

# BerkeleyHaas Case Series

Haas School of Business  
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## HENRY CHESBROUGH

### Innovation @ ENEL: From Monopoly Power to Open Power

*A utility is not the most fertile ground for innovation. There's a lack of pressure for innovation. For decades the industry has selected people that had a certain mindset for skills of obedience, order, compliance, rather than to change or innovate. Those are the people running the system, in an environment of low stress for change.*

— FRANCESCO STARACE, CEO

Francesco Starace was looking out the window of his office in the Rome headquarters of Enel, Italy's largest utility. He was trying to decide what programs were most needed to advance the utility company beyond its traditional heritage to a more renewable energy-based future. He was holding in his hands an early prototype for a proposed second-generation smart meter, which was intended to go into more than 40 million homes and businesses in Italy and around the world. He reflected that, if Alexander Graham Bell returned to see how telephones had changed since he first invented them, he would be amazed and astounded. Whereas, if Thomas Edison returned, he would probably feel that everything had remained the same.

#### History of Enel<sup>1</sup>

Enel is a multinational power company and a leading integrated player in the world's power and gas markets, with a particular focus on Europe and Latin America. Enel Group operates in over 30 countries across 4 continents, producing energy through a net installed capacity of more than 89 GW and distributes electricity and gas through a network of approximately 1.9 million kilometers.

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<sup>1</sup> Sources: background material for this section was taken from <<https://en.wikipedia.org/wiki/Enel>> and <<http://successstory.com/companies/enel>>

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Professor Henry Chesbrough prepared this case study as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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With over 61 million household and business customers worldwide, Enel has the largest customer base among European competitors and had become the largest integrated utility in terms of market capitalization in Europe. Its recent financial income statement and balance sheet are shown in **Exhibit A**.

Enel emerged from a collection of small private utilities, going back to the late 19<sup>th</sup> century. In 1962, ENEL (Ente Nazionale per l'energia ELettrica) emerged as a state-owned monopoly, but now is partially private. However, the largest shareholder of the company is still the Italian Ministry of Economy and Finance. Over the years, the company has grown by acquisition, and it has had to integrate nearly 1,300 companies into a unified management, operational, and technical organization.

Rural electrification was the focus of ENEL in the years following its establishment. The international oil crisis in the 1970s led to ENEL focusing on nuclear research as well as research on different forms of energy such as wind power. The Chernobyl disaster in 1987, however, forced a decision to terminate further construction of nuclear power stations by the company. In 1991, ENEL was obliged by law to partially liberalize electricity production. In 1992, it became a joint stock company with Italian Treasury as its main shareholder. In 1999, a legislative decree opened up the energy market for other actors to compete. This caused firms like Enel to organize their operations into separate energy generation, distribution, and sales activities. In 1999, Enel had an Initial Public Offering that raised over US\$16 billion, making it one of the top 10 IPOs to date around the world.<sup>2</sup>

The company expanded aggressively outside of Italy in the 21<sup>st</sup> century and is now a major multinational supplier of energy. In Spain, ENEL owns 70.1 percent of Endesa, the country's largest power company. Through this venture, ENEL became one of the biggest players in the field of electric supply in Latin America as well. In Slovakia, ENEL sold (in December of 2015) its 66 percent stake in the largest electricity producer of the country.

Throughout its history, Enel has also been active in renewable energy. It built the first solar energy generation plant in Sicily in 1981 and the first wind farm in Sardinia in 1984. It spun out Enel Green Power, dedicated to renewable energy, in 2008. In 2011, the company built its first pilot carbon capture facility in Brindisi and built its first smart grid in the Molise region of Italy.

Throughout its history, Enel had generated a number of important innovations. It led the world in the introduction of the first generation of smart meters into the Italian energy grid back in 2001. It pioneered breakthroughs in hydroelectricity and renewable energy. **Exhibit B** examines the company's pioneering work in smart energy meters as an example of its technological capability.

