Interaction with industrial users and framework for assessing the value of seasonal forecasts

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C3S (Sectoral Information Service) – funding & co-ordination

Climate Change Service

TRL 2-4

ECEM partners:

- UEA
- EDF
- MO
- MINES
- UReading
- ENEA

PARTNERSHIPS

External stakeholders:

- TSOs and DSOs
- Energy companies
- National & regional departments/agencies
- International associations & coordination activities
- Policy & operational relevant research organisations
- Commercial climate service providers for energy sector
- ECEM Advisory Board

Potential users

ECEM level of achievement:

- ✓ Enhanced collaboration & engagement
- ✓ Emergence of new users & champions
- ✓ Improved data tailoring, quality & usability
- ✓ Pre-operational tools (e.g. Demonstrator)
- ✓ Successful implementation of Proof of Concept
- ✓ Emergence of a community of practice

TRL 5/6

C3S operational services and Climate Data Store (CDS) including C3S Energy. C3S Energy: reconfiguration of ECEM & CLIM4ENERGY consortia (led by WEMC, reflecting the move towards an operational service) with stronger links to C3S and its CDS

Community of users & target users

TRL 7/8

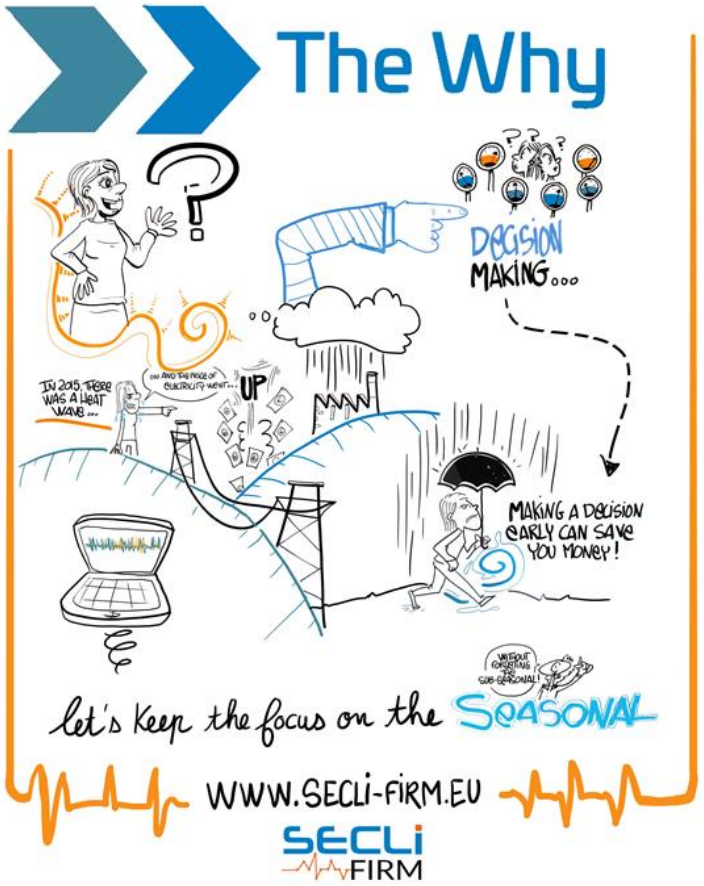
Commercial products and services

Well developed market for energy climate services

TRL 9

Goodess et al 2019
Climate Services

Value for decision making



A case-study approach

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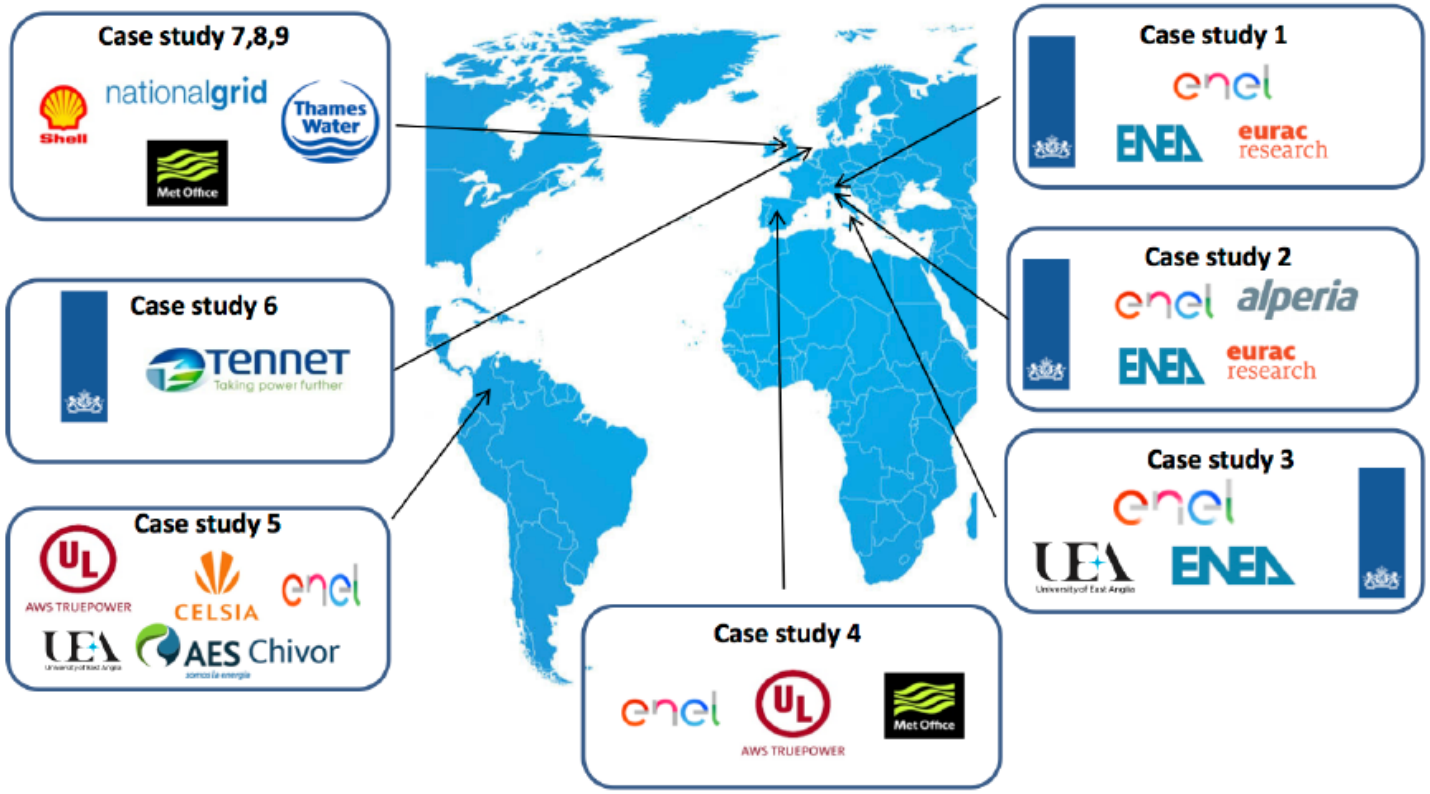
A case-study approach

Nine cases for Europe and S. America are investigated. These represent recent seasons with anomalous climate conditions leading to problematic and quantifiable impacts for the energy and/or water industry. They have been co-designed by industrial and research partners



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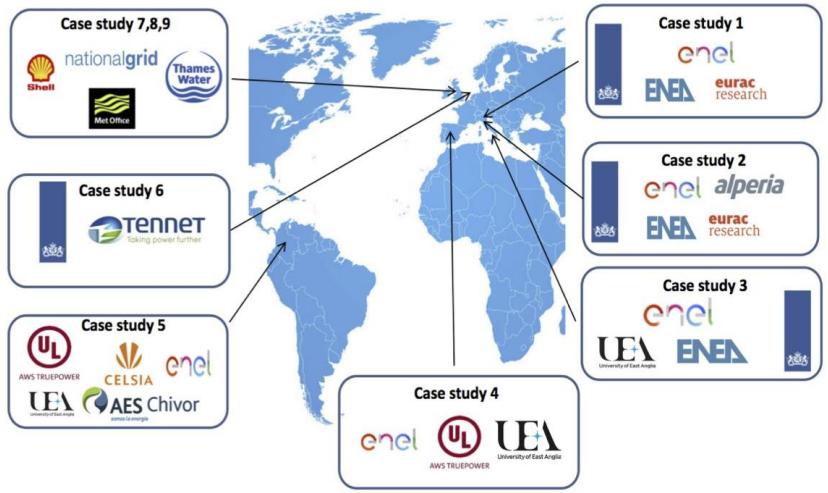
Co-design industrial/research partners

