



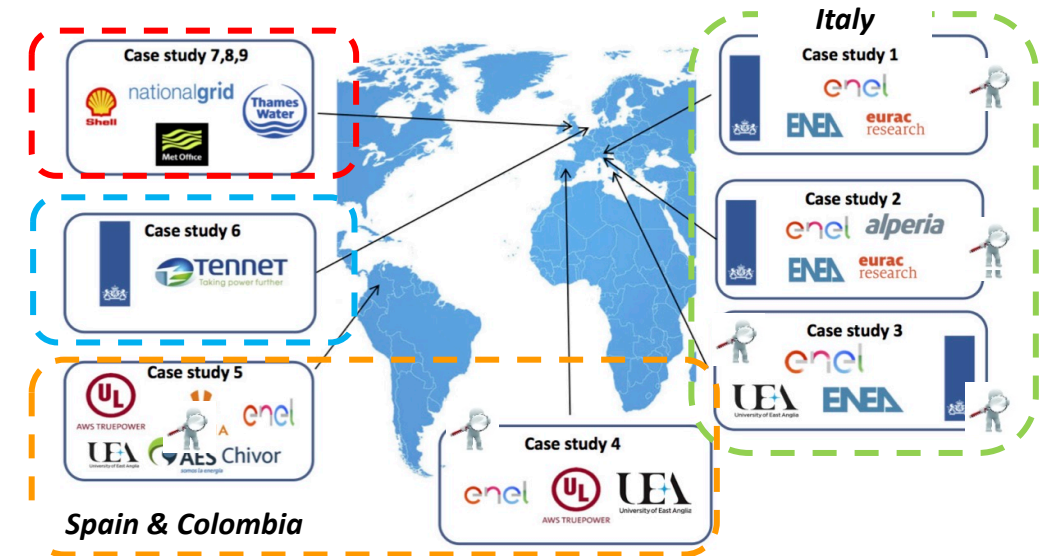
Climate Services For Energy

#ClimateThursdays

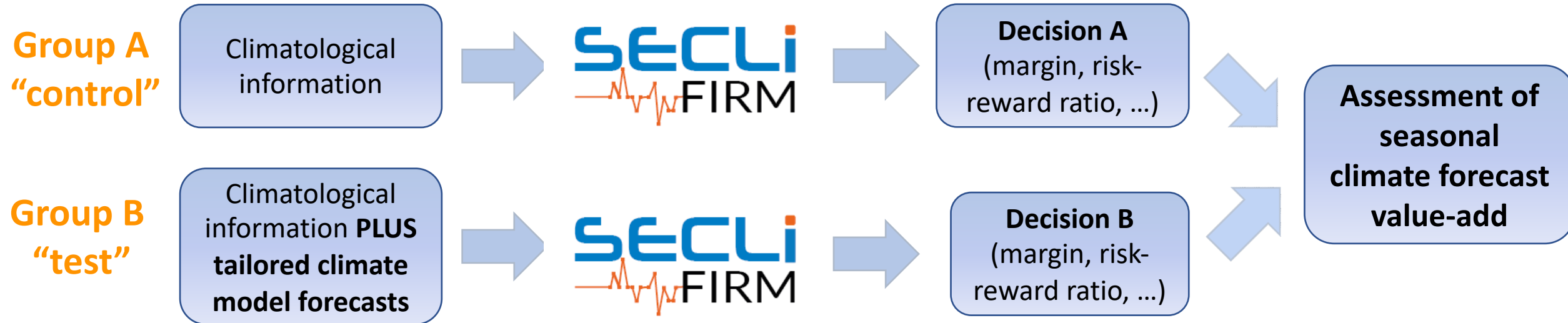


Grant Agreement
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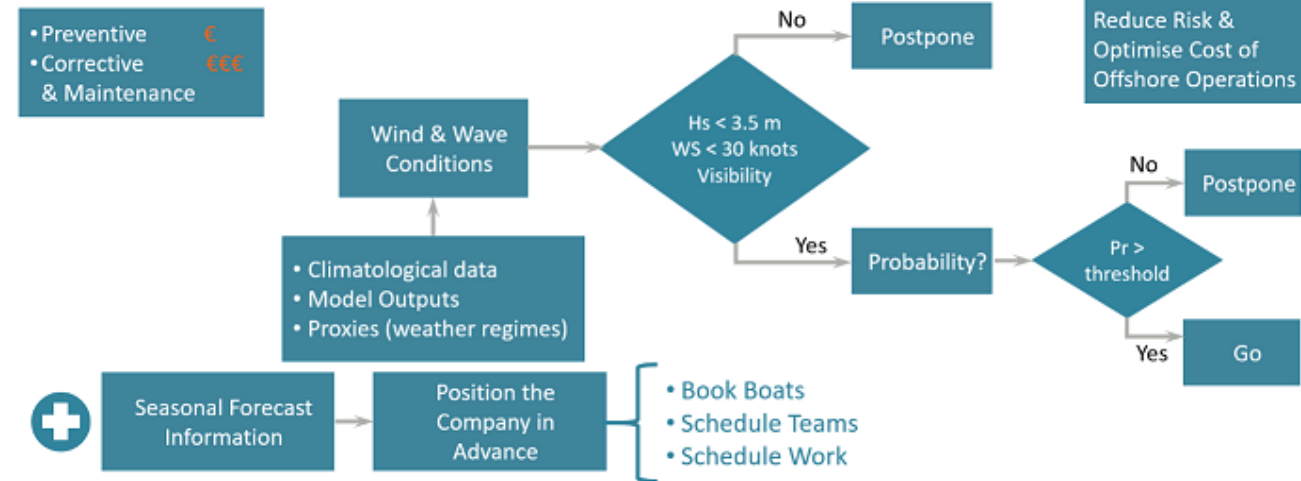
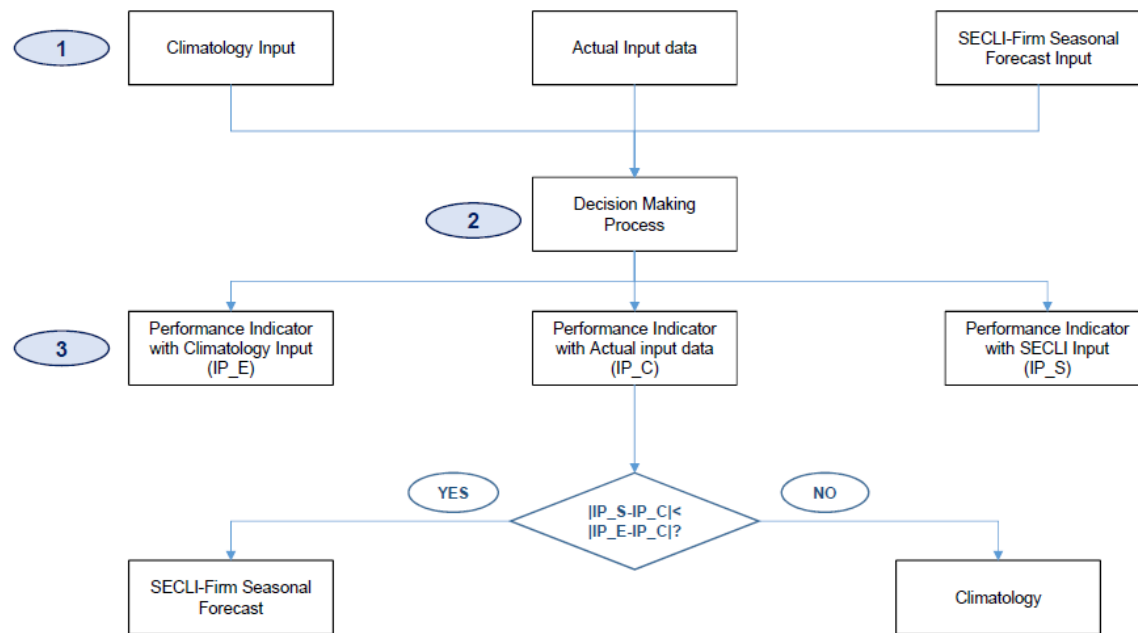
Case Study	Climate events	Geography	Sectoral impact	Co-designers
CS1	Heat Wave 2015, and other similar extremes	Southern Europe	Energy – Thermal electricity plant cooling, demand model uncertainty	ENEL, ENEA, EURAC, KNMI
CS2	Dry Winter 2015-16 and other similar extremes	Northern Italy	Energy – Hydroelectric power production	ENEL, KNMI, ENEA, EURAC, Alperia
CS3	Strong Winds March 2016 and other similar extreme	Southern Italy	Energy – Wind power production	ENEL, ENEA, KNMI, UEA
CS4	Extreme Winds 2014-15 and other similar extremes	Spain	Energy – Wind power production and balancing	AWS, MO, ENEL
CS5	Strong El Niños	South America	Energy – Hydroelectric power production and other RE	AWS, UEA, AES Chivor, Celsia, ENEL
CS6	Low Winds	North Sea	Energy – Offshore operations and maintenance planning	TenneT, KNMI



