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Enel Embraces AWS Cloud to Transform its IT Operations

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Introduction

Headquartered in Italy, 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 four continents, producing energy through a net-installed capacity of more than 89 gigawatts. It distributes electricity and gas through a grid network of approximately 1.9 million kilometers. With over 61 million customers worldwide, Enel has the largest customer base among European competitors and figures among Europe's leading power companies in terms of installed capacity and reported EBITDA.

Reducing costs by 8% and growing revenue by 14% are among the objectives in Enel's strategic plan for 2015–2019. The company is digitally transforming to capture opportunities emerging for new digital business models. At the same time, it is leveraging new technologies to digitize existing business, to gain efficiency and improve existing processes and company assets. As part of this transformation, the CIO laid out a new IT strategy and redesigned the IT organization, with cloud as a key pillar and enabler of the strategy.

"The migration of our infrastructure into the cloud fits perfectly in the company's digital transformation strategy," said Carlo Bozzoli, Global CIO, Enel. "It makes the company agile, and enables it to proactively manage market evolution."

Rethinking IT Infrastructure Operations

Traditionally, Enel had large data centers, mainly in two countries, based on opposed sourcing models. The Italian data centers were in-house, while the Spanish one was outsourced. With the launch of its new ICT strategy, the company looked at major technological trends, specifically evaluating the maturity of cloud, in order to fulfill Enel's strategic plan and improve the efficiency and flexibility of its IT infrastructure operations. After in-depth analysis, including comparison of different options for infrastructure sourcing, in the spring of 2015 the CEO approved the strategic decision to embrace cloud. The reliability, flexibility, synergies of scale, and advanced automation capabilities of cloud providers were deemed unparalleled by on-premise or outsourcing alternatives.

Solution Snapshot

Organization: Enel operates in more than 30 countries, serving 61 million customers, and operating 1.9 million kilometers of grid network. Enel has been listed by Fortune as 5th out of 50 companies that can change the world.

Operational Challenge: The Data Center Transformation initiative has been launched to align the overall DC strategy with evolving business needs, fully leveraging technology evolution opportunities.

Solution: Enel is implementing a remarkable Data Center Transformation, leveraging the cloud. About 80% of applications are being migrated.

Project Duration: Between September 2015 and May 2016 (nine months), 9,500 servers were migrated, of which 5,500 have already been moved onto AWS.

Benefits: With the shift to AWS, Enel achieved savings of up to 60% in storage costs, 20% in computational power, and reduced the time required to provision from 3–4 weeks to two days.

Making Data Center Transformation a Reality

Enel's data center transformation is unique in several ways, one of these being its magnitude. Overall, the initiative affects 30 countries, about 9,500 servers, and the migration of six petabytes of storage. Enel is the first among the world's largest utilities to fully embrace cloud for its infrastructure, not limiting it to test and development or to peripheral applications.

Time for execution is another interesting aspect. The migration process started in September 2015, and by end of May 2016 the Spanish data center was totally migrated, as well as about half of the Italian one.

With cloud becoming the preferred approach, Enel focused its internal resources on service governance, services orchestration, and control. At the same time, the perception of the IT operations people was changed: they are no longer considered IT asset managers (with assets being HW or applications) but rather have become service managers. The entire company became a "cloud champion."

Cloud Provider Evaluation and Selection

From October 2014 to March 2015, the data center transformation program was defined and market offerings evaluated. Many suppliers were assessed, and business cases (based on a three-year operating scenario) were compared. Enel's objective was to have a provider with a mature public cloud offering, capable of addressing the issues of large enterprises, with high cybersecurity standards, proven capabilities to run a wide variety of applications, and a strong technology innovation approach. Enel decision makers strongly preferred a provider with data centers located in continental Europe in order to comply with EU regulation.

In April 2015, Enel selected Amazon Web Services (AWS). The contract was signed at the end of June and migration started in September 2015. The richness and flexibility of AWS' available services, along with its competitive prices and commitment to Europe (AWS has multiple data centers in its Frankfurt Region) were key factors in the decision process.

