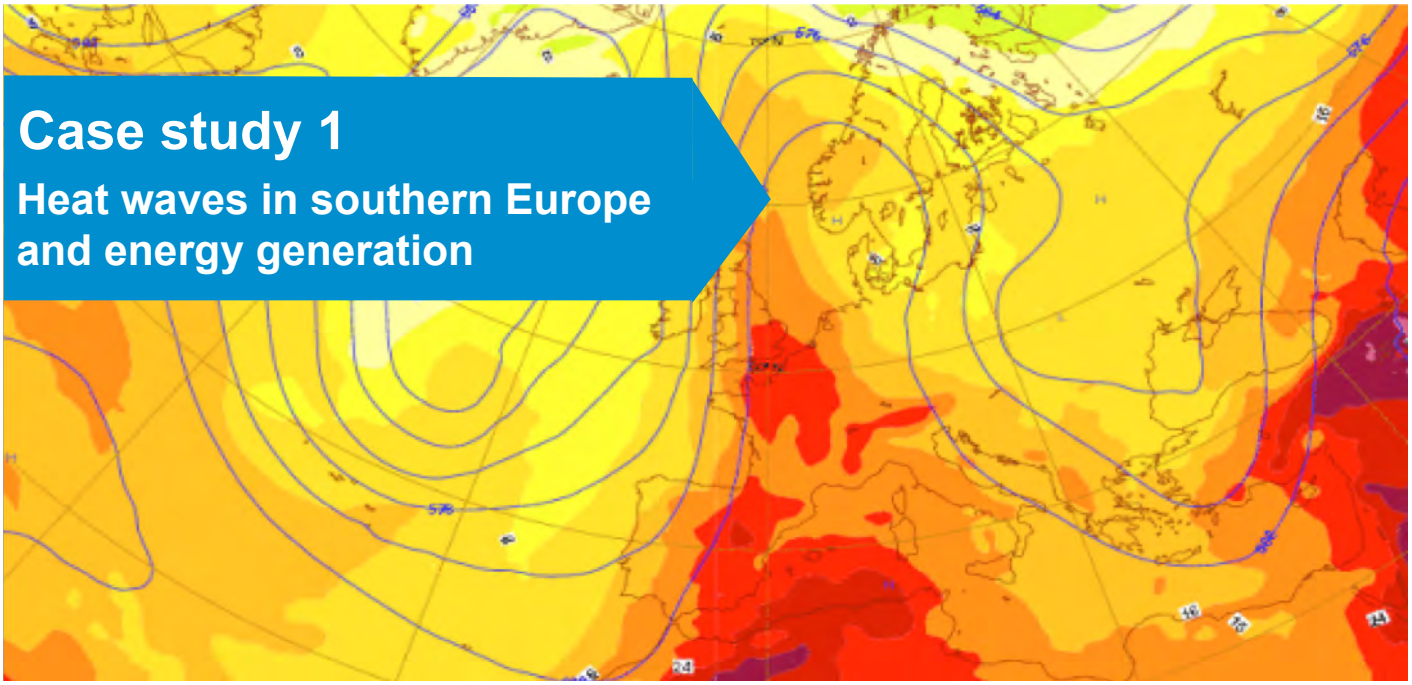


Case study 1

Heat waves in southern Europe and energy generation

Focus: Heat waves in southern Europe and the implications for energy generation and demand

Boosting decision making

- The main objective of this case study is to illustrate the benefits of designing adequate decision support products for the identification of extreme summer heat waves, which have a major impact on the power system.
- How can ENEL effectively manage the risks associated with extreme climatic events?

The seasonal forecasting context

- This case study focuses on seasonal forecasts of surface temperature. It explores the skill in predicting extreme summer weather such as occurred in Italy in July 2015.

Sectoral challenges and opportunities

- Electricity price dynamics associated with air conditioning demand spikes (net of total renewable production).
- Power price management and hedging of generation portfolio – when to hedge the power production?
- How are market and asset portfolio decisions affected by the (un)availability of water for thermal electricity plant cooling?
- Accommodating enhanced demand model uncertainty due to extreme events.

Weather conditions and the power system

Figure 1 (left) shows the average temperatures recorded in Italy during July and August 2015 compared with the 15-year average. Temperatures in July were ~ 5 °C above these climatological values. Figure 1 (right) shows the effects of the weather extreme on power demand. In July 2015, it reached a value of ~ 32 TWh, above the maximum over the last five years. It is interesting to compare the July situation with respect to August when more 'normal' weather predominated.

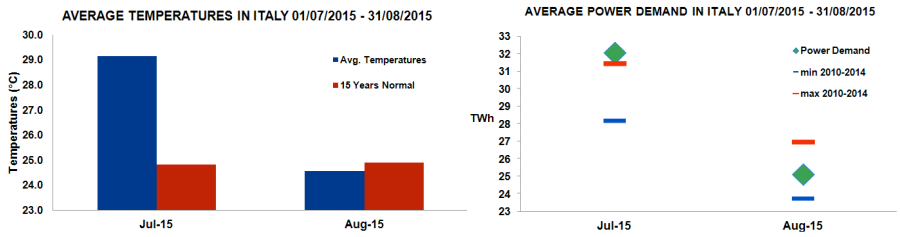


Figure 1: Jul/Aug temperatures and correlating power demand

Better strategy management

Assume an energy producer decided to sell 1 TWh (Figure 2) for the Q3/2015 product at a power price level consistent with market prices in May, within the range 45-55 €/MWh. If temperature forecasts correctly identifying the enhanced heat wave risk had been available, the producer could have taken the decision to keep its long position until the delivery period, selling its own production later at about 60 €/MWh (a differential of +10 €/MWh, or 20%).

