CUSTOMER SWITCHING MANAGEMENT AND RELATED IT SYSTEMS
IN ENEL DISTRIBUZIONE

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ABSTRACT
The Italian electric market has deeply changed in the last decade because of the deregulation process. This evolution has caused a change in the role of the electricity distribution companies that had to develop new organizations and new IT systems to manage the front office to customers and retailers. Enel Distribuzione, the Italian main network operator, has realized new IT systems for billing and customer switching, integrated with an innovative Automatic Meter Management system.

REGULATION FRAMEWORK
The Italian regulation process started with the decree n. 79 of the 16th of March 1999 and was completed on the 1st of July 2007 with the full market opening. This means that, starting from this date, all customers can choose a supplier on the Deregulated Electricity Market (ML; Mercato Libero). If no supplier is chosen by the customers, the Italian Authority for Electricity and Gas (AEEG) has recently established two last resort services in order to guarantee the energy supply:

- The Regulated Market (MMT, Mercato di Maggior Tutela): for the final domestic clients with no supplier on the deregulated energy market. The small commercial customer connected to LV network, with less than 50 employees and an annual revenue smaller than 10 millions €, are included in this service too. This service is guaranteed by the last resort retailer in its own competence area and the supply function for energy dispatching is held by Acquirente Unico S.p.a.
- The Business Customer Market (MS, Mercato di Salvaguardia): for all the clients differing from those above indicated, and not supplied on the deregulated energy market. This service is carried out by specific retailers, owner of the dispatching and supplying contract, identified on the base of procedures defined by the Authority.

In order to discipline the switching procedure from a dispatching and supplying contract owner to another on the same point of delivery, the Italian regulator establishes in details:

- Timing between the date of the request and the starting of the switching
- Timing of the communication of the switching meter reading data towards both the traders involved in the switching
- Timing of the communication of the meter reading data of the previous year towards the new trader.

As it can be deducted, this scenario has become very complex and has deeply changed the role of the Distributor. The Distributor is now involved in managing the whole switching processes from a type of service/market to another on its own network.

This means that the Distributor needs to check, control and manage the timing, consumption, measuring and consequent invoicing.

CUSTOMER SWITCHING, METERING AND INVOICING SYSTEMS

Web Trader portal
To manage the Switching process, since the 1st of January 2006, Enel Distribuzione has realized the Web Trader Portal (WTP) that is available for all the customers with the following purposes:

- To activate an automatic communication channel for the customers switching and to exchange the billing data with the retailers;
- To allow the monitoring and traceability of the retailers’ switching demands;
- To make available to the retailers some reports with all the information about their customers.

To date, about 90 retailers works on WTP and more than 400,000 operations were managed only in the month of January 2008 (due to the migration of MS customers to a different invoicing system).

These operations were fully supported in field by the AMM.

Figure 1. Number of Switching per month.

WTP is the main application for managing the Deregulated Market demands. The system allows:

- single and multiple demands data entry;
- demands acceptability check within one hour from the input (with the status indication, accepted, rejected, held on);
- monitoring of all the energy activation demands.

WTP also allows to manage this kind of switching demands:

- switching from one of the two last resort retailers to the Deregulated Market;
switching for a customer managed by an another supplier;
withdraw of the contract with the final customer.
Suppliers can insert requests in two different ways:
single data entry: on line validation
multiple data entry: massive validation and updating status indication within 24 hours from the input.
Moreover WTP allows to manage:
demands submitted by the MMT Supplier to Enel Distribuzione for the final customer that wants to leave from the Deregulated Market;
loss of the MMT requirements for the final customer that has to switch to the other last resort service defined from the Italian AEEG.
For each demand, WTP makes the following checks:
on starting date; from the first until the last day of the month N-2 are processed just the demands with a switching starting date on month N;
on bad payer- suppliers; it prevents bad payer-suppliers from acquiring new final customers;
formal control: mandatory data entry of the dispatching contract, point of delivery (POD), fiscal code, VAT account;
validation control of:
dispatching and transport contract;
POD existence and status (it must be active);
existence of other switching requests on the same POD;
consistency of the fiscal data of the final customer;
POD located in areas managed by other Distributors.
During the on-line demands for validation, the following may happen:
formal control are failed: WTP gives a reject pop-up message and the request is not inserted in WTP database;
formal control are passed while validation control are failed: WTP gives a reject pop-up message but the request is inserted in WTP database with status “Rejected”;
all controls are passed: the request is inserted in WTP database with status “Accepted”.
Instead during the massive demands validation can happen:
just one control is failed; the request is inserted in WTP database with status “rejected” specifying the reason of rejection;
all controls are passed: the request is inserted in WTP database with status “Accepted”.
After this first switching process step (requests’ control and acceptance are completed), the next step is the measures’ acquisition and this task is carried out by the AMM System, as described in the following paragraph.

