	62,4
5-10 TWh	31,5	63	59,5	45	48,4	45,8
1-5 TWh	44,5	34,4	50	56,7	58,7	58,3
0,1-1 TWh	26,9	25,7	21,8	22,2	22,7	22,1
fino a 0,1 TWh	2	2	2,8	3,1	3,3	3,8

Table 1.3 - Volume sold in the free market classified by company size (2010-2015)

The following two tables show the breakdown of the operators in the two main segments by percentage of volumes sold in 2016. It is immediate to see how the protected market is more concentrated than the free one: only Enel Servizio Elettrico has a market share of 86,3 %.

Protected Market (2016)	Volumes (GWh)	Shares %
Enel Servizio Elettrico	45.466	86,3
Acea Energia	2.502	4,7
A2A Energia	1.704	3,2
Iren Mercato	595	1,1
Dolomiti Energia	362	0,7
Hera Comm	270	0,5
Acegas-Aps Service	208	0,4
Alperia Energy	188	0,4
AGSM Energia	128	0,2
CVA Trading	126	0,2
A.I.M. Energy	104	0,2
Amet	86	0,2
Prometeo	54	0,1
Asm Vendita e Servizi	53	0,1
Linea Più	49	0,1
Other operators	798	1,5
Total	**52.693**	**100**

Table 1.4 - Volume sold by each operator in the protected market (2016)

Free Market (2016)	Volumes (GWh)	Shares %
Enel	40.831	21,1
Edison	11.793	6,1
Eni	10.686	5,5
Axpo Group	7.772	4,0
Gala	6.655	3,4
Hera	6.557	3,4
E.On	6.222	3,2
Metaenergia	6.197	3,2

Sorgenia	5.962	3,1
A2A	4.662	2,4
Acea	4.459	2,3
Iren	4.380	2,3
C.V.A.	4.315	2,2
Energetic Source	4.176	2,2
Duferco	4.074	2,1
Dolomiti Energia	3.739	1,9
Repower	3.593	1,9
SC Holding	3.222	1,7
Egea	3.072	1,6
Alperia	3.038	1,6
Other operators	48.321	24,9
Total	**193.725**	**100**

Table 1.5 - Volume sold by each operator in the free market (2016)

The operators active in the Protected market still seem to enjoy, compared to their competitors, a certain advantage in attracting domestic customers in the free market: of domestic customers who have abandoned the Protected market, 63% have chosen the connected supplier to the distributor as a supplier of the free market.

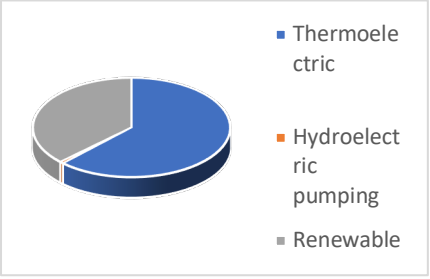
The total switching rate (an indicator of the openness of the electricity market) in Italy in 2016 has been 10,10% (8,70 % relative to domestic withdrawal and 15.60% relative to non domestic one), showing a positive trend from the 9,60% of 2015 (Table 1.6).

Client type	2015		2016	
	Volumes	Clients	Volumes	Clients
Domestic	10,10%	8,00%	10,20%	8,70%
Non domestic	32,60%	15,80%	27,80%	15,60%
Total	27,60%	9,60%	23,90%	10,10%

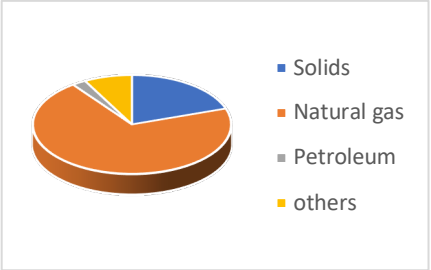
Table 1.6 - Total switching rate (2015 - 2016)

The assessment of the degree of liberalization of the electricity sector cannot be separated from an overview of the generation park structure, which in Italy sees a strong presence of gas, with a price dynamic that is still correlated – even if to a decreasing extent - at the price of petroleum (Table 1.7).

Source (2016)	GWh	Shares %
Thermoelectric	179.839	62,2
Hydroelectric pumping	1.825	0,6
Renewable	107.654	37,2
Total	**289.318**	**100**



Thermoelectric (2016)	GWh	Shares %
Solids	35.608	19,8
Natural gas	126.023	70,1
Petroleum	4.127	2,3
others	14.081	7,8
Total	**179.839**	**100**



Renewable (2016)	GWh	Shares %
Hydroelectric	42.250	39,2
Wind	17.648	16,4
Photovoltaics	22.104	20,5
Geothermal	6.289	5,8
Biomass and waste	19.363	18
Total	**107.654**	**100**

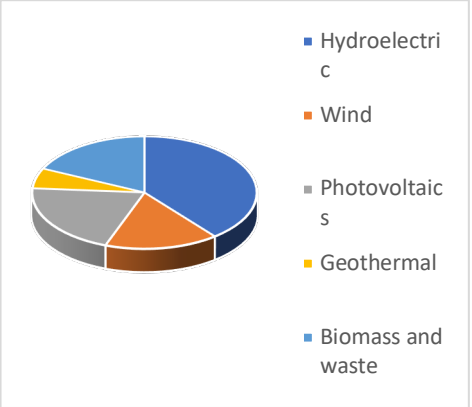


Table 1.7 -Italy generation park structure (2016)

The process of reforming the electricity markets has led to a significant reduction in upstream generation costs, due to the effect of greater competition, through the power exchange, and the effect, since the beginning of 2012, of the drop in gas prices on the spot market compared to long-term contracts.

The market price of electricity is made up of various components among which the energy price is less than 50% of the total price (Figure 1.6).

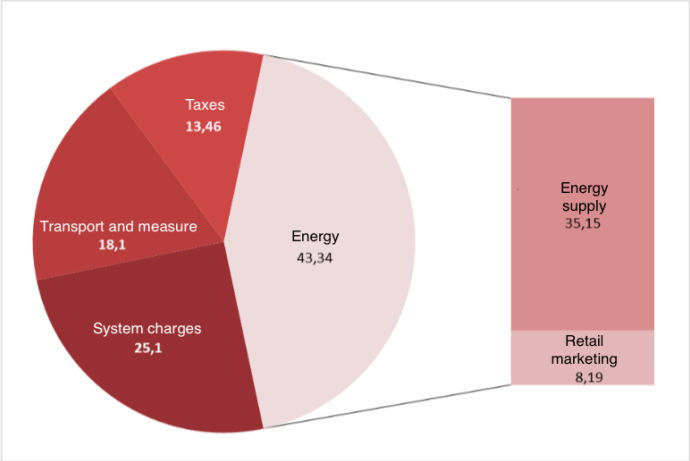


Figure 1.6 - Components of the market price of electricity (end 2016)

Figure 1.7 shows how this component, in the period January 2013 June 2016, decreased by 27%, a reduction that was not partially found in the final price which had a decline of only 6% because there was an increase in system charges (which grew steadily up to last quarter of 2015) and, in part, transportation and measurement costs (increased in the second quarter of 2014 and in the first quarter of 2015, after which they remained stable).

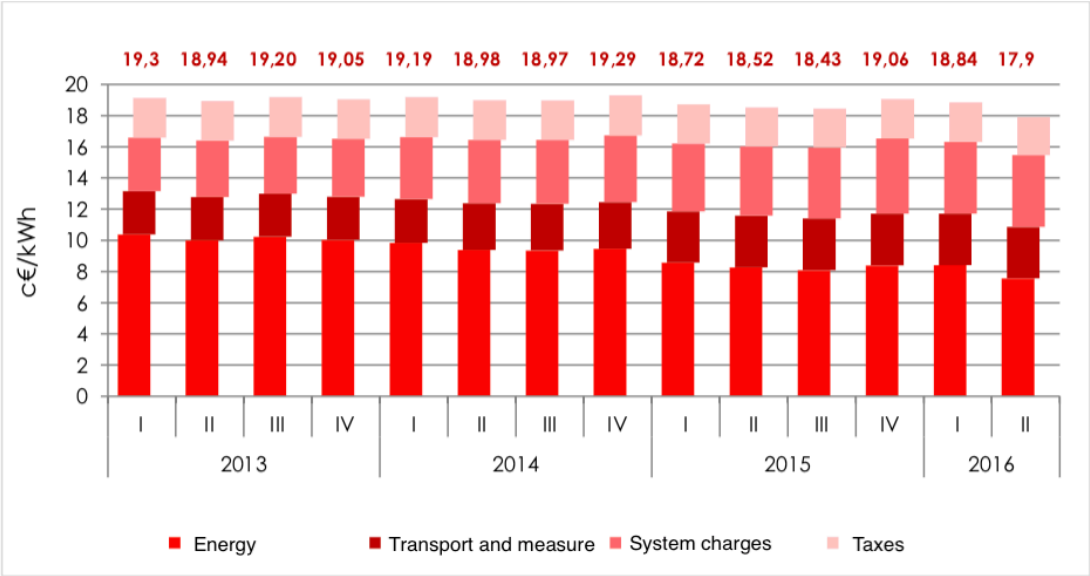


Figure 1.7 - Components of the market price of electricity (2013 - 2016)

These dynamics of price structures clearly reduce the room for maneuver of operators who find themselves and will increasingly find themselves acting on different levers to make their offer more competitive.

1.1.4 Future evolutive options toward an increasing liberalization

The Competition Law is still in progress and, in the face of a confirmation of the overcoming of the protected market by July 2020, has not detailed the path that directs this piece of liberalization.

A crucial issue still to be resolved is that concerning the methods of assigning the supply to domestic customers who will not have independently chosen a seller on the free market within July 2020.

The following table shows three options that are being evaluated:

	Option A: "Auctions 1"	Option B: "Auctions 2"	Option C: "No Auctions"
Normative reference	Amendment Scalia / Di Biagio, De Poli	Amendment Mucchetti, Lanzillotta	-
Attribution method	Insolvency proceedings for territorial areas	Insolvency proceeding on regional base	Attribution to actual operators in the Protected market
Customers to provide	Residuals in Protected market in 2019 and customers without a supplier	Residuals in Protected market in 2019	Residuals in Protected market in 2019 and customers without a supplier

Price	Increased compared to the prices of the Free market and therefore disincentive with respect to the permanence in the Protected market	Unitary price made up of two factors: fixed rate (subject to the offer) and variable rate (subject to PUN)	Disincentive price to facilitate the transition to the Free market or automatic transfer of the customer on the Free market with the same operator of the Protected market at the most advantageous offer
Antitrust roofs	Not expected	50% of the domestic clients market	-
Possible consequences	Auctions aimed at assigning customers on a service that, at least when fully operational, will be characterized by unattractive customers (eg defaulting or small failed businesses). For this reason, the price will be higher than the current protection, but it will still have to be "reasonable".	Option considered by some "paternalistic" and detrimental to competition. The mechanism would also cancel the consumer's activity by making it a passive player in the market	Confidence in the active role of consumers. Risk of recreating market concentration. Fundamental information campaigns towards the final customer.

Table 1.8 - Future evolutive options toward an increasing liberalization

While the auction mechanism tends to immediately build a new retail market, it nonetheless redesigns its "table" structure, not favoring a natural competitive evolution. Likewise, the "induced" output through disincentive price leaves room for market logic based on the best offers, but risks favoring the current market operators. It also leaves open the question concerning the long-term provision of universal service. These reflections suggest the possibility of a hybrid solutions.

1.2 Digitalization

Digitalization has made possible an incredible series of innovations thanks to which the combination of digital technologies has become able to destroy and recreate new business models.

Concerning Utilities, it is possible to distinguish among two main directions (Figure 1.8):

- "**Endogenous technologies**" made up of “Distributed Energy Resources (DER)”, “Smart Grid”, “Electric mobility”;

- "**Enabling Technologies**" made up of “Advanced Analytics”, “Artificial Intelligence”, “Internet of Things”, “Blockchain”. They are able to support the maximization of the value that can be extracted from Endogenous ones.

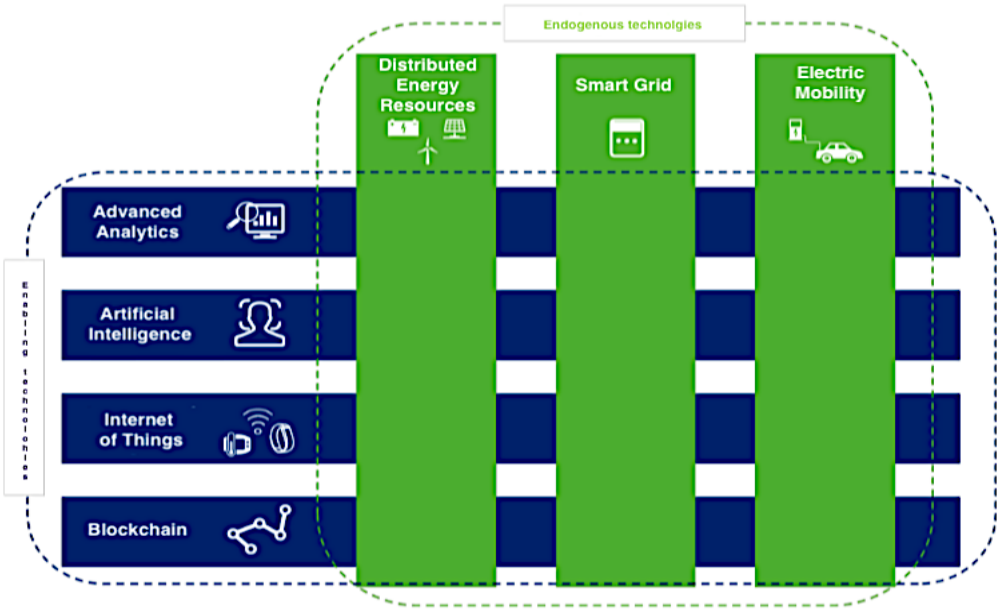


Figure 1.8 - Different types of new technologies

1.2.1 Endogenous technologies

1.2.1.1 Distributed Energy Resources (DER)

They include both electricity production technology from renewable sources and distributed in micro production units (photovoltaic, micro-hydro, mini-wind) and all the technologies able to accumulate small or large amounts of energy contributing to the independence from production from fossil sources.

The connection of DER to the distribution network and the consequent adaptation of the network itself to new and more complex energy models may be made possible on the one hand by intelligent networks and on the other by real time monitoring and settlement technologies.

The innovative and destructive element mainly concerns the drastic drop in production costs (and therefore costs for the end user) of the main components of DER (photovoltaic and storage systems for residential use). For example, in relation to the production/purchase costs of solar/photovoltaic panels for residential use and energy storage, it is estimated, by 2020, a cost reduction of 65% and 85% respectively. This aspect will contribute, despite the reduction in incentives, to a growth in the rate of adoption by final customers. To this it should be added that compared to the past, the control, monitoring and optimization technologies of the DERs contribute to making them more profitable and suitable also as an investment for medium - small plants, even without incentives.

It is estimated that photovoltaic micro-generation plants could reach 1.200.000 units in Italy by 2020.

With regard to the Energy storage scenarios in the decade 2016-2025, the compound growth rate of the network storage systems market is expected to be higher than 30% with a penetration rate above 2%.
What will be the effect of the exponential growth in technological terms and diffusion of DERs on the value chain will depend on the ability of the Utility and the Regulator to create the conditions for the evolution of business models to preserve the competition and the profitability of the system in its complex.

1.2.1.2 Smart Grid

In a context of such significant diffusion of DER, therefore, the realization of a new network infrastructure able to effectively support on one hand the reliability of the service and on the other the evolution of business processes along the entire value chain, is a fundamental factor.
The creation, thanks to DER, of new "energy ecosystems" or micro networks with their own internal rules, recalls into question all the traditional relationships along the value chain: it is widely believed that the electricity system without the necessary investments would be put in difficulty, in the face of a doubling of DER in terms of production capacity and number or concentration in specific areas of production units.
Significantly, in addition to the growth of micro plants on a residential scale, there is undoubtedly the impact due to the expected growth of wind and photovoltaic production.
This situation will inevitably lead to changes in the models and the logic of demand forecasting both for dispatching and for stock exchange purposes, moving from a relatively unidirectional system of production and absorption to a multi-directional model in which the net absorptions will decrease in relation to a substantial increase in the required power peaks (Figure 1.9).

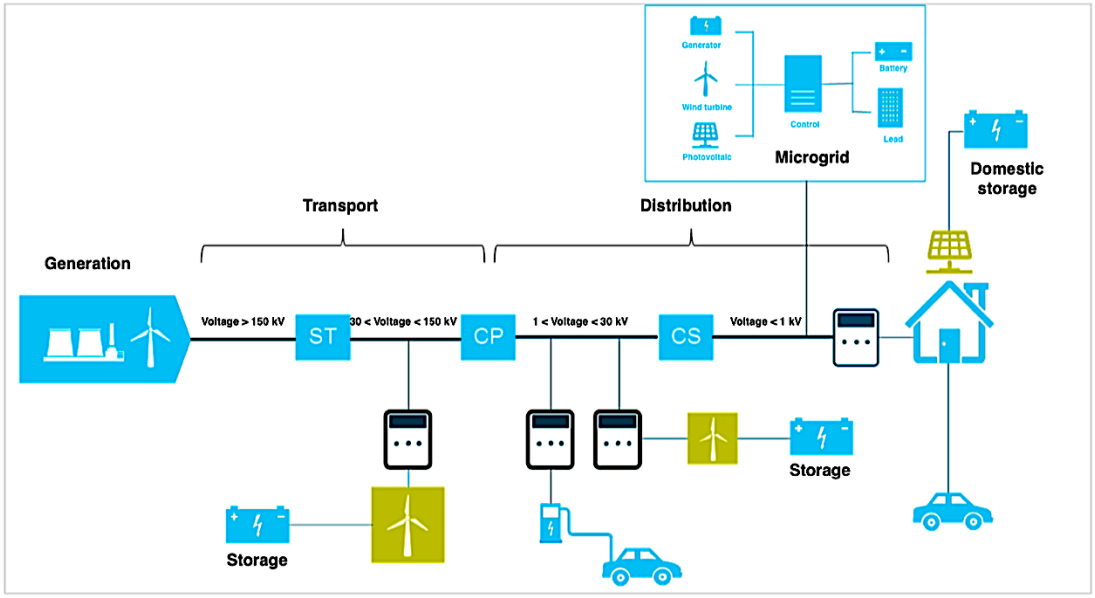


Figure 1.9 - Multi-directional model of the electric system

The current situation is not such as to predict criticalities in the short term, but in the long term the progressive transformation of the network, the installation of the new generation meters and the introduction of new balancing technologies will be fundamental in order to support the stability of the system. The newly designed smart grids will be able to:

1. facilitate the identification of a minimum common denominator among all the generation and storage technologies;
2. optimize the use of the assets related to the network;
3. improve the quality of service for end users;
4. guarantee the network security in terms of "availability" (in front of a contest of redefinition of the generation mix) or defense against possible hacking actions;
5. promote the integration and dissemination of new digital services such as home energy management and demand response enabled by ecosystems of IoT and from the use of advanced analytics;
6. support the expansion of DER so that they will be able to favor a network electrical reliability higher than the current one;
7. simultaneously manage technical and commercial aspects that can enable daily switches or demand - response systems.

The technologies associated with Smart Grid fulfill three main tasks:

- optimize monitoring and control of the network thanks to the use of sensors and dedicated IT and communication infrastructures;
- enabling consumers to contribute to the management of the network thanks, for example, to connected devices (Connected Home), to electric vehicles connected to the network (Vehicle to Grid), to storage and micro-generation systems;
- increase the physical capacity of the network through the use of advanced power lines such as UHV (ultra high voltage), superconducting, or direct current underground.

1.2.1.3 Electric Mobility

As for DER, this evolution is not innovative from a technical point of view but considering the widespread diffusion and progressive accessibility of a growing part of the Italian population. Thanks to the technological development related to the production of batteries, its price reduction and the need to create a healthier city environment with the introduction of zero-emission vehicles, in the coming years there will be a significant and destructive growth of electric mobility against traditional vehicles using fossil fuels.

A first estimate in 2020, provides that between private use, car sharing and public transport it can be reached a fleet of about 500.000 between BEV (Battery Electric Vehicle) and PHEV (Plug-In Hybrid Electric Vehicle): these are numbers still very limited when compared to over 37 million cars circulating in Italy but promising from the point of view of growth and impact on the environment and the electricity system. It is estimated that already in 2020 these vehicles can generate an incremental value for the electricity system between € 500 million and € 1 billion per year.

1.2.2 Enabling Technologies

1.2.2.1 Advanced Analytics

The diffusion of digital technologies both in the B2C (for example: smartphones, wearable devices and other connected devices, social media) and B2B fields (such as, by way of example, related products and machinery, data from transactions and contacts with customers and partners) have generated an exponential growth of unstructured data amount (Big Data).
This information asset, if properly stored and processed, constitutes a key corporate asset to support strategic decision-making but also commercial and operational decision-making.
This capacity is the result of new features and logics made available by Advanced Analytics technologies based on a connected ecosystem of data, IT tools, models, processes and resources aimed at maximizing the organization's ability to solve business problems.
The applications in the Utility area that are gradually affirming are numerous and can embrace all areas of the entire value chain:

- scenarios for the optimization of forecasting and trading activities;
- prediction of the propensity to contact and complaint of customers in order to identify proactive actions of "caring" on the customer and reduce management costs;
- customer segmentation based on behavioral and socio-economic models with the aim of forecasting the needs and propensity to purchase also acquiring data from unconventional sources such as social media or specific external data sources. This data can be used in time real during any contact with the customer for sales purposes;
- prediction model of the abandonment of customers, allowing companies to direct resources on certain customers and using the situation on their own advantage or to increase customer loyalty;
- optimization of online and offline marketing campaigns on the basis of behavioral characteristics of the different segments and customer profiles.

1.2.2.2 Artificial intelligence

Artificial intelligence is referred to those processing technologies that allow, through the use of "machines", the execution of activities that traditionally presuppose human intervention.
AI technologies, for example, enable computers and objects to:

- understand cause and effect relationships and to represent accumulated/archived knowledge in a structured and growing way over time;
- extract conclusions from facts or rules of inference and plan/execute actions;
- acquire new knowledge from examples or experiences;
- understand, communicate and analyze natural language;
- control objects at the highest level of experience;
- recognize the objects present in the images.

In the Utility area the ability to know how to combine the progressive shift of interactions with customers on digital channels (for example: requests for information on payments and bills, complaints management) with artificial intelligence technologies has a significant impact on the operating model, on the processes of business and the potential benefits in terms of reducing operating costs.

In fact, the application of AI technologies to the activities of Front and Back Office can generate positive effects on some main lines:

- reduction of response times thanks to the automation of work (from days to few hours or even minutes);
- reduction of the processing effect on "human-intensive" activities but with low value for the customer and contextual recovery of resources for the execution of higher value activities;
- improvement of Customer Experience and Customer satisfaction thanks to a more effective, quick and personalized service.

These benefits are supported by market forecasts that show the disruptive effects that the application of the AI will have on all sectors and along the entire value chain.

Gartner consultancy estimates that by 2023 one third of the activities carried out by highly specialized figures (such as doctors, lawyers, brokers, professors) will be carried out by "smart machines", while in 2030 90% of the professions as we know them today will be carried out through tools of Artificial Intelligence.

1.2.2.3 Internet of Things

The Internet of Things (IoT) is the technology that makes it possible to connect common objects with each other, which become interconnected, creating an ecosystem of industrial and commercial applications developed to address specific needs of final consumers.

The trend of growth of connected devices in the world and investments in such technologies is inexorable: in 2020 the annual global investments in IoT technologies will reach about 1.300 billion euros while the number of connected devices could reach 30 billion devices.

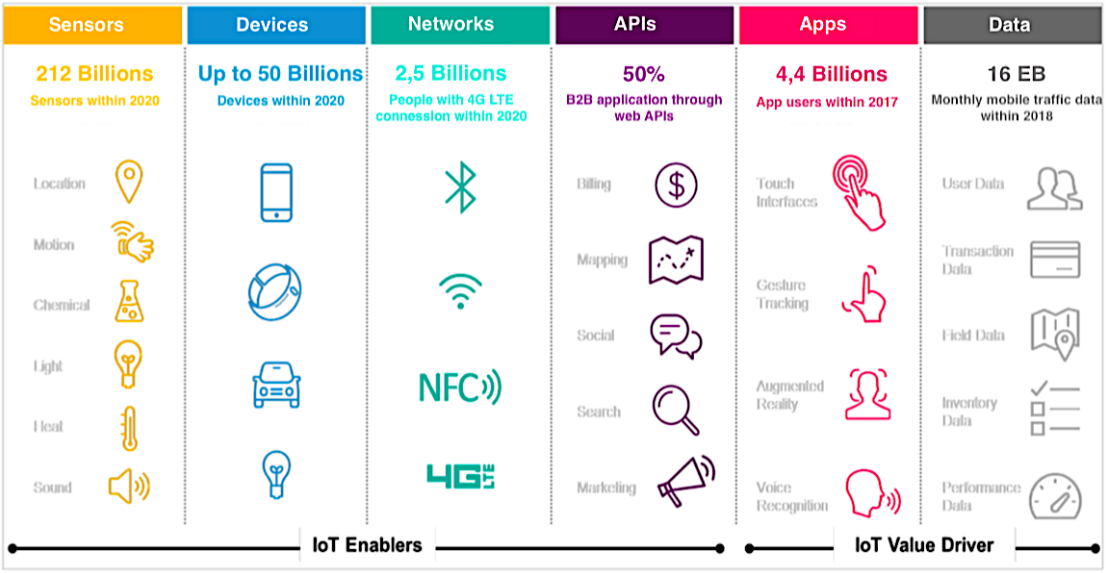


Figure 1.10 - Internet of things application and diffusion within 2020

IoT applications are many: devices able to manage and monitor energy consumption (from the control of individual appliances, to the suggestion of maintenance or alert in the event of malfunctions or loss of performance), to communicate with each other solely for the purpose of safety of things or people (smoke sensors, rather than anti-intrusion, cameras able to detect temperature and movements in the home), objects that can monitor and predict the health of a person or responsible for the control of vehicles. There are 6 main success factors:

- **Security**: management of identities and access rights to products, devices and data associated with them to prevent cyberattacks or the removal of personal data;
- **Traceability**: ability to monitor position, movements and use of devices in order to use this data to make effective interactions between people and devices;
- **Interoperability**: creation of "open" platforms capable of rapidly integrating different devices with the aim of enabling full integration between infrastructure, business processes and data flows to offer personalized experiences;
- **Diagnostics**: ability to monitor the status of the devices to identify any anomalies and the risks associated with them in order to provide support services and timely, effective interventions on the devices themselves;
- **Automation**: ability to build platforms able to enable devices to autonomously adapt their behavior on the basis of historical data and context in a predictive perspective;
- **Monetization**: enable the possibility to aggregate the data generated by the use of the devices and by the use of the services. In this way it will be possible to market information on consumer trends and on the possibility of purchasing or modifying the services offered.

The influence that IoT will have on the evolution of residential energy efficiency solutions is crucial. In fact, already today are available on the market solutions that can customize and automate the management of consumption (smart thermostats, control of consumption of electricity remotely), the operation of household appliances (smart appliances) and lighting.

1.2.2.4 Blockchain

A Blockchain network is a digital technology able to create a database (or register) of secure (encrypted) transactions with a view to distributed networks, accessible to all members of the Blockchain and therefore transparent and above all real time.

The Blockchain introduces the concept of “Smart Contract”: these are programmable contracts that are able to automatically exercise their clauses through a computer receiving input information in order to execute the terms provided.

The Blockchain performs, certifies, records and stores in a short time (typically less than 24 hours) every single transaction that takes place in the network eliminating the need for a third party centralized certification.

In the energy field, a possible application could be linked to the possibility of certifying, thanks to synergies with applications and data deriving from Smart Grid, DER and IoT devices, the origins of energy batches (distinguishing for example renewable sources from traditional ones).

The Blockchain, therefore, enables entities, be they companies, individuals and even sensors, to exchange and / or share data streams in a distributed, secure and real-time manner, guaranteeing, if necessary, increasing levels of anonymity according to the nature of transactions.
The distinctive, and in some ways revolutionary, trait of the Blockchain is therefore given by the elimination of the need for a third party certified to perform a transaction (for example, credit card circuits).
The introduction of the Blockchain opens up, in terms of potential long-term scenarios and in case of "perfect" adoption, some particularly disruptive use cases for Utility:

- enabling Demand Response mechanisms in synergy with IoT devices;
- certification and transmission of readings from new smart meters generation;
- enabling "continuous switching" scenarios for end users thanks to possibility of changing operators according to the most advantageous offers on the market at a given moment by exchanging certified commercial and technical information on the network;
- reduction of the costs of payment transactions for bills;
- reduction of management costs and processing of distributors' readings thanks to the certified data coming from the Smart Meter and automatically stored in transparent way on the Blockchain;
- simplification of billing, credit and accounting processes thanks to the union between certified measurement data from smart meters, commercial and payment information contained in smart contracts and data integration on utility back-end systems;
- possibility to certify energy from renewable sources connected to smart grids to propose "Green" offers at increased prices to specific segments of customers.

1.3 The New Energy Consumer

The growing digitalization of consumers and their experiences in purchasing and relating to retailers has contributed decisively to a strong change in expectations and levels of satisfaction with respect to the interactions they carry out with the different brands throughout their life cycle [6].
In particular the following main trends can be identified:

- **Collective Consumption**: "sharing" products and services rather than buying them (Uber, AirBnB);
- **Instant Everything**: consumers attribute value to fast, simple and low-effort services (Amazon Prime, Pay Pal);
- **Hyper-Relevant**: customers expect products and services to be characterized by a high level of customization (Netflix; Nest; Nike ID);
- **Meaningful Experiences**: the choice of purchase as an expression of one's lifestyle (Apple, Tesla, Vandebron);
- **Energy perspective**: new energy consumers exhibit a range of knowledge and needs—from those who are informed and active to those who view energy as a basic commodity;

- **Omnipresent**: for the next generation of consumers, digital is more than a channel—it has become a way of life. They expect anytime, anywhere interaction—and a seamless, easy and convenient experience;
- **Social centric**: social media is no longer just a forum for sharing ideas and information; it is now an extended ecosystem for marketing, selling and serving a variety of "socially" designed products and services;
- **Tech Savvy**: across demographics, more consumers are technology savvy—increasing the appeal of set-and-forget solutions that deliver financial savings, convenience and control;
- **Prosumer and focus on sustainability:** active buying and selling of energy through various business partners is making relationships more complex;
- **Interconnected**: growing interest in interconnected offerings that address more aspects of consumers' daily lives;
- **Pay it forward:** consumers pay in advanced for his energy consumption;
- **Open to new market players**: consumers remain open to receiving and acquiring various electricity-related products and services from new market players.

1.3.1 Collective Consumption

The success of "business-as-a-platform" models demonstrates consumers' interest and inclination towards new ways of "living" and "sharing" the products and services purchased. "Business-as-a-platform" means those emerging business models in which a company manages to create an ecosystem of customers and suppliers from which it is able to extract value through the disintermediation of each other. Just to name a few Airbnb, Uber or Waze, rather than the same Vandebron are companies that operate in business in which they do not hold hotels (Airbnb), cars for transportation of people (Uber), sensors for monitoring traffic or territory (Waze) or finally power stations for production from photovoltaic systems (Vandebron). The common element of these new businesses is the intelligent use of the information of the customers in their possession. They derive value from sharing (sharing economy) that these products and services create but without undergoing the constraints deriving from their possession.

At the same time, consumers experience a renewed sense of community, of collaborating, receiving in return a perceived value equal to or greater than that provided.

According to Accenture's New Energy Consumer research, in fact, 21% say they are strongly interested in participating in Energy Trading platforms and being willing to pay for it.

Moreover, the Energy Providers are progressively drawing on the advantages deriving from the power of involvement of digital channels, especially the Social Media, which are configured as an increasingly important vehicle for communication for institutional purposes, Brand Awareness and Customer Care.

37% of Utility Customers, in fact, declare that they intend to use Social Media to interact with their energy provider in the next future.

1.3.2 Instant Everything

For the Utility this trend translates into a request for digital services, simple, accessible anywhere and from any device. There is no shortage of examples of companies on our market that are launching completely digital offerings with innovative features, demonstrating the ability to attract consumers and generate profits through business, commercial and customer service models in digital terms.
Accenture's New Energy Consumer Survey (NEC) shows how the Digital Customers of Utilities compared to "traditional" Customers have:

a) a higher level of satisfaction (76% against 67%);
b) greater inclination to recommend your current supplier (44% against 20%);
c) a higher propensity to purchase additional products and services in the field Connected Home and DER (from 11 to 18% more than "Non-Digital" Customers).

The digitization of the offer and experience Client by its nature is demanding to Utilities new skills typical of retailers such as:

- coherent, simple, intuitive online-offline multichannel experience;
- personalized online marketplace (or e-commerce);
- interaction also through social media;
- customization of the commercial offer;
- active support for reducing domestic consumption and improving quality of life.

At present the Accenture research shows the existence of a significant gap between desired experience and the one perceived by customers.
Utilities have the opportunity to launch a Digital Transformation to grasp and address new and profitable needs of customers that differently from the past does not choose the digital offer only for economic convenience but also (if not above all) for the possibility of have a quick service, always available, simple and able to facilitate the control of costs and services used.
81% of consumers would use digital channels if the Utility were able to provide a digital, customer-centric experience that is in line with what is happening in other market sectors.
This indication is also confirmed by the trends in internet access and use of digital services by Italians, which also highlight the progressive reduction of the digitalization gap between Italy and the rest of Europe.

1.3.3 Hyper-Relevant

In the age of digital and "as-a-service" business models, consumers become increasingly demanding and want to buy only products and services that are strongly inspired by their needs, expectations and values.
Specifically, 97% of customers could be more satisfied if there were more flexibility on the part of the Utility to allow customization of their services and of the commercial offer in place of standardized offers, not very modular and in many cases undifferentiated between suppliers.
Achieving a high level of personalization requires the operators of the energy sector to be able to grasp the opportunities deriving from the collection, processing of data arising from the relationship with the brand and its products/services. Whenever the customer relates to the brand through the channels (digital and otherwise), connected devices, the digital

services offered, valuable information is generated and potentially able to be processed and to provide, through predictive and behavioral models, valuable indications timely and effective for the personalization of offers and services with the dual objective of increasing customer loyalty to generate opportunities for additional sales (and revenues).
Another very important aspect in the creation of "unique" products, services and experiences is linked to the ability of companies to implement Product Lifecycle Management processes able to foresee the direct and indirect involvement of the Customer from the early stages of product development.
Looking outside the energy sector, what is described is a reality for companies that have always been accustomed to compete to grab the best customers with the right compromise price/quality as in the case of Procter & Gamble and PepsiCo, which show how the ability to put the customer at the center of its decisions is an essential factor to develop products and services that are relevant and able to win customers' trust and preferences.

1.3.4 Meaningful Experiences

For a large share of consumers, the decision-making process and the act of purchase have become an expression of their values, their way of being and the image that the individual wants to show himself in his own community of belonging and network of relationships.
The Utilities, like any other Brand, need to identify and take into consideration the spectrum of passions, beliefs and key values of each customer segment, transforming a primary need such as the subscription of an energy tariff in an opportunity to create value for himself and for his client. The Accenture research allowed us to identify some distinctive features of customers:

- growing sensitivity to the environmental impact of their actions, the origin of products and services sold and the active management of their consumption;
- "de-commoditizization" of energy in terms of researching experiences customized in consumption management, as a way to express one's own lifestyle/values and stand out from others.

These customers' expectations have been addressed by some foreign companies that despite not being traditional energy sellers have undertaken a path aimed at engaging the customer with products and services consistent with the different lifestyles (significant are the experiences of SolarCity, Tesla or Vandebron).
At the same time, traditional vendors could create and offer products and services that know how to intercept these different attitudes, interests and values of customers creating huge opportunities for up-selling and cross-selling. There is no lack of success cases, such as that of Powershop (creation of the "first online shop for energy") and British Gas (over 300 thousand smart thermostats sold). In Italy about 60% of consumers are interested in purchasing products connected to their energy users for their control or to improve their management.
To seize these opportunities Utilities are requested to:

- improve the Customer Experience thanks to segmented offers and customized service levels;

- differentiate itself with new value propositions through the perfect synergy between services beyond-the-meter and completely discontinuous services with respect to the core business ("business as a platform" perspective: Amazon, AirBnB, Google, etc.);
- propose loyalty programs that direct the perfect alignment between the promises and the experience perceived by the Customer.

1.3.5 Energy perspective

Today's energy consumers seem to want it all: competitive pricing, value for money, new products and services, and consistent service—there is no longer a one-size-fits-all approach to consumers. With the growing complexity of the energy marketplace, consumer values have also become more sophisticated. To understand and address consumers' prioritization of energy preferences, energy providers should consider both ends of the spectrum.
On the one hand, there is the growing minority; these consumers are knowledgeable and opinionated about the source, mix and environmental impact of energy options ("energy literate").
On the other hand, there is a large but shrinking group that views energy as a commodity ("energy agnostic"). All consumers fall somewhere on the spectrum between these two end points.
Energy literate: these consumers have a perspective on energy that extends beyond price and they are increasingly aware of where their energy comes from. They are generally influenced by energy management programs, energy mix, new technology and distributed generation. Once consumers have a smart meter, they expect more as can be seen in Figure 1.11.

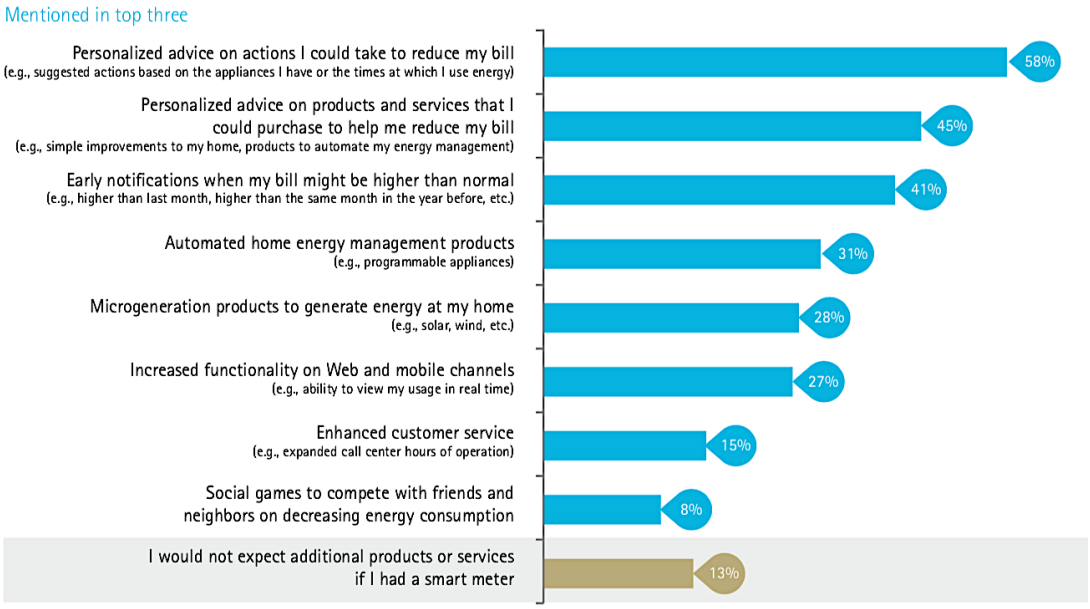


Figure 1.11 - Consumer expectations after the installation of smart meters

Energy agnostic: with these consumers, price has maintained a dominant role. These consumers seek simple, basic options that will allow them to reduce their costs.

1.3.6 Omnipresent

Consumers have become “omnipresent,” the notion that they are always available and online and move between the Web, telephony, social media, and messaging. One of the main implications is the need to create an entirely different interaction model with the consumer, one that reflects the proliferation of devices and communication types. This approach focuses on delivering excellence across a few channels—balancing effective self-service for basic transactions with higher-touch, more personal channels for high-value interactions. Accenture’s research shows that consumers’ preferences and behaviors are fundamentally changing the way they want to interact with their energy providers (Figure 1.12).

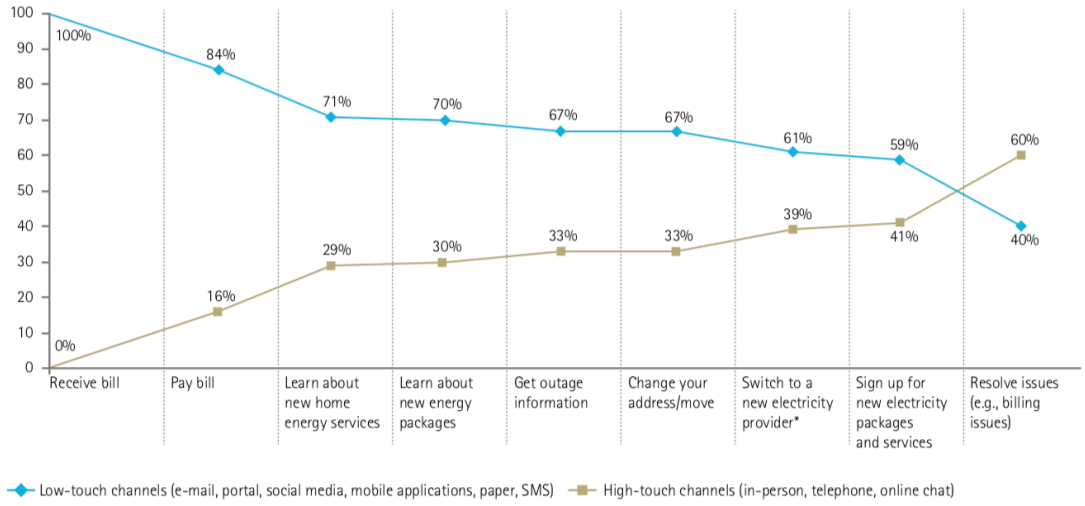


Figure 1.12 - Consumers' interaction preference with their energy provider

1.3.7 Social centric

Over the past years, the nature of social media interaction has changed. These interactions started with a highly vocal subset of consumers taking part in the online conversation.