"The evaluation of cloud providers was very accurate, and we invested our time to understand candidate companies' culture and business approaches," said Fabio Veronese, Head of ICT Solution Center Infrastructure & Networks and Head of Infrastructure and Technological Services. "We visited AWS in Seattle twice. We researched their people profiles and created relationships with product experts."

Migration Strategy

As a first step, a general "cloud-first" policy was put in place for new implementations — any new system needs to be cloud-native. However, Enel's biggest challenge was to move its existing solutions into the cloud, considering that the company had started a parallel program to optimize and standardize the Enel Group's applications portfolio, and was planning to replace some applications with cloud-native ones.

Using size as the best proxy for migration complexity, about 1,700 applications were categorized into three large groups: "SAP-related," "Big Elephants," and "Others." The latter represents 80% of Enel's applications in term of numbers, but only 35% in terms of compute requirements, with the "Big Elephants" representing 50% of compute requirements, mainly located in Spain. SAP-related applications were isolated from the main migration as Enel moved them onto SAP's cloud. Furthermore, Enel decided to introduce SAP HANA. The migration strategy started with the "Others" category, which allowed the execution team to reduce risks and learn by doing, and then to move to the "Big Elephants." ENEL selected a lift-and-shift migration model

Migration Execution

The core migration team was organized into two main groups: the IT operations transformation team and the program execution team. The latter scheduled, optimized, and monitored the actual migration, while the former focused on technological themes, detecting and solving any technology issues, including the preparation of script and tools to automate migration. This team was key to preventing issues, learning from inevitable mistakes, and promptly resolving any potential setbacks.

The first quarter of the migration (September–December 2015) was focused on moving the "Others" application category to AWS. These systems are less heavy in terms of data volume, but more numerous. Additionally, they often needed to be recompiled in order to be compliant with the latest software versions available on AWS. At the beginning of the project, each system required a few days of preparation before migration, but the process was progressively engineered and speeded up dramatically. By the end of the quarter, more than half of the "Others" application category had been moved.

Enel started to tackle the "Big Elephants" in early 2016. A large portion were custom applications hosted in the Spanish data center, but also complex distribution applications hosted in Italy. The technical issue was their size (in many cases above 40TB). To manage this, Enel created system backups and restored them in the new hosting environments (either on Enel's Italian datacenter or on AWS). Additionally, since the Italian proprietary data center utilization was progressively declining, and the Spanish outsourcing contract would be terminated by May 2016, Spanish servers were temporarily migrated to the Italian data center. Some of these solutions will be replaced as part of Enel's applications standardization and optimization initiative.

After nine months, roughly 5,500 servers were moved to AWS, and another 4,000 were temporarily moved to Enel's proprietary Italian data center.

Achieving Efficiency, Flexibility, and Innovation Goals

Enel Group's key objectives are operational efficiency, the simplification of operations, innovation, and industrial growth. Its new ICT strategy is designed to support the achievement of these goals. At the core of this strategy is data center transformation and full migration to the cloud, and by collaborating with AWS, Enel achieves:

- **High-level operational resiliency, cybersecurity, and compliance**. Thanks to AWS, Enel has built an architecture with 99.9% system reliability. Additionally, AWS supports security policies and practices that are more sophisticated than those traditionally adopted for on-premise data centers. For instance, AWS is compliant with many certifications (ISO 27001, SOC 1/2/3, etc.), EU regulations and data privacy laws (EU Data Protection Directive, EU-US Privacy Shield, etc.), and alignments/frameworks (CJIS, NERC, ICREA, etc.).

- **Flexibility and increased standardization**. The cloud–on-demand model makes it easier for Enel to scale computational power up and down, and the risk (and related costs) of over or under estimating infrastructure requirements for new initiatives has been eliminated. For instance, the company quickly understood and took advantage of Amazon's Elastic Compute Cloud (Amazon EC2), which provides resizable compute capacity. Enel selected higher EC2 instances at the beginning and reduced them during the optimization phase, allowing it to reduce the testing effort and increase the execution speed. Additionally, Enel created an internal service catalogue to standardize provisioning.

