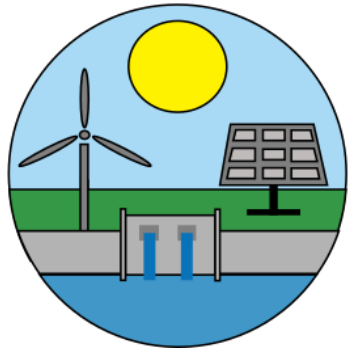


Clim2Power

Using climate data for the decision-making in power sector models

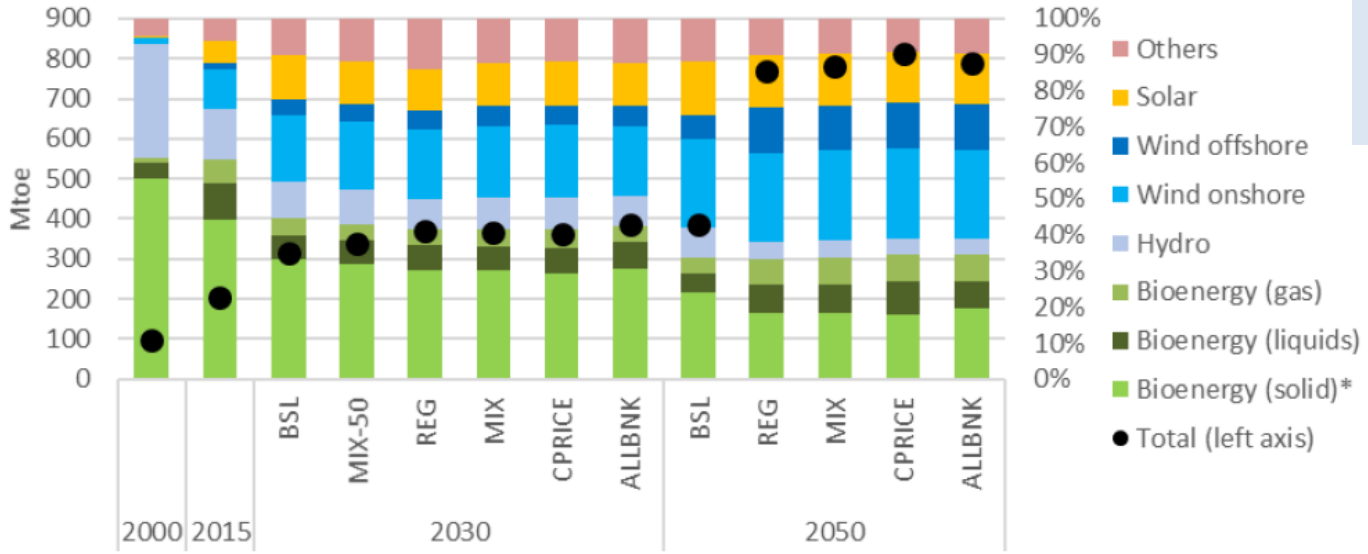
EU4CLIMATE PROJECT – Energy Sector, 10th February 2021

Sofia G. Simoes

Climate in energy models- Why is this relevant?

Most models used for energy & climate policy support do not consider yet seasonal and long-term climate impacts

Figure 8: Renewable energy production



Note: includes biofuel production for international air and maritime bunkers

Source: 2000, 2015: Eurostat, 2030-2050: PRIMES model

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0176

Climate is already affecting the power sector...

What is the sensitivity to climate variability of the pathways for a carbon neutral power sector in 2030/2050?