However, until the formation of Enel Green Power, it must be said that the many technical accomplishments of the company were generated primarily or exclusively from internal innovation activities. There was not much use of external ideas inside Enel at the time in their innovation process, with the exception of technologies that came in through acquisitions, such as those that accompanied the 2005 acquisition of Echelon Corporation.

## The Utility Business Model

Energy generation is a capital intensive business, and the energy produced is a vital commodity to all citizens in the society. This makes the provider of that energy a natural monopoly, with enormous market power and economies of scale that limit or prevent any effective competition. Over the past century, a complex web of regulations have arisen to manage these monopolistic businesses.

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<sup>2</sup> Source: <<http://www.investopedia.com/articles/investing/011215/top-10-largest-global-ipos-all-time.asp>>

To simplify, the business model for a utility is one where the regulators agree to allow the utilities a “normal rate of return” on the assets employed to generate and distribute energy in the utility’s market. This is termed “rate of return” regulation, and it can also be thought of as a cost-plus incentive system. It motivates utilities to invest in new power generation assets, since the larger the asset base of the company, the more money can be earned. The shareholders receive stable and growing earnings (so long as the asset base of the company continues to grow), making utilities a core long-term holding for institutional investors.

The cash flows from this commodity business are also quite stable, tracking the population growth and economic activity of the economy it serves. This encourages utilities to use large amounts of debt to finance the assets of the company. This leverage, in turn, increases the return on equity for the shareholders (though this leverage can cause more volatility in earnings, should a difficult economic environment arise).

## **Enel Green Power**

Enel Green Power S.p.A. is a spinoff of Enel that was formed in December 2008, grouping its global renewable energy interests together into one entity. Enel Green Power operates in 16 countries across Europe, North America, and South America. It generates energy principally from hydroelectricity, wind, solar power, geothermal, and biomass sources. The company's total worldwide installed capacity of renewable energy from these sources was about 10,400 MW by 2015.

Starace was selected from within Enel from the market division of the company to be the founding CEO of Enel Green Power (EGP). Starace had to create the company by gathering together the often-overlooked renewable energy assets strewn across the different geographies and business lines of the company. At the time, Enel did not have a strong commitment to renewables, and in fact, was discussing new investments in nuclear power. Separating the renewable energy assets from the parent company allowed more focus and management to be applied to them. Also, the governments at the national and European levels were creating attractive incentives, such as high feed-in tariffs in Spain, to stimulate more investment in renewable energy. The spinoff was a way to offer investors a chance to invest in this much smaller, but potentially high-growth, business.

Starace focused EGP on a mission of innovation and environmental sustainability. One example of this new mission could be found in Chile, in the village of Ollague. There, the company constructed a unique, off-grid system of power generation. It included photovoltaic energy, a mini-wind turbine, a co-generation facility, and also included energy storage. This unique system allowed the village to move off of noisy, dirty diesel generators. The improvement was so remarkable that some tourist agencies and operators are now bringing tourists to the town for the first time.

A second example emerged in Nevada in the U.S., where the company built the first hybrid photovoltaic concentrated solar power/geothermal generation facility at Stillwater. This hybrid approach combines the continuous availability of geothermal energy with the increasingly cost-effective but intermittent energy from the sun. The innovative technology enables the use of the sun’s heat to raise the temperature of the geothermal fluid extracted from the wells, making it possible to improve the cycle’s yield and increase its electricity output. The resulting data from this unique installation are analyzed by an EGP team in cooperation with the National Renewable Energy Laboratory (NREL) and Idaho National Laboratory (INL), under the oversight of the U.S. Department of Energy Geothermal Technologies Office (GTO)

thanks to a Cooperative Research and Development Agreement (CRADA) with the goal of exploring the potential of EGP's innovative Stillwater hybrid power plant.<sup>3</sup>

The renewable energy business challenged the habits of a successful utility company in many ways. As Francesco Venturini, the subsequent CEO of Enel Green Power noted, "Renewables are a completely different energy business. Nuclear plants take at least 15 years to plan and commission. Most large-scale power plants require at least 5 years to commission. On the other hand, wind generation facilities are put up in less than one year, so our renewables business requires a very different pace of activity. This requires a whole different mentality. Our speed of decision making and action is a big piece of what makes us different. For example, I have four different tenders going on this week, involving potentially billions of dollars of investment. It's exhausting in a way!"