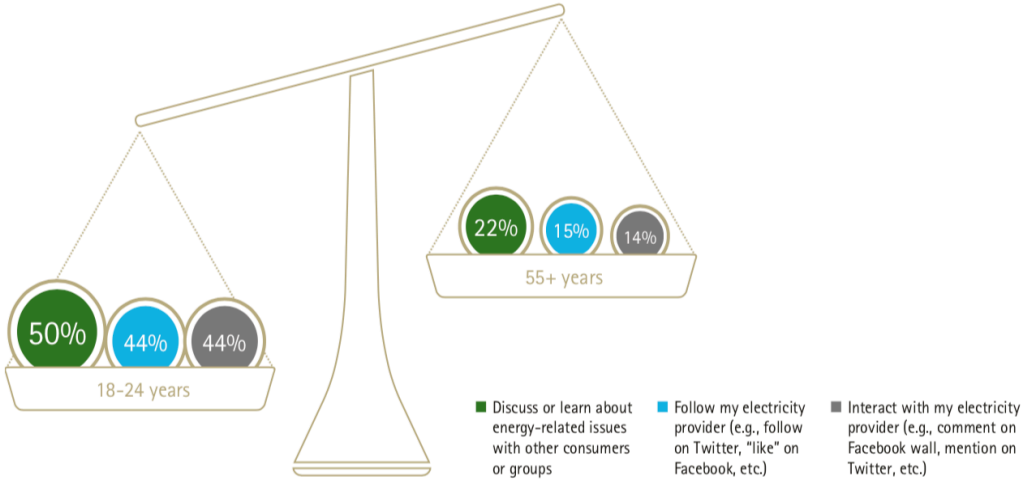


Figure 1.13 - Younger consumers' preference of interacting through social media with the energy provider (compared to older consumers)

Over time, social media has become a tool for energy providers to offer up-to- the-minute information during critical periods—building trust while reducing call-center volume. Now social media has become a core marketing, sales and service tool—one ideally suited to influencing consumer behavior, increasing customer satisfaction and driving revenue in competitive markets. In particular younger consumers are more interested in learning about energy or engaging with their providers through social media (Figure 1.13).

1.3.8 Tech Savvy

As smart meter rollouts and new capabilities gain momentum around the world, adoption of connected devices is also growing exponentially. More consumers are filling their homes with these devices and, in some cases, may not even realize it. Kitchen appliances, televisions, thermostats, lights, locks, phones and computers are all becoming "smarter"—with energy remaining the great connector. The ever-present nature of technology is enabling new value propositions around home and energy management solutions. Some consumers will leverage technology for convenience (making them ideal candidates for set-and- forget home automation services) while others will want to be more hands on (making them targets for an active energy management program with remote home energy management via Web portal or smartphone).
Accenture has observed a number of trends in consumer interest in energy management programs and smart/connected home products and services. The main reasons are well summed up in Figure 1.14.

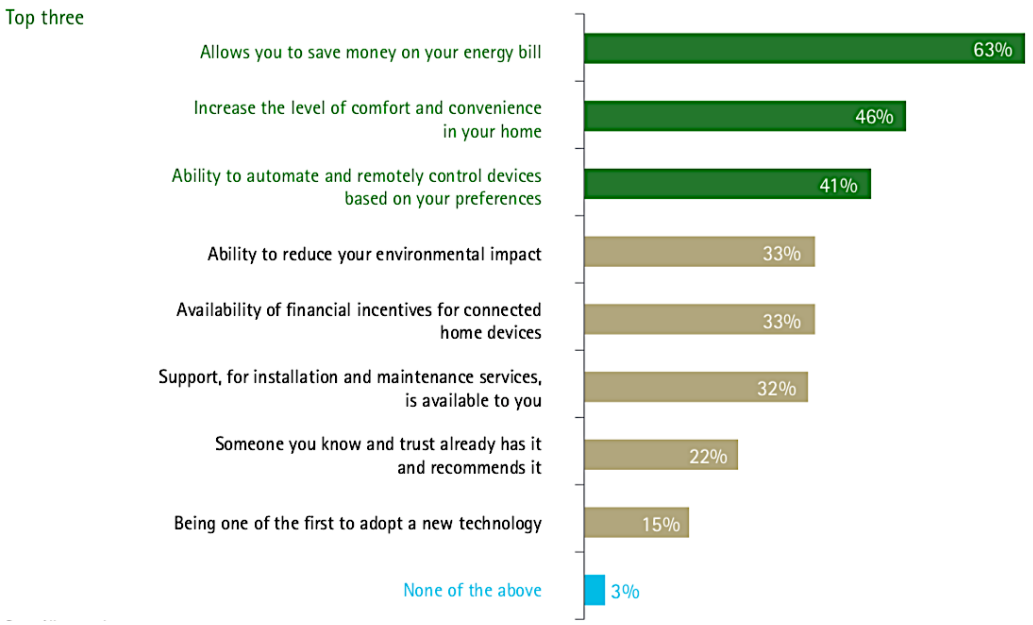


Figure 1.14 - Reasons why consumers are potentially interested in energy management programs

In this field energy providers have a big opportunity: after specialized companies, they are among consumers' most preferred providers for monitoring and control products.

1.3.9 Prosumer and focus on sustainability

Historically, utilities have had one-way relationships with bill payers. Today, environmental awareness, rising energy costs and declining costs of micro-generation technology such as solar panels, small-scale wind turbines and energy storage are driving governments and citizens to increase interest in a variety of distributed energy sources.
With growing adoption of residential solar and other forms of distributed generation, providers are facing a new dynamic. Consumers are becoming "prosumers" who are creating their own energy and, in some cases, selling it back into the grid.

1.3.10 Interconnected

Product and service bundles have become more popular among energy providers and consumers. Consumers welcome the convenience of receiving multiple services from a single provider. Consumers are interested in bundles that fit their lifestyle, whether it is around saving the planet, saving time or saving money— bundles have become part of the fabric of consumers' services. Extending beyond traditional commodity-based value propositions, energy bundles now include connected home services, technologies and plans, financing, insurance and other services—from security to cable and phone. Other possibilities include distributed generation products and support, as well as emerging options for in-home and remote-based electric vehicle charging.
Figure 1.15 shows the main reasons that are driven adoption of bundled energy packages.

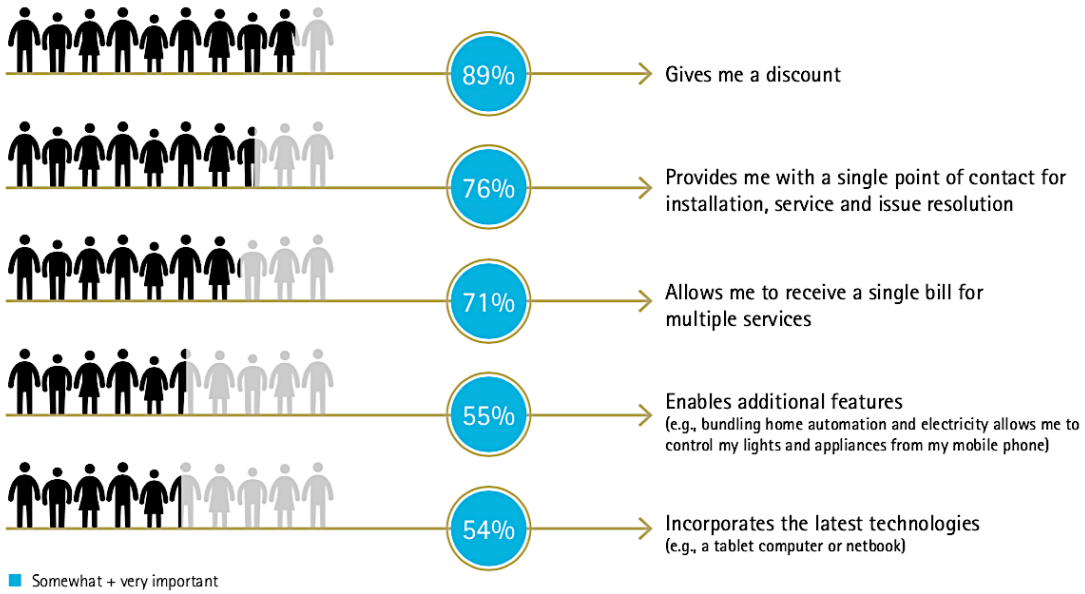


Figure 1.15 - Reasons why consumers are potentially interested in bundled energy packages

1.3.11 Pay it forward

Prepaid plan allows the consumer to have more control over his cost, minimize interactions with his energy provider and manage better his energy consumption. Compared to older generations and lower-income respondents, younger energy consumers were the ones overrepresented in expressing interest in prepaid. This trend is expected to accelerate, as younger consumers look for solutions more tailored to their digital, interconnected lifestyles and more aligned with their desire to reduce environmental impact. According to Accenture's

research, consumers' responses to what would motivate them to adopt a prepaid energy plan are well described in Figure 1.16.

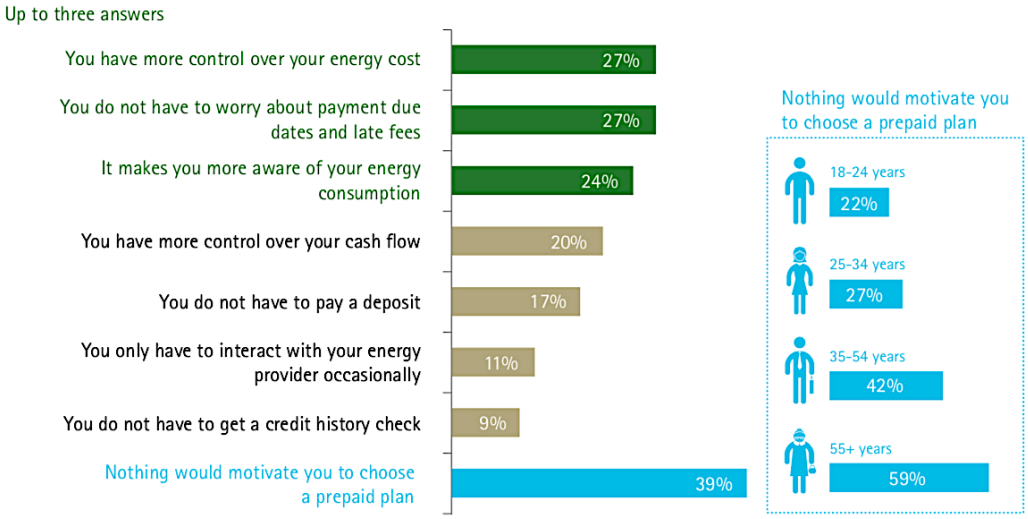


Figure 1.16 - Reasons why consumers are potentially interested in prepaid energy plan

1.3.12 Open to new market players

Accenture' research has revealed a positive trend in consumer interest in purchasing electricity or energy-efficient products and services from potential alternative providers already in 2011-2013 (Figure 1.17).

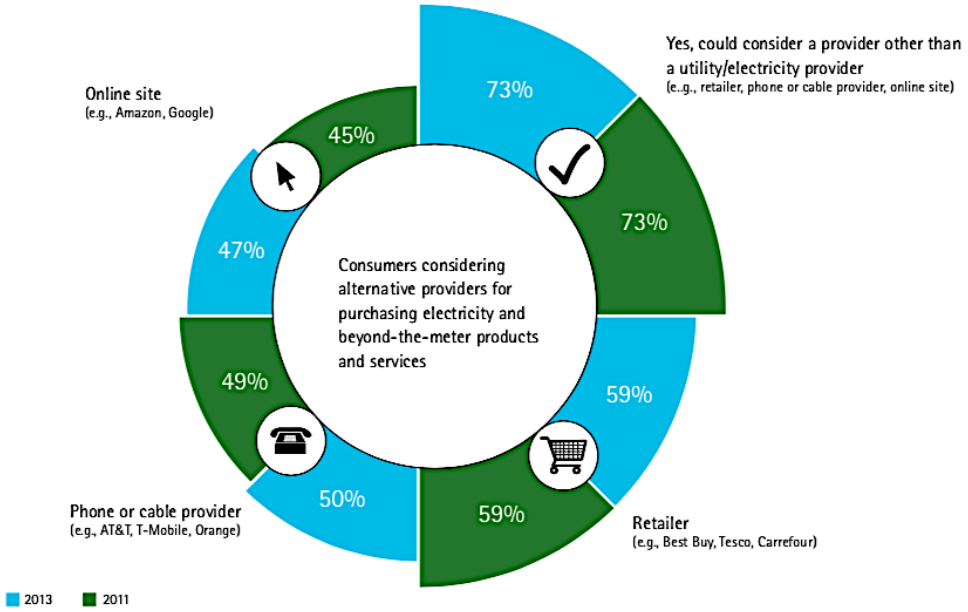


Figure 1.17 - Consumers interest in purchasing electricity or energy- efficient products and services from potential alternative providers

Nowadays this increasing trend is confirmed. Further, many beyond-the-meter competitors currently operate with a high degree of consumer centricity. Telecommunications companies (Orange), product retailers (Carrefour) and online site (Amazon, Google), for example, have long placed the consumer at the center of their businesses.

2 CHAPTER - "New market entrants: an opportunity or a threat for electric utilities?"

2.1 New market entrants

Industries are beginning to converge, driven in part by shifts in consumer behavior, technology trends, regulatory demands and the rise of sustainability.

In noncompetitive energy markets, other providers are entering the beyond-the-meter market with products and services designed to complement the commodity provided by the regulated utility. In competitive markets, energy companies are competing against each other, individually vying for a broader share of consumer spend. In particular, for core energy and new products and services, energy providers now face competition from all directions—startup digital retailers, telecom giants and prosumers, as well as incumbent utilities (Figure 2.1).

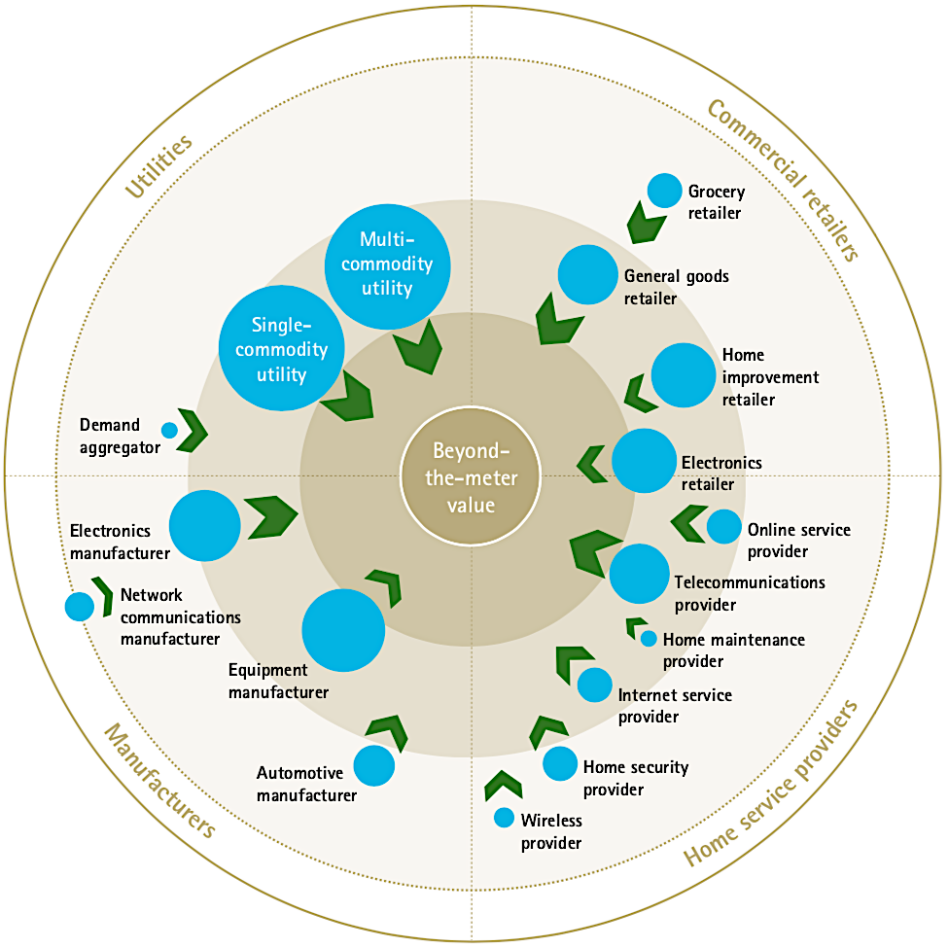


Figure 2.1 - New market entrants

In some markets incumbent providers have adopted a strategy to pursue a dual-fuel bundle, offering consumers extended products and services: today they remain consumers' first point of contact [7]. However, with the low cost of innovation, the following new players are entering both regulated and deregulated markets:

- a growing list of blue-chip vendors, including Apple and Google, are partnering with incumbent hardware and software providers to develop home Internet-of-Things ecosystems to user in a new phase of home energy management solutions. Apple's

HomeKit and Google's Nest, for example, are currently vying to become the smart thermostat of choice. One of the main reasons they are pursuing this market is because each wants to become the platform on which all of a consumer's in-home interactions occur;

- numerous startup companies seeking funding for home entertainment/security and other systems—any of which could theoretically be connected to a utility-owned platform to deliver a simpler and better consumer experience;
- pure digital competitors, (such as Powershop in New Zealand) using a digital platform, deliver a modern experience, offering energy packages consumers value;
- solar solution companies are offering compelling value propositions to consumers that may require energy providers to innovate to deliver renewable products and services in a new way, such as offering community-based solar services.

Although utility incumbents have the edge when it comes to economies of scale and years of experience in refining energy delivery, digital energy startups benefit from agility and risk tolerance and may not have responsibility for energy delivery. They are also well positioned to take advantage of new technologies for a seamless consumer experience across digital channels. By nature, digital startups benefit from the proverbial clean slate. Able to design internal operations and processes around consumer needs, they can choose where, when and how to automate transactional processes. In addition, as new energy retailers, they avoid many of the overhead costs borne by a traditional utility. This lower cost of entry has made it easier for digital energy retailers to enter the market. Admittedly, not every utility can be a pure digital retailer, but almost every provider can learn from how these retailers interact with their consumers.

This is not the first time in which utilities have recognized the possibilities of capturing value beyond the commodity. In the late 1970s and early 1980s, leading global utilities extended their business models into value-added products and services. Their goals were to pursue new revenue streams, find new consumers for their commodity service and increase consumer retention. Lacking the support of the appropriate technological advances, consumer demand and regulatory climate, these initiatives often fell short of their goals.

Almost forty years later, we are seeing a similar global movement toward value-added products and services that move outside the traditional scope of utility offerings. This time, however, the environment has changed. Technologies, consumer demand and government bodies have aligned to create the conditions for new opportunities in the energy marketplace. In essence, the lines between markets and value pools are blurring. Consequently, utilities are not the only ones hunting for value.

Utilities can view these entrants as new challengers for the consumer experience and share of spend in the beyond-the-meter marketplace. Or they can frame convergence as an opportunity to grow their market position partnering with them.

2.1.1 Consumer – renewable energy producers: Vandebron, Piclo, Moixa

2.1.1.1 Vandebron

Vandebron is a startup based in the Netherlands which acts as an electricity broker, enabling direct trading between consumers and local renewable energy producers via its digital marketplace. Consumers pay a fixed fee to access the online marketplace and cut out the "middle man" and renewable energy producers get on average 10 percent more for the renewable energy they produce. The service targets the residential market segment [8].

2.1.1.2 Piclo

Piclo is an online platform launched by Open Utility (a software startup based in London) to enable businesses to transact peer to peer with local generators of renewable energy. Businesses and generators sign contracts with an electricity retailer supplying the Piclo service. The retailer then sends meter data to Piclo, which performs the energy "matching"—while a Piclo account dashboard shows matched energy data and allows the business to customize its energy mix. Piclo doesn't cut out the energy retailer or offer lower prices, instead facilitating full visibility of the business energy supply chain. It targets small and medium-size businesses (SME) [9].

2.1.1.3 Moixa

Moixa installs smart batteries and bundled solar panels + batteries in homes. These batteries are aggregated into a "virtual power plant" and managed on Moixa's platform. Customers have the option to participate in Moixa's Gridshare scheme. In Gridshare, Moixa sells the excess power stored in its customers' smart batteries to the grid and gives residents a share of the profits. The service targets the residential market segment [10].

2.1.2 Peer – to – peer platforms: SolarChange and LO3 Energy

2.1.2.1 SolarChange

SolarChange is a network platform based on blockchain technology that connects, monitors and stimulates the use of solar energy. Solar panel owners earn SolarCoins, an integrated cryptocurrency and peer-to-peer payment networks, as they produce solar power and can in turn trade these in to purchase goods and services on several online exchanges. SolarCoins can also be converted into everyday currencies. The service targets the residential market segment [11].

2.1.2.2 LO3 Energy

TransActive Grid, through a joint venture between LO3 Energy and ConsenSys, connects distributed energy producers and consumers in the same neighborhood, enabling them to exchange energy directly, most notably in its flagship Brooklyn Microgrid project. TransActive Grid's energy market is built on blockchain—as rooftop solar panels produce energy, each electron is counted and written to a blockchain. Because blockchains are virtually

unfalsifiable, TransActive is able to cut out central controllers of the grid. There is no billing, no infrastructure losses and no accounting losses [12].

2.1.3 Bundled auto and energy management services: BMW

BMW is piloting its digital charging service in Germany, the Netherlands, United Kingdom and France. The service automatically and autonomously charges customers' EVs to capture the lowest rates. When combined with owners' rooftop solar, the software predicts generation based on weather forecasts to establish an optimum charging plan and marks a move for the vehicle manufacturer into value-add energy management services, previously the domain of specialized companies or energy utilities [13].

2.1.4 Will the tech giants become electricity retailers?

According to Ben Voorhorst, President of the European Network of Transmission System Operators for Electricity (ENTSO-E), Google or Facebook could enter the electricity retailing market in the next 5 years [14]. The main reason is that these companies already have a customer centric outlook. Others, justifying this hypothesis, are the following:

- increasing interest in smart home technologies: **Amazon**, for example with is voice assistant Alexa is making strong inroad into the smart home space. **Google**' Nest the same. In addition, this latter has other interests in the home energy space in the form of its "Project Sunroof" which uses its mapping tools to enable users to calculate the energy potential of their rooftop. Initially focused on the US, the tool is also available through E.ON in Germany.
- larger and larger commitment in renewable opportunities: this is explained by the will to use only renewable sources. To achieve this the companies are either sourcing renewables via long term power purchase agreements or acquiring or even developing their own projects.

  Google, for example, has officially achieved its 100 percent renewable energy target in 2017 (it does not mean that it is powering all its energy consumption with renewable energy but that it is matching what it consumes with equal amounts of purchased renewable energy: for every kilowatt-hour of electricity consumed, it buys a kilowatt-hour from a wind or solar farm built specifically for Google. Furthermore, the company says that its total purchase of energy from sources like wind and solar now has exceeded the amount of electricity used by its operations).

  Apple already has become a retailer in the US, with a 25-year power purchase agreement with Salt River Project. Moreover, they officially announced in April 9, 2018 that its global facilities are powered with 100 percent clean energy (including retail stores, offices, data centers).

  With these backgrounds, and especially with a surplus to requirements, it wouldn't take much of a stretch to look to consumer retail.
- the digital utility: the absence of a physical infrastructure necessarily should not be a concern. US blockchain startup Grid+ is developing the concept of the **digital utility**, aiming to significantly reduce energy costs by eliminating the typical retailer

overheads. The main objective is to bring wholesale market benefits to residential consumers: retailers purchase electricity at wholesale prices and sell it on directly to consumers. Without the overheads of traditional retailers, such as marketing and administration, which typically account for half their costs, the retail fee can be greatly reduced, in turn reducing the final cost to the consumer. As an example, taking the Texas market, Grid+ estimates its charge currently would be $0.068/kWh compared with the average retail cost of $0.115/kWh.

In order to do this, Grid+ is developing a hardware and software stack to create a secure Ethereum-enabled gateway and connect Internet of Things (IoT) devices.

The hardware gateway, named the 'smart energy agent', is an internet-enabled, always-on appliance that stores cryptocurrencies and processes the payments for electricity in real-time. The agent could also programmatically buy and sell electricity on behalf of the user and intelligently manage smart loads, such as a storage battery or smart thermostat.

Further, with artificial intelligence in the agent, it should be able to 'learn' the customer's behaviour and energy usage patterns.

For example, it is envisaged that the agent could estimate the user's next day energy needs and optimize its purchase on the day ahead or real-time markets or in some combination. For customers with storage, the agent could arbitrage the energy and generate revenue.

Currently the best candidate countries for international expansion from Q4 2019 on are Australia, Germany and the UK, according to the white paper, which points to the most significant factors for starter markets – smart meter penetration, regulatory friendliness, and price of electricity – "higher prices mean more room for competition".

2.1.4.1 Amazon

2.1.4.1.1 Smart home

When it first launched in 2014, Amazon's Alexa voice assistant was little more than an experiment. It appeared first inside the Echo, itself a wacky gadget launched without warning or much expectation. As it took off, though, and millions of people began to put a smart speaker in their home, Amazon's ambition exploded. The company saw an opportunity to build a new voice-first computing platform that worked everywhere, all the time, no matter what you were doing. And it began to chase that vision at full speed [15].

While one team at Amazon works on the Echo products themselves (including the Echo Spot, Show, Dot, Plus) and another works on the Alexa service itself, a different team is working on engineering Alexa's world takeover. Indeed, while Apple and Google offer access to their assistants slowly and methodically, Amazon has flung the doors off their hinges and let anyone in. The company knows the path to success is not just in Echo devices, and that Amazon can't possibly make every gadget anyone wants to use. So they've created a new division called Alexa Voice Services, which builds hardware and software with the aim of making it stupendously easy to add Alexa into whatever ceiling fan, lightbulb, refrigerator, or

car someone might be working on. "You should be able to talk to Alexa no matter where you're located or what device you're talking to," says Priya Abani, Amazon's director of AVS enablement. "We basically envision a world where Alexa is everywhere." [16].
Amazon's family of Echo smart speakers has been growing steadily since November 2015 in USA. The main different types are the following:

- Amazon's Echo 2 (controlled by Alexa): it is now in its second generation and with several derivative versions available, continues to expand its music, smart-home, and digital-assistant abilities. It's first a wireless speaker, but capable of much more. Using nothing but the sound of your voice, the user can play music, search the Web, create to-do and shopping lists, shop online, get instant weather reports, and control popular smart-home products—all while your smartphone stays in the pocket (Figure 2.2) [17].

Figure 2.2 – Echo 2

- Amazon Echo Spot: it is a ball-shaped alarm clock with Alexa functionality. It has a tiny 2.5in screen which displays text-based notifications as well as soothing pictures of clouds. There's even a front-facing camera integrated into the Spot which allows you to make video calls. You can use all the normal voice commands that you use with the standard Echo products (Figure 2.3).

Figure 2.3 – Echo Spot

- Amazon Echo Dot: this Echo is cheap and cheerful. It's a tiny 3,2 cm tall device and only has a small speaker inside it, meaning the sound quality is not great for anything beyond voice commands and (non-music) radio. It has all of the voice-functionality of the Amazon Echo 2 but in a nice small package for those who are already proud of their sound system (Figure 2.4).

Figure 2.4 – Echo Dot

- Amazon Echo Plus: it is a potential version of the Echo 2. There's a built-in smart hub so it can be connected to smart home devices and have Alexa search for any compatible smart-home products with one command. Sound quality is also bumped up, with the speaker having far crisper highs than the Echo 2 alongside a deeper bass and general improvements to its voice recognition (Figure 2.5).

Figure 2.5 – Echo Plus

- Amazon Echo Show: it is a major upgrade on the standard Echo as it comes with a 7in screen. This means you can view video content and watch the News instead of just listening to it. It also lets you make video calls and send video messages. Essentially, it's a regular Echo with knobs on (Figure 2.6).

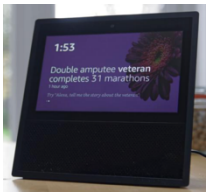


Figure 2.6 – Echo Show

The previous products arrived in the Italian market at the end of 2018.

In June 2017 Sense, the home intelligence platform that interprets the power usage and activity of devices in the home, announced the integration of its platform with Alexa. The Sense skill for Alexa lets families become more aware of their energy use. They will now be able to ask Alexa how much energy they are

using or solar they are producing, as well as the status of any device that Sense detects. Through this integration, the Sense Skill for Amazon Alexa enables even traditional, unconnected appliances to become part of the smart home. The new Sense skill for Alexa is available to anyone with both a Sense monitor and an Alexa-enabled device.
This represent certainly a further step of Amazon toward smart home and energy management system [18].

2.1.4.1.2 Renewable energy

Amazon is more and more involved in sustainability issues. For example, the company announced in October 2016 the development of the 253 MW (megawatt) Amazon Wind Farm Texas project, which is made up of 100 wind turbines and is one of 18 wind and solar projects currently launched across the United States, while there are another 35 more to come. Amazon boasts that all their operating and planned wind and solar projects will generate the equivalent electricity enough to power 330,000 homes each year [19].

2.1.4.2 Google

2.1.4.2.1 Smart home

In 2014 the company has announced that it has entered into an agreement to acquire Nest Labs, the maker of high-tech thermostats and smoke detectors, for $3,2 billion. The deal is the second biggest in Google's history after the $12,5 billion acquisition of mobile phone manufacturer Motorola [20].
Nest became a separate company in 2015, when Google reorganized into Alphabet — an umbrella company that encompasses Google alongside a group of smaller companies, including self-driving car pioneer Waymo, life sciences firm Verily, and cybersecurity tool developer Chronicle. In February 2018 Google just announced Nest will no longer be a standalone Alphabet company [21]; instead, it will merge with the Google hardware team. This strategic decision is a clear signal of the intention to put smart home more and more central, taking completely control of the brand.
Through this acquisition Google's strategy is to gain a firm footing in the growing market for web-connected household appliances.
Google can leverage Nest's technical prowess and manpower to develop the next generation of Internet-enabled home gadgets and speed up the development process. Furthermore, by expediting the development process, Google can have first mover advantage and leapfrog competition in the IoT market. However, there are concerns about the use of this technology. Opponents claim that installing such devices and collecting data will invade user privacy. Google could use this data to influence consumer behavior, market products and even dictate a user's lifestyle, infringing on privacy. Some of the products currently sold by Nest are the following [22]:

- Nest Smoke + CO Alarm (2013): it allows an higher level of protection sending messages to the mobile phone if smoke or CO is present inside the house (Figure 2.7).

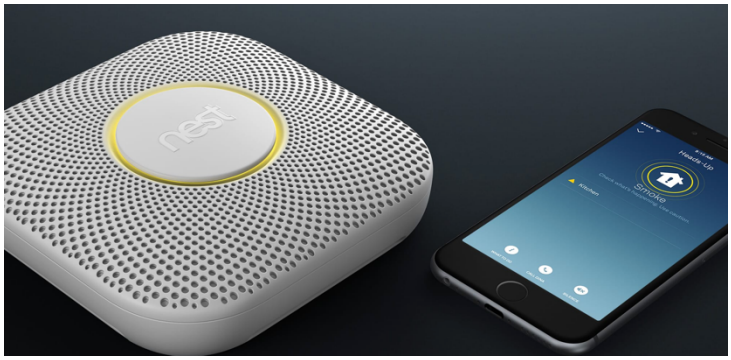


Figure 2.7 - Nest Smoke + CO Alarm (2013)

- 3rd gen Nest Learning Thermostat (2015): it helps to save energy, controlling half user's energy bill, more than appliances and electronics. After one week of use, it programs itself. Nest shows how much energy is used every day in the Home Report. Furthermore, The Nest Temperature Sensor (2018) lets the Nest Thermostat know which room should have a certain temperature at a certain time of the day. It can be controlled through the mobile phone (Figure 2.8).

Figure 2.8 - 3rd gen Nest Learning Thermostat (2015)

- Nest Cam IQ Outdoor (2017), Nest Cam IQ Indoor (2017), Nest Cam Outdoor (2016), Nest Cam Indoor (2015), Nest Secure Alarm System (2017): they allow an extreme security outside and inside home. In addition, the most recent models have Google Assistant built-in (Figure 2.9/ 2.10/ 2.11).

Figure 2.10 - Nest Cam IQ Outdoor (2017)

Figure 2.11 - Nest Cam IQ Indoor (2017)

Figure 2.9 - Nest Secure Alarm System (2017)

- Nest Doorbell (2017): it allows 24/7 streaming and continuous video recording; HDR video shows sharp details even in bright and dark areas; person, motion and sound alerts to detect visitors; it can recognize family and friends and send a special alert; (Figure 2.12).

Figure 2.12 - Nest Doorbell (2017)

The previous products are progressively arriving to the Italian market. The last one is the Nest Doorbell arrived at half of June 2018.

Other products that confirm the Google' interest in smart home, launched in 2016 in USA and just arrived in the Italian market, are Google Home and Google Home Mini [23] (Figure 2.13/2.14).
Google Home starts from what the Google Assistant (Google's voice-control system) can already do on Smartphone: the gadget finds answers, sets reminders, alarms and appointments on the calendar, checks the weather, performs mathematical calculations, summarizes information about upcoming trips, finds nutritional information about food and more.

Figure 2.14- Google Home

Figure 2.13 - Google Home Mini

Added to this, is the support for a handful of external products and apps, currently quite limited in number but still constantly growing. For listening to music, the user can for example entrust to Google Play Music, to radio stations through TuneIn Radio, and to Spotify. Videos from YouTube and Netflix can be played automatically on TV or through set top boxes compatible with the Google Cast protocol; smart appliances are controlled instead by the commands set by the manufacturers, but among those ready to interact with the Italian Assistant there are still few, among which for example the Philips Hue lighting products.
Google Home and the Mini variant offer the same functionality, but they remain very different from each other. The first is a speaker that reproduces a full-bodied sound and good quality, suitable for large rooms such as living room and kitchen; Mini is designed for the bedside table or the desk. In reality, in small apartments or small apartments, the mignon gadget is sufficient for listening and playing content even in the main rooms;
Google's two smart speakers should not be considered as finished products.
Rather they are evolving gadgets, which will become more and more useful over time based on three factors:

- the work of the Google developers, which will unlock functions;
- the number of compatible home automation accessories that everyone intends to provide their home of the future;
- the amount of new actions with which external developers will decide to throw in the nascent market (in Italy) of the app for digital assistants.

The latest complete merger with Nest will contribute to accelerate the evolution and development of these products.

2.1.4.2.2 Project Sunroof

Project Sunroof works by using high-resolution aerial imagery from Google Earth to help calculate a roof's solar energy potential. Potential customers simply need to enter their address, and in roughly one second the program analyzes factors such as shade, roof orientation and local weather patterns to calculate how many hours of sunlight hit that roof in a typical year. All of this information is combined to create an estimate for how much the household could potentially save by going solar over the term of a 20-year lease (Figure 2.15) [24].

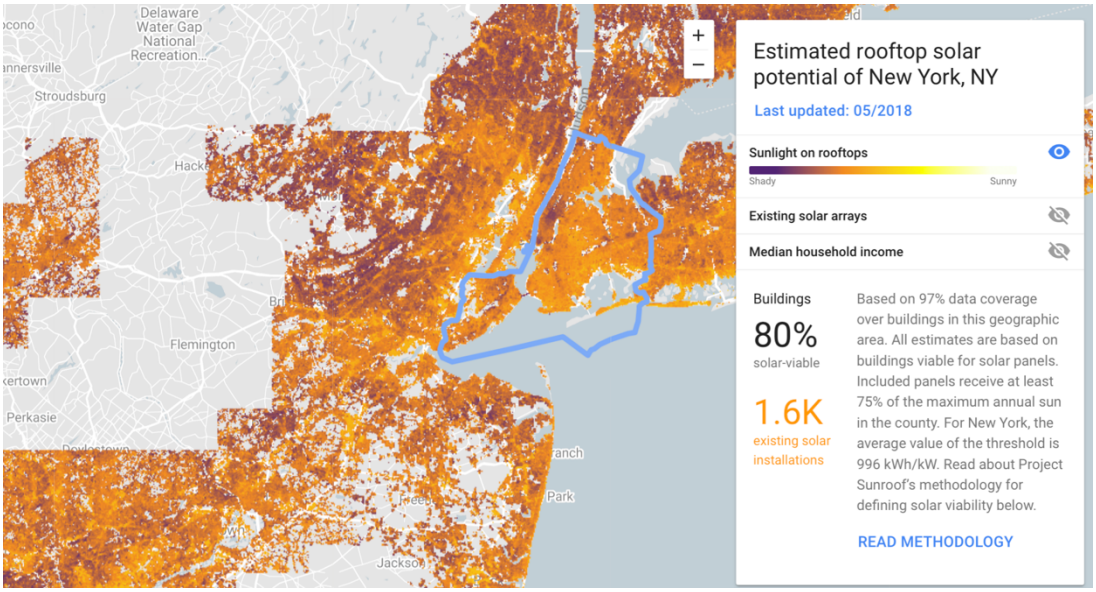


Figure 2.15 - Project Sunroof analysis

Users can fine-tune the estimate by entering their electricity bill information. They can also view savings estimates for different financing options, including a loan and direct purchase. Potential customers can then click to see solar providers in their area.

Project Sunroof currently hosts a mix of solar companies, including major players like SunPower, local installers like Verengo Solar and new players like Pick My Solar. Interested customers can choose to share their contact information with selected providers on the Sunroof platform or contact them directly.

This service isn't free for solar companies. Providers have to pay to join the platform, and they have to bid to receive referrals. It's up to users to actually send their information over to a provider, and the company pays only when Google shares its information.

In April 2016, Project Sunroof hit a new milestone by expanding to 42 states in USA, with the ability to analyze roughly 43 million rooftops.

Since May 2018 E.ON and Google have deepened solar partnership around Project Sunroof based on the following three points:

- E.ON aims for photovoltaic market leadership in Germany;
- Sunroof will start in Great Britain while Italy is still in preparation;
- Google cooperation in Germany extended until the end of 2018.

As in Germany, E.ON will be the first energy company in Britain and Italy to offer its customers a digital assessment of the PV potential of their homes - simple, free of charge and personally tailored.

In Germany the website www.eon-solar.de has established itself as the first address for interested parties who want to take their power supply into their own hands. Well over 10.000 customers have requested a detailed initial analysis of their roof's solar potential. Sunroof is thus making a significant contribution to E.ON's strong annual revenues growth of 150 percent in its solar business.

2.1.4.2.3 Renewable Energy

In 2010, Google started a journey to replace the electricity it uses with renewable sources by signing its first power purchase agreement (PPA) with a 114 MW wind farm in Iowa.
To ensure that its purchases have a meaningful impact on the environment, Google has followed the concept of additionality, which means that all the electricity it buys is funding new renewable energy projects.
In 2017—2.6 GW over 20 projects and 7 years later—Google announced that it reached its 100% renewables target [25]. This is a massive achievement, especially considering that Google began these plans when grid parity was little more than a dream for wind, and solar energy was a technology that only rich Californians and Germans put on their roofs. Figure 2.16 shows the cumulative corporate renewable energy purchased in the United States, Europe and Mexico:

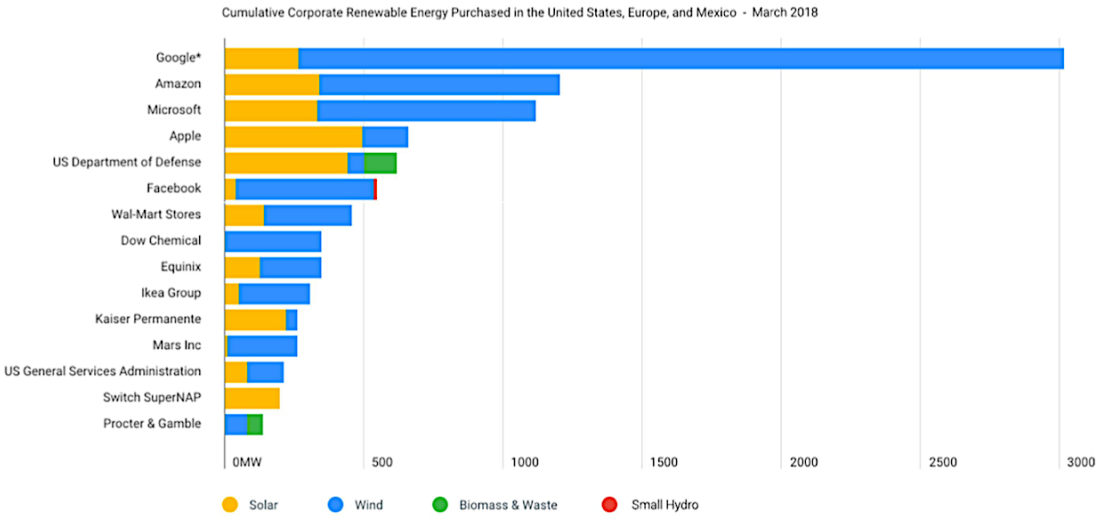


Figure 2.16 - Cumulative corporate renewable energy purchased in the United States, Europe and Mexico (2018)

It is true that Google is buying all its electricity from renewable sources, but it is unlikely that all the electricity it is using comes from renewable sources. This is because solar and wind, Google's choices for renewable sources, are both variable, while Google's electricity demand is not. In other words, there are times and locations when Google must use electricity that comes from traditional sources, while simultaneously the electricity generated from the renewable projects funded via Google's PPAs is curtailed and lost.
The next steps to move its energy program forward could be the following:

- work with the 20 projects it has funded to ensure they have onsite storage, which reduces the chance of curtailments and increases impact on the grid. This also means the balancing cost is not passed to other ratepayers;

- ensure all energy assets (distributed generation and loads) are part of demand response programs or virtual power plants, which makes the flexibility of these resources open to grid operators;
- make sure any new electricity procured is locally generated, and has no impact on the grid;
- encourage employees to take their own energy consumption choices along the same journey;
- commercialize energy itself.