Case Study	Climate events	Geography	Sectoral impact	Co-designers
CS7	Severe climate events in 'shoulder' months	North Sea	Energy – Offshore operations and maintenance planning	Shell, MO
CS8	Anomalous winter conditions	UK	Energy – Winter electricity demand	National Grid, MO
CS9	Dry Spring and Summers	UK	Water – Water use restrictions	Thames Water, MO



A control case only utilises climatological conditions based on historical averages, while a test case also considers individually optimised and tailored state-of-the-art probabilistic seasonal forecasts





Case study 1
Heat waves in southern Europe and energy generation

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

Boosting decision making

- The main objective of this case study is to illustrate the benefits of products for the identification of extreme summer heat wave power system.
- How can ENEL effectively manage the risks associated with extreme summer weather?

The seasonal forecasting context

- This case study focuses on seasonal forecasts of surface temperature extremes such as occurred in Italy in July 2015.

Sectoral challenges and opportunities

- Electricity price dynamics associated with air conditioning demand (production).
- Power price management and hedging of generation portfolio – i.e. how are market and asset portfolio decisions affected by the (un)plant cooling?
- Accommodating enhanced demand model uncertainty due to extreme events.



Case study 2
Dry winters in northern Italy and energy generation

Focus: A mild, dry winter 2015/16 due to pressure system over the Mediterranean - the impacts on energy generation

Boosting decision making

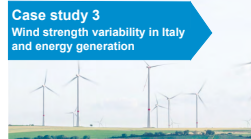
- The main objective of this case study is to illustrate the benefits of products to identify winter conditions in the Alps and Apennines.
- How can ENEL and Algeria effectively manage the risks associated with extreme winter conditions?

The seasonal forecasting context

- This case study focuses on seasonal forecasts of precipitation and snow pack will be used to forecast the potential energy stored by snow and ice.

Sectoral challenges and opportunities

- Power price management and hedging of generation portfolio – i.e. how are market and asset portfolio decisions affected by the (un)plant cooling?
- Prediction of gas price movements in a context of low hydroelectric demand net of total renewables.
- Optimising efficiency in hydropower production management (Algeria).



Case study 3
Wind strength variability in Italy and energy generation

Focus: During the first days of March 2014 variability in the wind regime over Italy synoptic systems over the Mediterranean implications for supply-demand balance

Boosting decision making

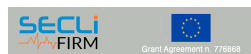
- The main objective of this case study is to illustrate the benefits of products to identify variability in the wind regime that impacts on the energy generation.
- How can ENEL effectively manage the risks associated with extreme wind conditions?

The seasonal forecasting context

- This case study focuses on seasonal forecasts of strong wind events. A challenge is the time sampling of such events that is usually short for temporal downscaling of seasonal forecasts will be investigated.

Sectoral challenges and opportunities

- Power price management and hedging of generation portfolio – i.e. how are market and asset portfolio decisions affected by the (un)plant cooling?
- Managing variable wind power production in a multi-asset system.



Case study 4
Highflow winds in Spain and energy generation

Focus: Sustained high and low wind energy generation in high penetration markets

Boosting decision making

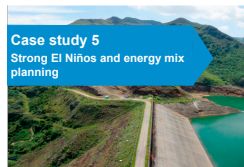
- The main objective of this case study is to illustrate the benefits of products to predict energy production in markets with high penetration of wind.

The seasonal forecasting context

- This case study focuses on demonstrating the impact of using wind for a big utility with multiple generation assets of different technologies. A challenge is the time sampling of such events that is usually short for temporal downscaling of seasonal forecasts will be investigated.