A 30.8% stake in Enel Green Power was floated on the Borsa Italiana and Bolsa de Madrid in November 2010, raising €2.6 billion from investors. In 2014, Starace was named CEO of the parent company Enel, and Venturini took his place at Enel Green Power. **Exhibit C** shows the recent financial performance of EGP.

## Organization of Enel

Enel was organized as a collection of quasi-independent companies until 2014. This reflected its historic growth by acquisition overseas, as it acquired operations in Spain, Slovakia, Russia, Romania, and many countries in Latin America. Each country's operations was led by a country manager, who had full P&L responsibility for operations in that country, covering, where applicable, the whole value chain from generation to distribution to sales and services to the customers. The company had different lines of business, some of them in geographies (see Iberia and Latam) some of them in operations.

This organizational structure was typical for many utilities. However, it created some problems, as noted by Francesca Di Carlo, the head of human resources for the company: "We have a culture that is very hierarchical: each silo tends to rely on its own individual knowledge, 'I tell you only what you need for the piece I want you to do.'...We developed organizational siloes by lines of business, where our distribution people didn't talk to our generation people. And our country managers didn't talk to each other. In our promotion systems, we consistently valued seniority more than courage, curiosity, or effectiveness."

Ernesto Ciorra, Enel's first Head of Sustainability and Innovation, agreed, noting: "We have been monopolists for decades, and monopolists don't need the customers' input. Our attitude was, 'I know what he wants, so I don't need his input.'"

The innovation activities of the company followed this organizational pattern. Each country had its own innovation agenda, and each line of business within the country had its own innovation priorities. As Ciorra commented, "We had the Not-Invented-Here syndrome in spades. Not only in our company, but even in one line of business, say Generation, in one geography, say Italy! If you're doing recharging stations in Spain, give it to me and I'll do it again and do it better."

Renato Mastroianni agreed, saying: "another factor that contributed to not sharing was the incentive system. Before, the system was designed on a single person, so everybody focused on his own objective. Each of us had Management-By-Objectives in very detailed items. But no one had overall responsibility

<sup>3</sup> <[http://www.enelgreenpower.com/en-GB/ena/events\\_news/press\\_releases/release.aspx?iddoc=1662265](http://www.enelgreenpower.com/en-GB/ena/events_news/press_releases/release.aspx?iddoc=1662265)>

for the performance of the business, even if they hit their individual objectives.... We had developed a monopoly culture.”

### **A New Innovation Approach for a Utility: Open Power**

When Starace took over the reins as CEO of Enel, the company started to rethink its competitive position in the industry. Historically, the company had viewed its primary competitors as other utility companies. Starace challenged them to broaden their thinking. He boldly stated: “We are competing with the cost of generating and the cost of distribution of the other forms of energy—these are our real competition: oil, gas, coal, nuclear.”

This insight had profound implications for the approach to innovation at Enel. Historically, the company had been quite self-reliant on developing and deploying new technologies, and as a matter of policy would not allow other utilities to use them. Nor would Enel ever use the technologies developed by other utilities in its own business. The problem with this self-reliance was that the scale of the technologies used at Enel was too small to drive down the costs of producing energy to levels that could win the competition with their alternative sources of energy. As Starace commented, “If we only apply our innovations to ourselves, we won’t get the scale we need. We need to make them available to the largest number of people. If you open up your innovations, you get better and you get scale.”