- **Speed of provisioning**. The time required for full provisioning was reduced from 3–4 weeks to two days. DevOps teams, for instance, are able to quickly self-provision what they need by leveraging a set service catalogue.

- **Infrastructure at a lower cost.** So far, Enel had achieved savings of up to 60% in storage costs, and 20% in computational power. Additionally, thanks to the pay-per-use cloud model, Enel is fully aware of its real infrastructure utilization. Only what is required is procured, which eliminates the costs of unutilized resources for which it was paying previously.

Another very important strategic benefit for Enel is the ability to take advantage of the continuous innovation efforts of vendors like AWS. For instance, since the beginning of the Enel and AWS collaboration, AWS has significantly increased its portfolio of available services. Speaking more broadly, Enel recognizes that major IT innovations will leverage cloud.

Successfully Transforming into a Cloud Champion

The utility industry, like many other highly regulated sectors, has traditionally been skeptical about cloud. After less than two years, Enel's IT executives were not only successfully executing this ambitious infrastructure initiative, but they had also transformed the company's attitude towards cloud, generating acceptance of the "cloud-first" strategy at all levels. Enel has moved to a new stage of cloud adoption, setting the "cloud-only" approach as its standard. The Enel Group's CEO strongly endorsed the CIO's decision, and IT leaders carefully shaped the transformation "story," communicating the rationale of cloud adoption, its strategic and operational benefits, and its place in the overall enterprise digital transformation.

"We consistently showed our trust and commitment to the cloud choice, and we created visibility around it. I personally coached project teams located in Italy, Spain and Latin America, sustaining our confidence also during the difficult execution moments," said Fabio Veronese. To foster digital culture from the inside, skilled employees with the right attitude of sharing knowledge and a creative view of the future acted as transformation "evangelists," contributing to the creation of a widespread cloud and digital culture. The ICT 'staff's profiles and skills were retuned with the new service-based approach.

Training was an important aspect of the transformation, since Enel wants to be the owner of its cloud decisions, and needs to be up to date on the technology and process. Workshops and courses on security and connectivity were delivered by AWS solution architect (SA) specialists. Additionally, AWS provided Enel with a long-term relationship with one of its specialist SAs, who has the connections with the AWS product teams. This was to ensure that any Enel special requirements are considered by AWS. For training, Enel adopted a multi-partner approach and reached out to different companies to take the best out of each one. One partner (Storm Reply) acted as Enel's technology consultant, and together they ran pilots on the technology and got familiar with AWS services. A second partner (Accenture) supported Enel as their process migration consultant, to understand how the migration program would work.

The working teams adopted a strong learning-by-doing approach. They were able to reduce testing to a minimum, and the operations transformation team kept focus on fixing any technological issues, while the program execution team dynamically managed the migration schedule.

Enel was strongly committed to moving quickly with the migration. The project leaders carefully balanced the tradeoff between speed and planning, making cost reduction the priority. The adoption of the lift-and-shift first approach generated savings from the beginning and provided visible quick wins, which contributed to the success of the transformation initiative.

What's Next for Enel: Complete the Migration and Stay at the Forefront of Cloud Innovation

The second phase of the transformation program consists of Enel moving another 4,000 servers to AWS cloud. With the continuous evolution of AWS' cloud offering and its investments in larger machines, some of the "Big Elephants," such as Enel's custom smart metering application, which only a few months ago was not portable, can now be moved into cloud. The goal of Enel is to have its infrastructure completely cloud-based within the next 18 months.

In parallel, Enel is radically transforming its people's mindset and the approach to IT infrastructure procurement. Its cloud-first strategy has now evolved into a cloud-only approach. "Our IT infrastructure transformation program was very challenging, and we successfully executed the first phase of it," said Fabio Veronese, Head of ICT Solution Center Infrastructure & Networks and Head of Infrastructure and Technological Services, Enel. "It was the starting point and we are committed to staying at the forefront of cloud innovation, with a continuous learning approach."

Methodology

The project and company information contained in this document was obtained from multiple sources, and most importantly from direct interviews with Enel executives by IDC analysts.