Sectoral challenges and opportunities

- To know in advance the expected energy production from renewable generation with conventional plants.
- When will I need higher generation from nuclear or gas plants? How can I complement the wind energy? Can I reduce my fossil fuel costs by optimizing the operation of my energy assets to increase my revenue?



Case study 5
Strong El Niños and energy mix planning

Focus: Strong El Niños in a South American country mix planning

Boosting decision making

- The main objective of this case study is to illustrate the benefits of products to predict the expected amount of flow of the hydro resource.
- As a complementary study, the case study will estimate how an energy mix challenge is the time sampling of such events that is usually short for temporal downscaling of seasonal forecasts will be investigated.

The seasonal forecasting context

- This case study focuses on demonstrating the impact of using sea big utilities with a large proportion of hydro power in their portfolio.

Sectoral challenges and opportunities

- To plan the future hydro resources during El Niño-La Niña events.
- To buy fossil fuels options in advance at lower prices to complement the hydro power.
- To design a future energy mix adapted to the local climate variability.



Case study 6
North Sea wind and wave impact on maintenance planning and logistics

Focus: North Sea wind and wave for maintenance

Boosting decision making

- The main objective of this case study is to illustrate the application of the use of vessels for offshore maintenance or supply operation.

The inter-seasonal to seasonal forecasting

- For offshore maintenance planning meteorological parameters height and mean wave period are important. This case study forecasts of wind (at 10m up to 100m height), and wave or conditions in the North Sea, from a climatological and forecast.
- This case study will assess the skill and value of forecasts of possible (i.e. at long-lead times beyond 15 days ahead).

Sectoral challenges and opportunities

- Optimising the scheduling of vessel hire and personnel manning operations and maintenance planning.
- When should the vessel hire take place, and for what period, specific offshore operation that is scheduled within the summer.



Case study 7
Energy logistics: wind and wave conditions

Focus: Wind and wave conditions during summer months in the North Sea and energy logistics

Boosting decision making

- Seasonal forecast evaluation will consider the skill of predicting calm (September to November) and spring (March to May) months in the North Sea.
- The climate forecasts will be translated into energy information, to demand and wind power.

The seasonal forecasting context

- This case study will explore the ability to identify periods of chronic stress (prolonged excessively high demand driven by either leakage or consumption). Climatologically, these will include conditions indicative of dry and hot summers, or drought conditions, or peaks in demand due to long periods of below average winter temperatures. If such conditions were predictable at seasonal timescale, it would help to flag high demand and support preparedness in terms of capacity and demand management.

Sectoral challenges and opportunities

- The expense of working in the offshore environment places special emphasis on reducing supply chain costs, such as those related to vessel charter and efficient operational planning.
- At present, the application of the latest weather science developments in the industry is traditionally very conservative, with limited use of forcing outputs, or even climate projections and teleconnections.



Case study 8
Winter weather and energy system balancing

Focus: The use of seasonal forecasts for Grid Operator

Boosting decision making

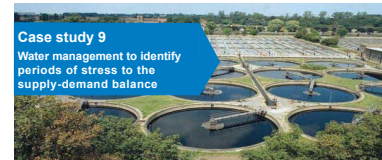
- The main objective of this case study is to illustrate the benefits of products to better predict the UK winter mean electricity demand and wind power.

The seasonal forecasting context

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

Sectoral challenges and opportunities

- The grid network has a central role to play in the future energy mix. National Grid is working to meet ambitious low carbon energy targets the people who use them, and find innovative ways to enable the country to meet this demand.
- Ahead of each winter, the UK grid operator must estimate the demand particular focus on peak electricity demand. This is to ensure there is no shortage of supply to meet this demand.
- By identifying potential risks to the system ahead of the winter, we reduce balancing costs over the winter period.



Case study 9
Water management to identify periods of stress to the supply-demand balance

Focus: The use of seasonal forecasts for water management to identify periods of stress to the supply-demand balance

Boosting decision making

- The water industry case studies will explore the application of seasonal forecasting to identify periods of stress to the UK supply-demand balance. These seasonal signatures may highlight chronic or acute periods of stress many weeks out, which will affect the operational management of the water system and the experience of the consumer through supply restrictions.