WTP’s new features
Some additional features were implemented in WTP in the course of 2008, allowing the system to manage:
new energy activations;
rising of available power;
AMR and voltage verifications;
personal and contract data modifications;
final customers arrears management.
An another important functionality of WTP is the reporting tool for the transport invoices. It makes daily available to suppliers the details of all the invoices issued by Enel Distribuzione on the day before. The report consists of an xml file containing the following data:
reference of the point of delivery (commercial and technical data);
the amount of all the items of the invoice;
the detail of the meter reading used to calculate the consumption invoiced.
This tool allows Suppliers to easily find and manage all the necessary data for invoicing their final customers.

Automatic Meter Management
The metering management plays a central role in the Italian Market deregulation. Since by 1999, the developing of the metering in Enel, from static meters and concentrator in field to central systems, guarantee the possibility to have a really liberalized market.
Such kind of market can exist only if based on:
availability of the measure of energy for all the players;
remote access to meter to reduce delays in execution of all operation which require the interaction with meters in field.

An overview of functional architecture
The scope of this section is not to provide a technical description of Enel’s Automatic Meter Management system but it is important to clarify functional architecture in order to better understand what are the advantage and the impact of the system on liberalized market.

The systems performs different functionalities and it is based on a unified data base. Here follows and overview on some of the most relevant features, they can be grouped in four sets: Meter Reading, management of metering data, meter management, integrated management of working: Meter Reading
Remote reading of total registers and load profiles;
Management of metering data
Management of total register and load profile for the certification of metering data;
Energy balance;
Communication of metering data to each player;
Monitoring of supply service quality;
Fraud detection.
Integrated Management of working
Management and optimization of operative’s work (position of points of metering and access information);
Each activity on meters in field is led by the request of...
the execution of a work starting from requiring systems (Billing or Front Office);
- Problem manager for a faster and easier resolution of technical problem.

Management of meters installed in field
- Remote disconnection and remote “authorization” of circuit-breaker local reclosing;
- Remote change of the contractual parameters without accessing the meter (for example: programmable power thresholds, programmable customer information on meter’s display).

The deep explanation of all the features comes out of the scope of this paper; since the availability of metering data plays a key rule in deregulated markets, here we focus on remote reading by meters and managing of metering data.

Enel’s AMM system performs the acquisition of the following metering data from devices in field:
1. daily load profile of HV and MV meters;
2. daily load profile of LV meter point having more than 55kW of maximum available demand;
3. monthly total registers of active and reactive energy of residential and non residential customer;
4. every two month registers of active and reactive energy of residential and non residential customer.

The availability of the remote reading on LV meters give the possibility to have the billing on actual reading and more on actual metering data for any situation in which are required for example:
- changing of customer during the billing period;
- customer switching of the energy supplier (trader);
- give an answer to an elaborate complaint.

Relevance of availability of metering data.
This subsection aims at showing how the efficient management of metering data has a positive influence on the opening of Italian market.

Since a full open market require the competition of energy suppliers, one of the most relevant issue is the availability of metering data for all the players. A suppliers needs historical series of consumption of a new customer in order to perform a better forecasting and have more accurate strategy as energy buyer.

When some customer switch from a supplier to another one Enel’s AMM system, in compliance to regulator’s rule, makes available to the new suppliers the historical series of active and reactive energy (total register and consumption or load profile according to the type of metering point for a period of 12 months) of the customers.

The communication of historical set of customer’s metering data have to be completed six working days before the day of switching.

Another important feature of the metering system is the sharing of metering data available for marketing purpose. Without the knowledge of the consumption characterizations, energy suppliers can not perform accurate business strategies. This problem is more relevant for residential customers than for the non residential one and it has effect of delaying the diffusion of free market.

To overcome this issue, one energy supplier, in compliance with regulatory rules and privacy laws, can obtain personal data and active energy consumption of last 12 months of residential customers inside the municipality specified.

For the request of this set of data, the energy supplier need only to specify the municipality (identified by ISTAT code1) for which they want customer’s details. Tab. 1 contains a trace of request collected by Enel’s system in the first days of December 2008 just to give an idea of the

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Tab. 1 List of some request of customer’s metering data collected by Enel’s system in first days of December 2008.

During the time between the request’s submission and the data sending, Enel’s AMM system checks the information for each metering point having a residential customer. It’s important to highlight that, to be compliant with Italy’s privacy law, can be communicated to requiring suppliers only metering data allowed by the interested customers.

Analysis of customer consumption.
The collecting and smart managing of metering data gives Enel the capability to perform detailed analysis on tariff and consumption. Detailed analysis on Italian consumption is attractive both for Authority and energy suppliers, since they give all free market players a complete picture of the consumption’s distribution.

In particular Enel performs a cluster analysis on LV metering points with non residential customers; this population is a representative sample of Italian panorama. The analysis aims at showing in a period from January 2008 to September 2008 the following data:
- what is the consumption in tariff T12;
- what is consumption in tariff T1 compared with other tariffs;

1 ISTAT Code is a serial number which identify all 8101 Italian municipalities.
2 Tariff T1 has been defined by Italian Authority in a range between 8:00 AM to 7:00 PM of a working day.
− what is the number of customer having such consumption;
It is not possible to provide here a complete representation
of such kind of data, it could appear too complex.
Figure 2 shows a synthesis, in which consumption data are
expressed as percent of total consumption and the same for
the number of customers.
The upper graph gives an idea of the weight and the lower
one of the number of customers.
From the examination of Figure 2, it is possible to evidence
that an energy quantity between 31% and 40% of the total
consumption has been consumed by customers having the
consumption in T1 from 40% to 60% of the total of his
consumption during months.