2.1.4.3 Apple

2.1.4.3.1 Smart home

In September 2014 with iOS 8 Apple has entered officially the smart home market. It has developed a software framework called HomeKit that lets users set up their iOS Device to configure, communicate with, and control smart-home appliances. By designing rooms, items, and actions in the HomeKit service, users can enable automatic actions in the house through a simple voice dictation to Siri or through apps.
Any manufacturer that wants to develop HomeKit-enabled accessories has to not only add support for HomeKit into their accessories and companion apps but also join Apple's Made for iPhone (MFI) program. At that point, Apple will either approve or deny the smart accessory. If approved, it will get the "Works with Apple HomeKit" badge. This strategy could represent a point of strength due to a higher safety but at the same time could limit the framework diffusion.
Apple wants to make it easier for smart accessories - like Philips Hue lights, Wink lights, and other smart speakers, thermostats, detectors, plugs, blinds, locks, sensors and so on - to communicate with each other. HomeKit-enabled smart accessories are secure, easy to use, and work with iPhone, iPad, Apple Watch, Apple TV, and HomePod [26] (Figure 2.17).

Figure 2.17 - Apple Homepod

The latter has been launched at the beginning of 2018 and is not yet present in Italy. It represents a late entry to the smart speaker game, but that's standard operating procedure for the Cupertino-based brand: let the rest of the industry stride ahead with a new form factor, identify the issues and then offer something that 'just works'... and generally for a higher price than the competition.

Siri will allow the HomePod to send messages, set a timer, play a podcast, check the news and link up to a range of HomeKit smart home tech to give Apple users a smart home hub at last.
Other features will include the HomeKit ability to control hundreds of home accessories and set phrases like "Hey Siri, I'm home" to control several accessories at the same time, such as turning lights on and off, setting a temperature or other smart home automation.

2.1.4.3.2 Renewable energy

Like other large, high profile businesses such as Amazon and Google, Apple has been increasingly investing in and sourcing renewable energies for its data centers and manufacturing and retail facilities, with the stated goal of achieving 100% renewable power for all its operations (reached in April 2018). Through its subsidiary Apple Energy LLC, the company has been granted the right, effective from August 6 2016, to sell energy, capacity and ancillary services at market based rates into the wholesale markets in the US [27].
In giving its approval last week, the Federal Energy Regulatory Commission (FERC) considered that Apple met the requirements for both horizontal and vertical market power in terms of its absence of utility affiliations and ability to unfairly influence power prices in the relevant regions.
With for example the smartphone market reaching saturation, company growth is likely to come more from innovation than from untapped markets. Therefore, new revenue streams – such as energy – could be crucial in maintaining a company's performance. With the legions of devoted Apple fans, the opportunity to purchase Apple energy could be compelling.
Apple has also been long rumored to be developing an electric/self-drive vehicle. A natural component of this would be a charging network, which could be supplied with Apple owned energy.
It's still early days for Apple Energy as a company but the energy markets are fast transforming and new opportunities are opening up as new entrants challenge the traditional utility model. With Apple's strong brand presence, the company comes with a competitive edge to any activity it decides to become involved in.

2.1.4.4 Amazon, Google, Apple: smart speakers comparison

2.1.4.4.1 Amazon Echo

Pros:

- screens make possible to use them as an alarm clock next to the bed. It's also helpful for ordering products through Amazon;
- there are thousands of "skills" that make the Echo smarter. This means users can install skills to order pizza by voice or play trivia games with the family;
- It can be an affordable way to create multiroom music by connecting multiple Echoes around the home.

Cons:

- managing the Echo through Amazon's Alexa app can be frustrating. Some options are buried in settings, and it gets more complicated as users add more Echoes around the house;
- Echo isn't always good at hearing users' commands as the Google Home is;
- it's not as good as Google is for sharing multiple accounts with family members.

Echo Dot: $49.99; Echo 2: $99.99; Echo Spot: $129.99; Echo Plus: $149.99; Echo Show: $229.99

2.1.4.4.2 Google Home

Pros:

- Google can recognize different voices of family members to serve up personalized information to different people;
- the user can send calendar information, shopping lists, translations, directions, traffic information and other queries, given to Google Home, right to the phone. This is convenient if the user says, "Ok Google, how long will it take me to get to Arby's?". After a response, it is possible to send that data to the phone so to have directions ready to go;
- it's powered by Google, which means it usually has some of the best answers when a question is asked to Google Home;
- the Home is usually pretty good at hearing even from across the room.

Cons:

- Google doesn't sell a model of the Home that can automatically detect gadgets around the house. That means the user needs a hub, which it is not needed with the Amazon Echo Plus.
- the user can't order as much by voice as he can from Amazon, which is tied into Amazon's vast library of products.
- while the user can control a Google Chromecast with Chrome, he can do a lot more with an Echo connected to an Amazon Fire TV.

Google Home Mini: $49; Google Home: $129;

2.1.4.4.3 Apple HomePod

Pros:

- it sounds great and gets nice and loud. Good for music;
- it now supports stereo playback and multiroom audio;
- the user can use it to control the lights and other smart home gadgets that are linked to Apple Home;
- it can manage user's calendar, but only for one person at a time.

Cons:

- the user can't control Apple TV with it;
- Siri only lets the user play Apple Music by voice. To play other services, such as Spotify, he has to stream it from his smartphone to the HomePod using AirPlay;
- it's very expensive, and there isn't an affordable model yet;

- the user can text people, but again only for one user — which isn't appealing for a household of people;
- user can't really call people from it. Instead, it serves as a speakerphone for the iPhone.

Apple HomePod: $349 [28].

Amazon has led in smart speaker sales and adoption since it pioneered the category with the Echo in 2014. But for the first time, someone else has topped the smart speaker sales charts. According to data from technology and smartphone analysts with Canalys, Google beat out Amazon in first-quarter smart speaker shipments in 2018 [29]: Google shipped 3,2 million Google Home and Home mini products, while Amazon shipped only 2,8 million. Growth from other competitors, such as Apple, has also eaten into Amazon's dominance.
In this past quarter (2018), a total of 9 million smart speakers shipped, compared with only 2,9 million devices in the first quarter of last year. While Amazon had nearly 80 percent of the market during that period of 2017, its market shares this year dropped to 27,7 percent. Google, meanwhile, jumped from 19 to 36 percent. Asian smart speaker leaders Xiaomi and Alibaba claimed a combined 18,8 percent, while "Others" (such as Apple) nabbed the remaining 17,2 percent of the market.

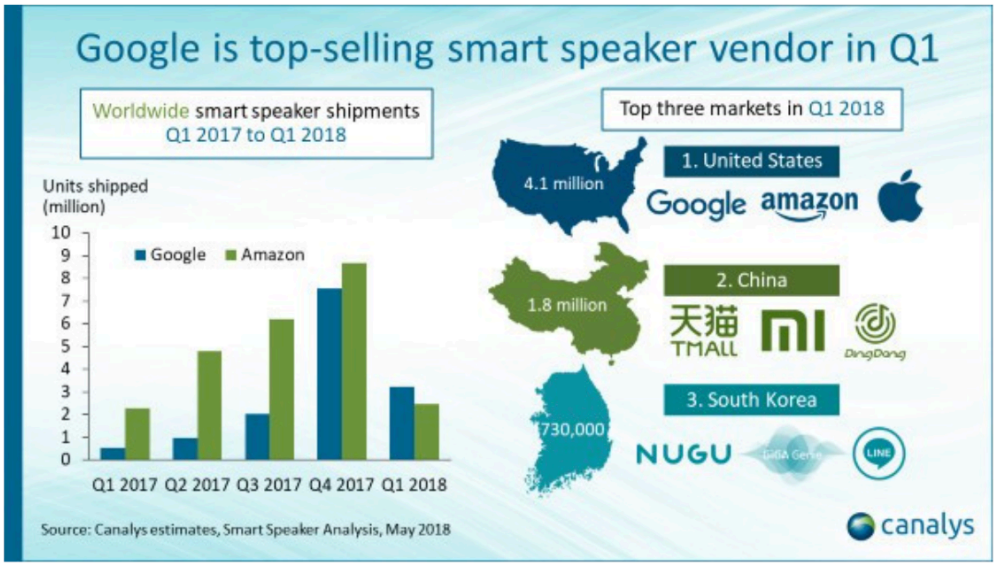


Figure 2.18 - Market share in the smart speaker market (2018)

The real difference, according to Canalys, is Google's international sales. While Amazon still leads in the U.S., it is having more trouble gaining traction abroad than Google. Its biggest advantage is in the channel. Operators and retailers tend to prioritize Google's speakers over those from Amazon, as Amazon is in the tricky position of being a direct competitor.
Google's dominance overseas may continue for this reason, as well as because of Google's multilingual abilities. Google Assistant is available in English, French, German, Italian, and Japanese. Amazon's Alexa, meanwhile, only supports three languages: English, German, and Japanese.

Amazon still dominates the smart speaker space in terms of smart home integrations and third-party skills. But for global dominance, the company's overpowering success in the retail space—something that helped it get an early lead—now may be holding it back abroad. Other retailers and technology providers would rather partner with Google, which they don't see as a threat. For both smart speaker–makers, there is still plenty of room for growth. With the enormous Chinese market at their disposal, we can't discount Alibaba or Xiaomi from possibly leapfrogging these two U.S.-based leaders at some point in the future, either. After all, the smart speaker market is still growing rapidly.
The competition between these two tech giants is underlined by the decision by Amazon not to sell any of the newer products from Google's smart home division Nest.

2.1.4.5 Facebook: smart home

Facebook is the most dominant social media company in the world, with tentacles that include WhatsApp, Instagram and Messenger. Pair that aggressiveness with its social reach and the possibility to make the smart home social becomes a reality [30].
Facebook's thread of services does not really integrate all too well. Sure, it is possible to post Instagram photos on Facebook, but that's about it. What Facebook needs is something that turns those threads into a web. And it may soon have some. Bloomberg has reported the company is working on both a laptop-sized 15-inch video smart speaker and an audio-only smart speaker.
While the smaller audio-only speaker is said to compete with the likes of Amazon Echo, Google Home and Apple HomePod, the larger device is apparently markedly different. The large screen, and its included "smart camera technology" have the goal of making people in different parts of the room feel like they're in the same space.
Allegedly developed by Facebook's Building 8 lab, which was founded to create hardware that locks people into Facebook's ecosystem, the device reportedly has a wide-angle camera, microphones and speakers. It's said to be powered by AI, though Facebook apparently isn't sure whether to power the device with Android or its own custom operating system. The camera could be able to scan for people in the room and lock onto them, which could enable it to do things like zoom into a child's painting while speaking to a parent away from home.
Facebook's new video smart speaker could bridge that real and virtual gap, taking the virtual living room and blowing it up to a larger scale, fusing it with your real living room. No wonder Facebook's alleged goal for this new video smart speaker is to make people feel like they're in the same space.
Finally, the company does not have a voice-based AI, like Alexa or Google Assistant or Siri. However, back in 2015 Facebook acquired Wit.ai, a company that created APIs that let developers build voice-based interfaces with a couple lines of code. Pair that aggressiveness with its social reach with all these tools and the possibility to make the smart home social can soon became reality.

2.1.5 Other competitors in smart home market

Microsoft GLAS thermostat: the device is powered, inside, by Windows 10 IoT and has a translucent touch display. The user can control the temperature, the weather, and monitor the air quality, both internal and external. GLAS also approaches the user's habits, adapting to the user's routines, always turning them into the ideal temperature, making the necessary changes from time to time.
Users are also bound by Cortana's assistance, integrated into the thermostat, and will be able to control all the functionalities of the device. Pre orders are now available in USA for a price of $ 319. In Italy is not yet available (Figure 2.19) [31].

Figure 2.19 - Microsoft GLAS thermostat

BTicino Smarther thermostat: the user can make a simple touch to activate heating or cooling and change the temperature and create custom programs (with energy saving) in a few simple steps through the App installed on the smartphone, whether at home or away. The Boost function allows to quickly obtain the desired comfort for each different time of day: it activates heating or cooling for a limited time, regardless of the profile set and the room temperature. Now among the new proposals has been announced the launch of a version that will integrate the ability to interact for the management of settings, in addition to the dedicated app, on-site controls and programmable functions, also through the use of Amazon Alexa voice systems and Google Home. It is available in Italy for € 175 (Figure 2.20) [32].


Figure 2.20 - BTicino smarther thermostat

Honeywell Lyric T6 thermostat: it contains a concentration of the latest smart home technologies: Wi-Fi connection, smartphone control and dedicated app, location-based temperature regulation (geo-fencing), touch display. The smart thermostat is also equipped with an "intelligent learning" function which stores the heating cycles of the house in order to reach the desired temperature in a certain time slot. It allows the compatibility with HomeKit. It is available in Italy for € 199 (Figure 2.21) [33].

Figure 2.21 - Honeywell Lyric T6 thermostat

Momit Bevel thermostat: it can be detached from the base to be taken to another room. It can be controlled through an app for smartphone. Smart features include “My Budget”, which allows the user to define energy balance objectives, control consumption times using statistics and the ability to plan them according to daily needs and habits. It "learns" habits and provides tips on how to save costs and, through geolocation, allows to turn on or

Figure 2.22 - Momit Bevel thermostat

off the heating based on distance from home. It is available in Italy for € 129 (Figure 2.22) [34].

2.1.5.1 Netatmo

Thermostat: it allows a temperature control outside home through smartphone. It creates a program based on user's habits and lifestyle, so to use heating only when needed (saving 37% of energy). It works with Apple HomeKit and with the Google Assistant. It is available in Italy for a price of € 179 (Figure 2.23).

Figure 2.23 - Netatmo thermostat

Smart Smoke Detector: it activates an 85dB alarm and notifies the user's smartphone when it detects smoke at home. The signal can be switched off either manually or via the app. Smart functions are accessed via the Netatmo Security app. The detector also has a self-check function that verifies correct operation and generates reports that can be consulted through the app. It is compatible with Apple Homekit. It is not already available (Figure 2.24).

Figure 2.24 - Netatmo smart smoke detector

Home Security Alarm: it is an accessory of the Welcome camera, with which it creates a complete system for the secure home, and also connects to the Tag, the security sensors for doors and windows of Netatmo. In practice, if the Welcome or the Tags detect an intruder, the alarm is activated with a powerful 110 dB signal. Also, in this case, the user receives a notification with a description of the event and with the video taken from the Welcome. The Security Alert can also be activated by hand, using the app. It is not already available (Figure 2.25) [35].

Figure 2.25 - Netatmo home security alarm

Despite an increasing competition in this field, Amazon, Google and Apple seems to increase more and more their supremacy.

2.2 The opportunity to create a platform business in the energy sector

The *energy sector has not yet been conquered by a platform giant like Amazon, Spotify or Facebook. However, there are reasons why this will happen soon.* All that is needed is two things: a trusted customer-facing platform and a back-office platform that combines the purchasing and trading of energy together with the management of customer demand [36]. One of the arguments against platforms in energy is that electricity generation and distribution are highly capital intensive. However, that argument does not hold up. The internet and the wider telecommunications area are also highly capital intensive. For example, companies like Google and Facebook use that equipment to deliver services to their customers. They may have some hardware but that is not their core competence. What they do is control the customer relationship. And this may be the real opportunity for a platform business in energy as the utilities who currently hold the customer relationship see them more as a 'number', or a metering point than a customer.

Given that utilities are so bad at dealing with customers, the reason why companies such as Amazon or other platform companies has not started yet to offer energy to their customers are the following:

- regulation which has hindered the standardization and commoditization of energy;
- these firms are not allowed to enter the market as there are state monopolies in place or regulations which prevent competition. Even where there is competition, as in most of Europe, cumbersome regulations are often stacked in favour of the incumbents.
- the other issue is the financial strength that has been traditionally necessary to guarantee delivery of energy to the customer. This plays to the strengths of energy companies which tend to have strong balance sheets, power generation assets and trading relationships with key fossil fuel suppliers.

These obstacles, however, will soon be overcome:

- with regards to the lack of competition amongst suppliers of energy, we are seeing the increasing liberalization of energy markets across the world as well as increasing pressure from regulators and legislators.
- the other big change is renewable generation, most of which is not owned by the utilities, which in turn is creating more competition in the power market. Add to that the growing use of wholesale power markets for trading electricity, not to mention the possibilities of blockchain, which will make it easier and more transparent to buy and sell electricity. This in turn makes it possible for a whole range of new players to enter the world of electricity as well as enabling a new range of business models.

The conclusion is that it is only a matter of time before global household names such as BMW, Amazon or Google begin making the necessary acquisitions to enable them to offer such energy services to their customers.

3 CHAPTER - “Possible reactions of electric utilities”

3.1 New potential business models

With shifting regulatory policies, changes in consumer demands and advances in technology, responding to the evolving energy marketplace is a complex undertaking. Having reviewed the currents shaping the evolving energy marketplace (Chapter 1) and the new potential competitors (Chapter 2), a critical question remains: *what is the most effective strategic direction for the energy provider of the future*? The answer depends on regulatory and market environments, technological capabilities, the size and nature of a utility’s consumer base, its internal appetite for change and its current business portfolio.
As utilities respond to the new opportunities and challenges driven by industry convergence, sustainability, changing consumer preferences and disruptive technologies, **four possible business models** can be observed (Figure 3.1):

Figure 3.1 - New potential business models for electric utilities

The main drivers are the following:

- potential revenue: the amount of additional revenue that a provider may be able to capture;
- breadth of product and service offering: the extent of the product and service offering that a utility supports, manages or sells to consumers;
- breadth of capability extension: the amount of additional and sophisticated capability development likely to be required for success with a chosen business model;
- operational and brand agility: the amount of flexibility and adaptability the organization and the consumer- facing brand require [37].

3.1.1 Standard Provider

A standard provider likely will continue focusing on supply, distribution and customer operations as core competencies, leaving most beyond-the-meter opportunities to others.
A standard provider creates revenue primarily by selling energy. Thus, revenue is variable based on market or generation and distribution costs and may be significantly affected by upward or downward trends in energy demand. Even when implementing smart technology, an energy provider committed to this model will concentrate on achieving grid efficiencies and improving back-office and customer operations as they relate to the traditional commodity business. While an energy provider following this model may engage in limited third-party relationships, it will leave the value-added products and services value pool to other providers. **With this model, the focus of innovation is on operational efficiency and cost effectiveness rather than products and services.**
The standard provider business model creates two future options for an energy provider:

- like New Zealand's Powershop and other utilities around the world, it can aggressively sell energy to consumers by "productizing" the commodity while also focusing on cost reduction. By focusing on the consumer relationship, standard providers can successfully maintain their role as the energy provider. In this scenario, customer service capabilities focus on delivering an effective self-serve experience and using channel capabilities to reduce cost-to-serve. Moreover, by automating these interactions without creating additional back-end processing, standard providers can reduce overall costs and increase customer satisfaction;
- another option for the standard provider is to focus capital and resources on supply and distribution, choosing to eventually exit the retail business. These standard providers will benefit by focusing their resources to win in different parts of the energy value chain, while allowing others to compete for the consumer relationship. Some standard providers may also seek to optimize investments in grid technology and efficiency.

This model has the following risks:

- utilities choosing this model will come to rely on other providers to secure demand for their commodity sales;
- if they do not continually invest in evolving customer capabilities, utilities that choose to retain consumer relationships may lose the most profitable consumers and retain only unprofitable consumer segments.

3.1.1.1 Powershop

New Zealand's Powershop has recognized that to capitalize on commodity sales, it needs to be responsive to the values of its consumer base. By leveraging online, mobile and emerging social media channels, Powershop offers customers more convenient, cost-effective and personalized access to basic commodity service. It offers customers the ability to view, monitor and purchase electricity via mobile apps on their smartphones. Beyond offering ease of use through new consumer channels, Powershop has productized the electricity commodity by creating powerpacks, such as "Airshed Energy," an electricity commodity

bundled with carbon offsets. These consumer-centric capabilities and offerings have made Powershop successful in acquiring and retaining commodity consumers.

3.1.2 Marketplace advisor

To address market and regulatory demands, **the marketplace advisor will offer consumers guidance and advice about new energy products and value-added services**. Essentially, these providers become the trusted advisor for energy, home products and services, and energy efficiency. Beyond guidance, these utilities may choose to create online portals or hubs where they keep a managed repository of third-party products and services that can help consumers address their energy needs. This model requires a higher degree of new capability extension, but depending on the partnering structures, revenue potential is limited. Moreover, partnership management and product knowledge are central to becoming a trusted marketplace advisor. The marketplace advisor employs customer analytics focused on understanding how consumers use energy and structuring effective value propositions for additional products and services.

An energy provider following this model may be able to generate net-new revenue and increase customer retention by building consumer referral programs and service agreements with preferred vendors of value-added products and services.

This model has the following risks:

- an energy provider following this model no longer has exclusive ownership of the consumer relationship. It must rely on third parties to meet consumer expectations, deliver value to the market and attain demand management goals;
- it also needs to build strong vendor and exception management capabilities. After all, a single mistake can irreparably damage its reputation as a trusted advisor.

3.1.2.1 Duke Energy

In the new energy marketplace, Duke's CEO aims for the utility to assume a role analogous to that of a large Internet market provider—offering uniquely branded products and services that link consumers and energy-efficient equipment providers through a single platform. The organization's vision for developing the new energy marketplace includes:

- utilizing Duke's brand on energy-efficient, in-home products that communicate directly with the utility;
- offering unique discounts on the best energy-efficient appliances, as well as utility-branded appliances;
- promoting consumer conversion from gasoline-fueled vehicles to electric vehicles;
- advocating regulatory changes to allow for decoupling of consumer consumption and tariffs. establishing leading industry perspectives on an open Internet protocol platform for in-home appliances.

3.1.3 Specialized provider

With this model, an energy provider complements its traditional commodity offering with specific value-added products and services. Some examples may include targeted offerings around green energy, electric vehicles or home area networks. They require:

- operational and brand agility for successful product launches and consumer adoption;
- consumer insight and delivery excellence drive opportunity identification;
- effective sales, delivery and analytics.

With the specialized provider model, an energy provider is setting a highly focused strategy regarding the types of products and services it offers and when it offers them. In doing so, it can stay closely aligned to its core, make highly targeted investments and grow in a more measured fashion. Revenue is created through the core commodity; however, additional revenue and margin are delivered by value-added products and services. **The main risks** is that concentrating focus and investment in only a few areas, an energy provider could expose itself to larger losses if any or all of those decisions prove flawed. These energy providers may also find themselves left out of a product/service category as other competitors fill the void. Utilities may opt for the specialized provider model as an interim step on the journey to becoming a full-service provider.

3.1.3.1 *Green Choice*

Green Choice is a 100% green electricity supplier in the Netherlands. Established in 2001, it offers customers sustainable energy from solar, wind, water and biomass. Its differentiation strategy is based on providing customers with green choices—from energy and self-generation capabilities to home energy management and options for electric vehicle charging.

Such offers demonstrate that Green Choice is committed to its brand, even if it means new offers eroding value from the core business of selling green energy. Furthermore, Green Choice's brand extends well beyond energy retail. It makes continual investments in technology and partnerships and works with a variety of environmental, corporate and social organizations working toward a more sustainable world. Green Choice is setting the green example when it comes to energy.

3.1.4 Full-service provider

An energy provider following this model offers a wide range of products and services, including home services and other beyond-the-meter offerings. Thanks to industry and technology convergence, it may also venture into new categories of home services, be capable of bundling and may look much like many of today' telecommunications and cable companies.

Under this business model, a provider may acquire or develop internal capabilities around most or all of its beyond-the-meter portfolio. Alternatively, it may build a solid platform for integrating third-party capabilities that complement the utility's legacy strengths. The full-service provider offers the largest range of products and services, thereby increasing overall revenue potential but also requiring development of new capabilities across the

organization. Product development and portfolio management capabilities allow a full-service provider to profitably offer a range of value-added options to consumers.
Providers must maintain strong customer management and channel capabilities to deliver cost-effective marketing, sales and service that is targeted at increasing revenue per customer. Meanwhile, branding initiatives and in-person channels increase in importance as providers expand into additional products and services.
While becoming a full-service provider offers potential rewards—higher revenues, better competitive differentiation and stronger consumer relationships—it is also a tremendous change that **may introduce significant market and internal risks**. The evolution is complex and costly, and if an energy provider takes too long, it could find itself losing traditional markets before the growth strategy takes root.

3.1.4.1 *NRG Energy*

NRG Energy, a company with holdings in the United States, Europe and Asia, is using this strategy by building subsidiaries that sell products or services in such areas as renewable power, thermal steam and electric vehicle services. For example, in the United States, NRG owns a number of energy retailers including Reliant Energy. Reliant, a competitive energy retailer in Texas, offers consumers energy and additional products and services such as identify theft protection, air conditioning and heating tune-ups, and solar leasing options. Under its eVgoTM brand, NRG is also building a mass-market electric vehicle system that customers can sign up for in order to charge their electric vehicles. The service includes a home-recharging kit and bundles the charging equipment with the electricity commodity through subscription-based charging packages. NRG's approach takes advantage of its position as a vertically integrated utility to leverage opportunities across the energy value chain.

The optimal business model may vary considering the following elements:

- regulatory and market climate: the market and regulatory environment plays a large part in defining the current and future revenue potential for an energy provider. Thus, the first step is assessing whether it is the regulator or the market— or both— creating opportunity, and how large the opportunity is;
- consumers: consumer preferences, characteristics and perceptions of a utility will shape how much of the beyond-the-meter market it can capture. Thus, as a utility sets its sights on the future, it needs to find a way to segment and analyze its base of consumers, as well as determine the consumer appetite and value proposition for additional products and services;
- products and services: the emerging energy marketplace offers a wide range of product and service opportunities. When considering the possible business models ahead, utilities must determine what products and services they can effectively offer and the most effective strategy for bringing those to market;
- internal capabilities: existing internal capabilities are an important factor that drives the amount of change required to implement a particular model. It is likely that for all providers, current capabilities will not fully align with desired future business

models. Some utilities have not needed the organizational skills and capabilities required to thrive in a competitive marketplace. Utilities that plan to secure a meaningful share of the evolving energy marketplace need to consider what capabilities they currently have, what capabilities they will need, and how they can bridge the gap.

Moreover, **many providers are likely to integrate mix of models that can shift over time**. Depending on the type of business model different core competences are required.

3.2 The basic core competences of the utility of the future

The basic competence needed by all utilities is the ability to put consumers at the center of the business. Generally, consumers view their energy provider as a single organization. Internally, however, the customer experience is often fragmented across units that make sense only from an operational perspective. Because of these silos, providers often subject consumers to inconsistent messaging and interactions across multiple channels, causing dissatisfaction.

New consumer interactions related to distributed generation, electric vehicles and energy management products and services further highlight the need for more cross-organizational coordination.

Consumer centricity is a mindset that requires a commitment to looking from the outside in—reshaping traditional operations to provide a consistent and engaging multichannel customer. Given the impact and complexity of internal barriers, incremental changes are unlikely to yield true consumer centricity. Driving step-change improvement will require an enterprise view of customer operations supported by integrated, consumer-centric operating models, a customer champion and technology:

- in an era in which consumers are increasingly using multiple channels and devices, sometimes at the same time, energy providers will need to **bring the omni-channel concept to enterprise strategy**. In other words, it is not enough to maintain a strong presence in each channel; true consumer centricity requires a fully connected, cohesive experience that seamlessly transitions across channels;
- providers will require a point of accountability, which may take the form of a **chief customer officer (CCO)**. Under this model, responsibility and accountability for consumer interactions remain with each touch point, but the CCO assumes ultimate responsibility for ensuring the consumer is at the heart of key decisions. Moreover, is fundamental teamworking in a coordinated and organized way;
- applying a **common customer IT system**—such as a CRM or customer information system (CIS)—can drive creation of standard processes for consumer interaction. A common technology layer should fit over the operational pillars and include a single view of customers for:
    - contact and channel interaction management
    - case management
    - customer advocacy
    - campaign management
    - consumer insight and segmentation

To succeed amid the forces shaping the marketplace **and become more consumer-centric**, providers should embrace a staged and progressive approach to strategically building and enhancing **the following core competencies for the future**:

1. delivering operational excellence;
2. optimizing customers interactions;
3. creating lasting customers engagement;
4. extending the value proposition.

In particular, utilities should focus on getting the basics right by first building a strong operational foundation to support further layers of competency development.

3.2.1 Delivering operational excellence

Operational excellence could be seen as a comprehensive discipline that delivers measurable, repeatable and predictable business results through continuous improvements in effectiveness and efficiency. And yet, operational excellence is not simply about doing the same things better; it also addresses the way the business is set up and how the work is executed on a day-to-day basis. In this way, operational excellence is about creating a foundation for simple, agile operations today while taking a forward-looking view focused on generating value over the long term. It is important to focus on the following elements:

- eliminate customers dissatisfiers (price stability, reliability service quality, perceived accuracy of the bill) and understand consumer expectations through analytics is of strategic importance for energy providers;
- develop people, nurturing essential skills, rewarding performance and keeping employees engaged can drive significant long-term gains for the organization;
- make the organization simpler: for example, energy providers operating across multiple locations and regions can reduce overhead by centralizing forecasting, workforce planning and scheduling;
- identify strategic outsourcing opportunities;
- establish key performance indicators and understand the complex interrelationships among these measures;
- understand the value of “little data”, defined as analytics initiatives that target specific business outcomes and encourage an organizational shift toward continuous, data-driven improvement. It does not require huge investments and allows some improvements such as decreasing customers complaint, improving self-service or electronic bill adoption rates;
- use and consolidate smart grid and smart metering that are having major impacts on a utility’s back office.

3.2.2 Optimizing costumer interaction

New channels, new devices, new types of interaction are creating a new landscape for utilities. Facing this proliferation of options, utilities have an opportunity to create a channel mix dominated by mobile and Web self-service. Doing so not only delivers on the changing

preferences of consumers (who are increasingly social, mobile and connected) but also can address a range of operational and efficiency goals.

Furthermore, as energy providers move beyond the meter (energy-efficient product and services) and face the need to develop multifaceted customer relationships, retail locations and face to face channels will gain importance. Indeed, an Accenture' research reveals that two-thirds of all consumers desire to purchase energy-efficient products in person through an in-store or in-home interaction.

Energy providers can use three inputs to develop a clear view of the right channel structure:

- **identify the volume of consumer interactions across channels**: high-volume interactions usually lend themselves to self-serve treatments and will have a significant financial impact;
- **connect key metrics to channels at the interaction level**: by understanding the cost, value and customer satisfaction impacts of different interactions across each channel, an energy provider can optimize the consumer experience and maximize business value;
- **understand consumer preferences and expectations**: deep insight provides a view of how consumers want to interact and what they expect from service interactions. Such insights overlaid with operational goals and cost to serve form the basis for defining the multifaceted relationship.

Consumers' changing preferences are leading to a more complex relationship with their energy providers. By changing the interaction mix and approach to reflect consumer preferences, utilities can deliver a tailored, personalized customer experience. These multifaceted customer relationships serve as the basis for achieving a genuine connection with the new energy consumer. From these relationships, utilities can develop value-added interactions and realize key business outcomes: customer satisfaction, reduced cost to serve, revenue assurance and demand-side management.

Increasingly, consumers prefer the convenience of self-service (Web-enabled channels) and mobile for a wide range of interactions. As a consequence, they must be a critical area of focus and represent a key enterprise value lever. Energy providers that can successfully

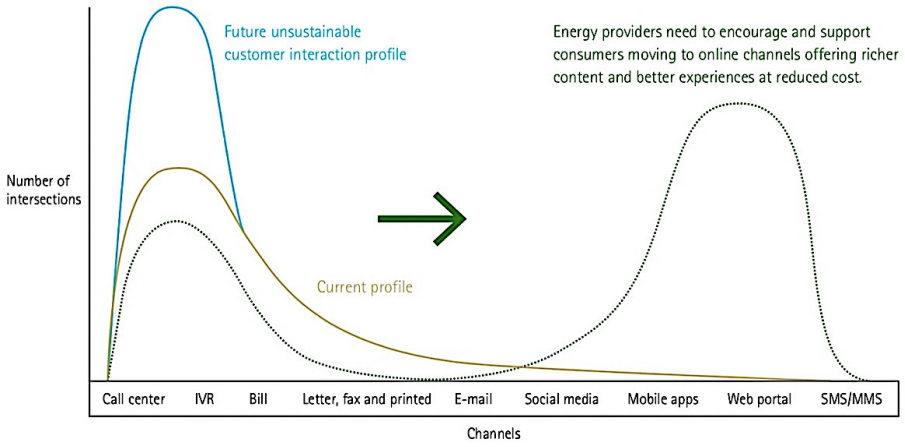


Figure 3.2 - Increasing consumers' interest for self-services and mobile

design, implement and deliver excellence in *self-service* and *mobile capabilities* will reap dividends that extend well beyond the commercial (Figure 3.2).

Self-service: historically, energy providers have developed self-service capabilities for a select set of relatively simple transactions, such as viewing bills or making payments, with a core value proposition of convenience. Today and in the future, expanding use of smart meters, home energy monitoring, and controllable applications and thermostats will converge with exploding use of the Internet and mobile technologies, creating new avenues for self-service. As energy providers begin to redefine the traditional self-service offering, the value proposition will become more complex. While convenience may still motivate some consumers, others will seek different benefits from self-service, but all will expect basic self-service capabilities from their providers. Indeed, Accenture's research has shown that when considering self-service, energy providers need to first master the basics. When considering the use of self-service, consumers reported that the most important factors are ease of use, first-time resolution and the availability of technical support when needed (Figure 3.3). Consumers are not forgiving: one bad experience can turn a consumer away from self-service or from the provider.

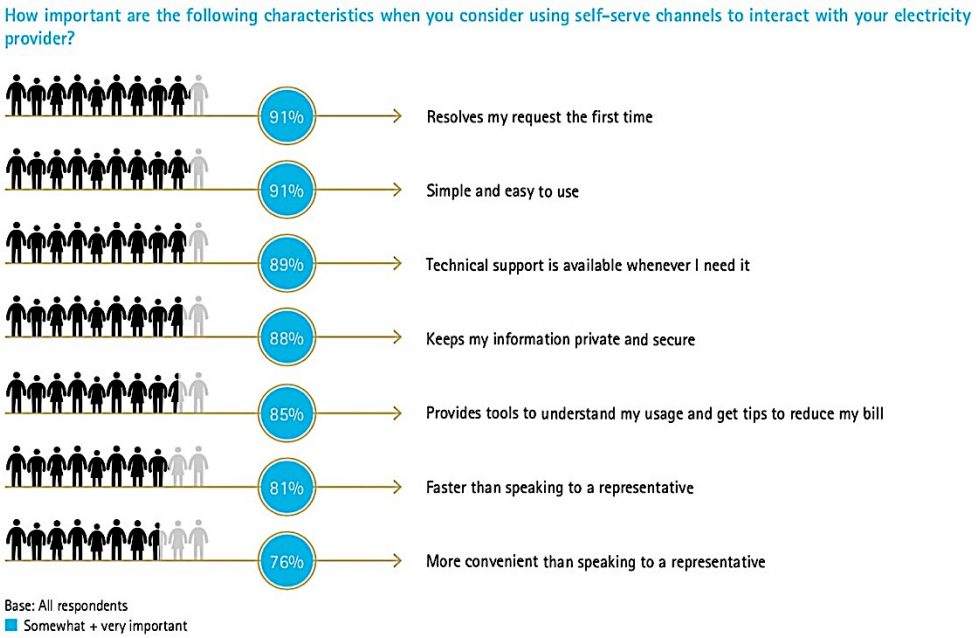


Figure 3.3 - Most important factors, considering the use of self-service, according to customers

Mobility: as consumers increasingly embrace smartphones and other mobile devices, energy providers need to rethink their digital strategies. Instead of treating mobility as an afterthought, providers must build a mobile-first mentality.

Over time, energy providers can work to increase mobile adoption by expanding their mobile platforms to include more transactions and more dynamic, engaging content, such as loyalty programs, games, other rewards and location-based coupon services. Leading utilities are already leveraging the broad range of capabilities new mobility channels offer. For example, Enel, a large Italian energy company, has designed a series of mobile applications that provide information and engage consumers through gaming mechanisms. One application related to wind power asks users to blow into the microphone to see how much power would be generated. Powershop, a New Zealand electricity retailer that operates in a deregulated

market, has designed a consumer-friendly mobile phone application and Web portal that allow consumers to monitor usage, purchase electricity and submit meter reads.

3.2.3 Creating lasting customer engagement

Traditionally, consumers and their utilities have not had a high-touch, high-value relationship (most consumers interact with their provider an average of just nine minutes per year). Whether to meet energy-efficiency goals, fuel new revenue opportunities, drive cost efficiencies or improve satisfaction, consumer engagement is becoming a much more critical component of virtually every provider's strategy. In strengthening engagement, utilities need to consider consumer preferences and technology advances to deliver innovative, tailored experiences that contribute to long-term satisfaction and loyalty.

As the growing adoption of electric vehicles creates a "roaming" energy consumer, energy management and other home solutions are challenging providers to develop relationships beyond the bill payer and to engage more actively in the home. Growing adoption of distributed generation (residential solar, in particular) is also creating a new dynamic for providers. The nature of the relationship fundamentally changes when consumers become "prosumers"—creating their own energy and, in some cases, selling it back into the grid. In other cases, groups of consumers are coming together in communities to influence the types of available energy options. Some organizations are responding by creating new offerings aimed at communities. For example, the Orlando Utilities Commission is looking to entice communities to lock in energy rates for up to 25 years, using the guaranteed revenue to finance a community solar project. Similarly, some organizations are applying the success of online crowd sourcing to energy. California-based Solar Mosaic has created an online marketplace to attract crowd-sourced financing for solar projects and is obtaining positive results. Although Solar Mosaic is not a utility, it demonstrates that taking innovative new approaches to engaging communities of consumers may offer opportunities for energy providers in the future.

Providers will increasingly need to engage a broad range of stakeholders to tap new opportunities and remain relevant in the new energy marketplace.

The following points should be considered in order to engage more and more customers:

- the energy provider must shift to a dynamic consumer concept and recognize new types of consumers (Figure 3.4). Energy providers must now consider overlapping consumer types that require differing levels of sophistication to understand and engage;

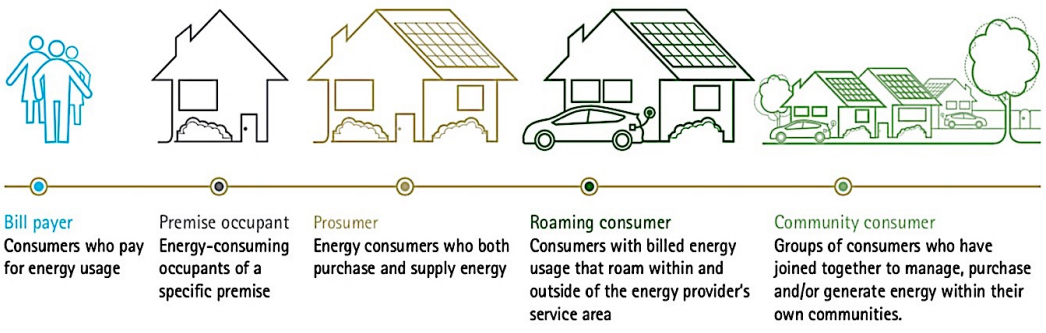


Figure 3.4 - New type of energy customers

- utilities have long used behavioral segmentation as a key tool for delivering operational and consumer insights. To truly drive value, providers need to combine this approach with needs-based segmentation. Behavior refers to the consumer's actual actions and lifestyle. By contrast, needs and attitudes refer to how a person feels about energy and his or her provider;
- as smart metering, home area networks and other technologies give consumers more control over their energy usage, the industry will need to evolve payment options as well. A possible approach incudes prepaid energy that is positive considering utilities' cash flow and help customers to budget and reduce the worry about receiving bills that could push them into debt;
- electric vehicles represent a promising opportunity for utilities to increase revenues and a new way to connects consumers with their energy consumption by creating a platform for daily engagement. Utilities can capitalize on consumer values of convenience and simplicity by offering products and programs that help to automate home energy management;
- gamification— the process of using game thinking and game mechanics to engage users and solve problems—combined with the rollout of smart technology offers a powerful new way to create an excellent consumer experience and encourage conservation behavior. For example, US-based Simple Energy has designed an online platform that allows users to score their energy usage against friends and receive rewards for conservation behavior. Like consumers, employees can be engaged and motivated through gamification;
- the ability to manage, analyze and extract insights from data will power success with consumers and operations. Successful energy providers will take it a step further—using consumer insights to proactively tailor interactions across channels and to enable new services. One prime example is intelligent invoicing, which allows utilities to deliver different bill formats and messages based on consumer segments, past history and value to the organization. Furthermore, interestingly, Accenture's research demonstrates that nearly two-thirds of all consumers are not opposed to having utilities share their usage data with third parties to offer additional services that provide consumers with value through bill savings and new type of services;
- as consumers gain greater control over and insight into their energy usage, data visualization and analysis tools are becoming a critical part of solutions that seek to engage consumers around energy usage and management. Regardless of the delivery channel—online portal, mobile application or paper mail—consumers increasingly want the tools to understand, evaluate and gain insights from their energy usage information;
- as online researching and shopping become the norm, utilities can provide an engaging experience to customers evolving physical locations that were once primary points of sale and customer service into showrooms, experience and education centers. Since creating and delivering these types of retail experiences are not a core competency for providers today, they should leverage strategic relationships to address both the evolving energy marketplace and energy-efficiency

goals— using partners to quickly and effectively build capabilities across customer and retail operations;

- utilities should engage with a variety of stakeholders including cities, municipal, regional and federal governments, universities, other service providers and even start-up organizations;
- exploit smart home and smart city initiatives, not only as a source of new revenue but above all as a competitive differentiator to attract and retain a new generation of professionals and entrepreneurs.