The seasonal forecasting context

- This case study will explore the ability to identify periods of chronic stress (prolonged excessively high demand driven by either leakage or consumption). Climatologically, these will include conditions indicative of dry and hot summers, or drought conditions, or peaks in demand due to long periods of below average winter temperatures. If such conditions were predictable at seasonal timescale, it would help to flag high demand and support preparedness in terms of capacity and demand management.
- This case study will also explore the ability to identify acute stress (highly variable demand) including heat waves or extremely cold and/or freeze-thaw conditions. If such conditions were predictable at medium/seasonal timescale, it would help flag high variability in demand and support preparedness in terms of resilience.

Sectoral challenges and opportunities

- The United Kingdom (UK) water supply market operates within the private sector comprising of a number of autonomous water companies. The sector is overseen by the Office of Water Regulation (OFWAT), which focuses on consumer regulation. The Environment Agency focuses on environmental regulation. The water businesses constantly balance supply of raw water with demand. Both supply and demand have a significant dependency on the weather.
- By timely identification of potential risks, we will explore whether it is possible to secure customer supply and optimise operational costs.

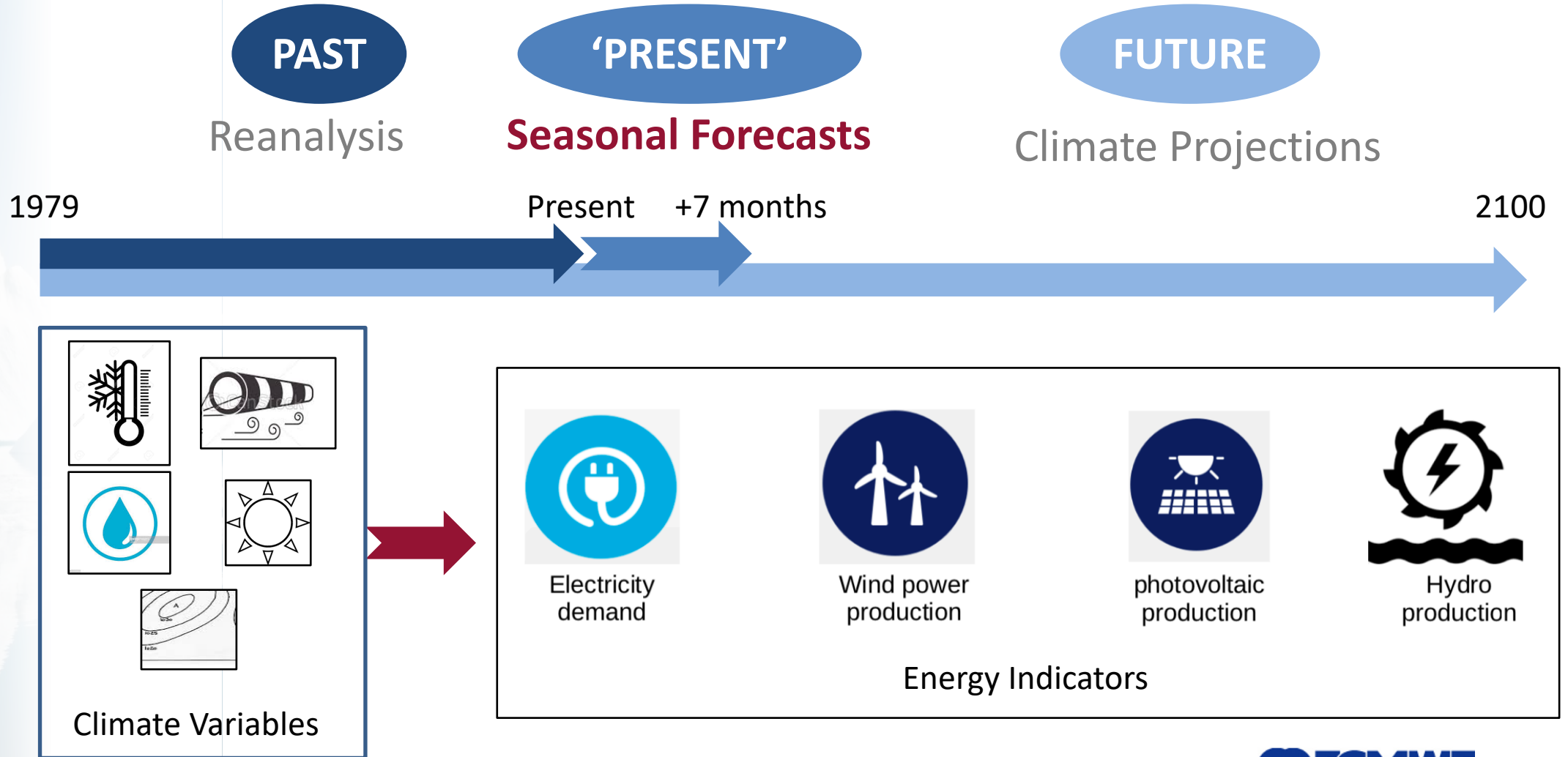


<http://www.secli-firm.eu/case-studies/>



Climate
Change

C3S Energy in a Nutshell

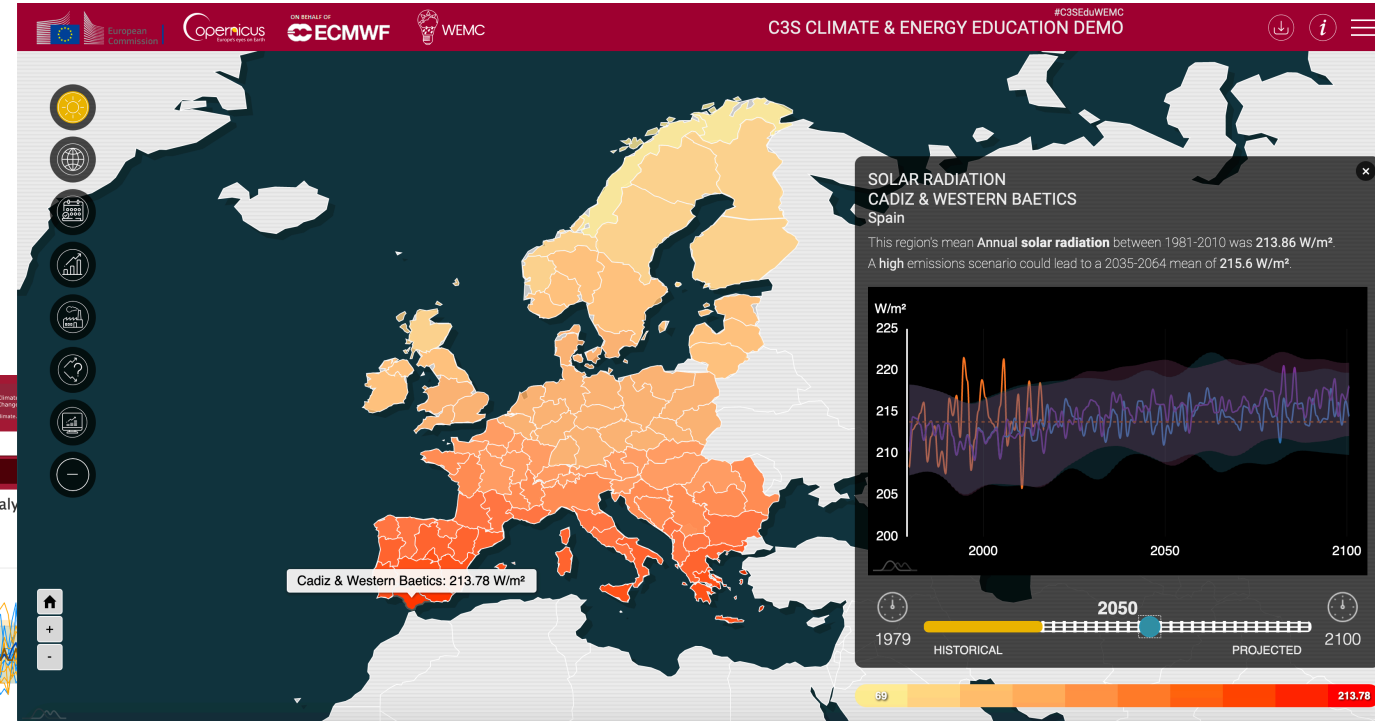