Starace brought in key executives from across the company to inaugurate a new era for the company. He promoted Enrico Viale to lead the efforts for working on Enel’s “Futur-E Project,” which involves wide participation for ideas and proposals to repurpose redundant energy generation sites. Livio Gallo was tasked with the job of introducing the second generation of smart meters across Enel’s energy networks. Carlo Bozzoli was given the assignment to incorporate insights from Enel’s 60 million customers into the company’s future direction (also known as Big Data) thinking and developing solutions that can make it easier to sell energy and value-added services, transforming the company in a service aggregator for both the home and industrial environments. Francesco Buresti led the procurement process for the company. Di Carlo moved over from audit to head up the human resources function. The company’s organization chart is shown in **Exhibit D**.

To manage the transformation of the company’s innovation process, Starace recruited Ernesto Ciorra. Ciorra had worked on projects at Enel previously as a consultant and knew the company from the outside. He soon realized, though, that the transformation would need to reach throughout the organization and would require significant time and CEO support.

One important step Ciorra took with HR head Di Carlo was the creation of a custom five-day program on innovation at the Harvard Business School in Cambridge, Massachusetts. This session brought all the senior leaders of Enel together in one place for an extended period of time, including all of the country managers and all of the line-of-business managers. Ciorra remembered, “People hated me for making them come to this course. But it helped to create a common culture of innovation for us. For example, we used to manage university research activities without any input from the businesses. The businesses saw R&D as parasitic, as a compulsory tax on the business. Now we are more connected to the businesses.”

Being more closely connected to the businesses of Enel allowed the company to reduce the duplication of projects across its different businesses. New technology projects for generating energy in one country were combined with different projects for generating that energy in another region. Storage technology needs were integrated across the regions as well. This allowed Enel to be among the first utility

companies to sign a collaboration agreement with Tesla, a U.S. company, for energy storage projects. “This agreement gives us a unified approach to storage across our businesses,” said Ciorra.

University research needs were put together across the businesses for the first time as well. Carlo Papa, head of university relations worldwide at Enel, noted, “We used to have projects with more than three hundred universities around the world. No one looked at all this work at the same time, and no one asked how we could get more value out of our many investments in this area. Our CEO asked me to sort this out. We have now identified the top ten key academic and research center partners for Enel around the world, and we are focusing our work with them on the future technologies that will really make a difference as well as on the people we need to join our team to change the world.”

Organizationally, innovation used to be managed inside the different businesses of the company. Under Ciorra, these functions were now gathered together into a central innovation hub, which reported directly to the CEO of Enel. This structure was supported by new tools that allowed innovations to be more widely known throughout the company. As Ciorra said, “Our tool collects all the projects together in one place, to expose the projects so that they can be seen by anyone in the company. The finance group won’t allow the project to be funded if they don’t share! This has given us a CRM of innovation... Eventually, we want to open this tool to external people, so that they too can give their input on these projects.”

The new innovation process established stage gates to examine possible new initiatives. As each project was initially established, it would be evaluated for its innovative potential. Initially funds to support the project would be kept small, to keep them agile. But as they progressed, more money would be provided if the progress being made was substantial. Ciorra also initiated new activities to stimulate more openness within the organization. The Innovation World Cup, for example, invited teams of internal staff to propose their own startup to be developed within the company, benefit of 20% of their working time to be spent on the project. The winners will be in the management team of the new business. Another program was My Best Failure, an invitation for staff to nominate their failed initiatives in order to celebrate their risk-taking and develop more tolerance of failure as a necessary input to innovation success.

Another initiative inside the innovation team was the creation of the Enel Idea Factory. The purpose of the Factory was to stimulate creative thinking within the company to solve business problems. In this way, creative thinking could become part of the rational thinking process. This was also an open initiative, involving people from outside the company as well. Ciorra explained, “A nice example of the Idea Factory process was its use in Brazil. We explored how we could redesign the business development activities for renewables in Brazil, and came up with a number of fresh ideas. The response inside Enel was so positive that we are now spreading this process to other geographies in Latin America. And instead of pushing countries to try the process, we have shifted it to an on-demand service, and they are calling us to come in and help them.”

Enel’s innovation collaborations now also extend to other areas that previously received little or no attention within the company. The company has created a number of initiatives with startup companies, including hackathons and competitions. It works with venture capital firms and incubators of new businesses. Often, the company scouts for promising startup companies and seeks to engage them with joint development or joint market agreements. These are popular with the startups and their investors, because they do not involve any equity investment.