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

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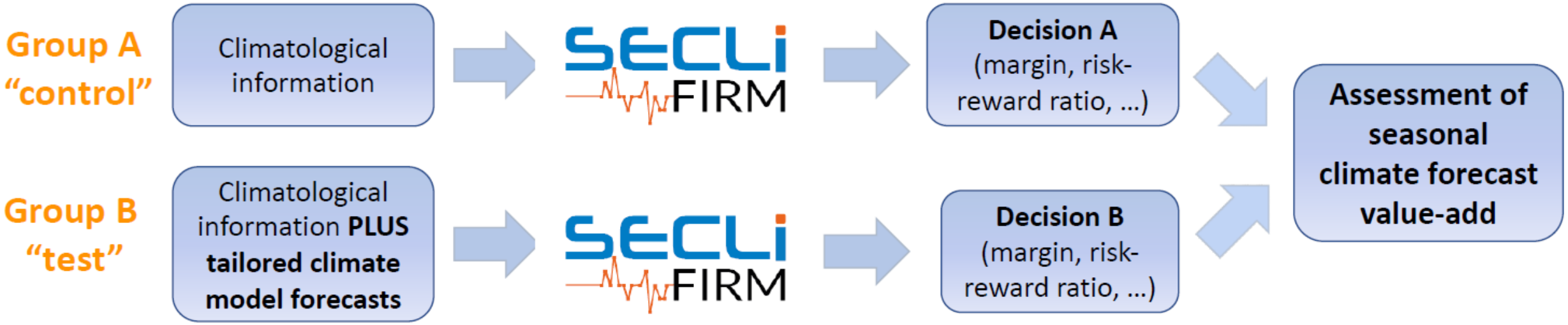
Assessing value add



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

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The starting point

At the start there were several energy companies that had…

- No real seasonal forecasts for time horizon of 1 -> 6 months, use of tools based on climatology or stochastic approaches tests
- No or very basic knowledge on climate problems and their links with the business
- Basic knowledge of the existence of seasonal forecasts, reanalysis and relevant projects (Copernicus, etc.)

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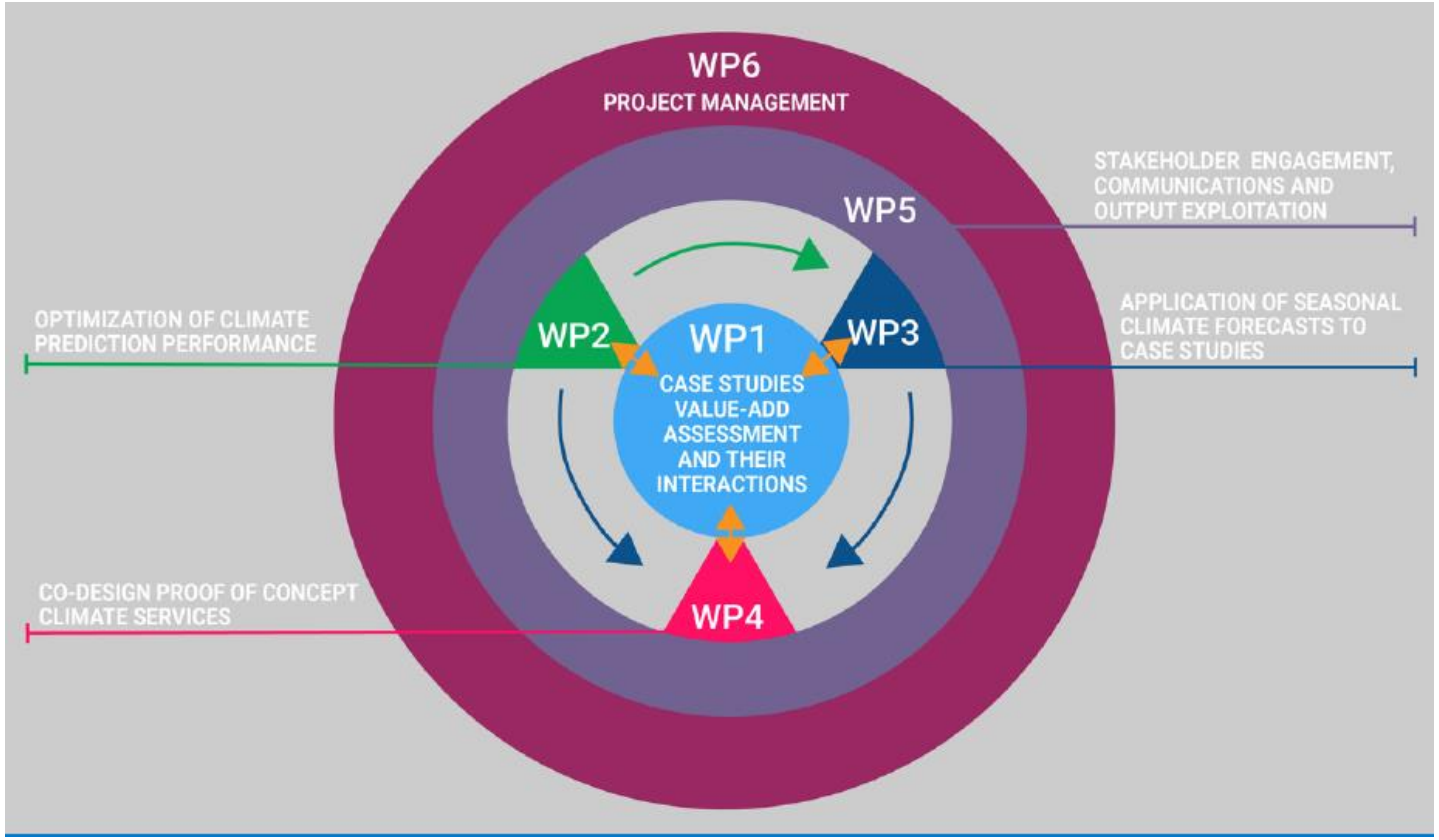
Building relationships and understanding