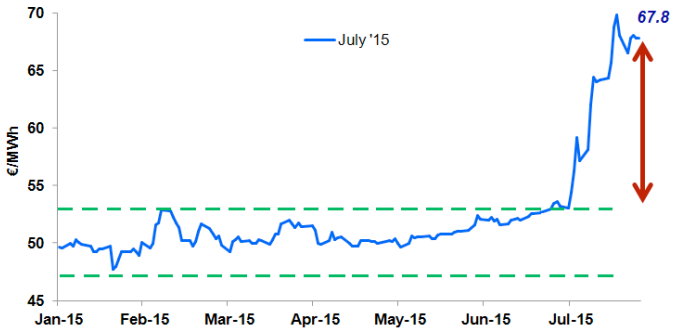


Figure 2: Italian spot power prices in July

Climate event

Extreme heat wave in southern Europe July 2015

Sector impact

Increase in power prices associated with spike in summer

Management strategy

Using seasonal climate data to forecast energy demand linked to weather conditions

Industrial and research partners

The SECLI-FIRM project aims to demonstrate how improving and using long-term seasonal climate forecasts can add practical and economic value to decision-making processes and outcomes, in the energy and water sectors. To maximise success, each of the nine SECLI-FIRM case studies is co-designed by industrial and research partners. For this case study, the industrial partner is utility company, ENEL, and the research partners are ENEA and EURAC.

The industry context

In Italy there is an open market system for power, where price is determined by the balance between offer and demand. The Italian power market is divided into six geographical zones that, in some situations, behave as insulated systems. In terms of the power market, electricity price correlates positively with demand and negatively with renewable production because, in the bidding curve, renewable power plants are offered at zero price. Therefore, a measure of tightness could be defined as the demand net of renewable production.

The business process

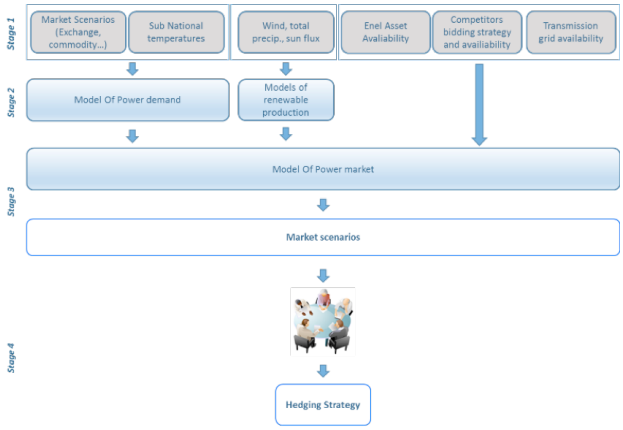


Figure 3: Flowchart for ENEL business process

Figure 3 shows the general framework of the decision process to manage the business within ENEL. A control group and a test group will be established by ENEL (see Figure 4 overleaf). In terms of climate conditions, the control group will only be able to access widely known climatological conditions (currently the most common approach) while the test group will also be given current tailored seasonal climate forecasts.

Co-designers

ENEL
EURAC
ENEA

Industry context

Utility
Power generation

Business process

Data gathering (market and meteo)

Simulations of the power market

Hedging committee

Value assessment of seasonal forecasting

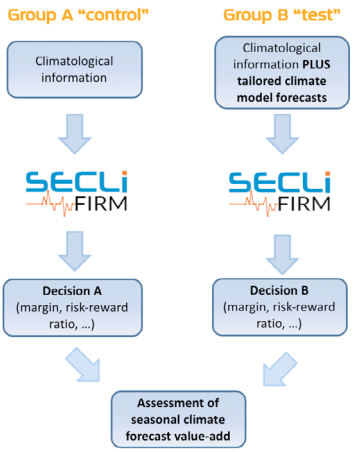
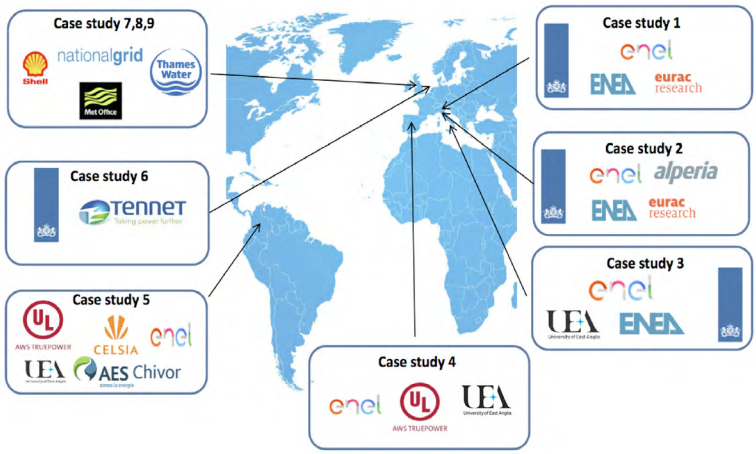


Figure 4: Flowchart for the evaluation process

The nine SECLI-FIRM case studies



The Added Value of Seasonal Climate Forecasting for Integrated Risk Management (SECLI-FIRM)

For more information visit:

www.secli-firm.eu

or contact the SECLI-FIRM team at:

info@secli-firm.eu

Value assessment

How will the value of seasonal forecasting be assessed?

Find out more

For more about this and other SECLI-FIRM case studies, visit www.secli-firm.eu

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