This new approach has also changed how Enel works with its many suppliers. As Buresti, head of procurement at Enel, commented, “Our supplier base spends 50x what we spend on R&D. So how do we tap into that more effectively? I asked to meet the R&D people of my customers (not just their commercial people). They’d never heard of this! But that’s the best way to tap their capabilities. Most of our focus is on efficiency, trying to get more from our existing assets. What is the vision of our

supplier base in terms of future technological developments? That itself is interesting. Historically Enel developed its vision internally. Now we are opening up to our suppliers to inform our vision. A second opportunity was to tap into the external supply base to solve specific problems. How can we get their help to solve this problem?”

Enel started with its suppliers who were spending the most on R&D, and asked them: Tell us where your R&D budget is going, what is the state of technology, and where do you see it going? While the company was learning a lot, it didn't yet have good processes to digest this new information.

The second way Enel engaged its suppliers was in attacking specific problems. To do this, Enel created a “supplier club.”<sup>4</sup> Enel selected the most advanced supplier in each company and shared their biggest problems with that group. This extended to specific agreements on how Enel would treat the solutions, who would own the IP, and so on.

One recent example of how suppliers contributed to new innovations came from a 1.8 GW coal plant outside Rome. Twenty-three key suppliers were invited to present ideas for new materials for desulphurization of the coal and how to manage the scrap material generated by the plant. Enel gave these suppliers a tour of the plant and made their technical team spend the whole day with the suppliers. The suppliers were then given 15 days to come back to Enel individually with their best ideas for improvement. One of its biotech suppliers told them, “you are world class, but with a process that was developed 40 years ago! A lot has happened since that you might consider.” Half of the suppliers responded with concrete proposals on desulphurization, and all of them contributed ideas for the surrounding processes such as safety, logistics, components, and materials.

After the process of soliciting these ideas was completed, Buresti presented the results to the management committee, which included the CEO. He recounted, “The CEO, Starace, complimented me for this work. Then he said, ‘Let me tell you what will happen in 90 days. You will receive a huge pile of paper from the operations staff of the plant, telling you why these ideas won't work. So tell our operations people that they must pick at least 2-3 of these ideas and push them through.’”

## **Combining Innovation with Sustainability**

Ciorra felt strongly that Enel's new innovation process could also help the company in its mission to improve sustainability in energy production. “You must innovate to achieve sustainability, and if you are not sustainable, you cannot innovate,” he said. A number of innovation projects underway in the company were launched with this in mind. Inside Enel Green Power, the company was using an outside company, Innocentive, to manage a challenge for how to use drones for improved operations maintenance of solar plants. Two earlier Innocentive challenges were for ways to improve the operations of Enel's biggest geothermal power generation plant in Russia.

Another example was the project noted above in the miners' village of Ollague, where Enel converted the power supply from diesel to solar and wind power generation, using diesel only as a backup power source. This has dramatically transformed the 200 inhabitants' life: people now have hot water and heaters 24 hours a day, the small community school has enough electricity to also teach IT skills, and the only food shop in the village has a fridge that can keep food fresh around the clock. Venturini commented, “In this way, clean electricity becomes a feedstock for more development. Instead of cleaning up after the fact, we engineer upfront to reduce waste. This creates much less noise and less cost for the community, the local tribe, and for us. And we train the local population to service the equipment,

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<sup>4</sup> This practice was first developed in Spain by Endesa (the Spanish company Enel acquired in 2007) 10 years ago.

instead of sending technicians into the region from 500km away. This is a critical part of sustainability in the economic sense.”

Ciorra added, “Another sustainability challenge for us is to focus on Minigrids, which establish local grids where power is not available, using renewable energy and storage systems. We are actively testing new technologies to practice ‘reverse innovation.’ This will help get energy to the more than 1 billion people in the world who still lack access to electricity.”