3.2.4 Extending the value proposition

Quickly becoming more than a commodity, energy is evolving into a consumer product that can align with consumers' values and preferences. As new products, services and technologies break through traditional boundaries, providers can seize opportunities to strengthen consumer engagement and, in some cases, identify new revenue streams. Even so, many providers will be challenged to establish the product management and innovation capabilities essential to extending the value proposition.

Furthermore, while exact conditions vary by market, many providers face stagnant energy demand. Looking to the future, greater energy efficiency, adoption of distributed generation and government mandates will continue to chip away at core commodity revenues. Meanwhile, margins are shrinking due to increasing generation costs, infrastructure investments and, in deregulated markets, fierce competition. **Extending the value proposition offers opportunities for providers to differentiate in a crowded marketplace and pursue new revenue opportunities**. In noncompetitive markets, rethinking the energy value proposition is a way to extend the relationship with consumers— acting as a trusted energy advisor and addressing conservation-related goals.

In competitive markets, value-added products and services can help improve consumer stickiness, increase share of spend and reshape providers' brands.

However, energy providers are not alone in pursuing value by reshaping propositions (Chapter 2). In competitive and noncompetitive markets, nontraditional new entrants are emerging along the value chain—**and it is important for providers to move quickly to define their territory and build relationships before others make the market**.

The main points to be considered are the following:

- ***innovation***: utilities have long excelled at innovation, often directing efforts at solving significant engineering challenges or profitably managing complex tariffs. Innovation is increasingly required in largely untapped areas including strategic brand management (brands may need to be updated to better reflect the new world in which energy is more than a commodity), product development (stage-gate development and opening innovation to third- party partners or even consumers) and product portfolio management.

  Energy providers must be able to continually monitor trends and translate them into value-added products and services— moving quickly and efficiently from study to scale (Figure 3.5).

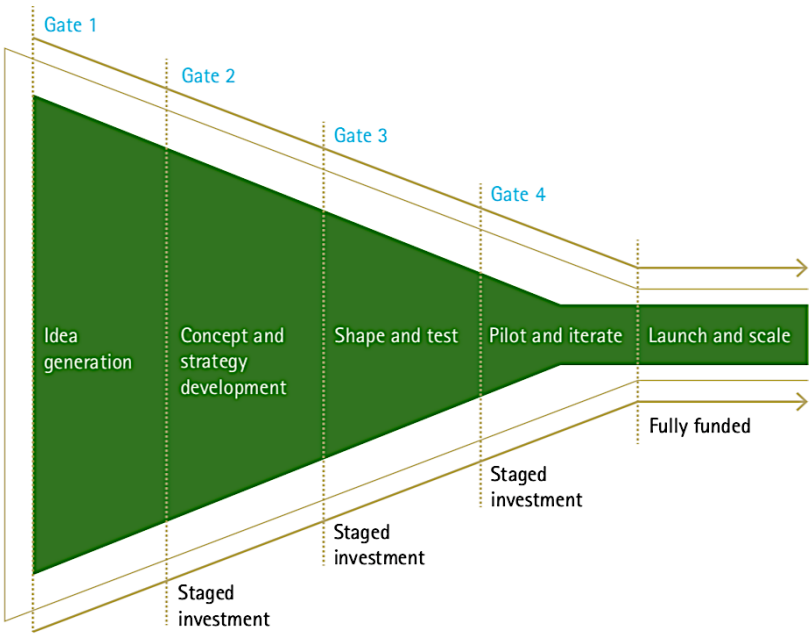


Figure 3.5 - Close funnel of innovation

Of course, innovation does not need to come only from within. Increasingly, organizations are tapping into the power of open innovation, which combines an internal innovation engine with fresh ideas and bold insights from outside the four walls of an organization (Figure 3.6).

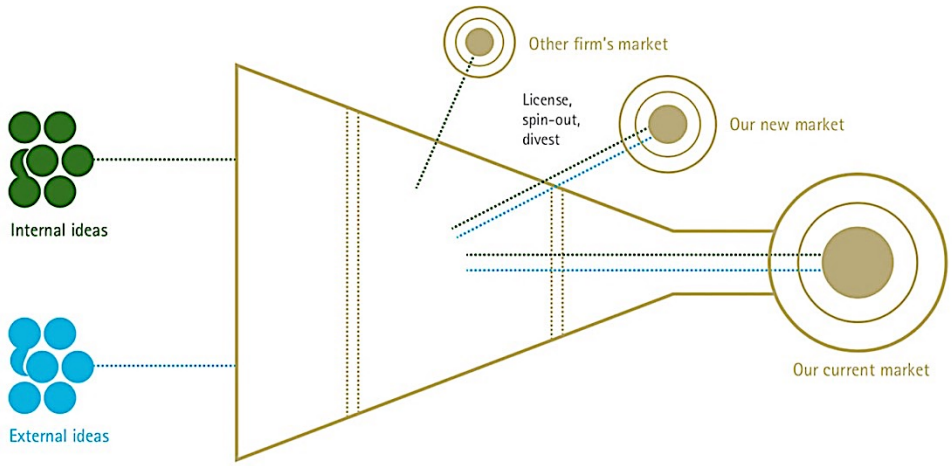


Figure 3.6 - Open funnel of innovation

Utilities that want to compete in the evolving energy marketplace will benefit from integrating open innovation into their organizations to rapidly augment internal innovation capabilities.

- ***multiproduct company***: according to an Accenture' research, when it comes to energy-related products and services, nearly half of consumers (48 percent) plan to spend money on them (Figure 3.7). Moreover, consumers who are not planning to spend are held back primarily by cost or by the belief that they will not see significant savings. Through innovative financing plans and consumer education, providers can

break down these barriers, creating more opportunities to influence consumer behavior and capture new revenue.

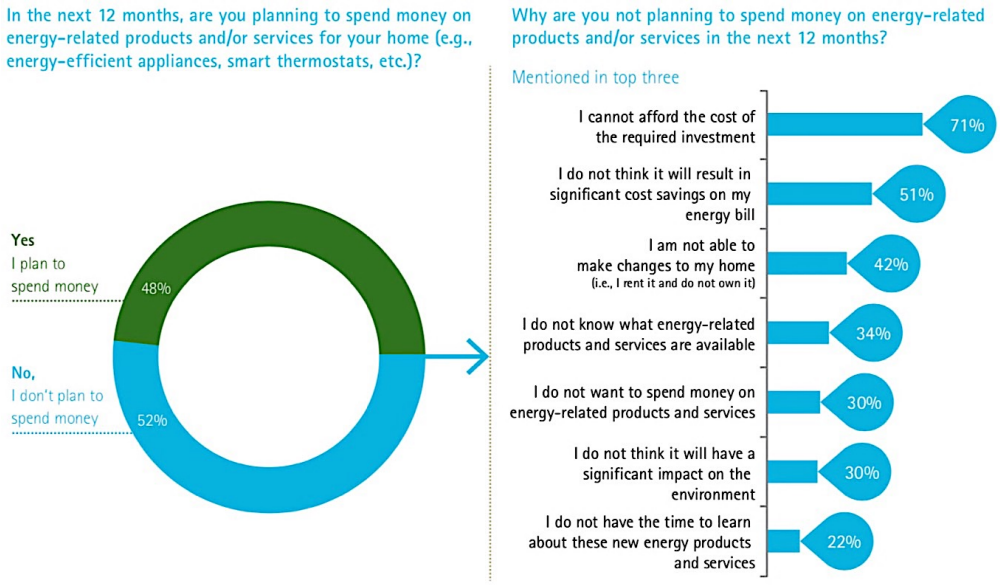


Figure 3.7 - Consumers' plan to spend money on energy – related product and services

In particular, utility can become a multiproduct company **increasingly adopting "dual-fuel" value propositions that combine gas and electricity**. However, opportunities to bundle products and services do not end there. Energy management technologies such as smart thermostats, home service plans, financing, insurance and other home services—from security to cable and telecommunications—are all possible elements of extended value propositions. Figure 3.8 shows the possible anatomy of a bundle:

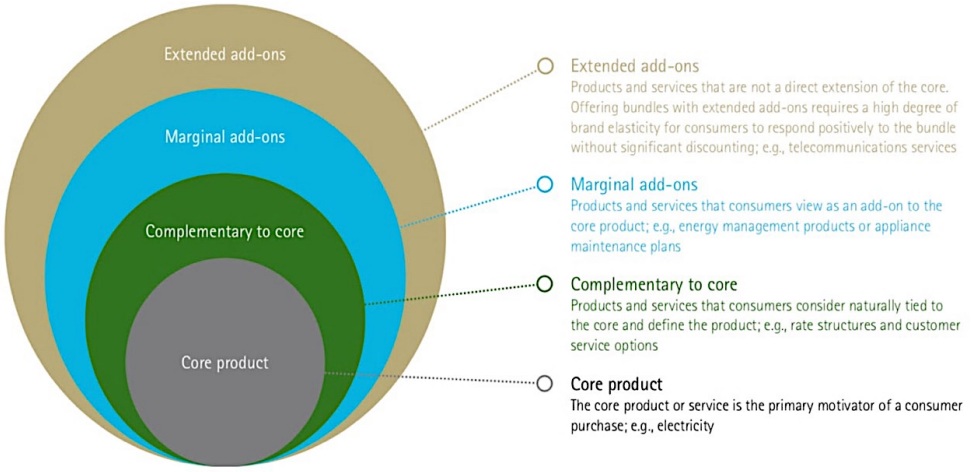


Figure 3.8 - Possible anatomy of a bundle

Utilities can make progress from single-product organizations to multiproduct organizations in the following ways:

- prioritize consumers and their requirements—and use that information as the basis of all product-related decision making;

- define a clear product strategy and allow it to guide portfolio decisions;
- increase the level of internal collaboration and innovation to gain more and better ideas;
- leverage partners for ideation and developing new products and services;
- develop and optimize portfolios of products and services based on value, strategic fit and balance;
- place portfolio management at the heart of the strategic planning process;
- establish an agile and well-formulated product governance model that can support efficient decisions;
- verify that the foundational information technology is in place to support product life-cycle and portfolio management.

- ***partnerships***: facing a need to extend the energy value proposition, utilities can leverage partners to augment their own offerings and extend into beyond-the-meter products and services. If a utility effectively co-brands through retail or other partnerships, it can add nontraditional offerings to its portfolio. Partnerships can take a number of forms and offer a range of value for providers and consumers:
  - creation of loyalty programs which offer rebates to consumers for purchasing certain products or taking specific actions;
  - offering of new products and services requiring internal capabilities different from those of utilities. One excellent approach is to co-brand an offering. Co-branded offerings require coordination, synergies and a partner with an established brand and product offering;
  - for emerging energy-related products and services, such established partners may not exist. As such, energy providers seeking to shape emerging products can take another route to market by investing in start-up businesses. For example, Eneco, an international sustainable energy company with operations in the Netherlands, the United Kingdom, Germany, France and Belgium, partnered with Quby, an energy management product development company to create Toon®. The innovative thermostat and in-home display allow consumers to track energy usage, display the weather and remotely control heating and cooling.

  Collaboration is not without risk. Above all, in today's fast-moving energy market, partnership governance needs to enable companies to make quick decisions. Slow decisions yield poor customer service and can quickly put a partnership in jeopardy. Potential partners should not only complement a provider's current offering, but also bridge capability gaps and consumer access that will help support provider goals. In many cases, partnering will be much faster and less expensive than developing internal capabilities.
- Implementation of ***cloud-based solutions***. In particular, utilities may be able to address concerns by building private clouds based within their own data centers or through a third party. Compared to a public cloud solution, this approach increases the initial costs, but avoids significant risks to data security, customer loyalty and brand reputation. Figure 3.9 shows the different opportunities for energy provider in the cloud:

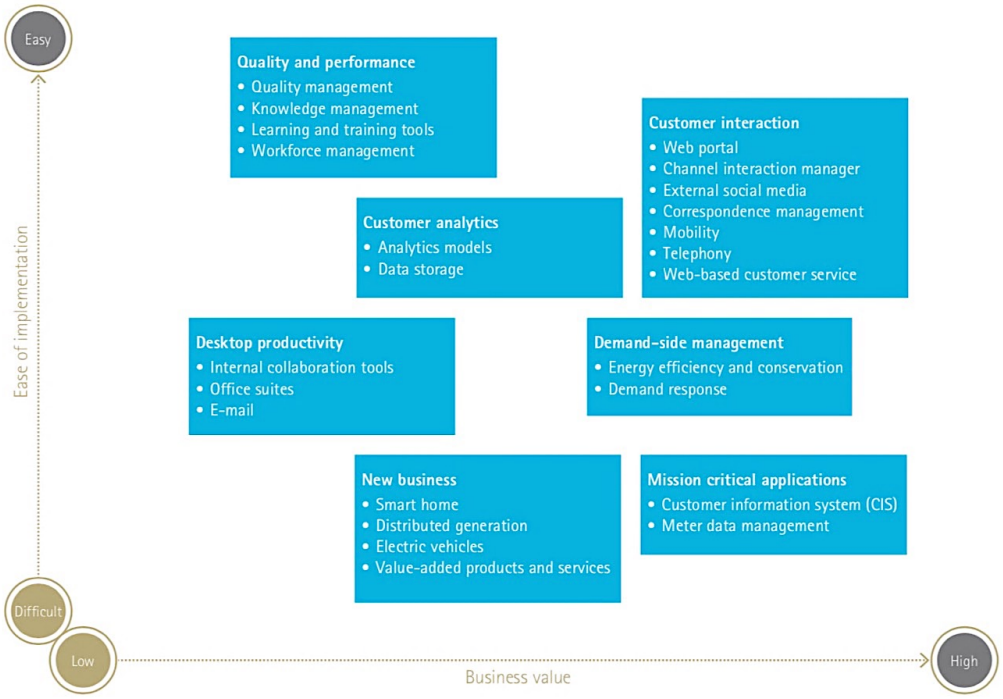


Figure 3.9 - Different opportunities for energy providers in the cloud

- Identification and ***recruitment of new type of talent*** and establishment of a ***culture*** and organizational ethos that is ***focused on being "change capable"***. The following points should be considered:
    - appointment of an executive transformation leader to lead and orchestrate change;
    - middle managers should be given the tools, capabilities and support they need to accelerate change initiatives;
    - utilities need to regularly update training, compensation and recruitment programs to align talent acquisition and performance incentives with their vision for the future. Moreover, historically many utilities have recruited technical talent with a nearly singular focus on engineering skills and contact center talent with an emphasis on compliance. Now energy providers will need to add another key recruiting criterion: empathy, as the ability of put themselves in the consumers' shoes. Other important skills are the following:
        - communication and technology skills needed to troubleshoot alarms and other events on smart meters and various home-based energy products;
        - education skills to help act as a trusted energy advisor offering insights to help consumers reduce costs and consumption;
        - sales skills to influence consumers and drive new revenue from value-added products and services;
        - next-generation technology skills for smart in-home technologies and distributed-generation devices (such as solar);

    - ability to use mobile applications to gather consumer information and provide sales and technical demonstrations in the field.
- ***digital transformation***: with the increasing importance and investment in multichannel technologies, mobile solutions and customer relationship management systems, providers should build better bridges between IT and the business. Seven steps to accelerate digital transformation can be considered:
    - set up the appropriate organization and KPIs: consider appointing a Chief Digital Officer to set digital strategy and lead digital transformation, set up a digital hub to steer the transformation at scale and speed, define a digital governance and collaboration model across the organization;
    - build a digital workforce and foster digital leadership;
    - digitize customer journey;
    - put the customer at the hearth of all operations;
    - automate customer operations and bring new insights by deploying robotic process automation (RPA) and artificial intelligence (AI) in operations at scale;
    - enable agility at scale;
    - create new business and ecosystem management capabilities [38].
- ***digital platform*****:** establish digital platforms for real-time business models, emerging energy solutions and customer-powered innovation. To become a standard and widely accepted solution in the marketplace, an energy platform must create value both for consumers and for the utility enhancing speed, efficiency and transparency. Well – rounded platforms should reflect or support these characteristics:
    - **choice**: consumer value and want a selection of products and services that meet their needs;
    - **open**: a platform will create a new marketplace for business and consumers to interact and transact;
    - **standardized**: standardization encourages cooperation and information sharing across platforms, applications and data sources;
    - **secure**: to support personalization any platform is likely to collect location, personal, transactional and other data. To safeguard it and maintain customer trust, platform must protect against unauthorized access of content by third parties and also reflect a strong governance approach for access to personal consumer data.

The following chapters have the objective to understand how four different companies (Enel, Edison, Engie, Sorgenia) are positioning themselves in the new dynamic electric marketplace from a business model point of view.

4 CHAPTER - “Business Case: ENEL”

Enel S.p.A. is a multinational energy company and one of the leading global integrated operators in the electricity and gas sectors. It operates in 34 countries in Europe, North and Latin America, Africa, Asia, Oceania. It produces energy through a managed capacity of more than 88 GW, selling gas and distributing electricity over a network of approximately 2,2 million km. With almost 72 million end-users in the world, Enel S.p.A. have the largest customer base compared to the European competitors and are among Europe's leading electricity companies in terms of installed capacity and reported EBITDA. In 2017, Enel generated a total of about 249 TWh of electricity, distributing 445 TWh over its own grids and selling 284 TWh. Company revenue has been 74,6 billion euros, with an ordinary EBITDA of 15,7 billion euros. Enel also sold 11,7 billion m^3 of gas [39].
The Enel Group is made up of about 63.000 people from all over the world.
The company is listed on the FTSE MIB index of the Milan Stock Exchange.

4.1 A bit of history

Electricity production in Italy in 1898 amounted to 100 million kilowatt hours and reached over 56 billion in 1960. Much of the production of electricity has exploited the characteristics of the territory, in particular the hydrogeological resources, by over 1.200 private companies either local or regional.
In 1962 Enel S.p.A was set up with the aim of making electricity an instrument for the development of the country and to define a national electricity policy, also based on the experiences of other countries such as France and Great Britain.
1962: Enel has acquired all the activities of companies operating in the production, transformation, transmission and distribution of electricity, subject to some exceptions, such as self-producers or companies that produce more than 70% of electricity in relation to other production processes or small companies that produced no more than 10 million kilowatt hours per year.
Compensation has been set up to be paid to the creditors at a rate of 5,5% over 10 years. 1962 was considered a transitional year in which all the costs and income of the acquired companies were transferred to Enel, while 1963 marked the first year of operation of the company.
1963-1970: Enel's first objectives have been the modernization and development of the electricity grid with the construction of high voltage backbones, international connections, connections to the islands, the electrification of rural areas and the construction of the national dispatching center. In this period the production of thermoelectric energy surpassed hydropower for the first time.
1970-1980: in 1975, following the oil crisis and the Austerity plan, with the definition of the first national energy plan (PEN), one of the main objectives has been replacing the dependence on hydrocarbons with the use of other energy sources, including hydroelectric, geothermal, increase in the use of coal, the waste cycle and in particular with the use of nuclear energy.
Some of the plants that has been built are the following:

- between 1972 and 1978 the Taloro hydroelectric plant was built in the province of Nuoro (Sardinia);
- in 1982 the construction of the Nuclear Power Plant of Montalto di Castro (now known as Alto Lazio) has been commissioned.

1980-1990: this period was characterized by the construction of new plants, also experimental with the use of alternative energy, and of a progressive decrease in dependence on oil, from 75,3% in 1973 to 58,5% in 1985.

1986 saw the first active balance sheet of Enel with a profit of 14 billion and 100 million lire. Finally, in 1987 following the Chernobyl events, the referendum on nuclear energy took place, which sanctioned the end of the use of nuclear energy in Italy, the closure and blocking of the construction of nuclear power plants and the definition of a new national energetic plan.

1990-2000: between 1990 and 2000 there was a gradual liberalization of the electricity market.

In 1991, the law of 9 January 1991, n. 9, initiated a first partial liberalization of electricity production from conventional sources and from renewable sources; the companies were allowed to produce electricity for their own use with the obligation to transfer the excess amount to Enel.

In July 1992, the Government Amato I transformed Enel into a joint-stock company with the Treasury as the sole shareholder.

In 1999, through the Bersani Decree, the liberalization of the electricity market was launched; this resulted in a corporate reorganization of Enel with the separation of production, transmission, distribution and sale of energy, entrusted to three separate companies: Enel Produzione, Enel Distribuzione and Terna (the ownership of Terna was completely sold by Enel in 2005). Furthermore, Enel has set a maximum electricity production threshold of 50% of the entire production on national soil.

In 1999 Enel, with its new corporate structure, was privatized for 31,7%. The listing was followed by privatization; the Enel shares were listed on the Italian Stock Exchange at a price per share of 4,30 euros (corresponding to 8,60 euros following the 2001 grouping); the total offer was 4,183 billion shares with a total value of 18 billion euros.

Already in 1997 with the privatization and the change of denomination (from ENEL –"Ente nazionale per l'energia elettrica, to Enel SpA) the change of the company logo was established: the one proposed by Maurizio Minoggio of the UNIMARK study was adopted, which combines the styles of the sun and the tree, with the roots that recall the company tradition and the rays that allude to the multiplication of services offered (Figure 4.1).

(1963-1982) (1988-1997) (1997-2016)

Figure 4.1 - Enel Logos 1963-2016

2000-2010: this period was characterized by some policies to reduce the environmental impact in energy production and by a progressive internationalization of Enel through numerous acquisitions and mergers.

Environmental policies:

- In 2000 Enel signed an agreement with the Ministry of the Environment and the Ministry of Industry, Trade and Crafts in which it has undertaken to reduce carbon dioxide emissions by 13.5% by 2002 and by 20% by 2006;
- In 2008 Enel established Enel Green Power, a company dedicated to the development and management of electricity production from renewable sources.

Mergers and acquisitions:

- In 2000, through its subsidiary Erga, Enel acquired CHI Energy, a renewable energy producer operating in the US and Canadian markets; the transaction costs Enel 170 million dollars;
- In 2002 Enel sold Eurogen S.p.A, Elettrogen S.p.A and Interpower S.p.A. in compliance with the provisions of the Bersani Decree;
- In 2007, Enel began the acquisition of the Iberian Endesa utility, where it first reached a 67% stake in the capital, reaching full control of the capital in 2009.

New plants and alternative energy:

- In 2009 Enel gave life to the Archilede project; the new urban lighting system has been chosen by 1600 municipalities; this new intelligent lighting technology has enabled energy savings of around 26 GWh / year, reducing carbon dioxide emissions by 18,000 tons / year;
- In 2009 Enel inaugurated a new photovoltaic plant at the Villa Demidoff Park in Pratolino (Florence). The project called "Diamond" involved the commissioning of a plant capable of storing the energy accumulated during the daytime in the form of hydrogen in order to use this energy in the absence of the sun.

2010-2015: this period was characterized by the reorganization of some group activities.

Industrial activities:

- In 2011, Enel inaugurated in Brindisi at the ENEL Federico II plant the first pilot plant in Italy to capture carbon dioxid;
- In 2011, Enel Distribuzione built the first smart grid in the Molise area of Isernia, that is Smart Grid, able to efficiently regulate the bidirectional flow of electricity produced from renewable energy sources. The total investment for this project amounted to 10 million euros;
- In 2012, Enel and Renault, in the area of electric mobility and Smart City, collaborated to produce a car model that would allow the customer to pinpoint the location of the Enel charging points closer to their position in real time. Previously, there were also collaborations with other manufacturers such as Opel, Mercedes and Piaggio.

Research and development activities:

- In 2011, Enel Distribuzione, a company that manages the distribution network of Enel and NEC Corporation, reached a strategic partnership agreement with the aim of developing new technologies and solutions in the context of Smart grids;

- Between 2012 and 2014 Enel Distribuzione and General Electric collaborated in research projects in the fields of energy efficiency and CO_2 emissions reduction.

Other operations:

- In 2011, Enel was admitted to the FTSE4Good Index of the London Stock Exchange, which measures the behavior of companies in environmental sustainability, in relations with stakeholders, in respect of human rights, the quality of working conditions and the fight against corruption. From 2012 to 2017 Enel was reconfirmed in the FTSE4Good;
- In 2015 Enel presented the Powering Education project to the Expo, launched together with The Coca Cola Company and Givewatts, in order to increase the consumption of renewable electric energy in rural areas of Kenya, through the distribution of solar energy lamps in several schools on the territory;
- On 25 May 2016, the Cassa Depositi e Prestiti approved Enel's offer for the purchase of Metroweb for a consideration of € 806 million, paid in part in cash and partly through a shareholding in the company resulting from the merger between Enel Open Fiber and Metroweb.

2016-2018: this period was characterized by a series of operations aimed at digitizing the group and innovation, with particular attention to the issue of sustainability:

- in January 2016 Enel launches the "Open Power" brand, presenting itself with a new visual identity and a new logo. The concept of "openness" becomes the engine of the operative and communicative strategy.
- in June 2016 Enel presents Open Meter, the new Enel 2.0 counter destined to take the place of the first generation electronic meters. The instrument was designed by the famous designer and architect Michele De Lucchi.
- in July 2016, Enel launches an Innovation Hub in Israel in Tel Aviv: the goal is to identify 20 startups with which to collaborate, while offering a personalized support program.
- In December 2016 Open Fiber completed the acquisition of Metroweb Italia for a total of 714 million euro.
- in March 2017 Enel inaugurated the Innovation Hub at the University of California at Berkeley: the goal of the operation is the scouting of startups for developments in new collaborations in the future.
- in April 2017 Enel enters Australia with the largest "ready to build" photovoltaic project, implemented through a joint venture with the Dutch Infrastructure Fund.
- in May 2017 Enel launches E-solutions, a new global business line that aims to explore new technologies and develop innovative products and digital solutions.
- in July 2017 Enel joins Formula E to bring the first zero-emissions event to New York in the history of the championship.
- in September 2017 Enel enters the twentieth place of Fortune's "Change the World" list, becoming one of the 50 leading companies in the world and the only Italian company to have a positive social impact through its business activities.
- in October 2017 Enel enters the Top 20 of the World's Best Employers List 2017 of Forbes Magazine.

- in October 2017 Enel is confirmed by the global non-profit CDP platform as a global leader in the fight against climate change.
- in November 2017 Enel presents E-Mobility Revolution, a plan which envisages the installation by 2020 of 7 thousand charging stations for electric vehicles.
- in November 2017 Enel presents the 2018-2020 strategic plan, focused on digitization and promotion of new offers to customers.
- in December 2017 Enel signs an agreement with Audi for the development of services related to electric mobility.
- in December 2017 Enel launched the Enel X brand on the market, developing innovative products and digital solutions in areas where energy shows its greatest possibilities for transformation.
- in January 2018 Enel launches a new green bond in Europe: the issue amounts to a total of 1,250 million euros.
- in February 2018 Enel becomes the title sponsor of the FIM MotoE World Cup and MotoGP Sustainable Power Partner.
- in March 2018 Enel inaugurated Peru's largest photovoltaic solar plant, a $ 170 million investment.
- in May 2018 Enel became a partner in the Osmose project, aimed at developing integrated systems and services in the renewable energy sector.
- in May 2018 Enel inaugurated in Pisa the Innovation Hub & Lab of the Global Thermal Generation, a space for the development of innovative technologies to be applied in thermoelectric generation.
- in May 2018 Enel won the final round in the public tender for the acquisition of Eletropaulo, first distributor of electric energy in Brazil.

4.2 Organizational model

On April 28, 2017, the Enel Group adopted a new organizational structure, introducing a new Global Business Line, called "Enel X", in order to promote customer focus and digitization as value accelerators.
In particular, the new organizational structure of the Enel Group is structured, like the previous one, in a matrix (Figure 4.2) that considers:

- **Divisions** (Global Thermoelectric Generation and Trading, Infrastructures and Global Networks, Renewable Energies, Enel X), which is entrusted with the task of managing and developing assets, optimizing their performance and the return on investment capital, in the various geographical areas where the Group is present; the Divisions are also entrusted with the task of improving the efficiency of the processes managed and sharing best practices worldwide.
- **Regions and Countries** (Italy, Iberia, South America, Europe and North Africa, North and Central America, Sub-Saharan Africa and Asia), which is entrusted with the task of managing relations with institutional bodies and local regulatory authorities

within each country of the Group's presence, as well as sales activities of electricity and gas, providing other support in terms of staff and other services to the Divisions.

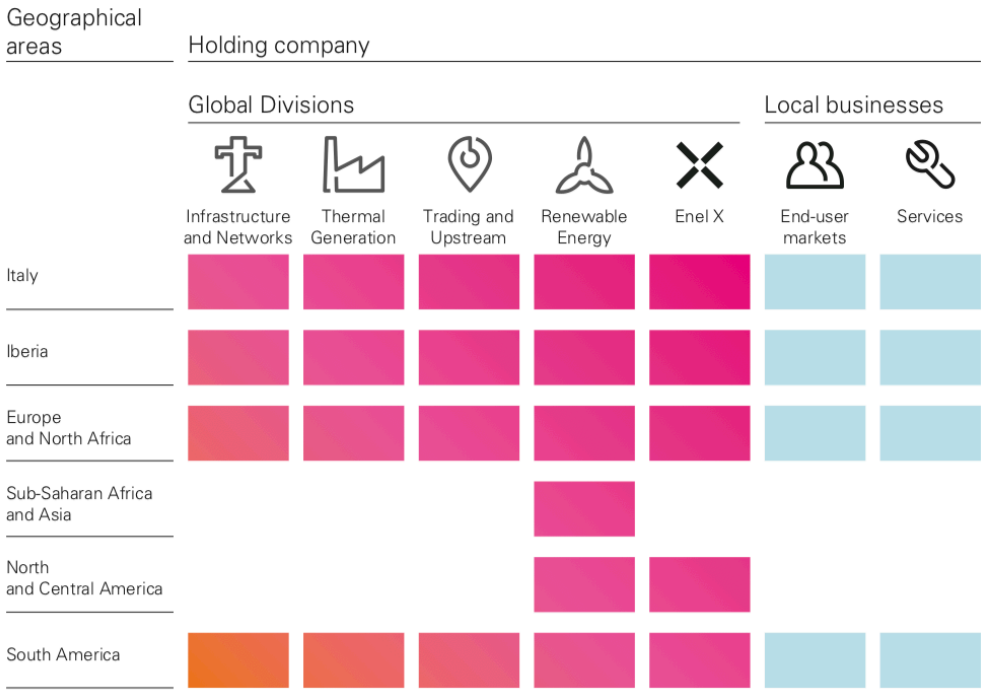


Figure 4.2 - Enel Group new organizational structure (2017)

- To this matrix they are associated in a business support perspective:
  - **Global Service Functions** (Purchasing and ICT), which is entrusted with the task of managing information and communication technology and purchases at the Group level;
  - **Holding functions** (Administration, Finance and Control, Human Resources and Organization, Communication, Legal and Corporate Affairs, Audit, European Affairs, Innovation and Sustainability), entrusted with the task of managing the processes governance at the Group level.

4.3 Enel in Italy

4.3.1 Economic performance

Table 4.1 shows the 2017 economic results by geographic area. It can be noticed that the most profitable areas are Italy, South America and Iberia. The biggest amount of investments is focused on South America (36,92%).

The item “Others, eliminations and adjustments” includes not only the effects from the elimination of intersegment transactions, but also the figures for the Parent Company, Enel SpA.

Results by geographic areas - 2017 (Millions €)	Italy	Iberia	Europe and North Africa	Sub-Saharan Africa and Asia	North and Central America	South America	Other, eliminations, and adjustments	Total
Revenues	38.781	19.994	2.411	96	1.187	13.154	-984	74.639
Revenues %	51,96 %	26,79 %	3,23%	0,13%	1,59%	17,62%	-1,32%	100,00 %
EBITDA	6.863	3.573	543	57	759	4.204	-346	15.653
EBITDA %	43,84 %	22,83 %	3,47%	0,36%	4,85%	26,86%	-2,21%	100,00 %
EBIT	4.470	1.842	306	15	553	2.970	-364	9.792
EBIT %	45,65 %	18,81 %	3,13%	0,15%	5,65%	30,33%	-3,72%	100,00 %
Capital expenditure	1.812	1.105	307	30	1.802	3.002	72	8.130
Capital expenditure %	22,29 %	13,59 %	3,78%	0,37%	22,16%	36,92%	0,89%	100,00 %

Table 4.1 - Enel Group economic results by geographic area (2017)

Table 4.2 relate Enel performance in Italy to the overall results. Enel has increased its profitability both as a group passing from €3.087 million (2014) to €9.762 million (2017) and in Italy passing from €1.918 million (2014) to €4.470 million (2017). The weight of Italian EBIT has decreased passing from 62,1% (2014) to 45,8% (2017) since the group has expanded over the years. The ROS both globally and in Italy has shown a positive trend [40][41][42].

Italy - Performance (Million €)	2014			2015		
	Italy	Enel Group	% Italy	Italy	Enel Group	% Italy
Revenues	38.389	75.791	50,7%	40.727	75.658	53,8%
EBITDA	6.343	15.757	40,3%	6.916	15.297	45,2%
EBIT	1.918	3.087	62,1%	4.588	7.685	59,7%
Group Net results		517			2.196	
EBITDA/Revenues %	17%	21%		17%	20%	
ROS (EBIT/Revenues) %	5%	4%		11%	10%	
Italy - Performance (Million €)	**2016**			**2017**		
	Italy	**Enel Group**	**% Italy**	**Italy**	**Enel Group**	**% Italy**
Revenues	37.045	70.592	52,4%	38.781	74.639	52,0%
EBITDA	6.618	15.276	43,7%	6.863	15.653	43,8%
EBIT	4.270	8.921	49,2%	4.470	9.762	45,8%
Group Net results		2.570			3779	
EBITDA/Revenues %	18%	22%		18%	21%	
ROS (EBIT/Revenues) %	12%	13%		12%	13%	

Table 4.2 - Comparison between Enel Italy and Enel Group economic results (2014-2017)

Group net financial debt is more or less stable. Cash flow from operating activities has increased from €10.058 million (2014) to €10.125 million (2017). Cash flow from investing activities has increased as well passing from €6.137 million (2014) to €9.294 million (2017). Cash flow from financing activities has passed from a positive value, €1.536 million (2014) to a negative one, €-1646 million (2017). Capital expenditure has increased both globally and in Italy.

Italy - Performance (Million €)	2014			2015		
	Italy	Enel Group	% Italy	Italy	Enel Group	% Italy
Total shareholders' equity		51.145			51.751	
Net financial debt		37.383			37.545	
Cash flows from operating activities		10.058			9.572	
Cash flows from investing/disinvesting activities		-6.137			-6.421	
Cash flows from financing activities		1.536			-5.382	
Capital expenditure	1.460	6.701	21,8%	1.843	7.113	25,9%
Italy - Performance (Million €)	**2016**			**2017**		
	Italy	**Enel Group**	**% Italy**	**Italy**	**Enel Group**	**% Italy**
Total shareholders' equity		52.575			52.161	
Net financial debt		37.553			37.410	
Cash flows from operating activities		9.847			10.125	
Cash flows from investing/disinvesting activities		-8.087			-9.294	
Cash flows from financing activities		-4.474			-1.646	
Capital expenditure	1.894	8.552	22,1%	1.812	8.130	22,3%

Table 4.3 - Comparison between Enel Italy and Enel Group economic results (2014-2017)

The following tables (Table 4.4) go in deeper detail, showing Enel performance in Italy by Business Line.

Italy - Revenue by Business Line (Million €)	2015		2016		2017	
Infrastructure and Network	7.905	*19,41%*	7.237	*19,54%*	7.584	*19,56%*
Generation and Trading	22.186	*54,47%*	19.403	*52,38%*	19.919	*51,36%*
Renewables	2.308	*5,67%*	1.796	*4,85%*	1.822	*4,70%*
End-user markets	15.138	*37,17%*	15.323	*41,36%*	16.256	*41,92%*
Services	1.191	*2,92%*	1.207	*3,26%*	1.314	*3,39%*
Eliminations and adjustments	-8.001	*-19,65%*	-7.921	*-21,38%*	-8.114	*-20,92%*
Total	40.727	100,00%	37.045	100,00%	38.781	100,00%

Table 4.4 - Enel Italy revenue by business line (2015-2017)

2016-2017: revenue in 2017 amounted to €38.781 million, an increase of €1,736 million compared with the same period of 2016 (+4.7%), the result of the following main factors:

- an increase of €516 million in revenue from Generation and Trading (+2.7%) compared with 2016. This development is primarily attributable to:
  - an increase in revenue from the sale of fuels on the domestic and international wholesale markets, essentially due to the increase in intermediation business;
  - an increase in revenue from trading on international energy markets due essentially to a growth in quantities handled (+33.9 TWh) of proprietary trading conducted on the European electricity ex-changes (particularly in France and Germany) against a background of rising prices;
  - an increase in revenue from fees from the Regulatory Authority for Energy, Networks and the Environment (ARERA) for transactions on the Power Exchange, mainly attributable to the cost reimbursement scheme for essential generation units;
  - an increase in revenue from the sale of CO2 emissions allowances and green certificates, owing to rising prices for allowances;
  - a decline in revenue from the sale of electricity, essentially related to the lower quantities generated. More specifically, the change is mainly attributable to the decrease in revenue from the sale of electricity by way of bilateral agreements to other national resellers, only partly offset by increased revenue from sales on the Power Exchange;
  - a reduction in gains on extraordinary transactions, which in 2016 included the gain on the sale of the equity investment in Hydro Dolomiti Enel.
- an increase of €347 million (+4.8%) in revenue from Infrastructure and Networks operations, largely reflecting:
  - an increase in contributions from the Energy & Environmental Service Fund for white certificates due to the increase in volumes purchased, but especially to the rise in the unit contribution, which reached record highs in the 2nd Half of 2017;
  - an increase in rate revenue, mainly reflecting the rise in transmission rates (ARERA Resolution 779/2016), only partly offset by the reduction in distribution rates, the negative effect of the equalization mechanisms and the abolition, starting from January 1, 2017, of the equalization mechanism for revenue from domestic customers. In addition, there was an increase in revenue relating to changes in the “regulatory lag” (ARERA Resolution 654/2015);
- a €26 million increase (+1.4%) in revenue from Renewables generation, the result of higher average sales prices, which more than offset the lower volumes generated;
- an increase of €933 million (+6.1%) in revenue from End-user markets for electricity, essentially reflecting:

- an increase in revenue on the free market for electricity mainly as a result of higher volumes sold (+11.0 TWh);
- an increase in revenue on the regulated market for electricity attributable to the increase in rate revenue and revenue from marketing, partly off- set by the decrease in volumes sold (-1.9 TWh) and in the number of customers served;
- an increase in revenue from the sale of natural gas to end users due to increased volumes sold and higher average sale prices. These effects were only partly offset by the positive effect of prior-period items;
- the increases in connection fees and in revenue from the cost reimbursement system for safeguard-market service providers.

2015-2016: revenue in 2016 amounted to € 37.045 million, a decrease of €3.682 million compared with the same period of 2015 (-9%), the result of the following main factors:

- a €2.783 million decline in revenue from Generation and Trading compared with 2015. This reduction is mainly attributable to:
  - a decline in revenue from the sale of electricity essentially related to the lower quantities generated. More specifically, the change is mainly attributable to the decrease in revenue from the sale of energy by way of bilateral agreements to other national resellers and the reduction in revenue from sales on the Power Exchange, which were only partially offset by increased business on the ancillary services markets;
  - a decline in revenue from trading on international energy markets due, essentially, to a reduction in quantities handled of proprietary trading conducted on the European electricity exchanges (particularly in France and Germany) against a background of falling prices;
  - a decrease in revenue from the sale of CO_2 emissions allowances and green certificates, owing to lower volumes handled and the replacement of the mechanism of incentives for green certificates established by the Ministerial Decree of July 6, 2012;
  - a reduction in transfers from market operators due mainly to the decrease in transfers related to the security of Italy's electrical system;
  - a decrease in revenue from the sale of fuels on the domestic and international wholesale markets, which is essentially attributable to the decrease in intermediation business;
  - a reduction in gains on extraordinary transactions, which in 2016 included the gain on the sale of the equity investment in Hydro Dolomiti Enel (€124 million), whereas this aggregate in 2015 included the gains on the sales of SF Energy and SE Hydropower.
- a decrease of €668 million (-8.5%) in revenue from Infrastructure and Networks operations, largely reflecting:
  - a decrease in revenue related to the regulatory changes introduced with Resolution 654/2015 of the Authority for Electricity, Gas and the Water System (the "Authority"), which in 2015 eliminated the "regulatory lag";
  - a reduction in rate revenue mainly due to the decrease in transmission rates;

- a decrease in revenue following regulatory changes introduced with Authority Resolution 268/2015, which abolished the contribution for irrevocableness risk for distribution companies for the collection of system charges and called for a strengthening of the system of guarantees required for the transport agreement;
- the increase in contributions from the Energy & Environmental Services Fund (formerly the Electricity Equalization Fund) for white certificates (in the amount of €132 million) due to the increase in volumes purchased and in the unit contribution.