Then they started learning from each other a common language with scientific partners…

- Strong flow of information exchange between scientific partners *(WP2)* and stakeholders *(WP3)* :



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Making progress

After some efforts some important outcomes have been achieved in the case studies:

- Probabilistic use of seasonal forecasts
- Formalisazion of the business decision processes
- Tools to manage reanalysis and seasonal forecasts

start

Stakeholder: determistic 'mindset' on idea of using seasonal forecasts

To a semi-probabilistic approach

To be continued

Application to the business evaluation model

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Review of methods by an economist working with the SECLI-FIRM team

Menu of Economic Assessment Methods to Choose from:

- DECISION THEORY MODELS
- AVOIDED COSTS
- ECONOMETRIC MODELS
- CONTINGENT VALUATION
- PARTIAL AND GENERAL EQUILIBRIUM MODELS
- OTHER ALTERNATIVE METHODS

Case studies

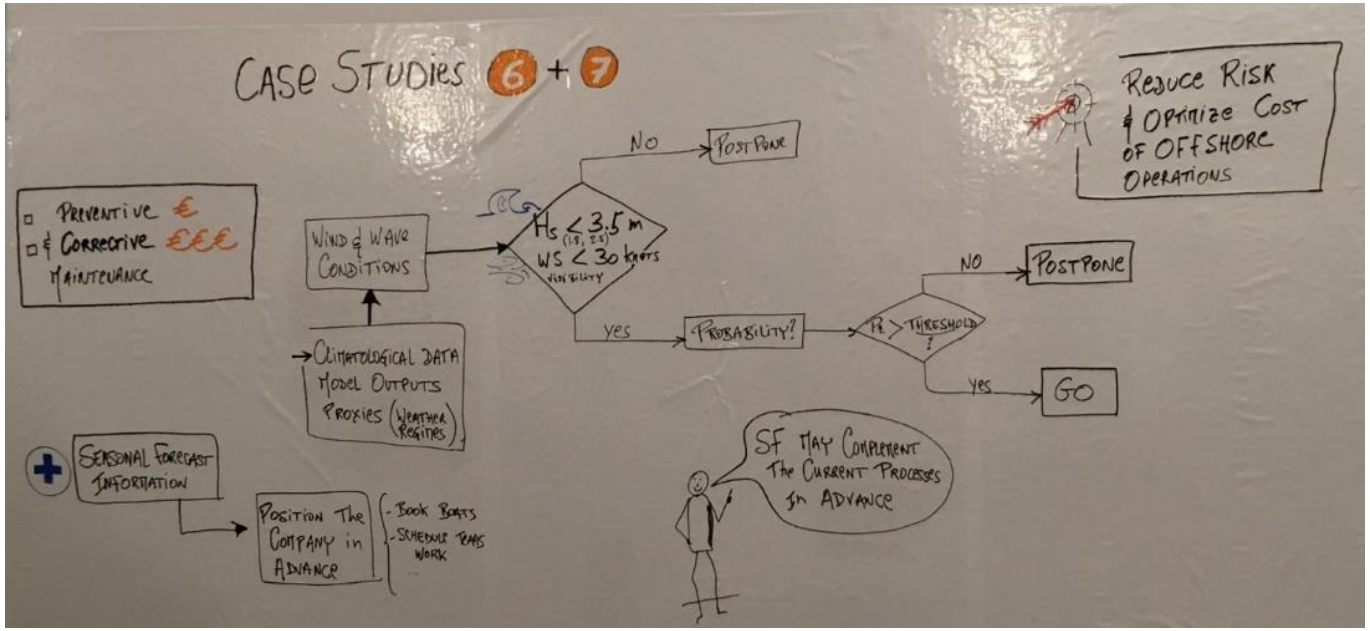
Case-study partners identify where their current decision-making approaches sit within this framework.

