

## Acquirente Unico: procurement for aggregated zonal demand

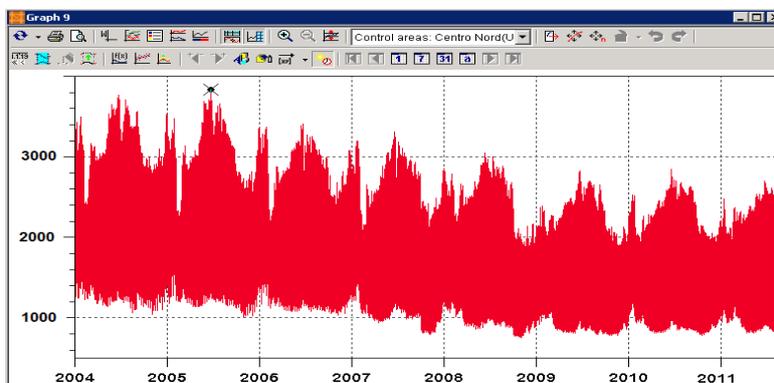
A case study for the zonal demand forecast of the household and small business

Acquirente Unico S.p.A. (AU) is a subsidiary of the Gestore dei Servizi Energetici S.p.A.. GSE is the fourth largest Italian company by revenue in 2011 with an approximate turnaround of approximately 30 billion Euros. AU's mission is to procure electricity supply for low voltage households and small businesses that have not switched to the deregulated market.

The Italian Regulatory Authority for Electricity and Gas (AEEG) established the „Maggior Tutela service - Customer protection“ to guarantee this customer typology with a secure and not discriminatory power supply. AU buys electricity based on its forecasts demand and resells the energy at standard tariff in accordance with its mission.

### Tasks

The main objective of the project was to provide an accurate forecast of PRA (residual load profile by area), the power curve of the low resolved metering points aggregated by the distribution system operators (i.e. balance grid area).



### OVERVIEW

#### Customer

- AU is a subsidiary of GSE, the state-owned company which promotes and supports renewable energy sources in Italy.
- AU is the buyer of the Italian market and is entitled by law to the power procurement for the residential and small business customers who decide not to switch to the liberalized market.

#### Key Challenges

- Import the PRA (load profile by area) and CRPU (AU share) for all Italian distribution grids.
- Aggregate the distribution load profiles by market zone
- Run an accurate forecast of the market zone PRA consumption.

#### Benefits

- Wide range of forecast and analysis algorithm from the basic one to the most advanced.
- Hierarchical instance model by market role.

*„Since 2005 the BelVis system supported us in achieving our target forecast accuracy. The flexibility of the BelVis system allowed us to develop a number of tailor suited forecast models able to cope successfully with the continuous challenge of a very dynamic market.*

*We are very happy about our choice to adopt BelVis and the long term cooperation with the BelVis team is the best witness of how successful our experience with the system is.“*

**– Santino Mazzaferri,**

Forecast specialist,

Acquirente Unico SpA

The main challenge for this project was to cope with an evolving customer base having only the aggregated curve, hence not suitable for a typical bottom up forecast approach. The regulatory framework introduced a stepwise opening of the liberalized market share which brought a gradual and instable decrease of the aggregated PRA.

Furthermore the time delay for the availability of the actual data is almost two months, much longer than in a standard forecast case, making impossible to catch the previous month consumption patterns.

### Finding a solution

The first phase of the project took place in 2006 and involved the implementation of the BelVis module for both energy data management and forecasting.

The system imports the PRA and the AU CRPU (it is the AU share of the PRA) for all Italian power distributors. The following step of the process is the calculation of the weighted aggregation and normalization of the AU consumption loads at zonal level with a number of tailor made algorithms. This zonal aggregation is the historical base for the forecast. The continuous adoption of enhanced algorithms enabled AU to cope with a demand in continuous development in both volume and shape.