EUROPEAN COMMISSION

Brussels, 17.9.2020
SWD(2020) 176 final

PART 1/2

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

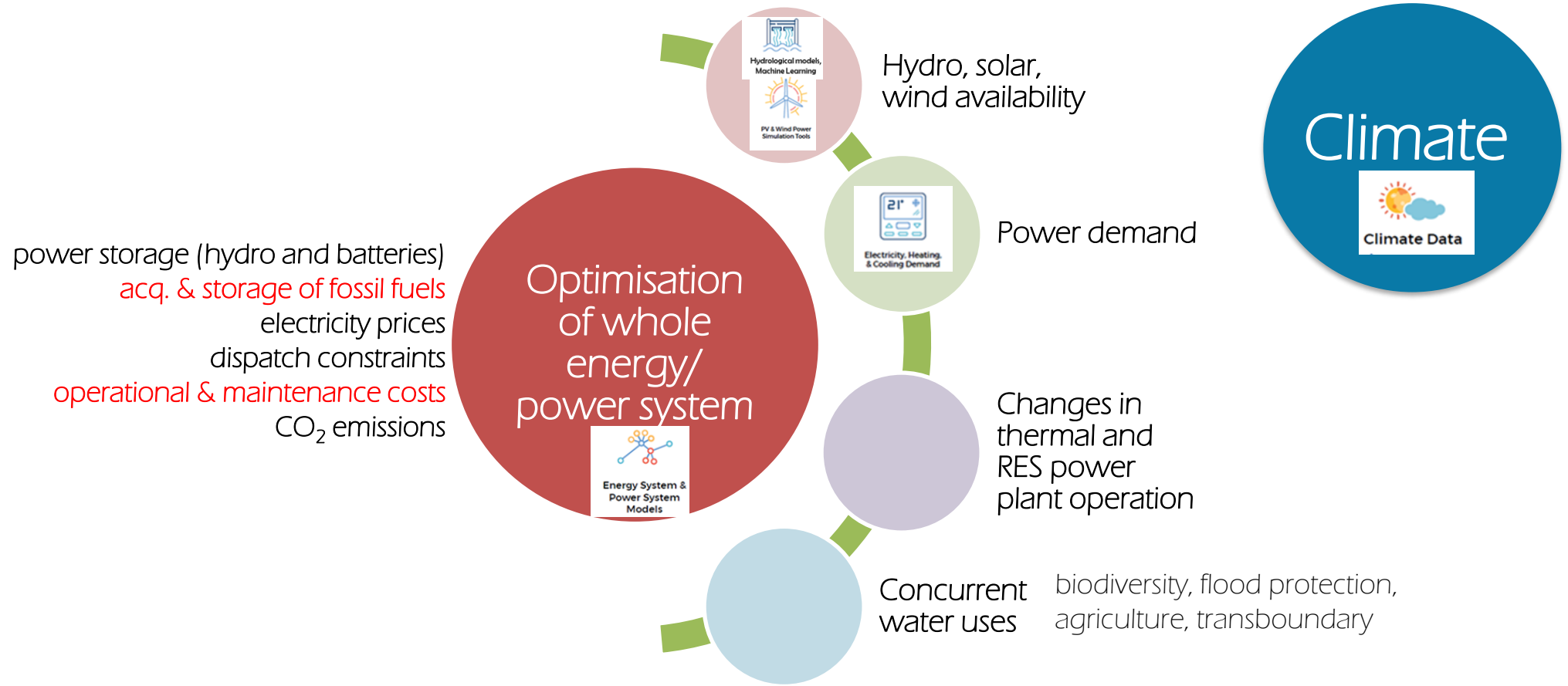
COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Stepping up Europe's 2030 climate ambition