Case-study partners use decision trees to help (a) illustrate key decision processes, especially climate-driven ones; (b) identify points/nodes where SECLI-FIRM data can be integrated and its value assessed.

Case-study partners consider the relative merits of alternative decision evaluation approaches.

Building on work of H2020 CLARA and task force on value of climate services
also Soares et al., 2018, Assessing the value of seasonal climate forecasts for decision making. *WIRES Climate Change*.

Developing decision trees



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Decision tree for N Sea case studies

- Preventive €
- Corrective €€€
  & Maintenance

Reduce Risk & Optimise Cost of Offshore Operations

Wind & Wave Conditions

Hs < 3.5 m
WS < 30 knots
Visibility

No → Postpone

Yes → Probability?

Pr > threshold

No → Postpone

Yes → Go

- Climatological data
- Model Outputs
- Proxies (weather regimes)

Seasonal Forecast Information → Position the Company in Advance

- Book Boats
- Schedule Teams
- Schedule Work

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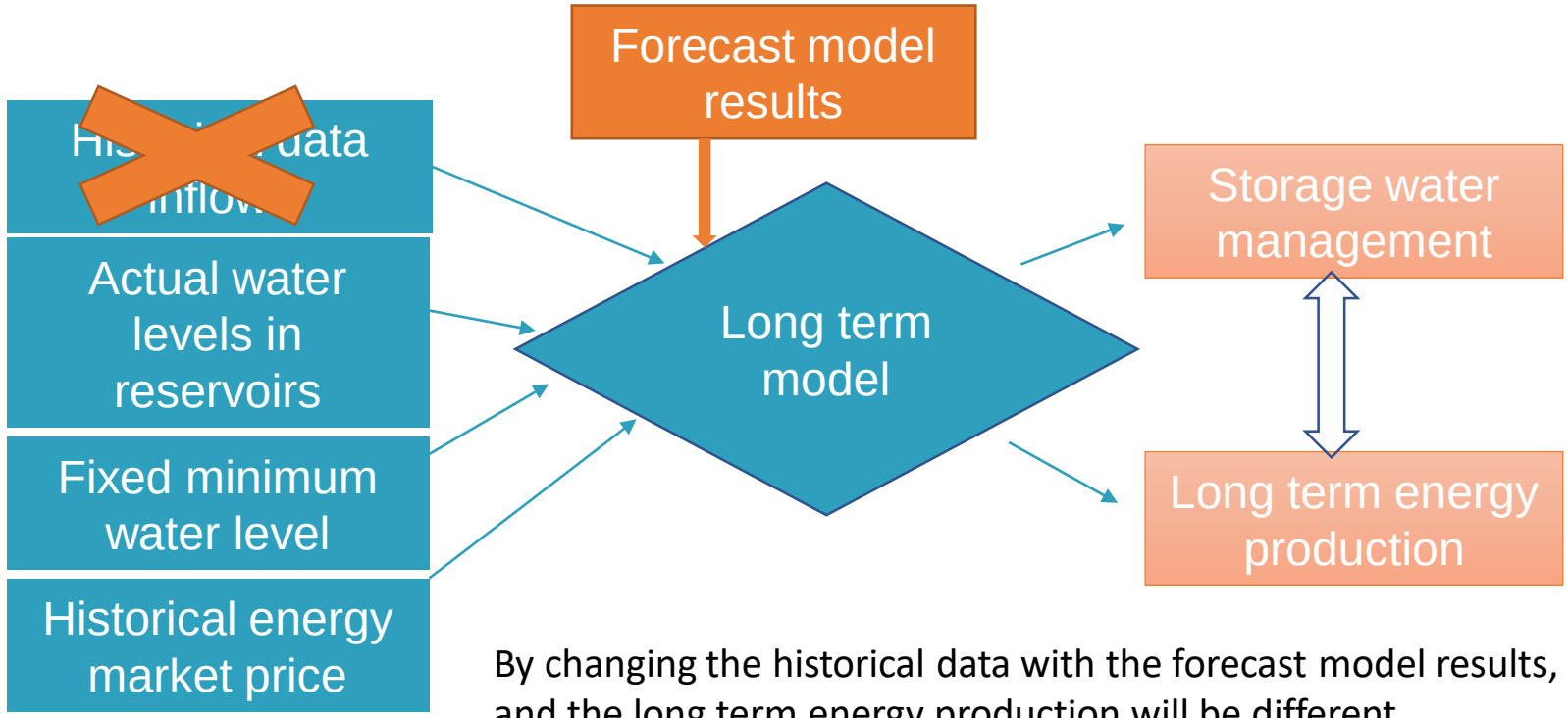
Case study 2: Dry winters in northern Italy & energy generation