- a €512 million reduction (-24.0%) in revenue from Renewables generation, which was mainly related to the decrease in revenue from the sale of energy due to the decline in hydroelectric power generation, as well as to the recognition, in 2015, of negative goodwill and the fair-value remeasurement connected with the 3Sun acquisition and an indemnity required under the agreements with STM;
- an increase of €185 million (+1.2%) in revenue from End-user markets for electricity, essentially reflecting:
  - a decline of €715 million in revenue on the regulated electricity market due to a decrease in quantities sold (-3.5 TWh) and in the number of customers served;
  - an increase of €813 million in revenue on the free market for electricity related to the increase in quantities sold (+10.2 TWh), which was only partially offset by price effects;
  - an increase of €90 million in revenue from sales to end users on the natural gas market, primarily reflecting the positive change in corrective payments for past years and an increase in quantities sold.

Italy - EBITDA by Business Line (Million €)	2015		2016		2017	
Infrastructure and Network	3.933	*56,87%*	3.620	*54,70%*	3.467	*50,52%*
Generation and Trading	184	*2,66%*	-70	*-1,06%*	239	*3,48%*
Renewables	1.431	*20,69%*	1.031	*15,58%*	1.054	*15,36%*
End-user markets	1.336	*19,32%*	1.932	*29,19%*	2.007	*29,24%*
Services	32	*0,46%*	105	*1,59%*	96	*1,40%*
Total	6.916	100,00%	6.618	100,00%	6.863	100,00%

Table 4.5 - Enel Italy EBITDA by business line (2015-2017)

Italy - EBIT by Business Line (Million €)	2015		2016		2017	
Infrastructure and Network	2.914	*63,51%*	2.596	*60,80%*	2.319	*51,88%*
Generation and Trading	-93	*-2,03%*	-460	*-10,77%*	0	*0,00%*
Renewables	1.095	*23,87%*	751	*17,59%*	745	*16,67%*
End-user markets	690	*15,04%*	1.333	*31,22%*	1.361	*30,45%*
Services	-18	*-0,39%*	50	*1,17%*	45	*1,01%*
Total	4.588	100,00%	4.270	100,00%	4.470	100,00%

Table 4.6 - Enel Italy EBIT by business line (2015-2017)

2016-2017: operating income amounted to €4.470 million, up €200 million (including an increase of €45 million in depreciation, amortization and impairment losses) compared with €4.270 million in operating income recognized in 2016. More specifically, in addition to the increase in the gross operating margin, it reflected:

- the increase in net write-downs of trade receivables, owing to a deterioration in the recoverability of receivable for electricity sales to traders and regulated-market customers;
- higher depreciation, mainly for network infrastructure;
- the recognition in 2016 of impairment on the goodwill and assets of Nuove Energie due to the change in a number of measurement parameters in the midstream gas business.

2015-2016: operating income came to €4.270 million in 2016, a decrease of €318 million compared with the €4.588 million in operating income recognized in 2015. More specifically, the reduction in net write-downs of trade receivables, which was particularly evident in the sale of electricity on the regulated market, was partially offset by the impairment recognized in 2016 on the goodwill and assets of Nuove Energie due to the change in a number of measurement parameters in the midstream gas business.

Italy - Capital expenditure by Business Line (Million €)	2015		2016		2017	
Infrastructure and Network	1.134	*61,53%*	1.278	*67,48%*	1.275	*70,36%*
Generation and Trading	178	*9,66%*	119	*6,28%*	115	*6,35%*
Renewables	341	*18,50%*	304	*16,05%*	227	*12,53%*
End-user markets	124	*6,73%*	133	*7,02%*	139	*7,67%*
Services	66	*3,58%*	60	*3,17%*	56	*3,09%*
Total	1.843	100,00%	1.894	100,00%	1.812	100,00%

Table 4.7 - Enel Italy capital expenditure by business line (2015-2017)

2016-2017: capital expenditure in 2017 amounted to €1.812 million, down €82 million compared with the previous year. More specifically, the change is attributable to:

- a decrease in investment in Infrastructure and Networks operations equal to €3 million, mainly for digital meter replacement work under the Open Meter plan approved by ARERA Resolution 222/2017/R/eel. This increase in activity was more than offset by lower investment in service quality, which had been brought forward in 2016;
- an increase of €6 million in capital expenditure in End-user markets;
- a €4 million decrease in investment in Generation and Trading;
- a €77 million reduction in investment in Renewables, mainly on hydroelectric, biomass and wind plants.

2015-2016: capital expenditure in 2016 amounted to €1.894 million, up €51 million compared with the previous year. More specifically, the change is attributable to:

- an increase in capital expenditure for Infrastructure and Networks, primarily in work to improve and maintain service-quality standards;
- an increase in capital expenditure for End-user markets;
- a decrease in capital expenditure for Generation and Trading;
- a reduction in capital expenditure for the Renewables business, attributable mainly to geothermal and biomass plants.

4.3.2 Operations

The following tables show the main data about operations of Enel in Italy in the years 2014 – 2015 – 2016 – 2017.

Italy - Operations	2014			2015		
	Italy	Enel Group	Italy %	Italy	Enel Group	Italy %
Net electricity generation (TWh)	71,8	283,1	25,4%	68,5	284	24,1%
Net efficient generation capacity (GW)	33,69	96,112	35,1%	30,715	89,742	34,2%
Electric energy transported (TWh)	223	411,1	54,2%	227,1	427,4	53,1%
Electricity sales (TWh)	87,1	261	33,4%	88	260,1	33,8%
Employees at year end	33.405	68.961	48,4%	33.040	67.914	48,6%

Table 4.8 - Enel Italy operations (2014-2015)

Italy - Operations	2016			2017		
	Italy	Enel Group	Italy %	Italy	Enel Group	Italy %
Net electricity generation (TWh)	60,9	261,8	23,3%	53,5	249,9	21,4%
Net efficient generation capacity (GW)	27,761	82,68	33,6%	27,652	84,916	32,6%
Electric energy transported (TWh)	224,1	426,7	52,5%	227,3	445,2	51,1%
Electricity sales (TWh)	94,1	263	35,8%	103,2	284,8	36,2%
Employees at year end	31.956	62.080	51,5%	31.114	62.900	49,5%

Table 4.9 - Enel Italy operations (2016 – 2017)

Italy - Net electricity generation (TWh)	2014	2015	2016	2017
Thermal	*42,528*	*43,495*	*37,609*	*32,421*
Hydroelectric	*22,811*	*17,913*	*16,052*	*14,025*
Geothermal	*5,576*	*5,809*	*5,832*	*5,758*
Wind	*0,9*	*1,118*	*1,298*	*1,188*
Other sources	*0,008*	*0,184*	*0,122*	*0,126*
Total	71,823	68,519	60,913	53,518

Table 4.10 - Enel Italy net electricity generation (2014-2017)

Italy - Net efficient generation capacity (GW)	2014	2015	2016	2017
Thermal plants	*19,301*	*16,743*	*13,752*	*13,613*
Hydroelectric plants	*12,858*	*12,407*	*12,423*	*12,425*
Geothermal plants	*0,761*	*0,761*	*0,761*	*0,761*
Wind farms	*0,7*	*0,72*	*0,728*	*0,772*
Other	*0,041*	*0,084*	*0,097*	*0,081*
Total	33,661	30,715	27,761	27,652

Table 4.11 - Enel Italy net efficient generation capacity (2014-2017)

Italy - Electric energy transported (TWh)	2014	2015	2016	2017
Total	222,975	227,125	224,1	227,322

Table 4.12 - Enel Italy electric energy transported (2014-2017)

Italy - Electricity distribution network (km)	2014	2015	2016	2017
High-voltage lines at year end (km)	*20*	*13*	*13*	*13*
Medium-voltage lines at year end (km)	*350.358*	*351.493*	*352.607*	*353.808*
Low-voltage lines at year end (km)	*786.289*	*788.709*	*792.367*	*795.397*
Total	*1.136.667*	*1.140.215*	*1.144.987*	*1.149.218*

Table 4.13 - Enel Italy electricity distribution network (2014-2017)

Italy - Electricity sales - (TWh)	2014	2015	2016	2017
Free market	*37,369*	*38,656*	*48,302*	*59,262*
Regulated market	*49,734*	*49,369*	*45,837*	*43,958*
Total	87,103	88,025	94,139	103,22

Table 4.14 - Enel Italy electricity sales (2014-2017)

Italy - Average number of electricity customers	2014	2015	2016	2017
Free market	*5.473.322*	*6.105.541*	*6.732.570*	*7.552.217*
Regulated market	*21.734.575*	*20.966.542*	*20.044.065*	*18.867.841*
Total	27.207.897	27.072.083	26.776.635	26.420.058

Table 4.15 - Enel Italy average number of electricity customers (2014-2017)

4.3.2.1 Net electricity generation

The previous tables show a decreasing trend both overall, passing from 283,1 TWh (2014) to 249,9 TWh (2017), and in Italy, passing from 71,8 TWh (2014) to 53,5 TWh (2017). Moreover, Italy weighs less and less on the total amount from 25,4% (2014) to 21,4% (2017). In particular, each period has been characterized by the following events:

2016-2017: in 2017 net electricity generation amounted to 53,518 TWh, a decline of 12,1% or 7,395 TWh compared with 2016. Specifically, the decrease in thermal generation (down 5,188 TWh) is the result of the reduced competitiveness of the coal plants and the lower output of the combined-cycle plants, including the Termini Imerese and Priolo Gargallo plants in Sicily, which were placed at a disadvantage by the new interconnection with the mainland that entered into operation in 2016.

The decrease in hydroelectric generation (down 2,027 TWh) was instead due to poorer water conditions com- pared with the prior year.

2015-2016: in 2016, net electricity generation totaled 60,913 TWh, a decline of 11,1%, or 7,606 TWh, from 2015. The decrease in demand had a negative impact on generation volumes, particularly in hydroelectric generation (down 1,861 TWh) due essentially to the deterioration in water availability compared with the previous thermal power generation (down 5,886 TWh) which was partly attributable to a number of maintenance activities, with maintenance on Brindisi Sud being particularly significant.

2014-2015: in 2015, net electricity generation amounted to 68,519 TWh, a decrease of 3,304 TWh on 2014. More specifically, the decline in hydro generation (-4,898 TWh), mainly associated with the deterioration in water conditions compared with the previous year, was only partly offset by an increase in thermal output (0,967 TWh).

4.3.2.2 Net efficient generation capacity

The previous tables show a decreasing trend both overall, passing from 96,112 GW (2014) to 84,916 GW (2017), and in Italy, passing from 33,69 GW (2014) to 27,652 (2017). Moreover, Italy weighs less and less on the total amount from 35,1% (2014) to 32,6% (2017).

In particular, each period has been characterized by the following events:

2016-2017: net efficient capacity in 2017 totaled 27,652 GW, a decrease of 0,109 GW compared with the previous year. The change mainly reflects the closing of Section 6 of the Genoa coal plant;

2015-2016: net efficient capacity in 2016 totaled 27,761 GW, a reduction of 2,954 GW on the previous year following the progressive closure of a portion of the thermal plants for which deactivation requests had been submitted to the Ministries for the Environment and

Economic Development in accordance with Law 290 of October 27, 2003. Of particular note was the decrease in capacity in the oil/gas segment due to a reduction in MW related to the plants in Montalto di Castro (1,272 MW), Rossano Calabro (570 MW), Augusta (195 MW), and Portoscuso (264 MW) and for the combined-cycle/gas-turbine segment related to the plants in La Spezia (664 MW) and Assemini (26 MW). It should also be noted that a portion of these plants fall within the scope of the Future project, the program launched to give new life to 23 deactivated thermal power plants, for a total of 13 GW of installed capacity.
2014-2015: net efficient capacity in 2015 totaled 30,715 MW, a reduction of 2,946 GW on the previous year. The unavailability due to long-term technical issues is mainly connected with additional requests from the Ministries for the Environment and for Economic Development to shut down generation assets pursuant to the provisions of Law 290 of October 27,2003.

4.3.2.3 Electric energy transported/Electricity distribution network

The previous tables show an increasing trend both overall, passing from 411,1 TWh (2014) to 445,2 TWh (2017), and in Italy, passing from 223 TWh (2014) to 227,3 TWh (2017). However, Italy weighs less and less on the total amount from 54,2% (2014) to 51,1% (2017). The electricity distribution network has increased from 1.136.667 km (2014) to 1.149.218 km (2017). In particular, each period has been characterized by the following events:
2016-2017: electricity transported on the Enel network in Italy for 2017 increased by 3,222 TWh (+1.4%), going from 224,1 TWh in 2016 to 227,322 TWh in 2017. The change is essentially in line with the increase in electricity demand in Italy.
2015-2016: electricity transported on the Enel network in Italy for 2016 decreased by 3,025 TWh, going from 227,125 TWh in 2015 to 224,1 TWh in 2016. The change is essentially in line with the increase in electricity demand in Italy.
2014-2015: electricity transported on Enel distribution network in Italy in 2015 increased by 4,15 TWh, going from 222,975 TWh in 2014 to 227,125 TWh in 2015. The change is essentially in line with the increase in electricity demand in Italy.

4.3.2.4 Electricity Sales/Average number of customers

The previous tables show an increasing trend both overall, passing from 261 TWh (2014) to 284,8 TWh (2017), and in Italy, passing from 87,1 TWh (2014) to 103,2 TWh (2017). Moreover, Italy weighs more and more on the total amount from 33,4% (2014) to 36,2% (2017). The amount of energy sold on the Free market shows a positive trend passing from 37,369 TWh (2014) to 59,262 TWh (2017); on the opposite side the amount of energy sold on the Regulated market has decreased from 49,734 TWh (2014) to 43,958 TWh (2017). In particular, each period has been characterized by the following events:
2016-2017: electricity sold in 2017 came to 103,22 TWh for an overall increase of 9,081 TWh compared with the prior year. The trend essentially reflects the greater volumes sold on the free market, focusing mainly on business customers, as a result of new commercial policies.

2015-2016: electricity sold in 2016 came to 94,139 TWh for an overall increase of 6,114 TWh compared with the prior year. These developments are consistent with those in recent years, with the gradual shift of customers from regulated markets to the free market.
2014-2015: electricity sold in 2015 totaled 88,025 TWh, up 0,922 TWh compared with the previous year. These developments are consistent with those in recent years, with the gradual shift of customers from regulated markets to the free market.
The average number of customers on the Free market has increased passing from 5.473.322 (2014) to 7.552.217 (2017) and the major contribution come from the domestic consumers; the average number of customers on the Regulated market has decreased passing from 21.734.575 (2014) to 18.867.841 (2017). As a whole, the total number of customers has decreased passing from 27.207.897 to 26.420.058.

4.3.3 Enel Subsidiaries in Italy

In Italy Enel owns the following companies that produce, distribute and resell electricity:

- The whole of **Enel Produzione** and, through Enel Produzione, the following:
  - 49% of Hydro Dolomiti Enel.
  - 51% of Energy Hydro Piave.
- The whole of **Enel Servizio Elettrico** - that deals with the sale of electricity on the regulated market.
- The whole of **Enel Energia** - that deals with the sale of electricity and natural gas on the free market and to end customers. Enel Energia also owns 100% of Enel.si, a company that offers renewable energy solutions to end customers and franchises "Punto Enel Green Power".
- In the production of electricity from renewable resources Enel owns 69,171% of **Enel Green Power** which in turn owns several subsidiaries worldwide, in Europe, North America, and South America.

With regards to infrastructures and grids Enel owns:

- 100% of **Enel Distribuzione** – for the distribution of electricity.
- 100% of **Enel Sole** – which deals with public and artistic lighting.

For trading on international markets and in Italy, as well as for the procurement and sale of energy products including gas, Enel owns 100% of **Enel Trade**, which in turn owns 100% of Enel Trade Romania, Enel Trade Croatia and Enel Trade Serbia.
Through Enel Trade, Enel also owns Nuove Energie, a company that specializes in the construction of regasification plants.

Since from July 2020 the Regulated market is expected to be overcome, the following analysis will be focused on the sale of electricity to the final customers on the Free market. All the different strategies used by Enel to be competitive in the electric energy market for this next milestone will be underlined.

4.3.3.1 ENEL ENERGIA

4.3.3.1.1 Economic performance

Tables 4.16 and 4.17 show the main performance indicators of Enel Energia over the years 2010-2017. It is easy to notice a progressive growth, after a period of crisis until 2014. For example, Net results has passed from €159,57 million (2014) to €752,60 million (2017) [43].

Enel Energia - Performance (Million €)	2010	2011	2012	2013	2014	2015	2016	2017
Revenues	9.122,71	8.694,62	9.817,28	9.809,55	9.410,58	10.163,41	11.273,84	12.193,49
EBITDA	753,31	289,93	383,71	559,85	751,92	1.059,38	1.471,57	
Net Results	-99,85	1,77	43,99	15,73	159,57	358,14	679,51	752,60
Total assets	4.202,38	4.083,38	4.287,87	3.898,82	3.981,27	3.912,65	5.116,33	5.223,62
Shareholders' equity	109,18	1.114,71	1.128.126,00	1.089,32	1.213,83	1.438,44	1.758,81	1.871,68
Net financial debt	135,32	-17,22	-2,90	0,80	61,66	10,41	-16,57	

Table 4.16 - Enel Energia economic performance (2010-2017)/1

Enel Energia - Performance (Million €)	2010	2011	2012	2013	2014	2015	2016	2017
EBITDA/Revenues %	8,23	3,32	3,88	5,67	7,86	10,32	12,91	
ROS %	5,59	0,19	1,12	2,67	3,9	6,56	9,31	
ROA %	12,18	0,4	2,57	6,77	9,36	17,21	20,75	
ROE %	-9,25	0,16	3,9	1,44	13,15	24,9	38,63	
Debt/Equity ratio	0,14	0,01	0.01	0,01	0,06	0,01	0	
Employees	982	979	958	1.048	1.151	1.147	1.187	

Table 4.17 - Enel Energia economic performance (2010-2017)/2

In 2017, Enel Energia consolidated its leadership in the free market, confirming itself as a reference point for customers for commodity power and gas.

In 2017, Enel Energia reached 11,9 million active customers, of which 7,9 million on the commodity power and 4 million on the commodity gas. Furthermore, as part of digitalization, 30,1% of customers have an invoice with an electronic bill (web bill) and 40,3% have a direct debit payment method.

In addition, 86.000 insurance services for home maintenance and management were sold, around 16.000 LED light bulbs and around 6.400 energy efficiency products (climate, photovoltaic and storage, home appliances, electric mobility, smart homes).

During the year the Enel Energia service model was revised, through the Retail Transformation program, with the aim of ensuring a transformation that maximizes benefits and investments, giving centrality to the customer and ensuring the transformation of operating models into digital optics.

4.3.3.1.2 Commercial Strategies

Consumer segment

In 2017, Enel Energia's portfolio of commercial offers, for the Consumer segment, expanded and renewed thanks to a series of innovations:

- the "Sempre con Te" offer: dedicated to customers coming from the Regulated market. The offer includes a price for the energy component blocked for 12 months which is equivalent to the price set for the Regulated market [44];
- on the occasion of the 100th anniversary of the Giro d'Italia, the 100x100 "GiustaPerTe" offer was launched, supported by a national communication campaign. The offer included a 100% discount on the energy and gas component for the first month of supply. The 100x100 GiustaPerTe membership also entailed participation in the "A Tutto 100" competition, valid for 2 months, which was giving away 1.000 prizes;
- the end of 2017 was characterized by the focus of Enel Energia on the commodity gas, with the aim of strengthening Enel's awareness of the gas market. The "Gas20" offer was launched: it includes a price for the raw material gas component blocked for 12 months and a 20% discount on the price of the gas raw material for 12 months, in addition to the free EnelMia card for 1 year. The offer is dedicated to customers who, together with the Gas 20 offer, also subscribe to a light offer from Enel Energia, or alternatively they have a light supply already active with Enel Energia.
- In 2018 Enel Energia promoted other two interesting offers:
  - "Luce 700 Exclusive" offer: it allows a 30% discount on the energy component for one year to the first 700 customers (Figure 4.3).
  - "Porta i tuoi amici" offer: for each new light or gas contract concluded using his code, the client obtains a bonus up to 75 euros on his bills.

Figure 4.3 - "Luce 700 Exclusive" Enel offer

Business segment

In 2017, Enel Energia confirmed its positioning strategy on the Top and Large customer segment, with a 45% increase in volumes delivered compared to 2016.

The results on the Small and Medium volumes were positive, with an increase of about 5% compared to the previous year on electricity.

Also in the Public Administration segment, Enel Energia confirmed its market leadership by winning 7 lots of the CONSIP EE15 tender, for a nominal volume of 3,7 TWh, up 28% compared to the previous tender.

In the second half of the year, a communication campaign was launched for the business segment with the aim of positioning Enel Energia on the values of reliability and transparency.
In addition, the Business project was launched, with the aim of focusing Enel Energia's acquisition strategy on the most valuable segments through the proposal of dedicated offers, an update of the organizational model and the support of specific communication actions.

Loyalty programs

In 2017, Enelpremia 3.0 confirmed a successful digital program, with a logic of engagement of customers through gamification that proved to be extremely functional; in fact, the preparation of the prizes was very high, especially for customers who took part in most of the activities provided during the year. Approximately 1,4 million customers were registered in the program (Figure 4.5).
As for the EnelMia card partner circuit, the consolidation of strategic partnerships was accompanied by the inclusion of new partners; in fact, from this year EnelMia customers will be able to get discounts also from Coin, API IP, Philips, Europcar, Ledbyled, Airlite (Figure 4.4).

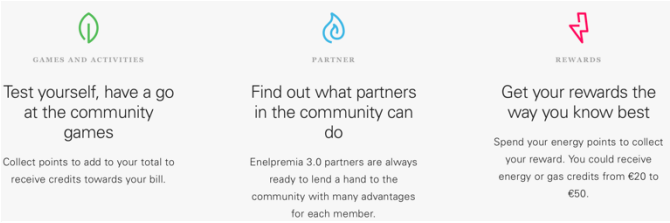


Figure 4.5 - Enelpremia 3.0

Figure 4.4 - Enelmia card

4.3.3.1.3 Customer operations performance

Customer management has achieved important results in terms of quality of service and greater efficiency in operating processes, in line with the company's strategic priorities; in particular in 2017, the Company issued 75 million bills, with a billing performance of 99,9%, confirming the constant commitment to minimizing the waste on the billing process.
Enel Energia has also introduced a new communication to the customer with the Reclami 2.0 project, an initiative that aims to transform the critical contact point of the claim into an opportunity to strengthen the relationship with the customer. The complaint is always handled accurately, but with a simple and never technical language, also providing a telephone contact with the customer.

4.3.3.1.4 Contact channels with customers

In 2017, Enel Energia achieved positive commercial results, with the acquisition of over 2,5 million new sites between the electricity and gas market and a channel mix for inbound channels, in particular on direct stores and indirect.
These results have been achieved thanks to the continuous strengthening and renewal of its sales network and have been accompanied by a continuous attention to quality, both in the sales phase and in the phase of customer management and the development of various

initiatives aimed at improving the contact with the customer who requires increasingly streamlined and digital-oriented processes. The main contact channels and their main operative and commercial results have been the following:

- *Agencies:* they confirm themselves as an important channel for the proposition of commercial offers, on which there is constant monitoring of quality and commercial compliance. There have been many actions in support of the agencies during the year, both in terms of communication and dedicated events and in terms of continuous network optimization throughout the country;
- *Smart Agent*: the channel consolidated its sales performance of commodities and services. Actions aimed at the specialization of agents continued during 2017 and, in the last few months, a plan for the development and transformation of the network has begun, with a greater push towards the business segment;
- *Teleselling*: in the difficult context of the commodity market, Enel Energia has decided not to call potential new customers over the phone to stipulate electricity or gas contracts.

  For this reason, on 1 June 2017, the Teleselling Outbound channel was closed with immediate termination of contracts with external suppliers.

  On the other hand, the Teleselling Inbound channel confirmed good sales channels in 2017, with the acquisition of 260.000 new customers and a 4,9% redemption, and excellent quality standards, replying to about 5,2 million calls from potential customers interested to the commercial offers of Enel Energia;
- *Inbound contact center*: in 2017, it received approximately 31 million calls with a service level of 97% and an average waiting time of 25 seconds.
- *Direct and indirect shops*: Enel Energia in 2017 confirmed the presence on the national territory of its own direct network of 121 Enel Points and has strengthened and developed the network of indirectly managed stores for a total of about 720 indirect shops active as of December 31st. In 2017 the channel continued to improve the sales performance of the commodities becoming the first acquisition channel.

  Enel Energia has supported a continuous process of optimization of the network of indirect shops, through the revision of the layout and the development of tests for alternative business models, such as islands in shopping centers and the opening in areas with high commercial value;
- *Digital channels*: in 2017, Enel Energia's digital channels were completely revised, with the aim of ensuring the evolution of the customer experience from both a commercial and a managerial point of view. The customers registered in the self-care area in 2017 amounted to 2,3 million, compared to the 1,2 million registered in 2016 (+ 52%), more than 18 million online transactions were made by customers and were acquired by the channel web 96.000 new customers, up 24% compared to 2016.

  In October 2017 an updated version of the Enel Energia app was published. Among the elements of innovation in addition to design in line with the digital guidelines of the group, the possibility of verifying the activation status of the supply contract, the integration of the My Energy service to control the electricity and gas expenses by consulting the graph consumption and the ability to customize your application by inserting the features preferred by the user on the home page.

In 2017 the new website enel.it was designed and launched, object of the One Hub Italia project. The project aimed to integrate, in a single digital touch point, the Enel Italia institutional site and the Enel Energia commercial site. The new web portal strengthens awareness in the new areas of Enel Energia offer, guides the consumer through the wide range of products and services, directs and simplifies the process of evaluating and purchasing a product or service and directing the customer towards the functionalities self-care.

Two Twitter profiles, one dedicated to communication and one dedicated to customer caring, have been added to the existing Facebook and Instagram profiles with the goal of being closer to customers.

In March 2017, the Enel Energia BOT was launched with the main functions (self-reading, check of payments status and progress of the contract, etc.).

4.3.3.1.5 Enel Energia: next steps

Enel Energia strategy for the next future (since 2018) is based on the following points:

- consolidation of its leadership in the free electricity and gas market. In addition to the continuous strengthening of the market share in the residential segment, in 2018 Enel Energia will pursue the objective of increasing the number of business customers, focusing on the most valuable customers (SME). The strategy will be implemented by identifying the potential market, defining the products according to the needs of the target customers, developing communication and marketing campaigns dedicated to business customers. Enel Energia will therefore proceed in the course of the year to a complete review of the business product portfolio in terms of simplicity, clarity and flexibility, with the aim of guaranteeing the customer a renewed customer experience that ensures effective and innovative modes of engagement for the entire customer life cycle;
- with regard to Enel Energia's Loyalty programs, 2018 will see the convergence of the two current programs, EnelMia and EnelPremia 3.0, into a single new fully digital program, which will be launched towards the end of 2018 and will be channeled mainly through the App of Enel Energia;
- as for the digital strategy, 2018 will be a decisive year in terms of building a model of digital engagement, to multiply and enrich opportunities for interaction with our customers;
- during the year, the launch of the new CRM (CRM Transformation) solution based on Sales Force technology, which foresees an improvement in performance and a reduction in customer management operating times, will be highly significant.

4.3.3.2 From Enel Energia to Enel X

Within the definition of an organizational and corporate reorganization plan of the Enel Group, it was set up Enel X srl company, wholly owned by Enel S.p.A., which will operate in Italy through the Italian company Enel X S.p.A. of which he is the only member and will offer a new range of innovative products and services [45].

As a consequence, in March 2018 Enel Energia has officially announced that starting from 1 April 2018, all contracts relating to products and services other than the supply of electricity and gas will be transferred to Enel X Italia, including Enel Si S.r.l (company wholly owned by Enel Energia, dedicated to services, products and integrated solutions for energy saving and efficiency).

Enel X is divided into the following product lines:

1. E-Home & Consumer Solutions, with a focus on smart home and insurance solutions;
2. E-City, dedicated to the development of optical fiber, lighting, signaling, as well as security;
3. E-Industries: dedicated to the development of "off-grid", "limited grid" and distributed generation systems;
4. E-Mobility: which will include, among other things, charging infrastructures, platforms to manage the charging methods of electric vehicles, developing solutions for the exploitation of batteries and the re-use of batteries.

Concentrating in particular on the first product line, the main products are the following [46]:

Figure 4.7 - Enel X boiler

- Boiler (Light Offer, Plus Offer, Open Flue): it includes proper installation, tax deduction assistance, two-year warranty and a series of optional services such as the purchase of a Netatmo chrono-thermostat: it allows the control of the heating system from remote. It is compatible with smartphones, tablets and computers. By installing the dedicated application, the user can have access to information regarding the energy consumption of the system. It is compatible with the wide range of boilers of our "Light", "Plus" and "Open Flue" Offers (Figure 4.7);

Figure 4.6 - Enel X air conditioner

- Air conditioner (Light Offer, Plus Offer, Deluxe Offer): it includes proper installation, tax deduction assistance, two-year warranty and a series of optional services (Figure 4.6);

Figure 4.8 - Enel X photovoltaic

- Photovoltaic and storage: it includes inspection, design and installation, administrative practical assistance, charges for connection to the distribution network, removal and disposal of modules upon expiry. Other optional services are available (Figure 4.8);
- LED bulb: it is designed to combine a warm and relaxing light with a clean and essential design, a minimum energy consumption (-90% compared to traditional light bulbs) to ensure a correct brightness, economic savings and respect for the environment (Figure 4.9);

Figure 4.9 - Enel X LED bulb

- Maintenance and repair;
- Enel X Sun Thermal: it allows to produce hot sanitary water using solar energy and includes site inspection, design and installation, assistance with administrative procedures. Optional accessories and optional services are available, as well.

4.3.3.2.1 Enel X: next steps

By completing the organizational and corporate restructuring plan, in the near future Enel X will be able to present itself to the market in the Residential and Micro Enterprise segments with solutions in the E-Home and E-Mobility field.
In particular, in the e-Home segment it should be able to present solutions for the development of smarter homes, capable of reducing energy consumption and guaranteeing greater well-being with specific reference to:

- products and services for the home: boilers, air conditioners, photovoltaic, solar thermal, services of assistance and maintenance installations;
- Smart - Home solutions: solutions for automation, consumption monitoring, safety.

To offer capillary installation and maintenance services to all consumer customers, it intends to create a specialized technical network able to guarantee the coverage of the entire national territory.

The E-Mobility area will focus on the widespread installation of charging infrastructures (about 3000 per year) open to the public, both on public and private land, as well as on the marketing and installation of wall-boxes for domestic use.
In order to maximize its presence on the territory and expand the range of services offered to customers, Enel X Italia will focus on strengthening its commercial network dedicated to solutions for the home and electric mobility, through the contracting and management of Partner qualified.
Within the scope of customer management activities, Enel X will consolidate increasingly innovative and full digital processes and channels, through a new e-commerce channel and a Contact Center geared to the specific needs of Consumer and Business customers.

In conclusion, the continuous improvement of Enel Energia and the foundation of Enel X represent the will of Enel Group on the one hand to renovate their energy offers and on the other hand to be competitive on the future markets that will be opened to utilities such as smart home, smart city, electric vehicles. For this reason, **Enel could be classified as a potential "Full-Service Provider**" (Chapter 3).

5 CHAPTER - “Business Case: EDISON”

Edison S.p.A. is an Italian company active in the procurement, production and sale of electricity, gas and crude oil, wholly owned by the French group Électricité de France. It is the oldest energy company in Europe, currently operates in Italy, Europe and the Mediterranean basin employing over 5.000 people.
It is one of the main producers of electricity in Italy, holding 7% of national production (2017): it owns a production park that includes combined-cycle gas plants (CCGT), hydroelectric plants, wind, solar and biomass. In 2017, Edison generated 19,7 TWh of electricity through a managed capacity of 6,4 GW and sold 10,9 TWh [47].
In the hydrocarbons sector, Edison is the one of the largest Italian operators, covering 22% of the national gas need and selling 6,9 billion m^3 of gas (2017): the company is currently studying hydrocarbon exploration and production in the Middle East and Africa and, according to the current CEO Marc Benayoun, intends to build infrastructures in Europe, thanks to the network of pipelines and its regasification plants already started by Snam, which has detected important networks in Europe, including France.
Company revenue has been 9,9 billion euros, with an EBITDA of 803 million euros. All data refer to year 2017. Only the savings shares in the FTSE Italia Small Cap index are listed on the Milan Stock Exchange, following the delisting of ordinary shares in 2012.

5.1 A bit of history

The first Edison company was formally incorporated in Milan on 6 January **1884** as the Italian General Electricity Company Edison System for the production and distribution of electricity. Giuseppe Colombo, its president, had already built in the center of Milan, in the former Teatro Santa Radegonda, the first European power station, which became operational on 18 June 1883, which illuminated the premises of the Galleria di Milano, the nearby streets and the “Teatro alla Scala”.
In 1893 Edison set up the first experimental electric tram in Milan, the first piece of a vast urban and extra-urban network that Edison ran until 1916. Thomas Alva Edison's patents based on direct current proved to be soon outdated; since 1895 a pool of Italian banks, led by the newly established Banca Commerciale Italiana, relaunched the company by adopting the alternating current system, also thanks to appropriate agreements with the AEG and gradually investing new capital. Already just before the First World War, Edison was one of the major companies producing electricity and development continued in the 1920s and 1930s.
1950-1991: after World War II Edison was one of the largest electric groups in Europe. In the 50s Edison invested in diversifying its activities, strengthening itself in other sectors (including chemistry). Following the nationalization of the electricity sector in 1963 and the consequent sale of electricity production and sales, Edison remained self-producing, continuing to manage the power stations that supplied the group's industrial plants.
In 1966 the company merged with Montecatini, from which Montedison (1969) was born, the largest Italian industrial private chemical group. In 1979, the Montedison electrical plants (21 hydroelectric and 2 thermoelectric plants) were merged into a new company, SELM,

which after four years was listed on the Milan Stock Exchange. In 1991 SELM was renamed with the historical name of Edison.

1991-1999: the following years represented a period of great development, also thanks to the 1991 National Energy Plan which promoted the construction of production plants from renewable and assimilated sources, relaunching the role of self-producers. Also, in the 1990s, Edison consolidated its activities in the hydrocarbon sector, acquiring important reserves of natural gas.

2000-2011: since 1999 the new legislation on the progressive liberalization of the electricity sector (Bersani Decree) reintroduced competition in the electricity and gas sectors. Edison entered the new market, realizing the first electricity supplies to private customers, expanding its presence in the gas sector.

In 2000, the holding company Compart (Company of insurance and industrial shareholdings S.p.A.) of Luigi Lucchini - which already owned 36,1% of ordinary shares - launched an internal tender offer on the shares of Montedison SpA with the help of Mediobanca, to prevent hostile escalation and at the same time to monopolize the dividend recovery of the sub-subsidiary Edison. Action that ended, after a month, with the control of over 92% of the ordinary capital of Montedison and the consequent incorporation of Montedison S.p.A. in the Compart S.p.A. renamed with the name of the merged company.

In the summer of 2001 Italenergia - a company set up by Fiat Energia, Électricité de France (EdF), Tassara of the Franco-Polish financier Romain Zaleski, Banco di Roma, Banca Intesa and Banca San Paolo - launched a takeover bid for Montedison and Edison, gaining control. This led to the disposal of all the activities of the Montedison Group which were not included in the energy sector and which were no longer considered core business.

With the negotiations launched between October and December of the same year, Edison, Sondel (subsidiary of the Falck Group, after the failed merger a few months earlier), Fiat Energia and Montedison were merged into Italenergia, giving life to a new company called Edison SpA again. The structure of Edison S.p.A. was therefore amended in 2005, when the control of the company passed, through a takeover bid, to Transalpina di Energia srl, the wholly owned subsidiary of the Électricité de France group (EDF) and Delmi, of which A2A held 51%. The first president was Giuliano Zuccoli.

On 24 May **2012**, following a nearly one-year reorganization, Électricité de France (EDF) acquired exclusive control of Edison, placing ordinary shares on the Milan Stock Exchange.

5.2 Edison Group

5.2.1 Economic performance

Tables 5.1 and 5.2 compare the economic performance of the “Electric Power Operations” business segment to that of Edison Group as a whole [48][49][50].

Performance (Million €)	2014			2015		
	Electric Power Operations	Edison Group	% Electric Power Operations	Electric Power Operations	Edison Group	% Electric Power Operations

Sales revenues	7.859	12.325	63,8%	6.529	11.313	57,7%
EBITDA	652	814	80,1%	360	1.261	28,5%
EBIT	260	292	89,0%	-977	-795	122,9%
Group Net results		40			-980	
EBITDA/Revenues %	8,30%	6,60%		5,51%	11,15 %	
ROS (EBIT/Revenues) %	3,31%	2,37%		-14,96%	-7,03%	
Performance (Million €)	**2016**			**2017**		
	Electric Power Operations	**Edison Group**	**% Electric Power Operations**	**Electric Power Operations**	**Edison Group**	**% Electric Power Operations**
Sales revenues	5.682	11.034	51,5%	5.127	9.940	51,6%
EBITDA	386	653	59,1%	289	803	36,0%
EBIT	184	-260	-70,8%	33	42	78,6%
Group Net results		-389			-176	
EBITDA/Revenues %	6,79%	5,92%		5,64%	8,08%	
ROS (EBIT/Revenues) %	3,24%	-2,36%		0,64%	0,42%	

Table 5.1 - Edison group economic performance (2014-2017)/1

Performance (Million €)	**2014**			**2015**		
	Electric Power Operations	**Edison Group**	**% Electric Power Operations**	**Electric Power Operations**	**Edison Group**	**% Electric Power Operations**
Total shareholders' equity		7.137			5.876	
Net financial debt		1.766			1.147	
Net cash flow		685			619	
Capital expenditure	43	300	14,3%	42	332	12,7%
Employees at year end	1.051	3.101	33,9%	1.030	3.066	33,6%
Performance (Million €)	**2016**			**2017**		
	Electric Power Operations	**Edison Group**	**% Electric Power Operations**	**Electric Power Operations**	**Edison Group**	**% Electric Power Operations**
Total shareholders' equity		6.265			6.203	
Net financial debt		1.062			116	
Net cash flow		85			946	
Capital expenditure	98	305	32,1%	133	347	38,3%
Employees at year end	2.949	4.949	59,6%	3.156	5.144	61,4%

Table 5.2 - Edison group economic performance (2014-2017)/2

2016-2017: in 2017, the Group's net revenues totaled €9.940 million, or 9,9% less than the previous year. EBITDA registered an increase of €150 million mainly thanks to a favorable scenario that has contributed to higher margins in thermoelectric generation. EBIT has passed from - € 260 million to €42 million marking a positive trend.

Considering the business segment, sales revenues, EBITDA and EBIT has decreased from 2016 to 2017. ROS on the one hand has increased at a group level passing from -2,36% (2016) to 0,42% (2017), on the other hand has decreased at a business segment level passing from 3,24% (2016) to 0,64% (2017).

In particular, the sales revenues of the Electric Power Operations decreased by 9,8% compared with the previous year mainly as a consequence of a reduction in volume sales due to a different portfolio optimization.
The reduction in volumes was partially offset by an increase in average selling prices and by the contribution of Fenice group (consolidated since April 1, 2016).
2015-2016: in 2016, the Group's net revenues totaled €11.034 million, or 2,5% less than the previous year. EBITDA amounted to €653 million (€1.261 million in 2015), for a decrease of €608 million.
At a business segment level, EBIT has increased passing from €-977 million to €184 million. ROS has shown a very positive trend, as well.
In particular, the sales revenues of the Electric Power Operations, which from April 1, 2016 include the contribution of Fenice Group (280 million euros), decreased by 13% compared with the previous year, mainly due to a decline in average sales prices driven by the benchmark scenario and to a decrease in sales to end customers.
2014-2015: in 2015, the Group's sales revenues totaled €11.313 million, down 8,2% compared with the previous year. EBITDA amounted to €1.261 million (€814 million in 2014), for an increase of €447 million. Group net results show a very negative path.
Considering the business segment, all indicators shows a negative trend.
In particular, the sales revenues of the Electric Power Operations decreased compared with the previous year, mainly due to a decline in average sales prices, driven by the benchmark scenario, and to lower sales volumes.
Moreover, the following important trend could be observed in the period considered:

- at a Group level, the net financial debt decreased consistently from €1.766 million (2014) to €116 million (2017) thanks above all to positive cash flows;
- the capital expenditure increased both at a group level and at business segment level;
- the number of employees has shown a positive trend: considering in particular the business segment, they have passed from 1051 (2014) to 3156 (2017). Furthermore, the weight on the total of those belonging to the "Electric Power Operations" business segment has passed from 33,9% (2014) to 61,4% (2017).