## **The Organization of Open Power**

One of the changes that Starace instituted upon taking over the CEO role at Enel was to impose a matrix structure on the organization. In this structure, someone running a power generation plant in Peru, for example, would have two bosses: one in the country (Peru), and one in the line of business (geothermal, hydro, solar, coal, depending on the power source). The organization chart in **Exhibit D** shows this matrix structure.

This has started to change the internal culture of Enel. “The matrix revolution really pushed people to share, as a natural part of your job. You have two bosses now, so you need to talk to at least two people to do your work! This has led to a culture where our managers are obliged to share, in order to succeed,” Di Carlo noted. A recent example of this structure working was the successful launch in 2015 of a new 400MW hydroelectric dam in Colombia. This launch required close coordination between the country organization in Colombia and the hydroelectric line of business inside Enel. “They worked together to make this happen, and it became a big success for the new matrix organization,” said Di Carlo.

The matrix structure has allowed us to fix some of our earlier problems,” said Ciorra. “It used to be that startups were not linked with any of the business lines, but now someone in each line of business manages the startup environment.” Carlo Papa added, “Now someone manages the entire university relationship, who also serves as the ambassador of Enel’s HR to the university. In the past we had lots of work duplication. This was embarrassing for us to the outside world, because it looked like we didn’t talk to one another inside our company. It was also damaging from an economic approach. Lots of people were getting money from Enel for redundant projects.”

Organizing and streamlining projects in this matrix structure also helped to expand the critical mass of innovative projects and allowed Enel to speak with one voice to external partners. A recent example of this arose in the domain of virtual reality. In a number of Enel’s businesses, it was felt that greater use of VR would help its technicians do their work better. Previously, there was small projects inside individual business units exploring how to apply VR, and there were numerous internal prototypes of VR viewers. “Now we have unified our requirements and have been able to leverage external partners far more effectively,” stated Ciorra. We are now working with LG and Siemens to build the ocular viewers we need. And they will do it for free and will share royalties with us! They will customize for our needs, and then sell it to others and make it a business!”

## **The Future of Open Power @ Enel**

The embrace of Open Power has created a number of new opportunities for Enel. Indeed, the company is quite enthusiastic about its future. One upcoming project is the country-wide upgrading of power meters in Italy. The first smart meters were installed in Italy in 2001, and the country’s energy network was fully digitized by 2006. Ten years later, it is time to substitute a new generation of smart meters. These new meters will be much more intelligent and enable new services both for consumers and prosumers, allowing for future home energy management. The company estimates that it will install more than 40



million new meters in the next 3-5 years, as discussed in detail in **Exhibit B**. This would create the most advanced power grid of any major industrial nation.

Di Carlo summarized the situation this way: “Today I see two streams of innovation for us. One is technology driven by the Lines Of Business. Here we have managed to achieve less duplication across our LOBs, thanks to clear management, leadership, and strategy for each LOB. The other stream, though, is one we haven’t yet done enough. This is innovation driven by our customers, where we create new products and services to meet their new needs.”

Starace saw Enel’s future more philosophically: “Open Power means try to capture as much innovation around you as you can. Don’t try to compete with others who have the task to invest in new innovations. We don’t need to own it to influence it. There is abundant money for this investment from venture capital and other sources. We used to think everything we do will be right and we will never fail—this is a total negation of innovation! Technology is coming to transportation too. Existing technology doesn’t satisfy environmental regulations without cheating. These technologies can co-exist for a while, but there will be a showdown over oil in transportation in the next 15 years, and we need to have grids ready for this. We will need far more power generation capacity, as well as ways to charge and re-charge batteries. This may involve new business models as well. We have developed a vehicle-to-grid technology that enables both the charging and the discharging of the car’s battery. This allows to generate revenues by aggregating cars’ battery capacity to offer grid balancing services. Effects on the life consumption of the battery are negligible while with a very attractive value proposition for the customer. An EV vehicle attached to a smart grid can become mobile, on-demand energy storage for us. We have started deploying this business in Denmark and UK markets.”