Long term model → Short term model → Price → Storage management → profits



By changing the historical data with the forecast model results, the storage water management and the long term energy production will be different.
With better input data, Alperia can improve the management, the annual production and consequently the final profit may increase.

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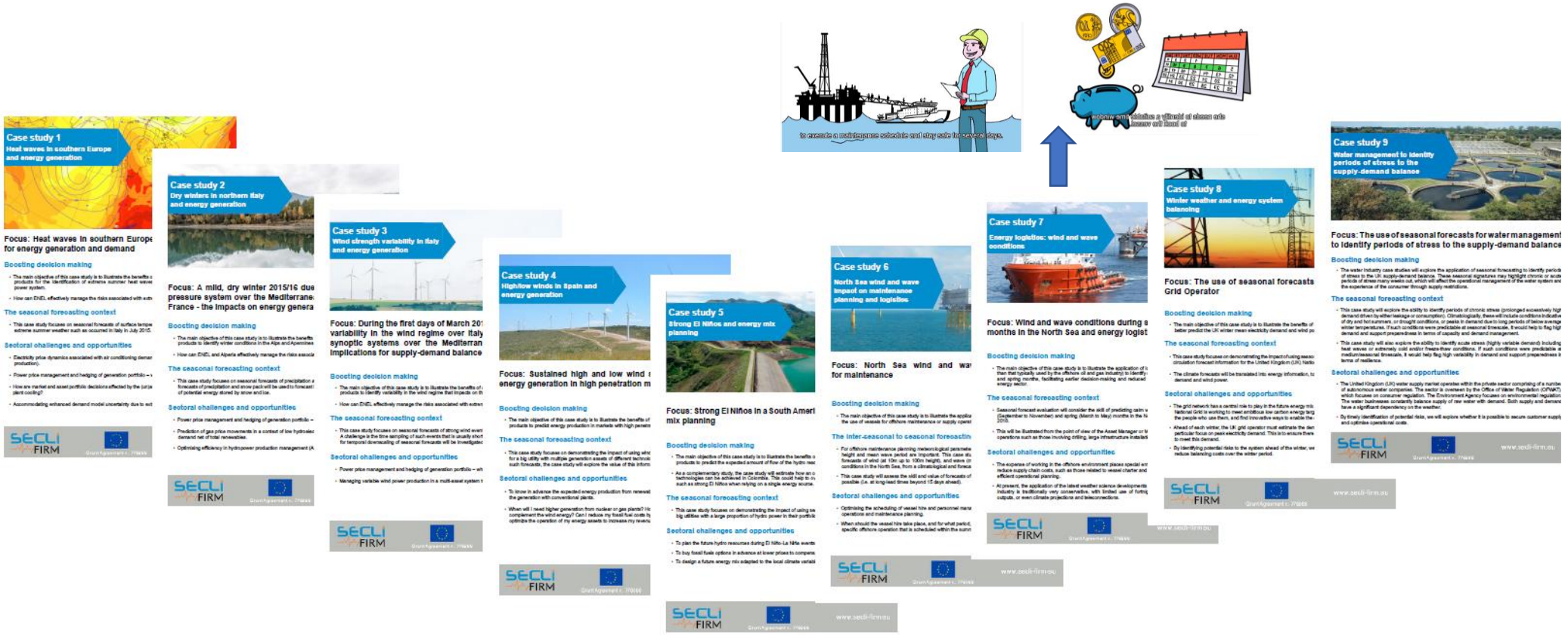
Thank you!



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

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