5.2.2 Operations

The following tables show the main data about Edison operations.

Edison Group - Operations	2015	2016	2017
Net electricity generation (TWh)	18,5	20,4	19,7
Net efficient generation capacity (GW)	7	6,5	6,4
Electricity sales (TWh)	17,1	11,6	10,9

Table 5.3 - Edison Group operations (2015-2017)

Edison Group - Net electricity generation (TWh)	2015	2016	2017
Thermal	14,116	16,765	16,469
Hydroelectric	3,378	2,49	2,209
Wind and other renewables	0,987	1,103	1,064
Total	18,481	20,358	19,742

Table 5.4 - Edison Group net electricity generation (2015-2017)

Edison Group - Net efficient generation capacity (GW)	2016	2017
Thermoelectric power plants	4,735	4,621
Hydroelectric power plants	1,12	1,132
Wind power and other renewables	0,604	0,604
Total	6,459	6,357

Table 5.5 - Edison Group net efficient generation capacity (2016-2017)

Edison Group - Electricity sales - (TWh)	2015	2016	2017
Residential	1,513	1,218	1,18
Business	14,502	9,325	8,855
Small Business	1,094	1,039	0,893
Total	*17,109*	*11,582*	*10,928*

Table 5.6 - Edison Group electricity sales (2015-2017)

Edison Group - Average number of electricity customers	2015	2016	2017
Residential	489.967	446.919	433.218
Business	7.516	4.098	67.322
Small Business	94.510	86.586	72.318
Total	591.993	537.603	572.858

Table 5.7 - Edison Group average number of electricity customers (2015-2017)

2016-2017: Edison net production in Italy comes in at 19,742 TWh in 2017, down 3% on 2016; more specifically, thermoelectric production decreased by 1.8%, partly reflecting the sale of Termica Milazzo completed on August 1, 2016 (production 2016 equals to 535 GWh) and of Gever Spa as from March 2017 (production 2016 equals to 714 GWh). With regards to production from renewable energy sources, the trend in 2017 saw hydroelectric production down 11,3%, in line with the national trend, because of water availability in the period, and wind power generation and other renewables with values slightly down due, primarily, to less wind in the period, passing from 1,103 TWh (2015) to 1,064 TWh (2017).

Net efficient generation capacity has decreased passing from 6,459 GW (2016) to 6,357 GW (2017): thermoelectric power plants show a negative trend while renewable sources a positive one.

Sales to end customers dropped by 5,6%, from 11,582 TWh (2016) to 10,928 TWh (2017) mainly due to the smaller volumes sold to the Business segment.

The average number of electricity customers has increased from 537.603 (2016) to 572.858 (2017), despite a decrease in the number of residential and small business, and thanks to an huge increase in the number of business.

2015-2016: Edison's net production totaled 20,358 TWh, for an increase of 10,2% compared with 2015; more specifically, thermoelectric output posted a gain of 18,8% that mirrored in part the national trend for gas-fired power plants, despite the sale of Termica Milazzo on August 1, 2016. As for hydroelectric production, the trend that prevailed in 2016 resulted in a significant decrease (-26,3%) due to the change in the scope of consolidation (-22% approximately) resulting from the deconsolidation of Hydros (effective as of January 1, 2016, as stipulated in the governance agreements with the shareholder SEL), offset only in part by the contribution of the power plants of Cellina Energy and IDREG Piemonte acquired at the end of May 2016, and, for the balance, attributable to the different availability of water resources in the two periods.

On the other hand, production from wind power and other renewables increased by 11,7% mainly due to more windy weather conditions recorded during the period.

Sales to end customers were down by 32,3% chiefly as a result of lower volumes sold to the Business segment.

The average number of electricity customers has passed from 591.993 (2016) to 537.603 (2017), due to a decrease in the number of residential customers.

5.2.3 Sale of electricity and services to the clients

In Italy, Edison sells electric power and natural gas to approximately one million customers in the business and residential sectors, both under free market and regulated market rules and conditions. The commercial activity and customer relations take place through different channels, including sales agencies, branches, call centers, focusing on the development of the digital channel, both for prospects and for customers already acquired.

These business activities comprise selling and managing energy and environmental services intended for different types of customers (retail, companies, cities and entire territories).

The services portfolio includes:

- energy optimization to reduce consumption for equal output of the production processes while improving service quality;
- on-site energy production, with low or no environmental impact systems, such as photovoltaic, biomass, high yield co-generation, etc.;
- energy consulting in the field of energy management systems (ISO 50001), in the management of energy efficiency and environmental certificates and in in-house and external training for customers and partners;
- construction of projects on the territory, starting from the analysis of the opportunities to boost the efficiency of resources and ending with the construction of projects with stakeholders;
- coverage along the entire value chain of the environmental services of consulting, studies and designs, clean-ups, monitoring, sampling and analysis of environmental matrices, waste management, waste water treatment.

Activities are carried out in partnership with customers - through business models based on sharing the results obtained, adapted according to specific needs. On the residential market, the services offering is directed at covering all the needs of homes, from assistance, to efficiency, through photovoltaic power and the smart home.
With the launch of the Edison World Platform, Edison proposed an unlimited assistance service against unexpected events (Edison Casa Relax) and a flexible, customized Smart Home solution (Edison Smart Living) to promote energy savings, a theme that also drove the launch of Boilers (MyComfort) and Photovoltaic (MySun).
Lastly, the acquisition of Assistenza Casa enabled Edison to sell new services, allowing it to enhance its commercial Value Proposition.

5.2.4 Organization and employee services

Until the end of 2014 the group structure is represented in Figure 5.1:

Figure 5.1 - Edison Group structure (until the end of 2014)

In 2016, with the new CEO appointment an organizational and managerial restructuring of the Edison Group got under way with a redefinition of the Group's first-level macrostructure and the new executive committee (COMEX) and, consequently, the redefinition of the specific organizational structures also began:

- a new **Energy Services Market Division** was established with the mission of contributing to the Company's growth in the end-user market through the development, sale and management of energy and environmental services combining the activities of the Fenice Group, acquired in April 2016, with those operated by Edison (Edison Energy Solutions);
- the structure and responsibilities of the **Exploration and Production Division**, which contributes to Edison's growth and to the implementation of its strategy through the development and management of hydrocarbon exploration and production activities and the exploitation of Edison's reserves in the various countries while safeguarding and developing competencies and knowhow for various upstream activities, were redefined;
- the structure and responsibilities of the **Power Asset & Engineering Division** were redefined; this Division's mission is to contribute to the achievement of Edison's objectives through the development and management of electric power generating assets (hydroelectric, other renewable sources and thermoelectric) and to provide a single centralized hub for engineering activities providing support and services to all business areas within the scope of activity of the Edison Group;
- a special **Transformation Team** was established with the mission of orienting and guiding the Company's transformation, supporting Edison in facing the new challenges posed by changing markets and digitalization. This team focuses on issues and initiatives that, by acting on the evolution and innovation of the Company's operating models, increase their flexibility, efficiency and effectiveness, in terms both of internal cooperation and service and responses to the market.

"Edison Energia" and "Energy Services Market Division" well represent Edison Group strategy toward the final market.

5.2.4.1 EDISON ENERGIA

Edison Energia Spa is 100% controlled by Edison Spa. The company operates in the purchase, sale and exchange of electricity as well as the purchase, sale and exchange of natural gas on the free and protected market.

5.2.4.1.1 Economic performance

Some data about economic performance of Edison Energia can be identified in the following Table 5.8.

Edison Energia - Performance (Million €)	2013	2014	2015	2016	2017
Revenues	4.254	4.620	4.276	3.249	3.162
EBITDA	41,608	99,581	94,553	64,388	77,481
Net result	-54,467	-33,357	-3,839	-3,787	16,980
EBITDA/Revenues %	1,0%	2,2%	2,2%	2,0%	2,5%
Net result %	-1,3%	-0,7%	-0,1%	-0,1%	0,5%
Total shareholders' equity	46,581	41,803	21,865	47,248	88,531
Net financial debt	35,189	48,849	56,466	22,833	20,997
Employees at year end	248	255	262	259	259

Table 5.8 - Edison Energia economic performance (2013-2017)

It shows, in particular, a net profit of € 16,98 million in 2017, a strong improvement compared to the net loss of € 3,78 million in the previous year [51]. This result derives mainly from the combined effect of:

- an improvement in the contribution margin, linked to the recovery in the margin of natural gas, driven by higher volumes sold, offset by a slight contraction in the electricity margin combined with the reduction in sales volumes;
- lower write-downs and net losses compared to the previous year;
- a negative impact in 2016 of extraordinary components.

5.2.4.1.2 Portfolio offers and basic customer management

In 2017, Edison Energia, in addition to consolidating the offers already present in its portfolio, has enriched the offer addressed to the residential segment by launching the new "Edison World" platform. With Edison World the intent is to go beyond the sale of only the commodity offering its customers new services and ensuring maximum comfort and well-being as well as efficient and smart energy management: the offer includes devices for monitoring and control of consumption, home automation and unrestricted insurance and assistance services against unforeseen installations [52].

Consistent with the commercial strategy and with a view to strengthening the range of innovative services and added value for the customer, in March Edison Energia acquired 51% of **Assistenza Casa**, an Italian company of the international Homeserve group.

Assistenza Casa, established in 2010, has more than 50 employees, manages a network of about 1400 artisans throughout Italy and serves about 250.000 customers.

Thanks to this operation, the company will offer its customers repair services for the electrical, gas and hydraulic systems, installation and maintenance of boilers and air conditioners, as well as the installation of smart systems connected to the network and remotely controlled (Internet of things).

In the second half of 2017, Edison Energia further enhanced its commercial value proposition by launching "Edison My Sun" and "Edison My Comfort". The two offers are part of the Edison World service platform.

With the first, Edison Energia offers a complete service that provides the installation of a photovoltaic system and/or efficient battery giving the possibility to reset the electricity bill for a period up to 10 years.
Both offers are divided into different solutions and can be adapted to the specific needs of each customer.
"Edison Shop" is a really concrete way through which Edison is trying to enter the smart home market overcoming the past concept of electricity as a commodity. It offers, for example, the following products [53]:
Philips HUE E27 Starter kit: it gives the possibility to control up to 50 LED bulbs with the smartphone connecting through wireless (Figure 5.4);
Energy Control: it allows to monitor the electricity consumption of the user's home wherever he is, via smartphone, PC or tablet (Figure 5.3);
Netatmo thermostat: it allows to control the home temperature, via smartphone, PC or tablet with the Edison Netatmo smart thermostat. The user can reduce gas consumption by up to 25% while maximizing comfort at home (Figure 5.2).

Figure 5.4 - Philips HUE E27 Starter kit

Figure 5.3 - Edison Energy Control

Figure 5.2 - Netatmo thermostat

5.2.4.1.3 Communication

The communication activities, carried out in 2017, have had as main objectives:

- the promotion of new offers and services contained in the Edison World platform;
- the acquisition of new customers and the maintenance of Brand awareness.

In the residential segment, in particular, most of the resources were concentrated, with advertising and promotion activities on television, radio, printed paper and billboards at the local level.

5.2.4.1.4 Edison Energia: next steps

Edison Energia intends to pursue a goal of consolidating its customer base by focusing primarily on the quality of service and new offers, designed to increase the number of users and with the aim of increasing the loyalty of existing customers.
At the same time, the company intends to intensify the monitoring of high-potential customers with whom it intends to build a lasting and increasingly valuable relationship.
On the retail market, the objectives are to consolidate portfolio offers and develop value-added services for both residential customers and SMEs to complete the commercial offer. Furthermore, the testing phases of new innovative products and services will continue.

5.2.4.2 The ESCo world

The energy efficiency sector has now reached full maturity. This is supported by the Energy Efficiency Report 2018: increased investments for the period 2013-2017, characterized by an annual growth rate of 12%, peaking in 2014 and 2017. The analysis of the economic resources employed in 2017, carried out by market segment, it shows that 65% of investments concerned the home & building sector, 33% the industry and 2% the Public Administration, with a market growth for each substantially uniform area [54].

5.2.4.3 ENERGY SERVICES MARKET DIVISION

To contribute to the creation of a sustainable future, Edison created the Energy Services Market Division in which **Edison Energy Solutions** and **Fenice** converge, which have been operating in the energy services sector for many years.
Furthermore, on 1 March 2017, Edison Energy Solutions entered the urban biomass district heating sector, acquiring the majority (51%) of **Comat Energia**, the Comat group company operating in over 50 mountain communities in Piedmont.
Thanks to a wide range of services and a long experience gained internationally, the division is a solid and expert partner able to provide, share and implement any type of technical knowledge, identifying intervention models compatible with each specific need of the customer to build a common growth path [55].
In all areas of operation, the main mission of energy efficiency solutions is to optimize resources and consume in a more conscious way, transforming the ways of producing and using energy with the aim of eliminating waste and reducing management costs, through offering models that pay attention to social, environmental and economic sustainability.

Fenice

Fenice is an Energy Service Company (ESCO) specialized in energy efficiency solutions and environmental services, mainly for large industrial companies. More specifically, Fenice has an established position and competencies for the delivery of a complete range of integrated and customized energy saving and environmental sustainability solutions for its customers, with offerings integrated along the entire value chain, including energy diagnostics, environmental audits, design, installation and management of turn-key projects for complex energy systems and energy solutions with low environmental impact. Fenice operates in Italy, Poland, Spain and Russia. It is also worth of mentioning that in September 2016 the 100% of the equity stake in the company Fenice Rus Llc was sold.
With the acquisition of Fenice, Edison aims at positioning itself as a key operator in the Italian market for energy services, consistent with its strategic objectives, broadening and diversifying its offering. Leveraging the value of Edison's brand and customer portfolio and capitalizing on Fenice's status and competencies in its market segment, the Group will be able to develop and strengthen its position in the market for energy services, while at the same time expanding the range of services it can offer to medium and small-size companies, service businesses and public administrations.

Comat Energia

The company operates in the small-scale district heating plants mainly powered by biomass. The area of activity is the Piedmont with a strong concentration of plants in the province of Cuneo. More precisely, the company's object is the development, design, implementation and management of initiatives in the field of heat supply and management services, as well as other energy services for individuals, territories, and other public or private buildings, also operating as ESCO (Energy Service Company), with particular focus on heating and district heating fed with woody biomass for mountain communities in Italy, mainly through the design, construction, installation, testing, start-up, maintenance and assistance of heating plants and district heating networks.

5.2.4.3.1 Economic Performance

The 2017 objectives of the company, like that of previous years, were to continue the process of repositioning the market thanks to the growth of the customer base. For this reason, it has tried to understand the evolutions of the customers' needs and to respond in an innovative and profitable way, maintaining high levels of service quality and attention to safety. All this resulted in higher costs than the competition [56]. In particular the economic performance can be seen in the following Table 5.9:

Edison Energy Solutions - Performance (Million €)	2013	2014	2015	2016	2017
Revenues	0,037	9,189	11,908	4,188	6,801
EBITDA	-0,097	-1,215	-1,050	-1,113	-1,900
Net result	-0,056	-1,275	-1,423	-1,967	-2,635
EBITDA/Revenues %	-259%	-13%	-9%	-27%	-28%
Net result %	-150%	-14%	-12%	-47%	-39%
Total shareolders' equity	2,944	10,770	9,347	7,350	4,715
Net financial debt	0,000	0,284	0,272	0,013	0,005
Employees at year end	0	12	26	31	44

Table 5.9 - Edison Energy Solutions economic performance (2013-2017)

Some positive trends over the period considered can be identified: the increasing revenue, number of employees, the decreasing net financial debt.
In particular the main features of 2017 year have been the following:

- the higher revenues from €4,188 million (2016) to €6,801 million (2017) linked to the increasing exploitation of energy efficiency certificates obtained both on the company's own plants and on the plants owned by customers;
- higher production costs, mainly deriving from:
    - higher labor costs, due to the expansion of the workforce;

- higher amortization due to the impact of plants that entered service at the end of 2016 and in 2017;
- higher operating costs;
- greater consumption of materials and services.

- the diminution of net financial debt and total shareholder's equity.

5.2.4.3.2 Energy services market division: Next steps

The main objective of the company in the short term is to consolidate, through a quality and innovative offer, the presence in the segments of large industrial customers as well as SMEs and to fully grasp the promising prospects for development in the sector of energy efficiency of the tertiary sector.
In addition, strong incentive will be given, in the context of the renovation of the existing building park and the construction of the new, to the use of ICT and smart automation and control technologies. "Smartness" parameters will be introduced that will measure the building's ability to use new technologies to optimize their consumption and improve performance. Also important is the role of integrated renewable energy in buildings and electromobility, with the installation of recharging electric vehicles in parking lots of public and private buildings.

In conclusion, Edison Energia and the Energy Services Market division well represent the aim of the company to go beyond the sale of a commodity through specific value-added products and reliable services to the customers. Considering this observation, **Edison could be classified as a mix between the "Marketplace advisor" and "Specialized provider"** (Chapter 3).

6 CHAPTER - “Business Case: ENGIE”

ENGIE (known as GDF Suez prior to April 2015) is a French multinational electric utility company, headquartered in La Défense, Courbevoie, which operates in the fields of electricity generation and distribution, natural gas, nuclear and renewable energy. The company is a component of the Euro Stoxx 50 stock market index.

ENGIE is a pioneer in nuclear energy in Europe with the development of the first pressurized water reactor built in Belgium. It is one of the few players in the sector to develop expert skills in both upstream (engineering, purchasing, operation, maintenance) and downstream (waste management, dismantling) activities. As a nuclear operator, ENGIE owns and operates seven reactors in Belgium through Electrabel, owns stakes in the Chooz and Tricastin plants in France (1.208 MW – the equivalent of one nuclear reactor) and has drawing rights in Germany.

The company, formed on 22 July 2008 by the merger of Gaz de France and Suez, traces its origins to the Universal Suez Canal Company founded in 1858 to construct the Suez Canal. Since the merger in 2008, the French state holds approximately a third of the company. It adopted the "Engie" name in April 2015 in order to emphasize the changing nature of its energy business and de-emphasize its historical role as a nationalized gas monopoly [57].

The company holds a 35% stake in Suez Environnement, the water treatment and waste management company spun off from Suez at the time of the merger. GDF Suez bought 70% of Britain's International Power in August 2010, creating the world's largest independent utility company. The purchase of the remaining 30% was announced by GDF Suez in April 2012, and the transaction completed in July 2012. On July 1, 2015, the company announced the acquisition of solar parks developer Solairedirect, which makes it the largest solar power electricity producer in France.

Engie employs 153.090 people worldwide with revenues of €65,029 billion and net results of €1,424 billion. It is present in 70 countries. It is the first service provider for energy efficiency, the first independent producer of electricity, the third largest seller of natural gas in Europe. It has 228 heating and cooling networks in 13 countries; 112,7 GW of installed electrical capacity (of which 19,5 % is renewable); it supplies 245 TWh of natural gas in its portfolio from 6 countries.

All data refer to 2017.

ENGIE is listed on the Euronext exchanges in Paris and Brussels and is a constituent of the CAC 40 and BEL20 indices.

6.1 A bit of history

Before 2006: prior to the GDF Suez merger plans in 2006, the company existed as two separate French multinational corporations – Suez S.A. and Gaz de France.

Suez was (and still remains, through GDF Suez as) one of the oldest continuously existing multinational corporations in the world as the result of nearly two centuries of reorganization and corporate mergers. One line of corporate history dates back to the 1822 founded General Dutch Company by King William I of the Netherlands. The origin of its name 'Suez' traces back to its other founding entity – the Compagnie unverselle du canal maritime

de Suez founded in 1858 to build the Suez Canal. Suez S.A. was the result of a 1997 merger between the Compagnie de Suez and Lyonnaise des Eaux.

Gaz de France was created in 1946 along with its sister company Electricité de France (EDF) by the French Government. After the liberalization of Europe's energy markets, Gaz de France also entered into the electricity sector, having developed combined natural gas-electricity offerings. The company's capital was partially floated on the Paris Stock Exchange in July 2005, raising €2,5 billion for the French Government.

2006-2008: on 25 February 2006, French Prime minister Dominique de Villepin announced the merger of water supply and treatment, waste management and energy company Suez and power firm Gaz de France, with the aim of creating the world's largest liquified natural gas company. Since the French state owned over 80% of Gaz de France, it was necessary to pass a new law in order to make the merger possible. Whilst Nicolas Sarkozy was for several months opposed to the Villepin government's plans for a merger of the two companies, preferring a three-way deal with Italy's Enel which would maintain a controlling stake for the state, he subsequently accepted the government proposal. Law No. 2006-1537 of 7 December 2006 on the energy sector authorized the privatization of Gaz de France. On 3 September 2007, Gaz de France and Suez announced agreed terms of merger, on the basis of an exchange of 21 Gaz de France shares for 22 Suez shares via the absorption of Suez by Gaz de France. Various holdings of Gaz de France and Suez had to be divested in order to satisfy the concerns of the European Commissioner for Competition.

2008 – 2015: the newly created GDF Suez came into existence on 22 July 2008; the world's second-largest utility with over €74 billion in annual revenues. The deal resulted in the conversion of the French state's 80% stake in GDF into just over 35% of shares of the new company. The water and waste assets which formerly formed part of Suez were spun off into a new publicly traded company, Suez Environment, in which GDF Suez retains a stake.

In October 2009, GDF Suez placed 6th in an A.T. Kearney/ BusinessWeek ranking of the "World's Best Companies", the highest-placed European firm.

On 10 August 2010, the company announced a merger of its GDF SUEZ Energy International business unit, along with its operations within the United Kingdom and Turkey, with International Power. The acquisition created the world's biggest independent power producer, and the enlarged company will retain International Power's listing on the London Stock Exchange and be 70% owned by GDF Suez.

On 16 April 2012, the purchase of the remaining 30% of International Power was announced by GDF Suez, and the transaction completed in July 2012.

2015 - present: on April 24, 2015, GDF Suez announced it has changed its name to "ENGIE", in an effort to further expand the company's international footprint. CEO and Chairman Gérard Mestrallet said the new name was a symbol to meet the challenges of the energy transition and accelerate the group's development.

In July 2015, ENGIE acquired 95% of Solairedirect, raising its photovoltaic production from 125 to 486 MW.

On 2nd March 2017, ENGIE acquired Keepmoat Regeneration for £330m to form the places and community division, headed up by Keepmoat LTD's former CEO Dave Sheridan. The new division is focused on three key activities: energy, services and regeneration.

6.2 Strategy

Since 2014, ENGIE has operated a strategic shift, by reducing future exploration in fossil fuels and investing massively in renewable energies (solar, wind, geothermal, biomass, hydroelectric, and nuclear) and energy efficiency services.
In 2015, ENGIE announced its decision to stop new investments in coal plants, and to dispose of €15 billion in assets in order to reinvest into projects that promote low-carbon, distributed-energy. ENGIE also announced it will invest €22 billion in renewable energies, energy services such as heating and cooling networks, and decentralized energy technology.
The strategy of ENGIE is to promote decarbonized energy (oil and coal replaced by renewables and natural gas that emit less greenhouse gases), decentralized energy (energy produced and stored as close as possible to its place of consumption), and digitized energy (big data and digital tools for energy efficiency and network management). The Group plans to invest €1,5 billion on digital and new technologies related to energy.
ENGIE is also promoting an open innovation approach with its dedicated entity “ENGIE Fab” that supports in particular development of intelligent networks (smart grids), Internet of objects, green mobility, energy storage, and hydrogen.

6.3 Operations: Energy Services

ENGIE provides energy efficiency and environmental services. 90.000 of the group's employees are dedicated to these services. The main are the following:

- engineering: consulting, feasibility studies, project management and client support;
- systems, installations and maintenance: electrical installations, industrial maintenance, air conditioning and refrigeration, and systems integration;
- energetic services: energy efficiency solutions, multi-technology maintenance management, cogeneration and facilities management;
- housing services: cost-effective energy solutions, energy performance improvements, renewable energy and thermal renovation;
- "smart city": urban heating and cooling community systems, development of high-end technology solutions, a streamlined energy mix, carbon footprint reduction of buildings;
- micro grids and decentralized energy: local energy production and consumption systems, energy supply in isolated areas, residential self-consumption or in industrial and commercial sectors, eco-district;
- green mobility: alternative fuels (NGV, bioNGV, hydrogen, etc.), charging stations for electric vehicles, transport infrastructures, smart transit systems and upstream design and planning.

In March 2017, ENGIE acquired the Dutch EVBox, one of the largest suppliers in electric vehicle charging. ENGIE has set up "Better Mobility Today", a comprehensive range of clean mobility solutions. In June 2017, Engie won a five-year contract with Transport of London (TfL) for the provision of maintenance services for the London Underground. In September 2016, the city of Rotterdam (Netherlands) entrusted ENGIE and EVBox with the installation of 4,000 charging stations for electric vehicles. ENGIE has bought train communications

specialists Icomera (Swedish company leader in onboard communication solutions for public transport) through its subsidiary ENGIE Ineo.
ENGIE (50%) and Axium Infrastructure US (50%) won a 50-year concession to ensure the sustainable energy management of the Ohio State University in Columbus, one of the largest university campuses in the United States with 485 buildings.
In Asia Pacific, the Group signed agreements with Singapore, Malaysia and Indonesia to develop innovative solutions (solar energy, facility management services, micro grids, and smart city solutions).

6.4 Organization

In response to the challenge of the global energy revolution and to get closer to its customers, on January 1, 2016, ENGIE put in place a simplified structure based on a territorial and decentralized approach. The Group now comprises 24 operating entities (Business Units, or BUs), five Métiers and a range of support functions and operational functions. Most of the BUs are constituted on the scale of a country or group of countries, according to the density of the activities carried out in the geographical areas concerned. They bring together the Group's activities to meet the expectations of their customers and stakeholders in a given area.
The following were therefore created:

- 11 are geographic: Africa; Latin America; North America; Asia Pacific; Benelux; Brazil; China; North South, Eastern Europe; "Génération Europe" (Belgium, France, Germany, Italy, Luxembourg, Netherlands, Poland, Portugal, Spain, United Kingdom); Middle East, South and Central Asia, and Turkey; United Kingdom.
- 8 are set up in France: France BtoB; France BtoC; France Renewable Energy; France Networks; GRTgaz; GRDF; Elengy; Storengy.
- 5 are global: Exploration and Production International; Global LNG (Liquefied Natural Gas); Global Energy Management; Tractebel; GTT.

Five Métiers have been created in addition to this geographical structure: gas value chain; centralized generation; decentralized solutions for cities and territories; solutions for businesses; and solutions for residents and professionals.
The support functions and the operational functions complete the organization. They aim to reinforce the action of the Métiers to develop synergies within the Group and support the BUs.

- The support functions are as follows: General Secretariat; Finance Department; Group Human Resources Department; Group Strategy Department; Group Brand and Communication Department; Group Digital and Information Systems Department; Innovation Department; Corporate Social Responsibility Department; Group Real Estate Department; Risk Management Department; and departments reporting to the Chief Executive Officer (Internal Audit Department and Institutions France and Territories Department).
- The operational functions are as follows: Strategic Sourcing & Supply Department; Research & Technology Department; Business Development Oversight Department; Industrial Projects Department; and Nuclear Development Department.

6.4.1 North, South & Eastern Europe Business Unit (BU)

The North, South & Eastern Europe Business Unit (BU) is active today in more than 10 countries namely Austria, Czech Republic, Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Romania, Slovakia, Spain and Switzerland.
The BU's ambition is to be at the forefront of the energy transition in Europe. Its business environment is characterized by a rapid succession of far-reaching changes, such as decentralization and digitization, although the maturity of these changes varies from country to country.
The BU implements its strategy through a country-based organization which allows to strengthen current positions while driving innovation, all to the benefit of its customers.
The BU's main priorities can be summarized as follows:

- Strengthen its current activities as a platform for growth;
- develop integrated and digitalized energy efficiency services;
- scale up positioning in centralized and decentralized renewable energies;
- become an energy architect for territories.

The BU is active in more than three main business areas:

- customer solutions: the BU provides energy efficiency services as well as energy supply to industrials and businesses, residential customers and cities. The BU offers, among others, services in integrated facilities management, decentralized energy such as cogeneration and urban infrastructure (heating networks, public lighting);
- green energy generation: the BU designs, builds and operates renewable energy installations, particularly in wind but also biomass, hydro, and solar power;
- energy infrastructure: the BU runs distribution networks, mainly natural gas, and storage infrastructure.

In Italy, the BU is active in natural gas and electricity sales with more than 1,2 million contracts (BtoC and BtoB). The BU also supplies heating and cooling via cogeneration units and networks. It provides energy efficiency solutions to a variety of clients: residential, businesses and public authorities, the latest through the Consip process set up by the Ministry for the Economy and Finance. ENGIE also operates around 178 MW of wind and ground- and roof-mounted solar power assets, as well as biomass units. Italian authorities approved the end of regulated prices for gas and electricity which should be held in June 2020 and put in place a new capacity remuneration mechanism. They also published a new National Energy Strategy for 2030.

6.4.1.1 ENGIE ITALIA

The ENGIE group has been present in Italy for over 20 years.
Over the years the Group has undergone many transformations to meet the changes in modern society [58].
The "ENGIE" brand was officially born on April 24th, 2015 modifying the previous name GDF SUEZ, a company born from the merger of two energy groups: Gaz de France and Suez.

Today, ENGIE is one of the protagonists of energy in the area with the aim of being the leaders of the energy transition under way.
With a sensitivity towards responsible growth, ENGIE is oriented towards a low carbon dioxide economy: access to the sustainable economy, mitigation and adaptation to climate change, security of supply and optimization of the use of resources.
It offers global and integrated offers on the entire energy value chain, to individuals, cities and businesses, because it is able to integrate supply and services, with particular attention to innovative products and energy efficiency solutions.
ENGIE is engaged in the production of electricity also from renewable sources. Thanks to the Energy Management Trading activity, it provides customers with a competitive supply in the gas and electricity sectors.
ENGIE also manages: 300 municipalities, 10.000 buildings, 3.500 schools, 18 large universities, 15 stages.
In Italy ENGIE has roughly 3000 employees, more than 50 offices, 3 thermic power stations, 6 wind farms, 5 photovoltaic systems, 20 cogeneration plants, 9 industrial cogeneration plants, 11 district heating networks, 300.000 light points, 10.000 efficiency systems in public and private buildings, roughly 1.000.000 clients of which 1000 public administrations and important companies and 5000 condominiums.
In particular, ENGIE Italia S.p.A. operates in the Energy Management (EMT) sector and in the sale of electricity, natural gas and heat.

6.4.1.2 EMT area

The Energy Management activity carried out by Engie Italia SpA, aims to balance and optimize, in line with Group policies, the positions and market risks associated with generation and sales activities, in order to ensure and maximize margins.
Approximately 36 TWh of electricity and about 8 billion cubic meters of gas were processed in 2017.
More specifically, the company operates mainly on behalf of the other companies of the Engie group and has among its main activities:

- the complete management of the energy commodities subtended to the operation of the ENGIE Production plants;
- the negotiation of contracts for the supply of fuels for generation plants;
- sourcing natural gas for sales companies to end customers;
- the sourcing of national and foreign energy for the sales companies to the final customers;
- the purchase and brokerage of green certificates, CO2 certificates and other environmental certificates for the group companies;
- the optimization of the supply / demand portfolio as well as the management of the risk profile;
- the management of stock availability and transportation capacities abroad;
- interface function with the Energy Markets Manager (GME) with Terna SpA.

6.4.1.2.1 Sales Area

In 2017, the company positioned its B2C offering, offering 100% renewable energy.
To continue the satisfaction of its customers, the company has also introduced digital elements both in terms of applications and offers as well as devices for environmental monitoring.
Table 6.1 reports some operations data.

Engie Italia - Operations	2016	2017
Net electricity generation (TWh)	9,439	8,769
Electricity sales (TWh)	2,4	1,3
Average number of customers	125.395	136.482

Table 6.1 - Engie Italia operations (2016-2017)

6.4.1.2.2 Economic performance

Table 6.2 shows the improved economic performance of the company from 2016 to 2017.

Engie Italia - Performance (Million €)	2016	2017
Revenues	3.273, 7	3.690,1
EBITDA	42,50	33,60
EBIT	-157,70	10,50
Net Results	-118,10	36,64
Shareholders' equity	133,40	170,00
Net financial debt	287,20	274,90
Employees at year end	428	427

Table 6.2 - Engie Italia economic performance (2016 – 2017)

6.4.1.2.3 Organization

Engie Italia is positioned on the whole energy chain: production and sale of electricity and gas, energy management, energy efficiency solutions and integrated services.
In the organization of ENGIE Italia there are 6 business areas and transversal staff functions (Figure 6.1).

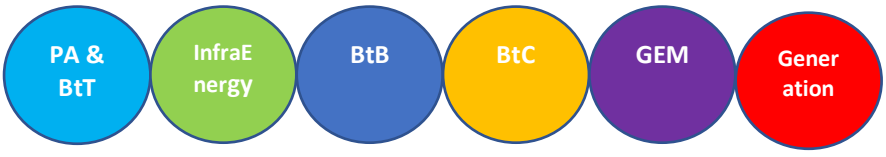


Figure 6.1- Engie Italia organization

Public Administration & Business To Territories (PA & BtT)
Public Administration Services, Hospitals, Subsidiaries.

- energy services (including energy efficiency solutions);

- integrated Facility Management.

Renewable and Decentralized Energy Infrastructure (InfraEnergy)

Services to private bodies and communities.

Management and maintenance of:

- wind, solar and biomass systems, district heating networks, cogeneration plants and other forms of decentralized energy production;
- engineering and construction services.

BtoB

Services to private companies and sports facilities.

- commodity and energy services (including energy efficiency solutions);
- management and maintenance of energy plants;
- integrated Facility Management.

BtoC

Services and supply of Energy to families, Soho (Small Office - Home Office) and condominiums.

- supply of electricity and gas;
- digital services and Smart Home solutions (IoT);
- installation and maintenance of boilers, air conditioning systems, heating systems;
- energy efficiency.

GEM - Global Energy Management

Energy trading.

- management of market risks related to the generation and sale of gas and electricity;
- competitive supply in the gas and electricity markets.

Generation

Large-scale energy generation.

- production of energy from thermal assets integrated with renewable energy;
- stability of the electricity network.

6.4.1.2.4 Activities of subsidiaries

Generation Area: ENGIE Italia S.p.A., through its subsidiaries, operates in the sector with the following mission:

- manage all the activities concerning energy production, optimizing the use of the plants and aiming to reduce production costs;
- plan the development and strengthening of production activities;
- manage, rationalize and expand the heat distribution systems also produced in cogeneration for the efficient use of energy;
- to promote and exploit the use of renewable energy sources in order to optimize the production portfolio.

This area includes the following companies: ENGIE Produzione S.p.A., Rosen Rosignano Energia S.p.A., Voghera Energia S.p.A., Tirreno Power S.p.A., ENGIE Rinnovabili S.p.A., Longano Eolica S.p.A., Fotovoltaico Sant'Anna S.r.l., SUNDREAM 2010 C. S.r.l..

Private residential client service area: ENGIE Italia SpA, through its investee company, Engie Casa SpA, operates in the management of the heating systems of the individual housing units,

their preventive and conservative maintenance, regulatory and legislative compliance and their technological upgrading (for the supply of post services counter to the single-family residential market).
The interventions of the company concern:

- the installation of systems for air-conditioning environments with or without hot water production;
- the installation of gas heating systems and appliances, generally like water heaters, stoves, individual radiators;
- the monitoring of internal systems and meter reading for the consumption survey.

The turnover of ENGIE Italia SpA is therefore made up of revenues deriving from the renovation of buildings, plant maintenance and renewal, and revenues from technical services and maintenance, which derive from the provision of services that include operation, surveillance, plant management and ordinary maintenance.
In 2017 more than 31.500 ordinary maintenance operations were carried out (+2% compared to 2016), 960 boilers installed (in line with 2016) and around 1000 technology products were sold (Nest and Netatmo smart thermostats, as well as indoor webcams).
The active contracts portfolio grew by 4% on an annual basis (+1550 contracts) settling beyond the 36.000 share.
These activities are becoming more and more central to ENGIE Italia business as the full acquisition of 2017 of Engie Casa SpA demonstrates.
In particular the Engie Casa offerings are articulated in four sections: Gas&Luce, Services, Smart home, Photovoltaic.
Gas&Luce: personalized and online offers with potential bonus to the clients. Only green energy and potential options for people already having photovoltaic panels;
Services: are made possible thanks to partnerships with other companies. For example, boilers and maintenance plan are available, Nest learning thermostat and Nest Cam Indoor;
Smart home: product bundling options are also possible. For example, light plus Nest learning thermostat/Nest Cam Indoor/ Nest Protect;
Photovoltaic: with its partner Sungevity, ENGIE proposes personalized solutions, monitoring and continuous assistance. Moreover, the client can also adhere to an energy offer dedicated to night saving.

6.4.1.2.5 Communication strategy

ENGIE tries to engage its customers through an effective communication with the objective to come closer to the customers. For instance, inside the ENGIE app there is an innovative feature called ENGIE Fit that offers a challenge to customers: whoever achieves the target will have a bonus in the bill that can vary depending on the goal of the game. For the first game the goal is to do at least 6000 steps a day on average for two weeks. It is a healthy lifestyle that allows you to live better and pollute less.

6.4.1.2.6 ENGIE Italia: next steps

The extraordinary transactions that have changed and which will substantially change the company's operations are the result of a process of consolidation and rationalization of the group's activities and corporate structure in Italy, in order to achieve significant operational synergies and get closer and closer to the final customers.

In conclusion, Engie Italia's strategy focused on the customer relationship and on the energy management/efficiency sector is a good indication of the company positioning as a **"Marketplace advisor" and, in a minor measure, "Specialized provider"** (Chapter 3).

7 CHAPTER - “Business Case: SORGENIA”

Sorgenia SpA is one of the main operators in the free market for electricity and natural gas, with around 200.000 customers throughout Italy. It has, with direct and indirect control, electricity generation plants for almost 3,2 GW of installed power. It is the first not incumbent company in the free market.

The Group produces energy efficiently - thanks to a modern and environmentally friendly generation park - and supplies it to end customers (business and residential) through a personalized offer. Sorgenia has chosen to adopt for its plants the best technology currently available both in terms of efficiency and environmental compatibility: the combined cycle with natural gas. High yields, almost zero emissions, decreased water use, lower land occupancy are just some of the environmental benefits of the combined cycle. The possibility of modulating production hour by hour, according to the energy requirements of the national electricity grid, also makes it a complementary solution to generation from renewable sources. The Sorgenia power plants are located in Termoli (CB), Modugno (BA), Bertonico-Turano Lodigiano (LO) and Aprilia (LT).

The company was established in July 1999, the same year as the liberalization of the electricity market due to Legislative Decree 79/99 (known as the "Bersani Decree"), which gradually extended the possibility of choosing an electric supplier by larger and larger numbers of consumers, starting with companies with higher consumption.

Sorgenia is a company 99,97% owned by Nuova Sorgenia Holding S.p.A., which is in turn owned by 6 leading Italian banks. Previously, until March 2015, 81,6% of Sorgenia SpA was held by Sorgenia Holding, which in turn was 65% owned by the CIR Group of De Benedetti and for 35% by the Austrian electricity company Verbund. Figure 7.1 shows the main structure of the group.

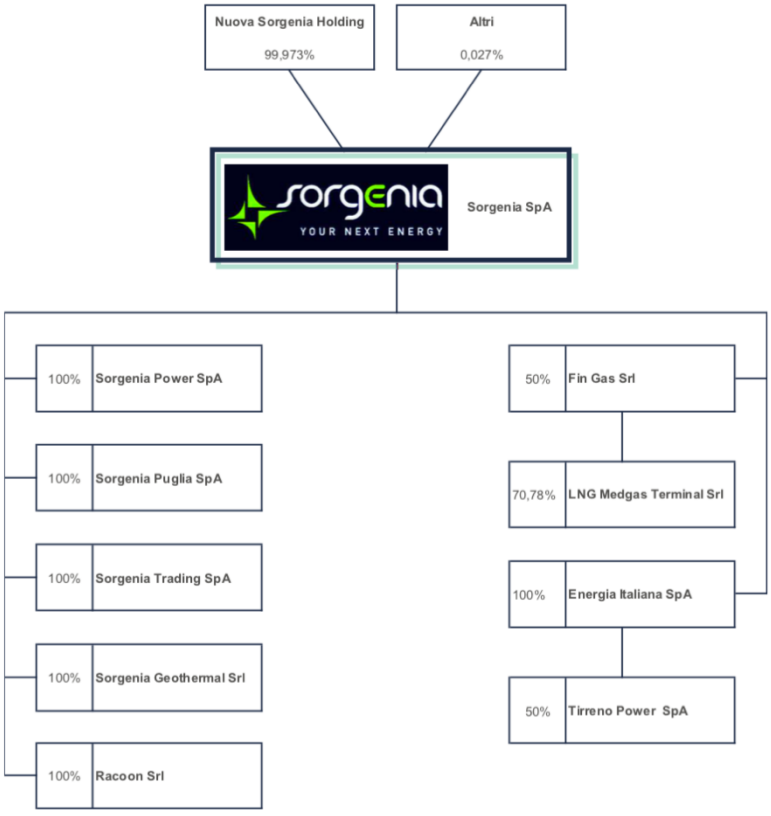


Figure 7.1 - Sorgenia Group structure

7.1 A bit of history

At the beginning, when it was founded in **1999** following the Bersani Decree on the liberalization of electricity, it was called Energia SpA. It was part of the CIR-De Benedetti galaxy which held, through Energia Holding chaired by Rodolfo De Benedetti, the 73,4 % of capital while 26,6% was in the hands of the Austrian energy group Verbund (controlled with 51% by the Austrian State).