![Figure 2 Evolution of energy consumption in full tariff T1; a) rate of energy consumption in full tariff T1, b) number (in% of total) of metering points having such consumption.](image)

**Supply Invoicing**

After meter reading acquisition, the invoicing system is able
to create a billing and invoicing document for each supply,
as requested by the Italian Authority.
The Distribution invoicing is based on some rules issued by
the Italian Regulator, which sets the fees for the
remuneration of the following services:
− electric energy transmission (TRAS);
− electric energy distribution (DIS);
− electric energy measurement (MIS).
For each one of these services, the Italian Regulator
establishes:
− the rates for all kind of customer (domestic users,
  public illumination, small and business customers);
− contractual power levels available.
During the 2009, Enel Distribuzione will also make
available a new invoicing method to considerably reduce
the number of distribution invoices issued to the retailers.
In particular the aggregation criteria will be:
− dispatching contract of the retailer;
− POD province;
− kind of customer (domestic user, public illumination,
  small or business customer);
− consumption month.
This means that, for each invoicing run and for each
consumption month, the retailers will receive a maximum of:

\[
110 \times 7 = 770 \text{ invoices}
\]

where:
− 110 are the Italian provinces;
− 7 are the types of customers provided by the Italian
  Authority,
regardless of the number of customers.
Whereas almost 10 invoicing runs per month, in an entire
year a supplier will receive a maximum of:

\[
10 \times 12 \times 770 = 92,400 \text{ invoices}
\]

Just as an example: in 2008 Enel Distribuzione (actually
managing almost 90 suppliers for 3.5 million of final
customers at the end of the year) issued almost 36 million of
invoices. With the new invoicing method, Enel will issue
only over 8 million of invoices with significant savings in:
− cost accounting;
− simplifying management of invoices reporting;
− simplifying communications with suppliers.

**An overview on the actual functional architecture**

As mentioned in the previous paragraph, the invoicing
process is based on the following steps:
− meter reading acquisition;
− billing document creation;
− invoicing document creation.
Below a quick overview of these steps.

**Meter reading acquisition**

For each meter reading, the invoicing system makes some
checks, in order to guarantee the accuracy of the data
(maximum power available, energy consumption related to the
power peak, and so on). Everything that passes these checks is
available for the next steps.

**Billing and invoicing document creation**

Also for these steps are required some validation checks in
order to avoid abnormal billing/invoicing values. In
particular:
− automatic checks:
  - for the billing using a control value in €/kW to
    compare with the total amount;
  - for the invoicing using a limit value to compare
    with the total amount;
− manual checks management.

**Performance of the invoicing process**

The invoicing system actually manages almost 3.5 million of
final customers with an invoicing rate of 95,000 invoices per
hour.
The number of final customer will gradually grow in the
next months until the end of the 2010, when the system will
manage 35-40 million of customers.
FUTURE DEVELOPMENTS

Enel has also started a new project called “Front Office Unico Rete” (FOUR, Network shared Front Office) with the aim of a future complete unbundling between Market and Network operators and of the integration of the Electric and Gas networks commercial processes. The main items of this project are:

- introduction of the “Application to Application” as a new communication method that allows the trader to connect directly to the distributor’s systems with real time demand updating;
- inbound and outbound documentation management integration;
- automatic management of the MV and LV Generators connection demands.

FOUR offers an easy multi-channel access for the suppliers, and a faster management of the different systems merging into it. Suppliers will be guaranteed a unique portal for all the services offered by Enel Distribuzione according to the Italian Authority’s dispositions. This portal works through different channels: Enel WEB site, an A2A Application (application to application), a certified Email (PEC). This guarantees the different suppliers the possibility of reaching Enel Distribuzione according to their different technical developments.

The A2A application channel allows a complete on-line integration of all the business processes involved in the services list. It works with the fastest and mostly optimized process end-to-end, starting from the customer’s request to the realization of the activity.

It also allows suppliers to offer a better and more efficient service to their customers.

On the inner side, if compared to the actual systems, FOUR guarantees a better automation and control of all the business processes. It functions through a BPM approach (Business Process Management). The BPM method allows a complete control and a high standard of monitoring of the whole business process (BAM-Business Activity Monitoring) and drilling down on the single ultimate activities.

FOUR integrates all the systems involved: technical applications, mapping tools, invoicing and Commercial Quality Control systems. All the single phases of the processes are monitored, and consequently the informations are coherent on the different systems.

Moreover, the on-line calendar allows the Trader to manage the appointments with its customers, by consulting the on line calendar of appointments for the different interventions available for the whole territory (SLOT). The appointments can therefore be fixed directly by the retailers, with a better service offered to the customers.

On the Distributor’s side, the better scheduling connected to the publishing of the appointments in SLOT allows a more efficient distribution of activities.

REFERENCES