## Case Discussion Questions

1. How do most utilities make money? What is their business model?
2. What kind of company was Enel, prior to the new CEO's arrival in 2014?
3. What technological changes are going on in the energy sector, particularly with regard to renewable energy?
4. How is Enel organized today? How does that compare to how it was organized earlier?
5. How would you assess the contributions of Ernesto Ciorra so far to Enel?
6. How would you assess the contributions of Francesco Starace to Enel so far?

**Exhibit A** Enel Income Statement: 2013-2105 (in millions of euros)

	<u>2015</u>	<u>2014</u>	<u>2013</u>
Revenue	75,658	75,791	80,535
Total Costs	60,529	59,806	63,146
Net income (Expense) from Commodity Contracts	168	-225	-378
Gross Operating Margin	15,297	15,760	17,011
Depreciation and Amortization	7,612	12,670	7,067
Operating Income	7,685	3,090	9,944
Financial Income	4,018	3,326	2,453
Financial Expense	-6,474	-6,456	-5,266
Total Financial Income/(Expense)	-2,456	-3,130	-2,813
Share of Income (Losses) from Equity Investments	52	-35	86
Income before Taxes	5,281	-75	7,217
Income Taxes	1,909	-850	2,437
Net Income	3,372	775	4,780

## **Exhibit B** Enel's Leadership in Smart Metering

Enel started in 2001 to deploy its own Automated Metering Infrastructure and was the first Distribution System Operator worldwide adopting Smart Metering on a large scale. Today Enel alone owns and operates more than 40 million smart meters—vs. 58 million in the U.S. owned by several hundred utilities—and is about to massively deploy the worldwide newest version of those devices, allowing telecom operators to leverage on this effort to deploy a superfast broadband network all over Italy.

Launched in 2001, the “Telegestore” project had a budget of 2.1 billion euros and a five-year plan. Thanks to the remote management infrastructure, in Italy Enel can now perform bidirectional communication with the meters by remote, automatically and at any moment. In particular, the Telegestore allows it to easily measure consumed energy and energy that will eventually be produced by customers, renewable energy in particular, and remotely manage contractual operations. At the same time, it can gather relevant data on the quality of electricity supplies while monitoring, in real time, service continuity, intervening promptly in case of network failure or malfunctioning.

The smart metering system enabled the opening of the electricity market by allowing more than 10 million Italian customers to subscribe to energy offers on the free market as well as allowing 250 thousand customers to change their energy supplier each month. This was made possible thanks to the whole Automated Metering infrastructure. The Telegestore provides an advanced smart metering system that allows almost 480 million remote readings per year and around 9 million remote operations per year. Since the full rollout in 2007, Enel has realized savings up to €450 million per year, compared to 2001.

But smart metering was just the beginning of Enel continuous improvement towards Smart Grids. Enel has developed an integrated system with hardware and software components for remote monitoring and automation of networks: real-time monitoring, selective fault detection logic, load shedding, optimization of network configurations, protection coordination, and integration of distributed generation (especially renewable energy sources).

Indeed, as the main DSO in Italy, Enel manages the integration in the grids of more than 16 GW of renewable energy generation increase with over 550.000 connections.

All those investment had led Enel Italian Network in the top benchmark in terms of Quality of Service improvement and Opex per customer reduction: from €80 to €52 Opex per customer and from 128 minutes to only 41 minutes of interruption per year per customer (which means a reduction of 68% from 2001 level).