2000: the company started supplying electricity to the first industrial customers.

2003: the gas supply from Libya also began via the Green Stream gas pipeline. It carried on with its investments the greenfield projects related to combined cycle power plants powered by natural gas in Modugno (Bari), Aprilia (Latina), Bertonico-Turano Lodigiano (Lodi) and Cremona as well as the one already started in Termoli. In 2003, the energy business (808 million euros in turnover compared to 574 in the previous year) accounted for one third of CIR revenues.

In 2005 it also started the business in the wind energy sector.

2006: Energia SpA, in which the Austrians of Verbund have signed a share capital increase of 150 million, despite being shareholders of Energia Holding, in exchange for a 6% shareholding, changed its name and became Sorgenia SpA. The largest shareholder was always the CIR of De Benedetti. In the first quarter of that year the turnover of Energia was of 454,5 million euros but the EBITDA was negative for 1,2 million against the positive one of 7,5 million of the correspondent period of 2005, the revenues net inflows went from +3,8 million in 2015 to -3,9 million, net debt rose from 429 to 491 million.

With the economic crisis, the development of the company slows down with negative net results in 2012 while debt was growing up to € 1,8 billion toward 21 banks among which Monte dei Paschi di Siena (Mps), shareholder of Sorgenia, Intesa Sanpaolo, Unicredit, Ubi, Bmp, Banco Popolare e Mediobanca. The main creditor bank was Mps which alone has loaded a third of that burden: 600 million, at the time granted to finance the electricity company. Faced with a heavy crisis, the De Benedetti were not willing to recapitalize the company as they had requested the banks. With a standstill agreement with the lending institutions, a restructuring process began with an increase in capital underwritten only by the banks: CIR and Verbund left the company and, in the end, the «parcel» Sorgenia ended up in the hands of creditor banks that have converted credit exposure into shares. Therefore, Mps found itself to be a shareholder of Sorgenia with 22% of the capital and to have it among the substandards of its accounts. The other banks involved: Ubi Banca with 18%, Banco Popolare with 11,5% Intesa Sanpaolo and Unicredit both with 10%, BPM with 9%.

The historical partners did not leave the company dry: once the debt has been repaid and the 10% return on the invested capital was obtained, the banks have committed to circulate to CIR and Verbund 10% of any capital gains that they would have obtained by selling the recovered company.

Since March 2015 the new CEO Gianfilippo Mancini was appointed.

2016: Sorgenia closed with a turnover of 1,5 billion euros (+ 13,9%) and a profit of 14,5 million. Indebtedness fell to 882,6 million. In an interview with Libero Quotidiano at the beginning of 2017, the president of Sorgenia, Chicco Testa, declared that the new company has nothing to do with the previous management, neither from an equity or management

point of view, and that it is able to pay the debts: in 2016 it has returned about 100 million and in 2017 it has available cash that allowed it to return another 170 million to the creditor banks. Two months later, during the presentation of the new advertising campaign with the testimonial Bebe Vio, Testa reiterated that the new Sorgenia is able to repay debts.
The year 2017 ended with the obtaining, at the end of December, of the homologation of the new debt restructuring agreement with all the creditor banks. This agreement introduces greater flexibility and better economic conditions and extends the repayment term to 2027. It therefore supplements the reorganization of the company from a financial point of view, which has already been implemented in the meantime from an industrial, commercial and economic point of view. All this makes the Group solid also in terms of structure and financial sustainability.

7.2 Economic performance

Tables 7.1 shows data about economic performance of Sorgenia Group over the years 2010 – 2017 [59].

Sorgenia Group - Performance (Million €)	2010	2011	2012	2013
Revenues	2.668,496	2.120,284	2.572,322	2.325,991
EBITDA	168,538	150,308	174,035	133,943
EBIT	31,221	19,931	-54,790	-414,259
Net result	58,799	18,664	-203,799	-840,269
EBITDA/Revenues %	6,3%	7,1%	6,8%	5,8%
ROS (EBIT/Revenues) %	1,2%	0,9%	-2,1%	-17,8%
Net result %	2,2%	0,9%	-7,9%	-36,1%
Total shareholders' equity	1.107,773	1.069,136	843,640	66,397
Net financial debt	2.124,467	1.824,845	1.987,462	1.855,304
Employees at year end	405	441	465	432
Sorgenia Group - Performance (Million €)	**2014**	**2015**	**2016**	**2017**
Revenues	1.844,815	1.382,690	1.574,884	1.351,413
EBITDA	121,502	39,825	121,863	160,647
EBIT	19,186	34,332	33,759	69,015
Net result	-57,296	340,500	14,502	43,946
EBITDA/Revenues %	6,6%	2,9%	7,7%	11,9%
ROS (EBIT/Revenues) %	1,0%	24,6%	2,1%	5,1%
Net result %	-3,1%	24,6%	0,9%	3,3%
Total shareholders' equity	3,824	352,689	376,320	418,691
Net financial debt	1.725,372	1.033,000	882,643	715,466
Employees at year end	339	275	283	289

Table 7.1 - Sorgenia Group economic performance (2010-2017)

It can be immediately noticed the high level of Net financial debt and Net results starting to become negative from 2012. Only from 2015 the company turned to be profitable again and to repay its debt.

To understand how the breakdown has occurred, it is necessary to go back in 2004 when Sorgenia decides to borrow and purchase four gas-fired power plants at a price of 400 million euros, stipulating binding contracts (take or pay), which is actually more expensive than supplies on the free market (so-called spot). It has been an over-investment that in 2014 still weighed on the scarce returns that generate the plants (cash flow for Sorgenia was only 50-100 million euros), but it was a strategic choice that at the time seemed even profitable, according to a vision shared by economists and establishment. Before the financial crisis, Terna considered the Italian energy needs to be undersized, more power plants were needed. At the time the forecasts talked about a need for 83 gigawatt an hour (for 2013). The reality has been very different for the following reasons:

- the forecasts revealed to be excessive because of the economic crisis, arriving to 65 GW;
- the renewable state subsidy boom (10-20 billion incentives per year) has aggravated the problem of Sorgenia because the "green" has flooded the energy market (35 percent comes from water, solar and wind) and new players (400 thousand) making production more expensive for traditional operators (in Italy the profit margins were close to zero for each kilowatt hour produced).

Since the appointment of the new CEO Gianfilippo Mancini in 2015, Sorgenia Group started a turnaround program and today is in a better and more solid position than some years ago. In particular, 2017 has been a very positive year, when the company strengthened the relaunch already started in 2015. EBITDA rose to €160 million, up 30% on 2016, while net income tripled to € 44 million compared to € 15 million in 2016. In 2017 the group generated more than € 150 million in cash flows, which made it possible to reduce net financial indebtedness to € 715 million (from € 883 million at the end of 2016) and to repay € 320 million to lending banks. The number of employees started to grow again since 2015 after a period of constant decrease.

Revenues: 2017 revenues have been equal to €1.351,413 million. The decrease in turnover, compared to 2016, is mainly attributable to the decrease in sales volumes of electricity and gas to high-consumption customers linked to the commercial choice to focus sales activities on Small and Medium-sized Enterprises (SMEs), on "VAT numbers" and on the Residential segment, customers with greater added value;

EBITDA: in 2017 it has been equal to €160,647 million. The positive change, compared to 2016, is essentially due to the higher operating margins recorded on the energy market (in particular on the Dispatching Services Market - MSD) from the Group's generation plants, to the increase in other operating income related to recognition of the Capacity Payment of previous years, as well as an increase in the margins of sales to end customers;

Net result: in 2017 it has been equal to €43,946 million. The positive change, compared to 2016, is attributable to the factors described above, with reference to EBITDA, and to the positive effect of the estimate review of expected financial flows of financial debt, deriving from new improved economic conditions negotiated;

Net financial debt: in 2017 it has been equal to €715,466 million with a decrease of 18,9% compared to 2016. This change is essentially due to the self-financing generated by operations and to the positive effect of the estimate review of the expected financial flows of the financial debt, following the effectiveness of the New Restructuring Agreement;
Liquid Availability: at the end of 2017 it has been equal to €162,556 million with a decreasing of 50% compared to 2016. The change relates to the net effect between the increase attributable to the higher operating cash flow generated during the year, and the decrease linked to full and partial repayments of loans made during the year;
Total shareholders' equity: at the end of 2017 it has been equal to €418,692 million. The increase recorded compared to the previous year is mainly due to the Group result.
These extraordinary results have been possible thanks to a strategy focused on the control and reduction of costs, higher structure flexibility, investments on innovation and digital. The next main objective of the company is to exploit the end of the regulated market in July 2020 to attract as much new clients as possible. Already today, Sorgenia is one of the most chosen providers of electric energy through internet with 8.000 new clients per month. The main target are young people used to surf and choose online and using digital channels to get convenient products and better services.
In the medium/long term, given the growing company base of clients, the next step could be an IPO in order to increase the number of financial resources.
In the short term the main objectives are the following:

- continue to be an efficient and flexible operator as much as possible on the wholesale market;
- development of production from renewable sources, from geothermal to hydroelectric to solar;
- focus on the development of attractive offerings to the final customers.

7.3 Operations

Sorgenia Group - Operations (TWh)	2016	2017
Net electricity generation (TWh)	4,278	6,026
Electricity sales (TWh)	5,962	3,806

Table 7.2 - Sorgenia Group operations

In the production of electricity, Sorgenia has profoundly revised the modalities of participation in the market of its modern and flexible combined-cycle gas plants (CCGT). In 2017, in particular, production plants, thanks to flexible management and supply strategies, were able to best satisfy the volatility of electricity demand on the electricity grid, with a consequent increase in margins on the markets for dispatching.
The increase in production was also encouraged by the decrease in imports from abroad (due to the unavailability of some nuclear reactors in France), the reduction in hydroelectric production (due to the low hydraulicity) and the partial replacement of coal with gas (which is cleaner and more flexible) in production from thermoelectric sources. National thermoelectric production has therefore increased, in particular CCGT.

In particular, the following data are relevant:

Combined cycle of Termoli (CB)

In 2017 the Termoli power plant produced 1,478 TWh and the average load was 290 MW.

Combined cycle of Modugno (BA)

In 2017 the Modugno power plant produced 1,276 TWh and the average load was 290 MW.

Combined cycle of Bertonico-Turano Lodigiano (LO)

In 2017 the Turano Lodigiano-Bertonico power plant produced 1,5 TWh and the average load was 350 MW.

Combined cycle of Aprilia

In 2017, the Aprilia power plant produced 1,767 TWh and the average load was 370 MW.

In a scenario that will be increasingly characterized by the growth of renewable resources, which are not programmable by nature, and by the abandonment of coal, the plants and strengthened dynamic management skills on the wholesale market of Sorgenia will be able to maintain strategic importance also in the medium - long period. In this regard, the approval by the European Commission of the Italian capacity remuneration mechanism (Capacity Market) was positive in February 2018.

The 2017 financial year reported volumes of electricity sold to end customers lower than those of 2016 due to the commercial choice to reduce sales to high-consumption customers and to focus on SMEs, the "VAT numbers" and the residential segment, customers with greater added value. On the other hand, the customer portfolio grew significantly from 180.000 redelivery points in 2016 to around 220.000 in 2017, with growth of over 20% compared to the previous year.

With regard to the sale of electricity, 2017 saw the full implementation of the new positioning of Sorgenia as a Digital Energy Company. As part of the Sorgenia residential customer segment, acquisitions based on the "full digital" offer continued to grow, achieving very significant results. This offer provides that the contract can be signed, with a few simple steps, exclusively online (via digital device such as PC, smartphone etc.) on the company's website.

The method of payment of bills can be chosen among the digital methods (direct debit, credit card, etc.) while traditional payment methods (checks, postal bills, etc.) are excluded. Interaction with the customer is also carried out via digital channels (for example, bills are sent electronically via e-mail or App and not on paper, communication can be made via telephone, chat, App without physical points of sale). The growth in the residential market through web offers is one of the main development channels for Sorgenia, also in view of the complete liberalization of this market segment expected in July 2020 with the abolition of the Regulated market.

Furthermore, in 2017 the following processes were improved:

- the "customer management" processes with the aim of increasing the quality of service and the degree of customer satisfaction;
- "credit management" with a consequent positive effect on the collection performance, on unpaid ratios and on working capital.

7.4 Brand reputation

In the year that has just closed, the Sorgenia brand has also strengthened thanks to communication and positioning campaigns for which the Bebe Vio Paralympic Champion was chosen as testimonial until 2020. She perfectly represents Sorgenia's will power and its ability to leave obstacles behind.

7.5 Innovation and development

With the aim of creating a challenging business growth and offer innovation plan, "Your Next Solution" was launched, a series of new innovations in energy efficiency, to reduce costs, protect the environment and promote electric mobility.
By way of example, in July 2017, a commercial agreement was signed with the Consorzio Lago di Garda, through which 800 structures dedicated to tourism have been enabled for the use of pedal assisted e-bikes and provided with charging stations.
And to offer customers the benefits that the most recent digital technologies will bring in the field of energy, some important collaborations have been started with leading research centers and incubators of Italian start - ups, inspired by a very concrete approach to the principles of open innovation.
Numerous projects have also been developed in the field of renewable energy, in particular geothermal projects in Tuscany and upper Lazio and mini-hydro plants throughout Italy, for the construction of innovative and environmentally friendly generating plants.
Projects to engage the residential customers have been promoted: "Next Energy", "Bring your friends" and other type of promotions are a clear example. These are based on the new logic of bundling and are possible thanks to a lot of partnerships made by Sorgenia [60].

7.6 Sorgenia: next steps

The strategic actions envisaged in the Business Plan will be implemented and aimed at:

- Electricity generation: guaranteeing very high levels of safety, reliability, efficiency and flexibility of the CCGT thermoelectric plants, in order to seize every opportunity both on the Day-Day Market (MGP) and on the Dispatching Services Market (MSD);
- Energy Management: optimizing dispatching of generation plants and maintaining adequate physical and financial coverage, through operations on futures markets, in order to protect margins both from generation and from sales activities to final customers, from strong volatility of energy scenarios;
- Sales market to end customers: continue commercial development in the market of small and medium-sized enterprises (SMEs) and "VAT numbers" - market segments in which Sorgenia operates since its establishment - and continue to grow in the residential segment through innovative offers full digital;
- Improve operational efficiency and maintain an extremely streamlined, efficient and flexible cost structure, in order to ensure a competitive advantage in both generation and sales to end customers and with the aim of becoming industry best practices in terms of structure cost.

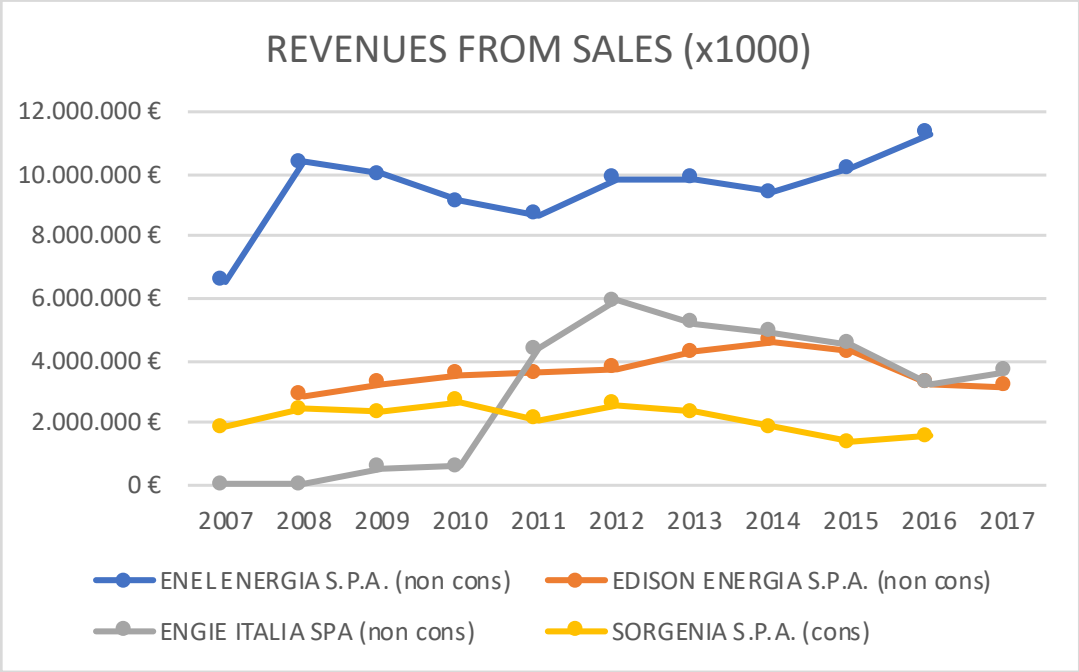
In conclusion, Sorgenia's strategy focused on the one hand on full digitalization and cost reduction and on the other hand to be a reliable customer partner makes the company a **good mix between the "Standard Provider" and "Marketplace advisor"** (Chapter 3).

8 CHAPTER - "Comparison between ENEL, EDISON, ENGIE, SORGENIA"

The objective of this chapter is to make a precise and accurate comparison of the previously analyzed companies in the Italian market: ENEL, EDISON, ENGIE, SORGENIA.

8.1 Economic performance

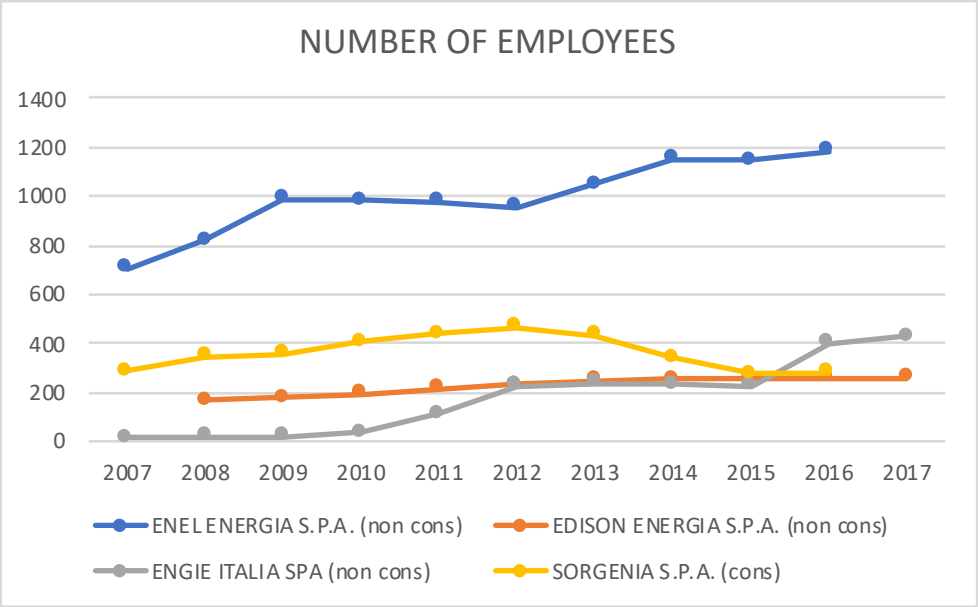
In order to understand the penetration in the Italian market, the Revenues from Sales have been considered, as shown in Graph 8.1[61].



Graph 8.1 - Revenues from sales comparison (2007-2017)

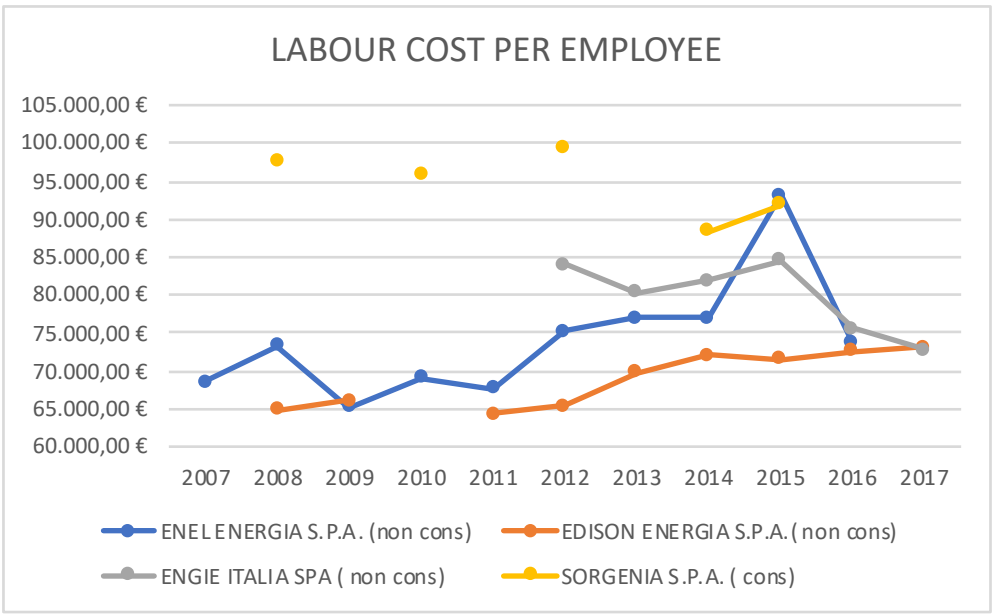
ENEL ENERGIA over the considered period maintains the highest penetration with increasing Revenues during the latest years. This is the result both of historical reasons that assures to ENEL the strongest position in the Italian market and of an effective management well aligned to the changing world of the electricity market.
EDISON ENERGIA has maintained a flat path, slightly decreasing in 2017.
ENGIE ITALIA has a steep growth between 2010 and 2012, overcoming both EDISON ENERGIA and SORGENIA. This latter, after a period of crisis during the year 2012-2013-2014, has started a new positive period.

The following two graphs gives some information about the number of employees (Graph 8.2) and the labour cost per employee (Graph 8.3).



Graph 8.2 - Number of employees comparison (2007-2017)

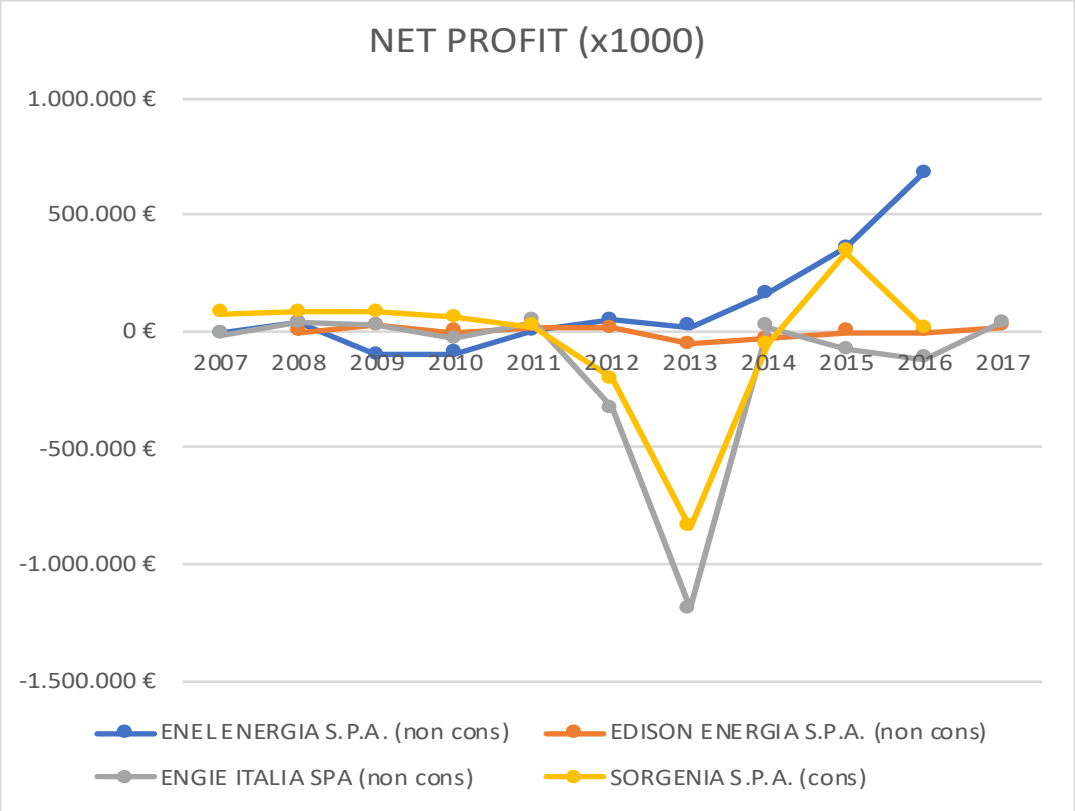
ENEL ENERGIA has a bigger number of employees compared to the other three companies. Furthermore, it is showing an increasing trend. An interesting point is about ENGIE ITALIA that has seen a steep increase since 2007, SORGENIA a decreasing path since 2012 and now starting again a slow growth.



Graph 8.3- Labour cost per employee comparison (2007-2017)

The most interesting point of the previous graph is the convergence of the four companies toward around €72.000 during the latest years, compared to more disparities previously.

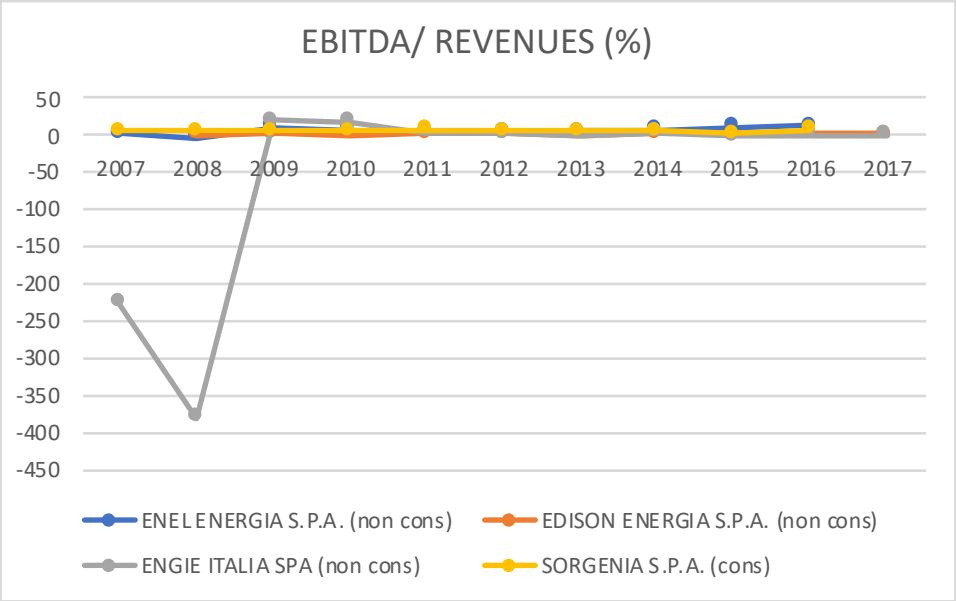
Graph 8.4 shows the Net Profit of the 4 companies.



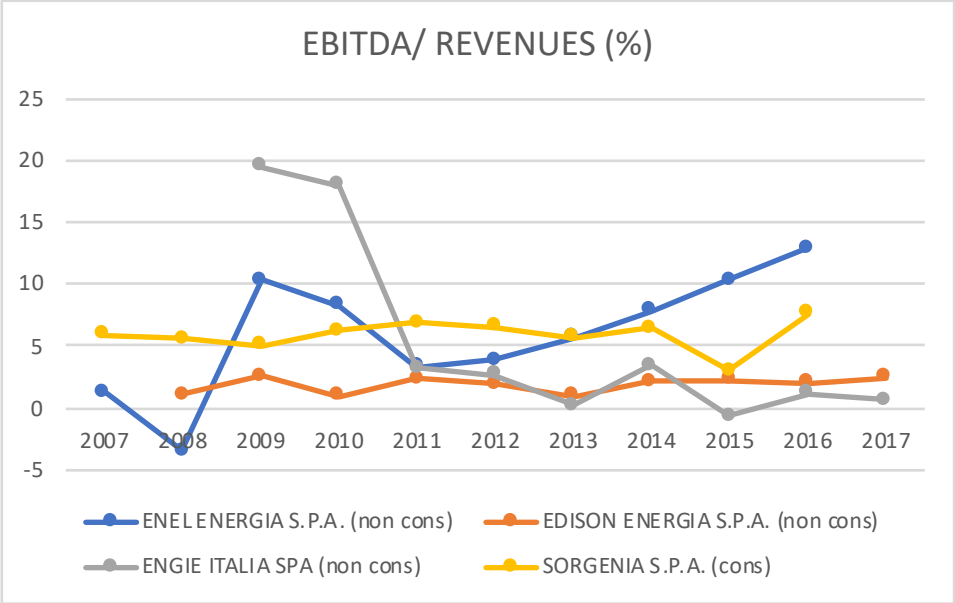
Graph 8.4 - - Net profit comparison (2007-2017)

ENEL ENERGIA confirms, as the previous in indicator, increasingly positive results from 2011. EDISON ENERGIA maintains a stable path, while ENGIE ITALIA and SORGENIA seems to be very similar and unstable with negative results between 2011 and 2014, better in the latest years.

In the following the EBITDA/REVENUES (%) indicator has been considered in order to compare the profitability of the analyzed companies despite the different penetration in the market and size of the companies (Graph 8.5).
ENGIE ITALIA has shown extremely negative results in the year 2007 and 2008. Since they are not comparable with the other ones, Graph 8.6 presents the same results without considering them.



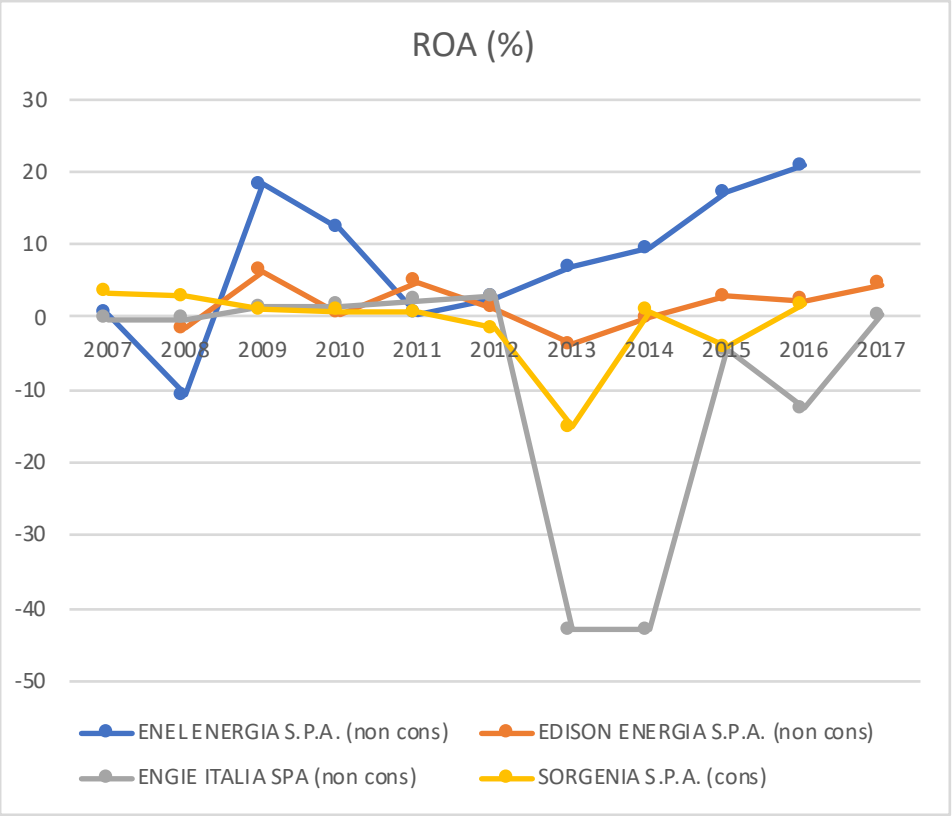
Graph 8.5- - EBITDA/Revenues comparison (2007-2017)/1



Graph 8.6 - EBITDA / Revenues comparison (2007-2017)/2

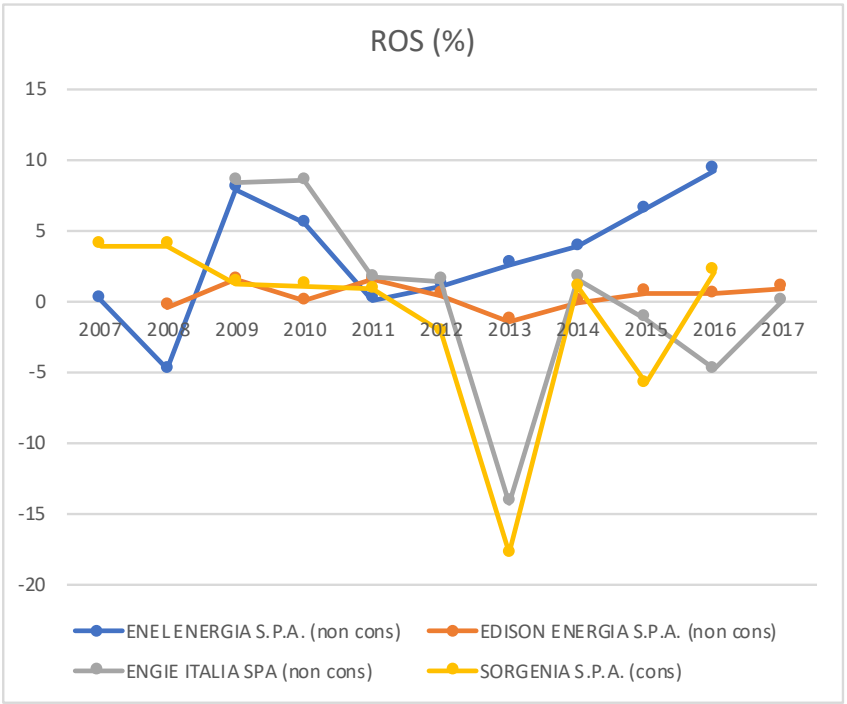
ENEL ENERGIA has showed increased positive results since 2011. EDISON ENERGIA has a more stable path with results comparable to ENGIE ITALIA after 2011. SORGENIA has shown a stable path with results always higher than EDISON ENERGIA and ENGIE ITALIA.

The following Graphs represent the following profitability index: ROA, ROS.



Graph 8.7- ROA comparison (2007-2017)

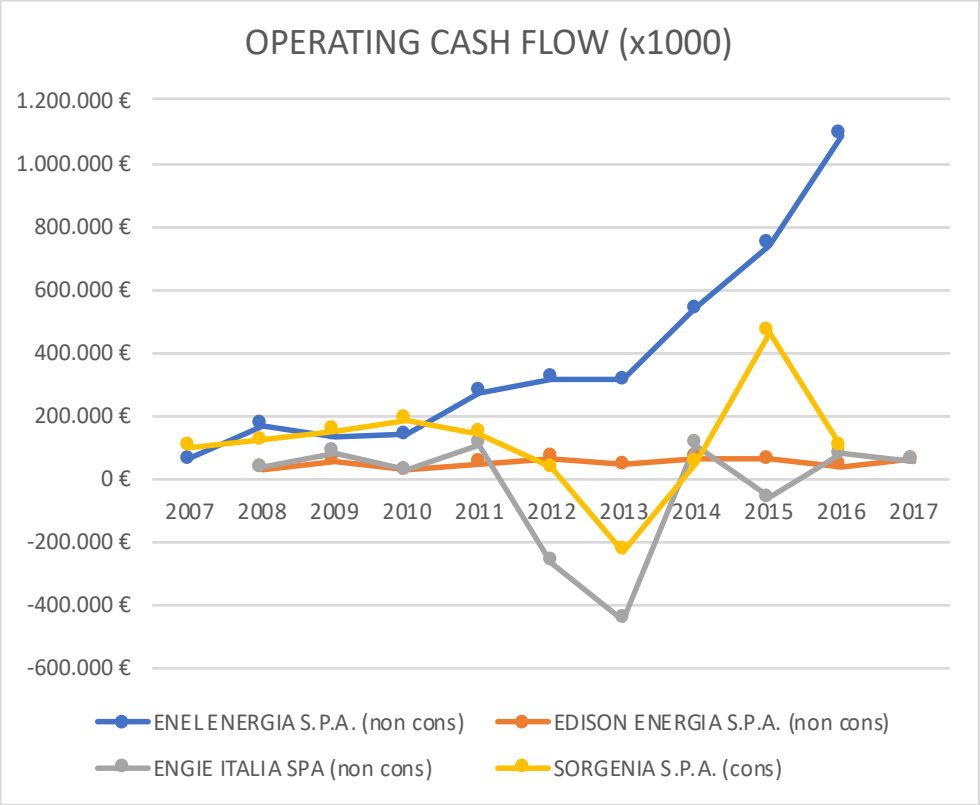
In terms of ROA, ENEL ENERGIA has the best position. EDISON ENERGIA maintain positive and more stable results. ENGIE ITALIA from 2012 has collected a series of negative results, culminated in 2013 and 2014. SORGENIA, after a previous uncertain period, seems to improve its performance.



Graph 8.8 -ROS comparison (2007-2017)

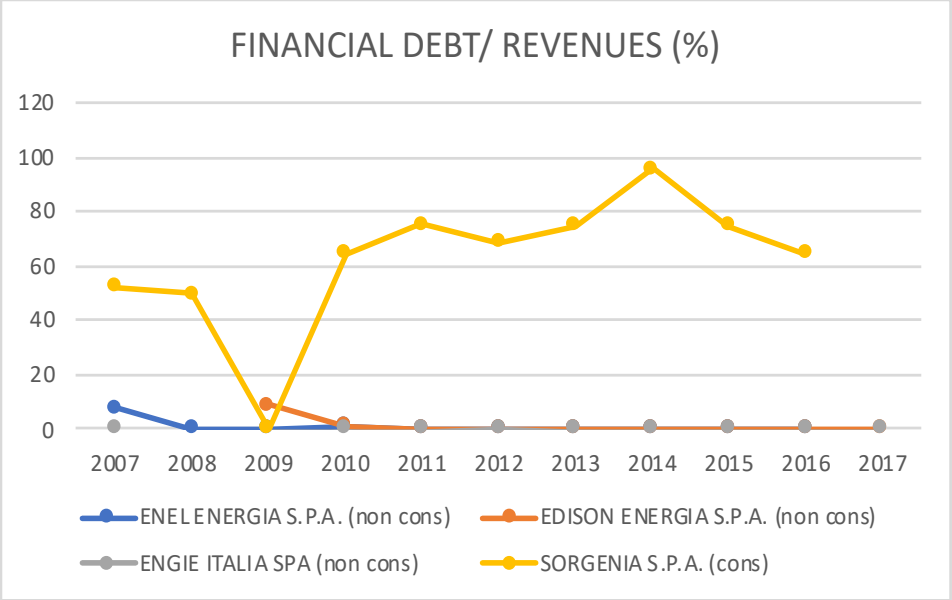
In terms of ROS, ENEL ENERGIA confirms the first position with 9,31% of 2016. EDISON ENERGIA has signed a positive path since 2014 culminated with 1% of 2017. More unstable are the results of ENGIE ITALIA and SORGENIA as can be seen from the graph.

Graph 8.9 gives indication about the ability of the analyzed companies to generate cash.
It can be noticed that ENEL ENERGIA conserves the best performance also in this case; EDISON ENERGIA has a stable positive path, much smaller than ENEL ENERGIA. ENGIE ITALIA and SORGENIA have a more uncertain path with a period of strong negative cash flows in 2012 and 2013 and better results in the latest years.



Graph 8.9 - Operating cash flow comparison (2007-2017)

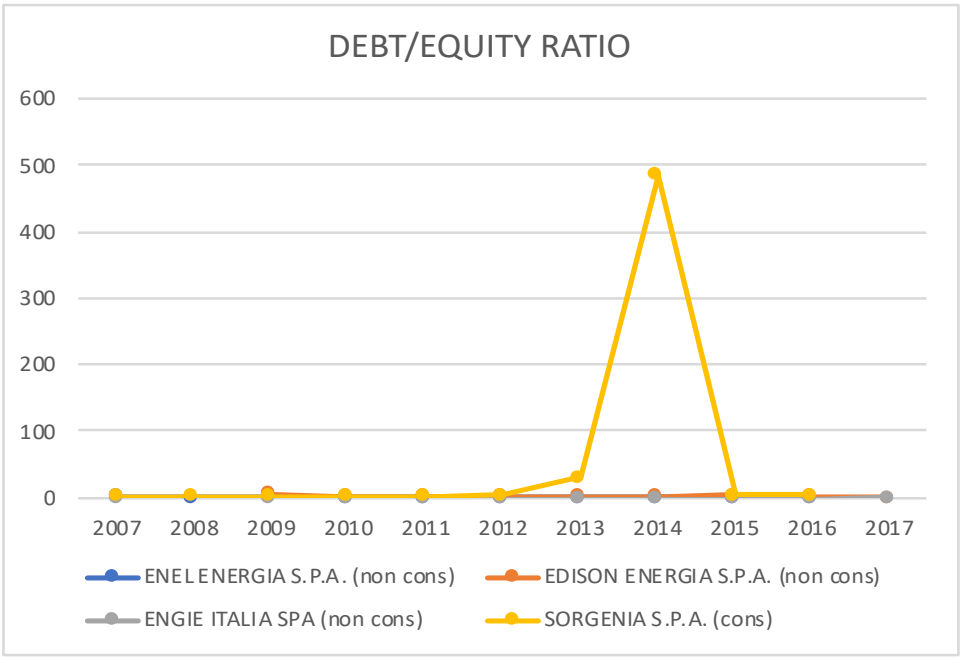
Graph 8.10 shows the position of the companies in terms of debt.