### KEY FACTS

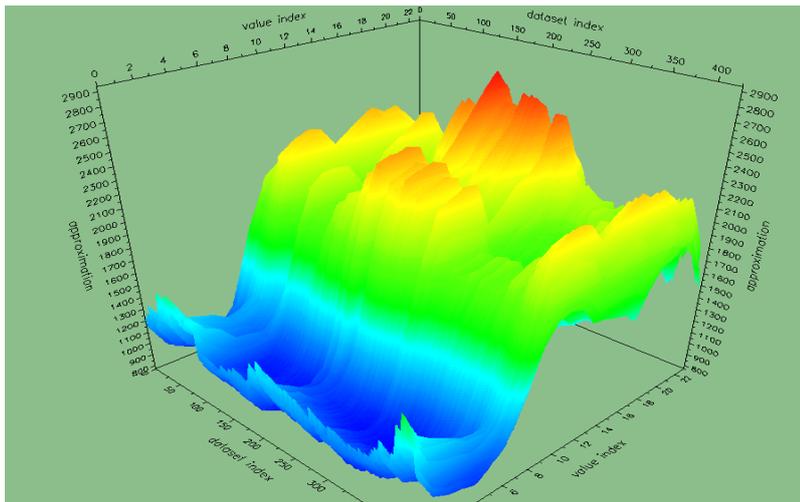
- Over 30 distributors aggregated demand forecast
- With the totality of the customer who did not switch to the liberalized market AU makes the procurement for a nearly 25% share of the Italian demand in 2011
- Total yearly volume of nearly 85TWh in 2011

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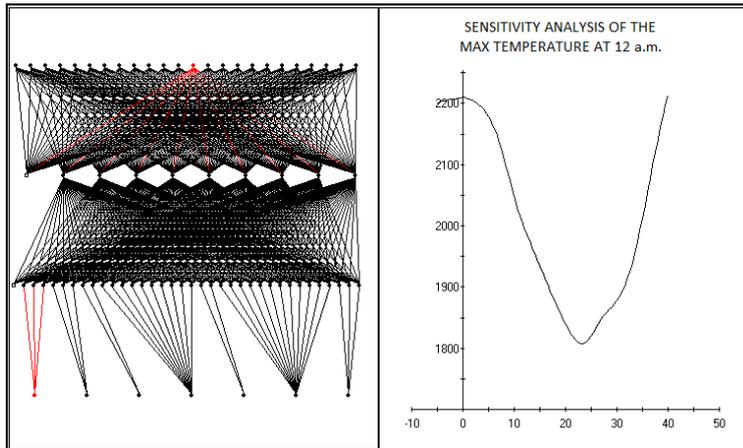
### Implementation

The first prediction models were based on day-type-forecast methods with a number of exogenous variables. The loads were forecasted according to an algorithm based on seasonality, weekday, holiday calendar and weather variables (i.e. air temperature, global radiation and humidity).

The EDM features were also very useful for the stabilization and the de-seasonalitzation of the actual load. The powerful visualization tool is always very useful to catch consumption trend for both special days and long term analysis.

The second phase of the project involved the implementation of the "PRO". This extended module provides a wide range of advanced forecast algorithms based on regression and correlation analysis. The methods used for this specific case are ALN (artificial logic network), ANN (artificial neural network) but also the ARIMAX (autoregressive-movingaverage). The same variables of the day-type-forecast were used and also macroeconomic indicators were tested. The load has shown a very strong correlation calendar and weather variables while the macroeconomic ones (probably because of the households and small business customer base has quite a rigid demand) shows a weaker correlations shifted forward by 6 months in time.

Currently the forecast is the output of a balanced mixture of algorithms and the users can easily monitor and adjust the daily forecast according to their judgment before sending out the schedule.



### Results

The AU is a very special case because of its unique role in the power market. Their main objectives are the stabilization of the historical base, the in-depth analysis of the consumption patterns and to provide an accurate forecast of a reduced number of curves (the six aggregated zonal curves). Giuseppe Mazza, Operation Manager at Acquirente Unico SpA says:

*"During these years we have gone through various phases of regulatory changes that affected both the customer base and its consumption habits. But the BelVis system always enabled us to manage a robust and advanced energy data process, going from import to calculation, from the analysis to the run of an accurate demand forecast. "*