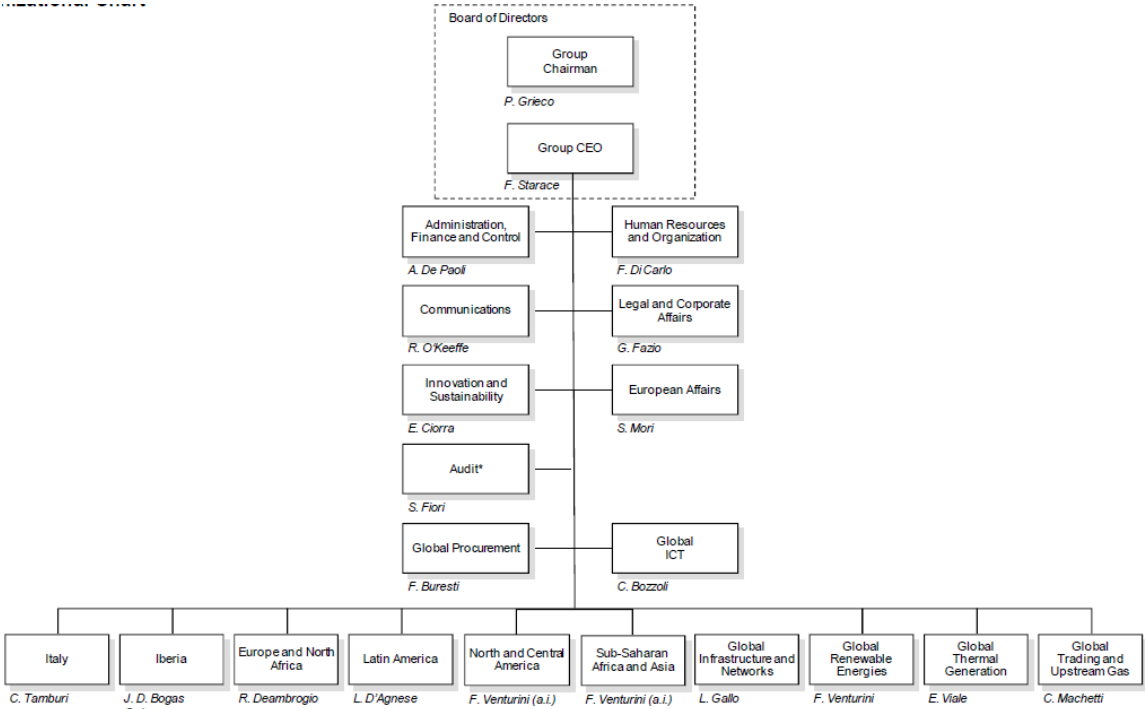
Enel has currently installed 34 million smart meters in Italy on its distribution network and sold more than 4 million smart meters to other Italian distribution system operators. By exploiting the experience gained within Enel group on AMI since 2010, Endesa (the Spanish utility within the Enel Group) is deploying a new generation metering infrastructure in Spain with the commitment to install more than 13 million meters by 2018. Currently in Spain over 7 million smart meters have been installed on Endesa networks and pilots are ongoing in Latin America.

Furthermore, starting from the fourth quarter 2016, Enel will deploy in Italy the second generation of Smart Metering Solutions, the newest in the entire World, replacing 32 million meters within the next 5 years. The revolution in remote management has been a springboard for a series of initiatives from Enel in the field of electric mobility—a complete infrastructure for recharging electric vehicles with the aim of promoting their widespread use—and more recently is opening up to telecom operators by offering the electricity pipes to deploy a superfast broadband network all over Italy.

**Exhibit C** Enel Green Power Income Statement: 2013-2015 (in millions of euros)

	<u>2015</u>	<u>2014</u>	<u>2013</u>
Revenue	3,011	2,920	2,757
Total Costs	1,160	1,054	991
Net Income (Expense) from Commodity Contracts	-25	76	21
Gross Operating Margin	1,826	1,942	1,787
Depreciation and Amortization	1,041	921	722
Operating Income	785	1,021	1,065
Financial Income	-108	-21	79
Financial Expense	-237	-236	-347
Total Financial Income/(Expense)	-345	-257	-268
Share of Income (Losses) from Equity Investments	8	-56	64
Income before Taxes	448	708	861
Income Taxes	184	264	324
Net Income	264	444	537

**Exhibit D** Enel Organization Chart, circa January, 2016



\* Audit reports, throughout the BoD Chairman, to Enel S.p.A. Board of Directors; it maintains a reporting line with Group CEO provided that the latter is in charge of over viewing the Internal Control System.