Graph 8.10 - Financial debt / Revenues comparison (2007 – 2017)

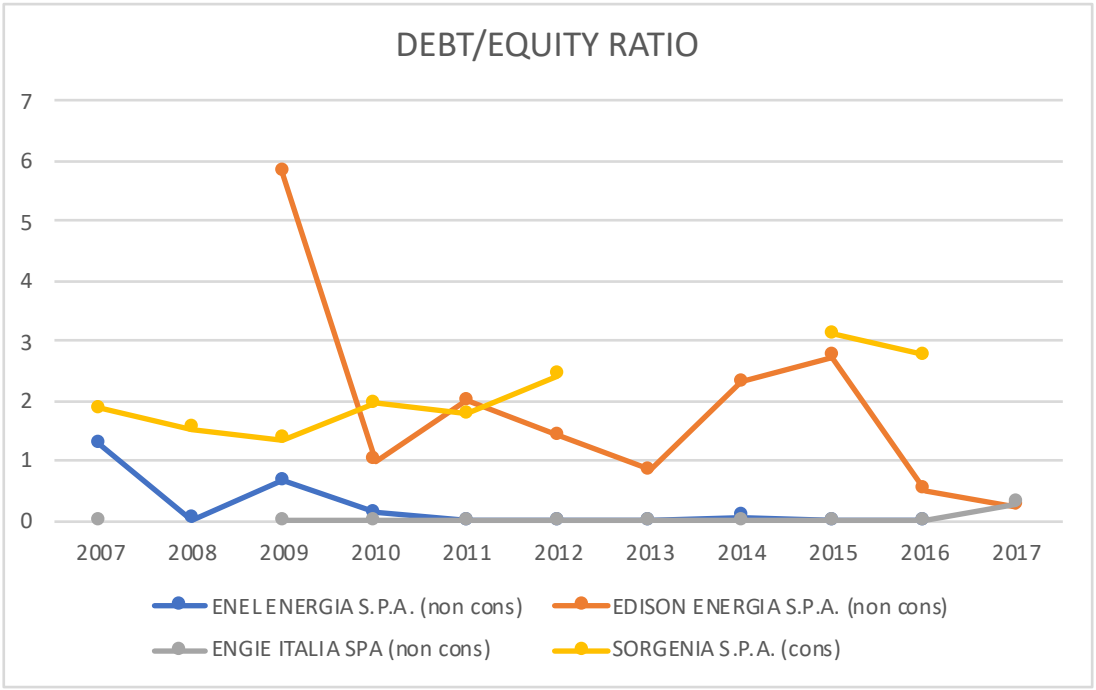
ENEL ENERGIA, apart from 2007, has always had negligible financial debt. The same for EDISON ENERGIA, apart from 2009. ENGIE ITALIA has always had negligible financial debt. Since 2010, SORGENIA has always had a huge financial debt and the main reason was the following: in the middle of the last decade, SORGENIA completed a series of investments in "traditional" generation plants (gas power plants), installing four modern and relatively efficient power stations. Unfortunately for SORGENIA, at the same time in Italy the revolution of renewables was also taking place, together with a sharp decline in the price of coal. This is relevant because if the renewables (solar or wind) produce, they take precedence over the electricity produced by traditional power plants.

Graph 8.11 gives the same information with SORGENIA having the highest DEBT/EQUITY RATIO culminated in 2014 (484,14).



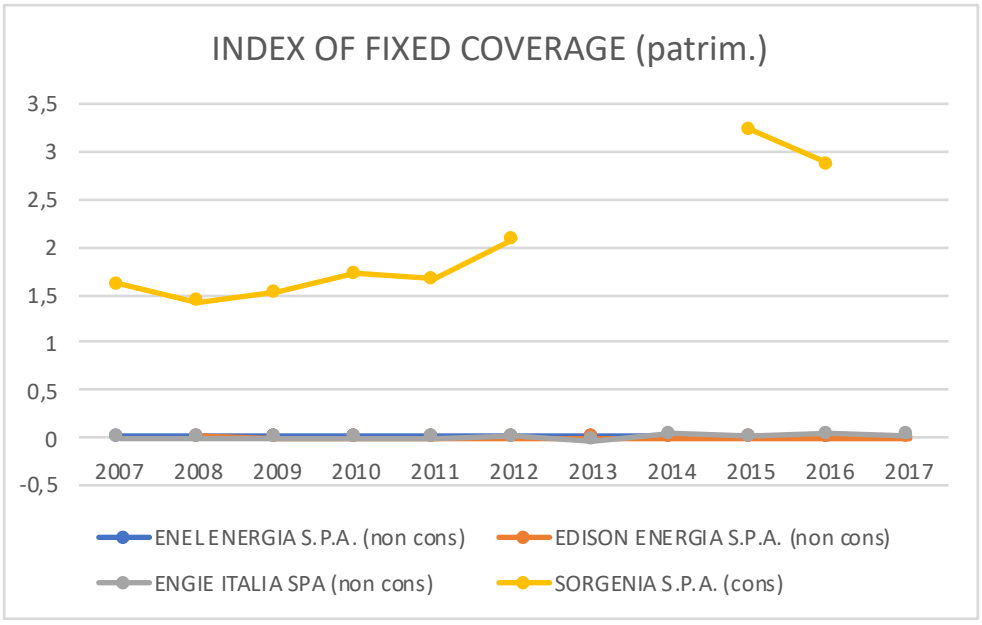
Graph 8.11- Debt/Equity ratio comparison (2007-2017)/1

In Graph 8.12 SORGENIA's results of 2014 have been deleted, in order to make comparable the other results.



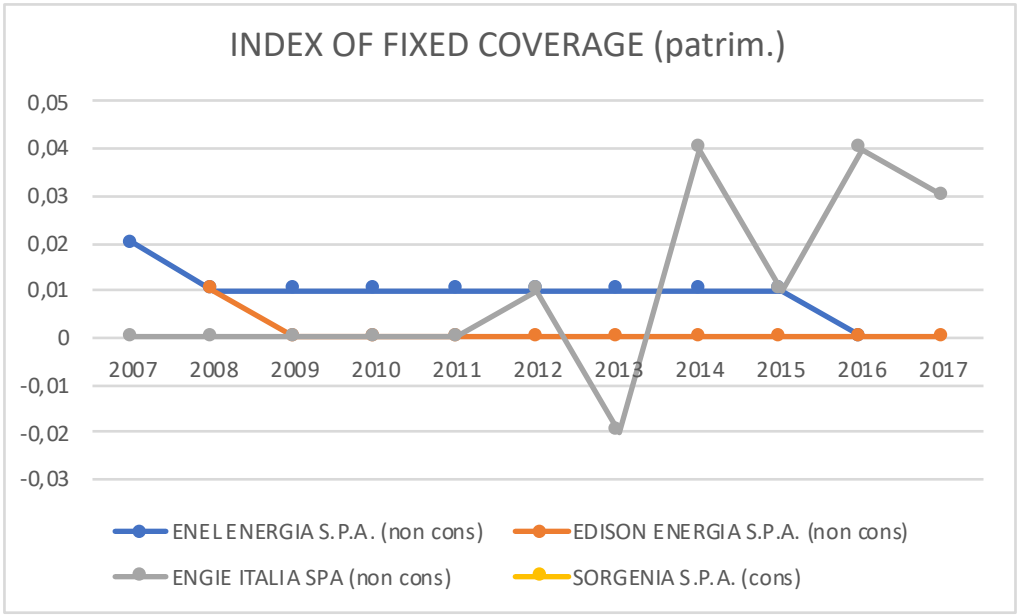
Graph 8.12 - Debt/Equity ratio comparison (2007-2017)/2

ENEL ENERGIA and ENGIE ITALIA have nearly always had more equity than debt. EDISON ENERGIA, instead, has always shown a bigger amount of debt compared to equity even if not at SORGENIA's levels. The same situation about the high level of debt of SORGENIA is well described by the following Graph 8.13 as well.



Graph 8.13 - Index of fixed coverage comparison (2007-2017)/1

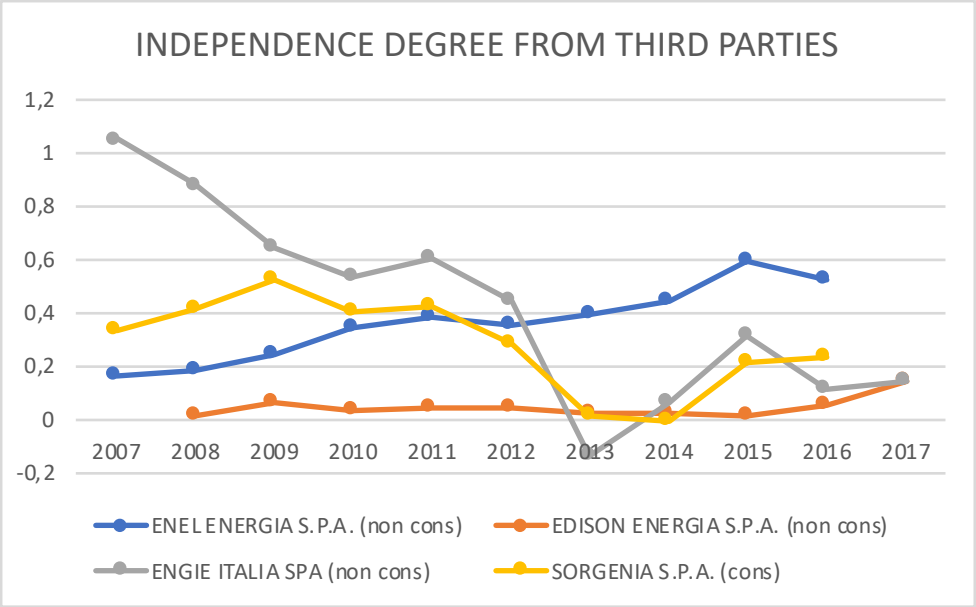
A major detail of the previous indicator is given in the following Graph 8.14.



Graph 8.14 - Index of fixed coverage comparison (2007-2017)/2

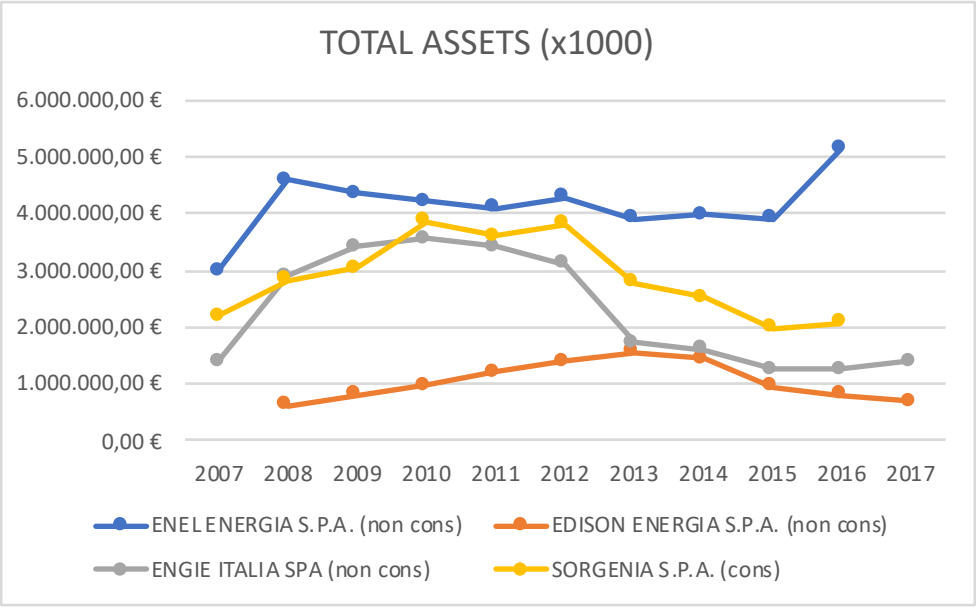
One interesting point is the very unstable path of ENGIE ITALIA, compared to the smaller and more stable path of ENEL ENERGIA and EDISON ENERGIA.

Graph 8.15 gives an indication about the independence degree from third parties based on amount of equity compared to debt. Since 2014 it is easy to see the higher independence of ENEL ENERGIA compared to the other three companies considered.



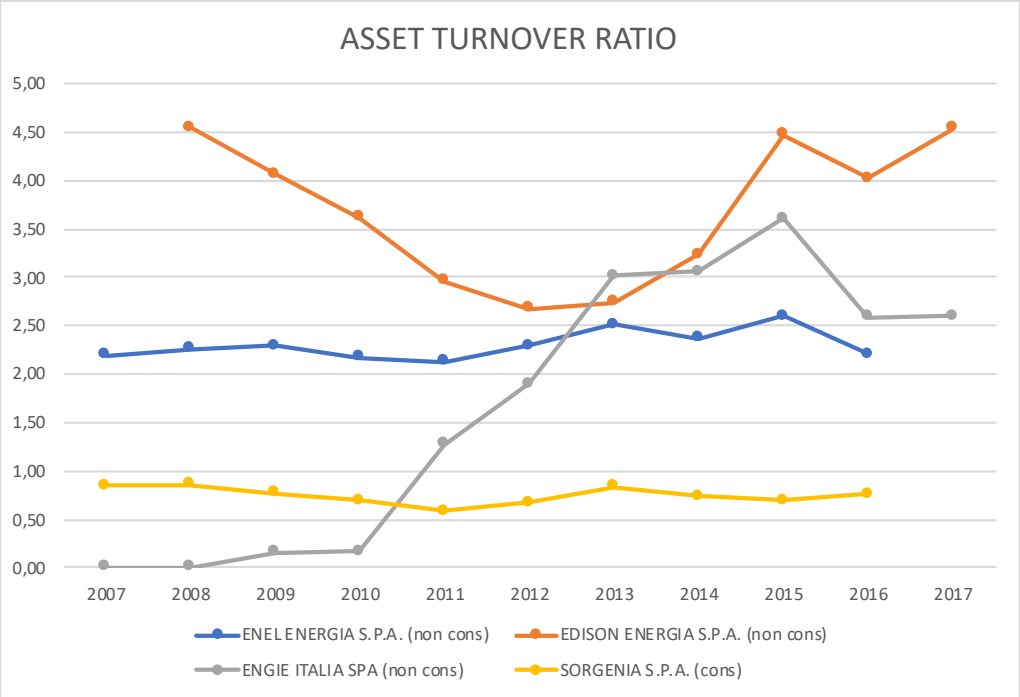
Graph 8.15 - Independence degree from third parties comparison (2007-2017)

Graph 8.16 well described the total assets of the four companies: ENEL ENERGIA has always had a bigger amount of assets compared to the other three companies. Moreover, it is showing an increasing trend in the last year compared to the other ones.



Graph 8.16 - Total assets comparison (2007-2017)

Finally, Graph 8.17 gives an indication of the efficiency with which the considered companies are using their asset to generate revenue.



Graph 8.17 – Asset turnover ratio comparison (2007 - 2017)

The most efficient company is Edison over all the period. It is relevant to see the improving performance of Engie.

Summing up the more relevant points is that ENEL ENERGIA is obtaining the best economic results. SORGENIA is recovering from the crisis of the previous years.

8.2 Operations

The following tables show a synthetic comparison about the main operations data:

Net electricity generation (TWh)	2016	2017
ENEL Italia	60,90	53,50
EDISON	20,40	19,70
ENGIE Italia	9,44	8,77
Sorgenia	4,28	6,03

Table 8.1 - Net electricity generation comparison (2016-2017)

Net efficient generation capacity (GW)	2016	2017
ENEL Italia	27,76	27,65
EDISON	6,50	6,40

Table 8.2 - Net efficient generation capacity comparison (2016-2017)

Electricity sales (TWh)	2016	2017
ENEL Italia	94,10	103,20
EDISON	11,60	10,90
ENGIE Italia	2,40	1,30
Sorgenia	5,96	3,81

Table 8.3 - Electricity sales comparison (2016-2017)

It is easy to note that ENEL's presence in Italy is definitely more important than that of the other three companies both considering net electricity generation and electricity sales. Moreover, the first indicator has decreased from 2016 to 2017 for all the companies, apart from Sorgenia; the second one is increased only for ENEL. Net efficient generation capacity has decreased both for ENEL and EDISON.
These results could be a possible indication about the progressive effort of the considered companies to invest less massively on production plants, trying to come closer and closer to the end users.

In particular, since the focus has been the final retailing to the end users, the following companies has been considered: ENEL ENERGIA S.P.A., EDISON ENERGIA S.P.A., ENGIE ITALIA SPA, SORGENIA S.P.A.. The period 2007-2017 has been considered.

8.3 Strategy

The following table makes a precise comparison between the main strategy components of the considered companies, focusing on different indicators. Even if Enel and Engie are multinational companies. , the considered market is the Italian one.

ENEL Italia

Global owner company	ENEL S.P.A.
Mission/ Vision/ Values	• Mission: Open access to electricity for more people; Open the world of energy to new tech; Open up to new uses of energy; Open Up to new ways of managing energy for people; Open up to new partnership. • Vision: Open power to solve the greatest challenges facing our world. • Values: Innovation, Responsibility, Trust, Proactivity. • Digitalization and consumer focus are the key enabler of the Enel's Group Strategy. A strong importance is given to sustainability of business model (Annual Report 2017).
Business Model (Chapter 3)	Full Service Provider.
Resources - Core competences	• Presence in different geographical market.

	• High historical penetration in Italian Regulated market. • Strong brand reliability and knowledge. • First Italian company in terms of installed capacity and distribution network. • Huge number of assets and experienced workforce. • Synergies between different departments.
Main customers	• Regulated market, Free market. • Domestic segment, Business segment (Large companies). • Increasing focus on SMEs in the future.
Product and Services	ENEL ENERGIA: Supply of electricity and gas. Increasing digitalization (ex. Invoice with electronic bill), direct debit payment method, bonuses and discounts for the energy components in order to increase consumers loyalty and attract them (often in recurrence of national events), leverage the predominance in the power supply to increase penetration also in the gas supply (through promotions). ENEL X: Products and services other than the supply of electricity and gas. 4 business: - E-home (Products: heating, air conditioning, photovoltaic, smart home - Services: home maintenance); - E-city (Services: artistic public lightning, digital city); - E-industries (Products: microgrid, energy efficiency solutions, Infrastructures - Services: marketing, consulting & energy, Intelligence, smart bill management, operation & maintenance); - E-mobility (Products: electricity recharge stations, app Enel X recharge, electric vehicles to be rent - Services: management systems, maps of electricity recharge stations).
Vertical integration	Presence in all steps of the value chain (Generation, Trading, Distribution, Sale to end client) through different subsidiaries.
Economy of scale/scope	Huge thanks to high volume and synergies between the different business lines.
Commercial Strategy	• Bonus, discounts and loyalty programs in order to engage as much as possible the final customers. • Structured contact channels system made up of agencies, smart agent, direct and indirect shops on the territory. Digital channels.
Method to implement strategy	Progressive internal reorganization/organic growth (launch of new global business line Enel X), strategic partnerships (automakers, start-up) and acquisitions.

Next steps	• Focus on SMEs. • Improve loyalty and digital programs. • Increase opportunities of interaction with customers. • Reduction in customer management operating time. • Complete organizational and corporate restructuring of ENEL X in order to enter the new most valuable markets.

Table 8.4 ENEL Italia Strategy

EDISON

Global owner company	Électricité de France
Mission/ Vision/ Values	To be the benchmark for providing energy with low environmental impact guided by principles of respect and integrity.
Business Model (Chapter 3)	Mix Marketplace Advisor and Specialized Provider.
Resources - Core competences	• Well-known brand coming from an historical presence on the Italian market. • Parent company is a big international player (EDF).
Main customers	• Free market. • Domestic segment, Business segment (Increasing focus).
Product and Services	EDISON ENERGIA Supply of power and gas; Products: devices for monitoring and control of consumption, home automation ("Edison shop"); Services: unrestricted insurance and assistance services against unforeseen installations. Repair services for the electrical, gas and hydraulic systems, installation and maintenance of boilers and air conditioners, as well as the installation of smart systems connected to the network and remotely controlled (Internet of things). Service that provides the installation of a photovoltaic system and/or efficient battery. (Thanks to acquisition of Assistenza Casa). ENERGY SERVICES MARKET DIVISION Services: Optimization of resources and consumptions.
Vertical integration	Generation, Trading, Sales to end customers (no distribution).
Economy of scale/scope	Medium.
Commercial Strategy	• Promotion of itself as an Energy Service Company (ESCo). • Sales agencies, branches and call center. Focus on development of digital channel. Advertising and promotion activities on television, radio, printed paper and billboards at the local level.

Method to implement strategy	Strategic acquisitions in order to acquire new competences; less organic growth.
Next steps	• Improve the quality of offers and service in order to consolidate the customer base, reach new customers. • Develop new value - added services for residential customers and above all SMEs. • Development in the sector of energy efficiency of the tertiary sector.

Table 8.5 EDISON Strategy

ENGIE Italia

Global owner company	ENGIE
Mission/ Vision/ Values	Focus on decarbonized, decentralized, digitized energy. Focus on energy efficiency and management solutions becoming a reliable partner for the client.
Business Model (Chapter 3)	Marketplace Advisor and, in minor measure, Specialized Provider.
Resources - Core competences	• Experience and competence coming from a big global group. • Huge network. • World's largest independent utility company.
Main customers	• Free market. • Domestic segment (increasing focus), business segment, public authorities.
Product and Services	• Supply and electricity (only renewable), gas, heat. • Product: thermostat and smart home products, boilers. • Services: heating and cooling via cogeneration units and network, energy efficient solutions, energy management activities, maintenance plans, monitoring and continuous assistance for photovoltaic solutions.
Vertical integration	Generation (low volume and renewable), trading, distribution (at global level – not in Italy), sale to end consumers.
Economy of scale/scope	High economy of scope
Commercial Strategy	• Promotion of itself as an Energy Service Company, thanks to its investee Engie Casa articulated in Gas&Luce, Services, Smart home, Photovoltaic; • Engagement of the final clients thanks to the use of gamification and online channels.
Method to implement strategy	Strategic partnerships
Next steps	Improve the process of consolidation and rationalization of the group activity in order to improve synergies and get closer to the final costumers.

Table 8.6 Engie Italia Strategy

Sorgenia

Global owner company	-
Mission/ Vision/ Values	To be protagonists of the new free energy market, recognized for the ability to bring solutions to customers through the use of digital technologies.
Business Model (Chapter 3)	Mix Standard Provider and Marketplace Advisor.
Resources - Core competences	• Agile organizational structure. • Flexibility given by a few capital - intensive assets. • Focused investment in innovation and digital.
Main customers	• Free market. • Residential segment and SMEs. • In particular, the main target are young people used to surf and choose online and using digital channels to get convenient products and better services.
Product and Services	• Sales of electricity through focus on full digital offers. • Bundling offers to promote electric mobility and protect environment.
Vertical integration	Generation, trading and sales to end consumers.
Economy of scale/scope	A few.
Commercial Strategy	• Full digital offers that make quickly every type of client interaction. • Campaign with Bebe Vio to strengthen its Brand reputation. • Engaging challenges, social media.
Method to implement strategy	Strategic partnership and collaborations.
Next steps	• Guarantee very high levels of safety, reliability, efficiency and flexibility of the CCGT thermoelectric plants. • Continue commercial development in the market of small and medium-sized enterprises (SMEs) with full digital offers. • Improve operational efficiency and maintain an extremely streamlined, efficient and flexible cost structure.

Table 8.7 Sorgenia Strategy

More precisely it is useful to report the figure of Chapter 3 to compare the business models of the four companies:

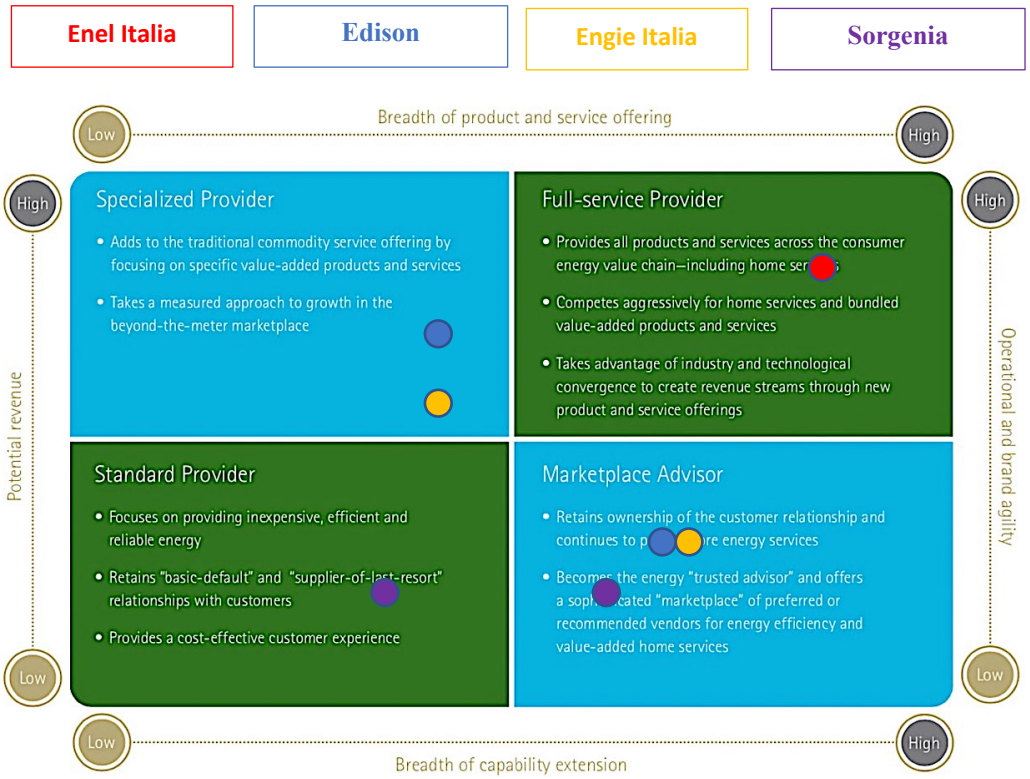


Figure 8.1 Enel Italia, Edison, Engie Italia, Sorgenia business model positioning

In conclusion, it is clear that all the four companies are reacting, even in different ways, to the big macrotrends that are changing the electric market. All have the following **common strategic targets** for the next years:

- focus on the offerings to the valuable SMEs;
- innovate, digitalize and improve more and more the quality of offers and services.

9 CHAPTER - “The current situation in the United Kingdom and France”

The most innovative English and French companies in the energy sector are analyzed in order to provide a good benchmark to follow for the Italian ones.

9.1 United Kingdom

The United Kingdom has historically been a forerunner in the start of liberalization processes that were then introduced at European level. Regarding the energy market, privatization dates back to 1989, through the Energy Act.
The following graph shows the trend between 2004 and 2018 of the domestic electricity market shares for each of the six large suppliers, medium and small suppliers [62].

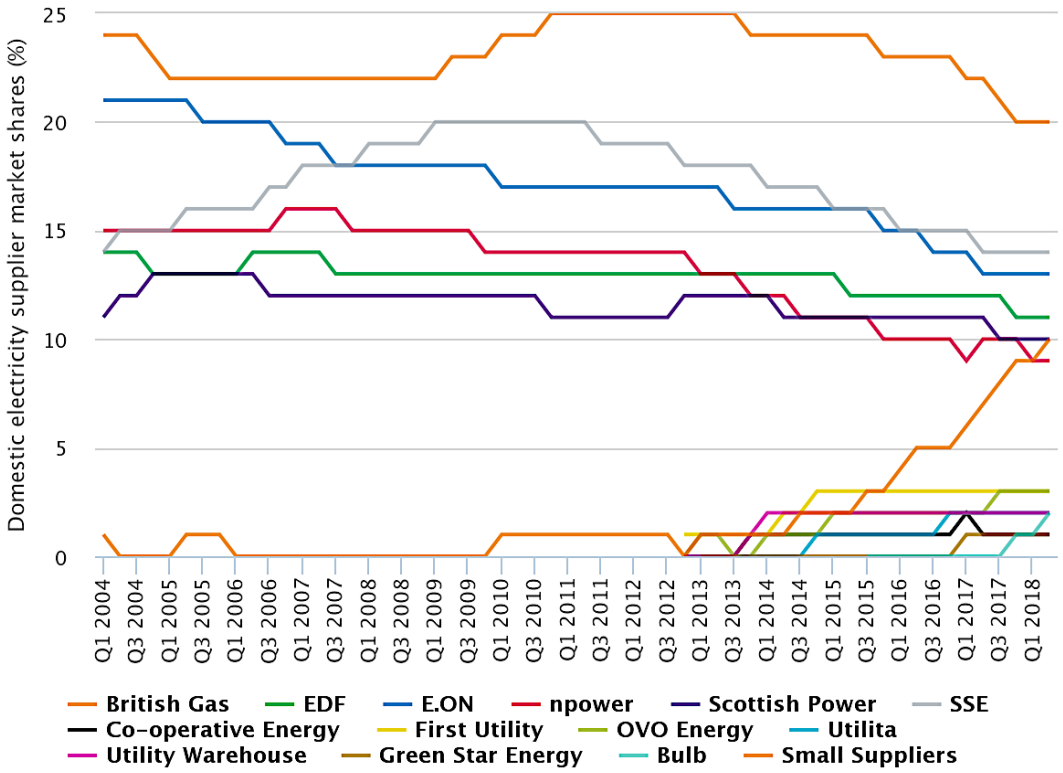


Figure 9.1 - Electricity supply market shares by company: Domestic (GB)

It is evident an increasing relevance of the small suppliers. They have been able to exploit the changing energy market in order to grow year after year. In the following the most innovative and leading companies will be analyzed.

9.1.1 Ovo Energy

Ovo Energy is an energy supply company based in Bristol, England. It began trading energy in 2009, buying and selling electricity and gas to supply domestic properties throughout the UK. As of June 2017, they have roughly 680.000 customers, an increase of 10.000 over the previous year [63].

Its original aim has been to make energy cheaper, greener and simpler through great service and transparency. Today they are trying to improve themselves blending renewable energy with smart technology focusing on energy retail, energy technology, domestic engineering.

Energy retail

In 2017 OVO introduced Boost, the first truly smart energy prepayment platform in the UK: it gives the customers the freedom to top up their energy when and where they would like, connecting the smart meter with the smart phone.

Furthermore, also an app-only energy supplier in beta is available, offering a transparent view on the market by actively promoting the best tariffs for customers on the website.

Energy technology

OVO created VCharge, a highly scalable, intelligent technology platform that remotely connects distributed flexible electrical devices (electric vehicles, home batteries, storage heaters) enabling the UK grid to symbiotically react to changes in demand and supply. Moreover, the company sells sophisticated batteries that utilizes VCharge platform, giving the possibility to customers to sell power back to the grid at peak time, earning revenues from energy arbitrage and new flexibility services.

The OVO Heat Dynamo is part of OVO's strategy to make heating greener through electrification while providing more value for customers. It is an internet connected smart switch that can be retrofitted to an electric storage heater to give it smart controls. OVO is also working with manufacturers to launch the first electric storage heaters with built-in VCharge integration later in 2018. These will be the world's first smart-grid enabled electric storage heaters, which will support balancing of the electricity grid by providing extra capacity for flexible energy distribution.

Concerning electric vehicles, the company proposed two solutions:

- the *OVO Vehicle-to-Grid (V2G) Charger* is the world's first widely available, single-phase smart vehicle charger to enable a two-directional connection with the electricity network;
- the *OVO Smart Charger* uses VCharge AI advanced scheduling to optimise grid balancing and battery longevity and responds to signals on pricing and demand from the grid. It can automatically charge cars during off-peak periods when demand for electricity is lower and energy is cheaper and possibly greener. It can also pause charging during peak periods to manage strain on the grid, saving money and avoiding the risk of local blackouts caused by surges in demand.

Domestic engineering

Smart meters installation is considered to be an important step for the implementation of a range of products and services that will transform energy systems for the long term. Since 2013 they are installed in the homes of OVO customers by In-Home Technology (IHT). Moreover, thanks to ChargedEV, the company consults, supplies, installs and maintains EV charge points in domestic, commercial, and public space settings.

OVO, thanks to the acquisition of CORGI HomePlan, provides expert assistance in central heating, breakdowns, scheduled servicing and general home emergencies.

OVO is trying to build a strong link with the clients, engaging them as much as possible.

One example is the sponsorship of the Tour of Britain.

9.1.2 Powershop

Powershop is an online electricity retailer, founded in New Zealand in 2007 and also available in Australia (2012) and the United Kingdom (2017) [64].
In particular it landed in UK with the backing of npower, one of the "Big Six" energy providers, making it very safe and reliable.
Powershop's aim is to introduce a simpler, friendlier and more transparent way of buying energy. The user can monitor its consumption on the website or on smartphone app and can choose to buy its energy with fixed monthly payments ("Powershop Lite") or with variable monthly payments on demand ("Powershop Pro"). This second way gives the possibility to buy four or five Powerpacks each month: they are a set amount of energy that can be bought at a discounted price and are personalized according to the consumer's energy use. They are of the following types:

- Special Pack: are special discount that are only available for a certain amount of time;
- Top Up Pack: are always available and can be chipped away at the monthly bill;
- Future Pack: enable the consumer to buy electricity in advance so to chip away at those winter – month bills that, generally, are more expensive.

The company offers a third further energy plan called "Powershop EV Pro": it is available only for fully electric vehicle drivers and it allows to combine home & electric vehicle energy. It permits to power the client's home and vehicle with 100% renewable electricity and to buy Powerpacks in order to make a lot of savings against the standard prices.
The choice to introduce these three different energy plans is a strategic one: the UK customer can gradually understand the Powershop's innovative system and pass from "Powershop Lite" to "Powershop EV Pro". It is a way to engage the clients and make them more proactive. Moreover, in order to increase the number of switches to "Powershop Pro", the company has created an initiative called "Your First Year Promise": in this way the maximum amount the customer will pay over the first year is that predicted by the company based on the usage details given in order to get the quote. This enforces since the beginning the sense of confidence and trust between Powershop and the new client.

9.1.3 Spark Energy

The most important particularity of Spark Energy is that it is the only supplier built around the UK lettings industry. It was born in 2007 as a small but promising start up company. Now it supplies 350.000 customers and is growing very fast. It is an extraordinary example of the possibility to create a successful business model only targeting in the right way the right people [65].

Considering these UK companies, the most important difference in their retail offers compared to Italian companies is the presence of prepayment tariffs.
In Italy they are not so diffused and until the end of 2016 were forbidden by ARERA. One of the most successful precursor of this service in Italy is Wekiwi.

9.2 France

In France, market liberalization took place in progressive stages, as in most European countries. From 2000 to 2006, the market was open to free competition, first for large industrial customers, until it opened up to all categories of customers in 2007.
From 1 July 2007, consumers can choose two types of offers:

- regulated rate offers, whose prices are set by the government and can only be offered by “historical suppliers” (EDF and some local distribution companies);
- market offers, whose prices are set freely by the different suppliers.

In December 2010 France launched the law on the new organization of the electricity market. This law provided for the removal of regulated tariffs for consumers with a contractual power of more than 36 kVA starting from 1 January 2016 and introduced rules aimed at allowing new entrants to compete on the market. The law, on the one hand, allowed the new suppliers to obtain supplies by accessing pre-set prices to 25% of the nuclear production capacity of EDF and on the other hand modified the mechanism for calculating the regulated tariff also for residential customers.
This method, in force since 1 November 2014, was no longer based on the costs incurred by EDF, but on those incurred by alternative suppliers for the supply of its customers and for the construction of their market offers. In this way the new entrants were finally able to offer competitive prices compared to the regulated tariff.
Even if the number of suppliers ("new entrants") has increased considerably since 2014, the level of competition in the French market is one of the lowest in Europe with EDF still playing a dominant role. Engie and Direct Energie remain the main alternatives to it.
Despite this situation limits the possibility of innovative ideas, services and solutions, in the following will be analyzed some of the leading players.

9.2.1 Direct Energie

Direct Energie was formed in 2003 when the French energy markets began to open to competition [66]. The company began selling electricity contracts to businesses in 2004, and to residential customers in 2007. They entered the natural gas market in 2009. In 2012, Direct Energie acquired another French alternate supplier, called Poweo, which made it the largest alternate energy supplier in France and one of the main competitors of the historical suppliers EDF and Engie. In 2018 the company was acquired by Total Group. With more than 2,6 million customers and 650 employees at the end of 2017, Direct Energie keeps on recording remarkable growth year after year.
The company has been able to strongly position itself in the French energy market thanks to the following reasons:

- the offerings of some of the lowest energy prices thanks to low overhead costs and strategic procurement procedures (own generation production and wholesale market);
- the ability to make its brand known thanks, for example, to the sponsorship of a professional cycling, called Team Direct Energie;

- the construction of a strong reputation for good customer service, winning the title of “Service Client de l’année” for eight consecutive years;
- the ability to innovate to accelerate its development.

The most important strength of the company is the exceptional attention to the need of energy consumers, offering them innovative services and tools.

Linky smart meter

Each customer with a Linky meter can track and measure changes in their electricity use, benefit from customized advice and receive an energy consumption statement by email each month. An interesting point is that, if a customer chooses a monthly plan and at the end of the year has consumed less than expected, Direct Energie will reimburse them for the difference with a 3% bonus.

Nest smart thermostat

It allows an intelligent management of heating being able to adapt the temperature to the consumers specific needs.

Mobile application, Messenger bot and Adrien

The application allows to simplify the energy management directly by the users: they are able to monitor their energy budget, view their payment schedules, automatic payments and billing history. At the same time the Messenger Bot ensures a constant support and assistance provided to the client. Finally, “Adrien” is a service whose purpose is to inform and assist households in defining renovation work that will reduce their energy bills.

Smart home

Direct Energy has put in place the following solutions that are being tested today:

- **Atome**: it enables a real tracking of the energy usage, allowing the use of Wi-Fi to transfer information from a Linky smart meter to a smartphone app.
- **On/Off**: composed of a module installed in the electrical board and a box next to the Internet box, it can be used to control one's electrical devices remotely.

9.2.2 Ilek

It is an ambitious green electric energy supplier, founded in 2016, that enables consumers and producers to connect each other seamlessly [67]. It proposes a collaborative energy platform that allows local renewable energy producers to sell their electricity directly to individuals. At the same time, the consumers can choose directly its producer of renewable energy: wind, solar or hydroelectricity. As a licensed electricity supplier by the Ministry of Energy, it guarantees energy flows and financial transactions. Direct access to the producer reduces the number of intermediaries and allow to obtain very competitive prices. Recently it starts to propose French residential and businesses to set up solar panels and auto consume their electricity.

In order to attract more and more clients, Ilek engages potential new users leveraging the possibility they have to contribute to reduce pollutions and to enter into a new community oriented toward the development of renewable energies. The possibility to become a sponsor, obtaining nice bonuses, is another interesting way to attract new clients.

9.2.3 Plüm Energie

Plüm Energie is a small French electricity supplier reserved for private individuals and founded in 2016 [68]. Its model is based on renewable hydraulic energy at a competitive price and on the reward of energy savings by a bonus in euros to lower its bills, already 4% cheaper than those of EDF at the regulated rate.
It can be considered one of the first supplier to financially incentivize its customers to save energy. The latter are strongly encouraged to reduce consumption also thanks continuous advices from the supplier and to the Plüm community. Moreover, to be as much closer as possible to its customers, the company offers a weekly newsletter to read in 30 seconds giving useful tips on how to save money.

9.2.4 Mint Energie

Mint Energie is a small green energy supplier and a brand of Budget Telecom group, launched in 2017 [69]. One of the most innovative offers of the company is the possibility given to the customers to have a real-time consumption monitoring (updates every 5 seconds) and to achieve indirect savings. It decisively outperforms the Linky smart meter which informs about consumption every 24 hours.
Mint Energie case well exemplifies the increasing presence in the retail energy market of new entrants coming from different background such as the telecom one.

CONCLUSIONS

The in-depth analysis of some macro trends such as the progressive liberalization of the electricity market, the unstoppable digitalization, the new features of the electricity consumer and the entrance of new players has been essential to understand the deep dynamism typical of the last phase of the electricity supply chain, which means the final retailing to the end customer.

Starting from this awareness, it will be essential for the main electric utilities to know how to reorganize themselves from a strategic and operational point of view in order to continue to remain central players in a changed market, undoubtedly more competitive. The potentially viable roads are different and vary according to the type of company in question: from improving and excelling in their core business, such as the sale of electricity, placing the end customer at the center (Sorgenia), until entering in new potentially profitable markets such as services aimed at greater energy efficiency (Edison, Engie), smart homes, electric vehicles (Enel).

This last decision requires the correct management of new players such as Google, Facebook, Amazon, BMW etc…. Knowing when to identify them as interesting partners or dangerous competitors will be one of the biggest challenges for electric utilities and also one of the major sources of their competitive advantage.

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