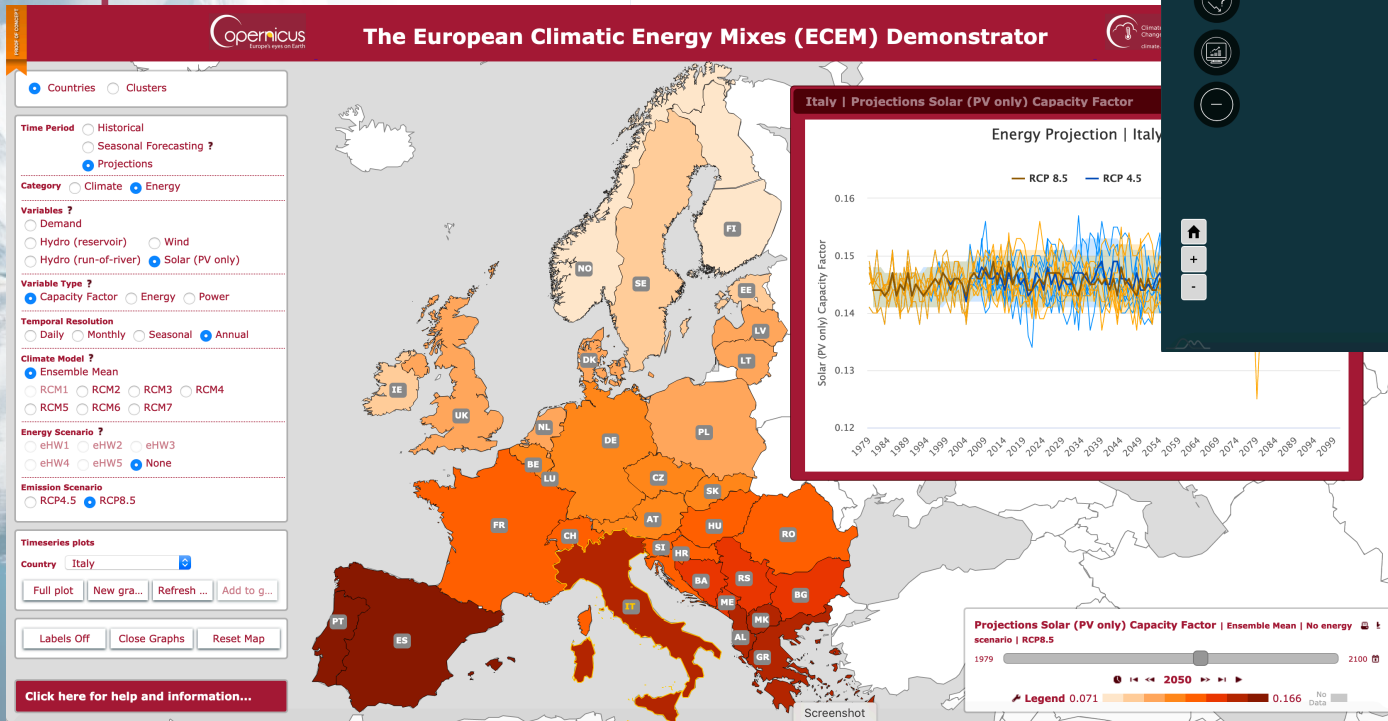




Climate
Change

C3S Climate & Energy Visualisation Tools

<http://ecem.wemcouncil.org>



<http://c3s-edu.wemcouncil.org/>





Climate Services For Energy

AGENDA

Introduction

Alberto Troccoli (UEA/WEMC)

5 min

Climate Service for energy management: a practical example from SECLI-FIRM

Antonio Maria Nicolosi (ENEL)

12 min

Operational climate service for RE: from co-development to market. A story from S2S4E

Ilaria Vigo (BSC)

12 min

SMHI Hydro GWh service – European Inflow forecasts for Energy Traders

Helen Ivars Grape (SMHI)

12 min

Potential benefits of using seasonal forecast in small hydropower plants: SHYMAT service

Eva Contreras (University of Córdoba)

12 min

Q&A – 15 min





Climate Services For Energy



**Thank you
for attending**

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