Case study 8

Winter weather and energy system balancing

Focus: The use of seasonal forecasts by the UK National Grid Operator

Boosting decision making

- The main objective of this case study is to illustrate the benefits of using seasonal forecast information to better predict the UK winter mean electricity demand and wind power.

The seasonal forecasting context

- This case study focuses on demonstrating the impact of using seasonal temperature, wind and atmospheric circulation forecast information for the United Kingdom (UK) National Grid operator.
- The climate forecasts will be translated into energy information, to give a forecast of winter UK energy demand and wind power.

Sectoral challenges and opportunities

- The grid network has a central role to play in the future energy mix. In a fast-changing energy landscape, National Grid is working to meet ambitious low carbon energy targets, connect new sources of energy to the people who use them, and find innovative ways to enable the decarbonisation of heat and transport.
- Ahead of each winter, the UK grid operator must estimate the demand over the coming winter, with a particular focus on peak electricity demand. This is to ensure there is sufficient electricity supply available to meet this demand.
- By identifying potential risks to the system ahead of the winter, we will explore whether it is possible to reduce balancing costs over the winter period.

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Essential climate variables

- Wind speed
- Temperature
- Mean sea level pressure

Essential energy variables

- UK energy demand
- UK wind power production

Energy demand and supply balancing

National Grid operate the electricity transmission network and the gas National Transmission System (NTS) in England and Wales, with day-to-day responsibility for balancing supply and demand. As we move away from a historical reliance on large thermal power generation there is now a greater diversity of supply and flexible demand than ever before. Therefore, the electricity transmission network has a vital role to play in the future energy mix.

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 research partner is the UK Met Office and the industrial partner is National Grid, one of the world's largest investor-owned utilities focused on transmission and distribution activities in electricity and gas in the UK and the US. National Grid play a vital role in connecting millions of people to the energy they use, safely, reliably and efficiently and are organised into two operating segments in the UK as follows:

1. Electricity Transmission

National Grid own and operate the electricity transmission network in England and Wales, which comprises approximately 7,200 kilometres (4,474 miles) of overhead line, 1,500 kilometres (932 miles) of underground cable and 342 substations.

2. Gas National Transmission System (NTS) in Great Britain

The network comprises approximately 7,660 kilometres (4,760 miles) of high-pressure pipes and 618 above ground installations.

Industry context

Day-to-day responsibility for balancing energy resources supply and demand

Co-designers

National Grid
UK Met Office

Winter weather and energy demand

The UK experienced a spell of severe winter weather with very low temperatures and significant snowfalls from late February to mid-March 2018. This was associated with a sudden stratospheric warming event, which was predicted from early February. Daytime temperatures remained widely below freezing with a strong east wind and significant accumulations of snow across much of the country. This was the most significant spell of snow and low temperatures for the UK overall since December 2010.

Business process

Currently an estimate of winter demand is made ahead of the winter using historical data, assuming the climatological risk of weather and associated demand. This case study will assess whether seasonal forecasts of weather can be used to improve upon this demand estimation.

A second focus for this case study will be to assess whether seasonal forecasts of wind speeds can improve estimation of UK winter wind power. The availability of wind power during winter is of particular interest because, if wind power output is strong, it can help to alleviate extreme demand periods.

Climate event

Winter 2017/18 – snow and low temperatures

Sector impact

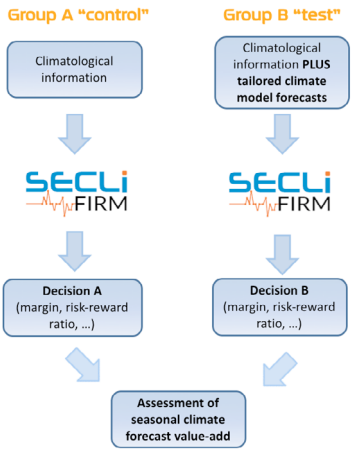
Supply and demand balancing is vital for maintaining network reliability and limiting the cost of energy

Business process

Estimate of energy demand ahead of the winter using historical data to assess the risk of under-supply

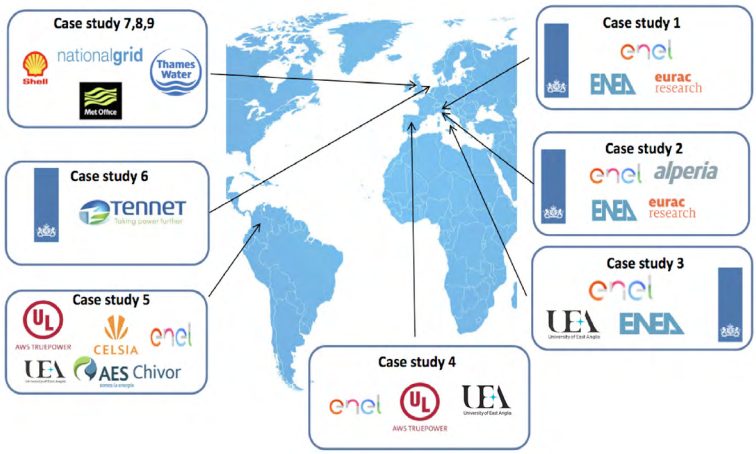
Application of seasonal forecasting to optimise grid and transmission supply and demand balancing

Value assessment of seasonal forecasting



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:

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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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