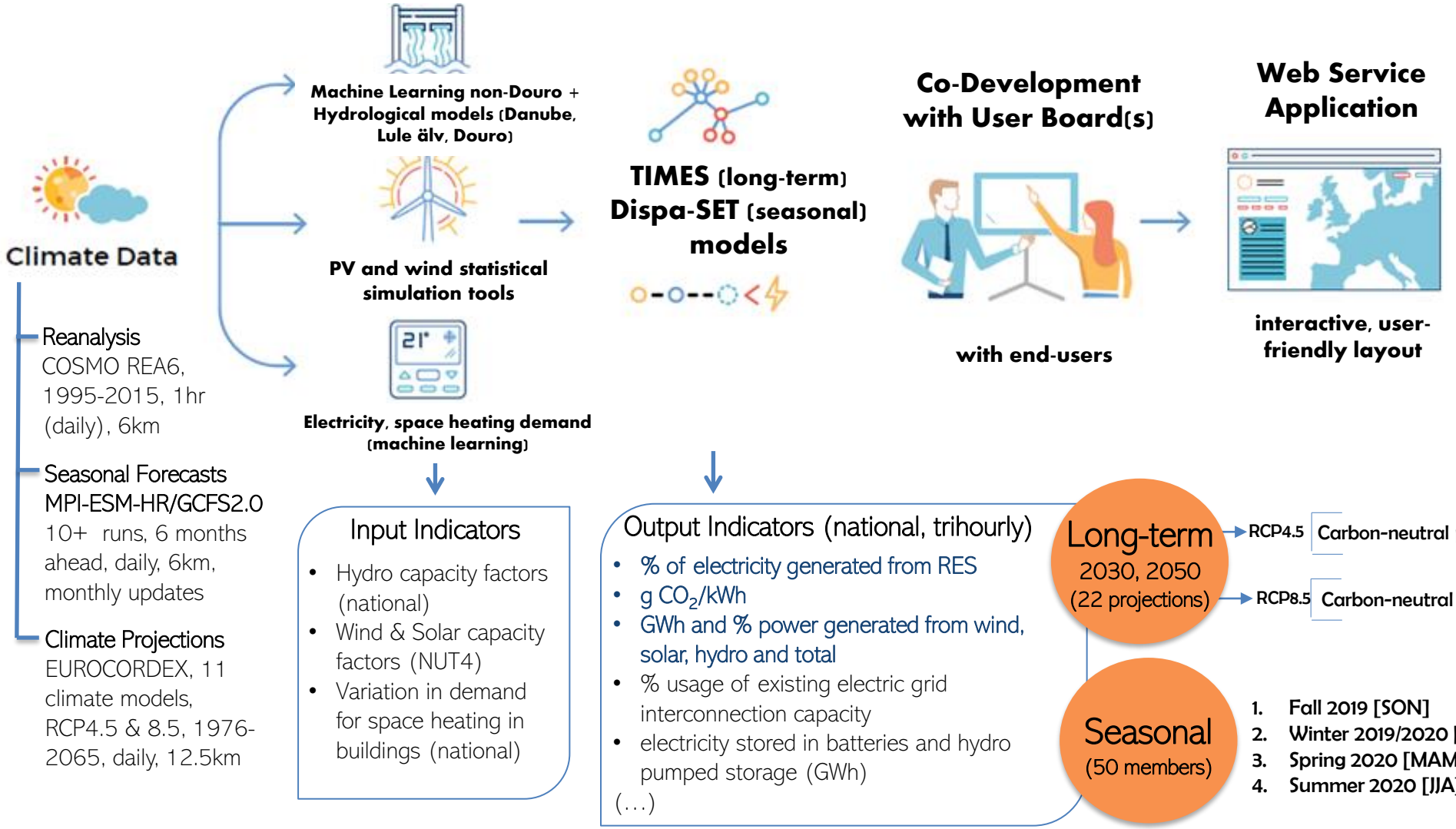
Investing in a climate-neutral future for the benefit of our people

{COM(2020) 562 final} - {SEC(2020) 301 final} - {SWD(2020) 177 final} - {SWD(2020) 178 final}

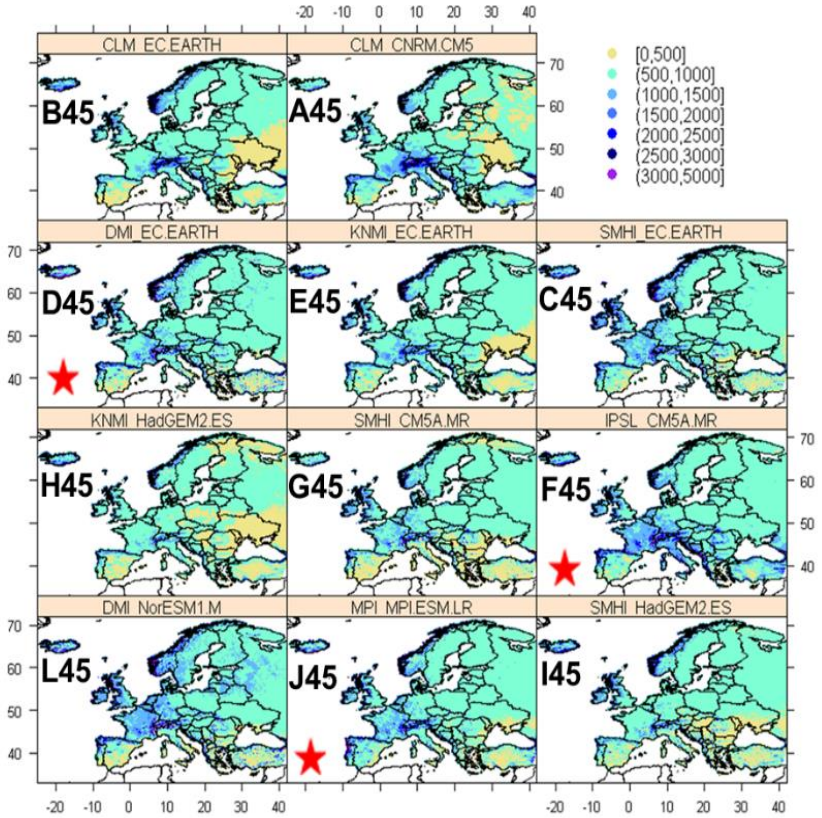
Making energy and power models respond to climate variability



Clim2Power Pipeline – from climate data to power indicators

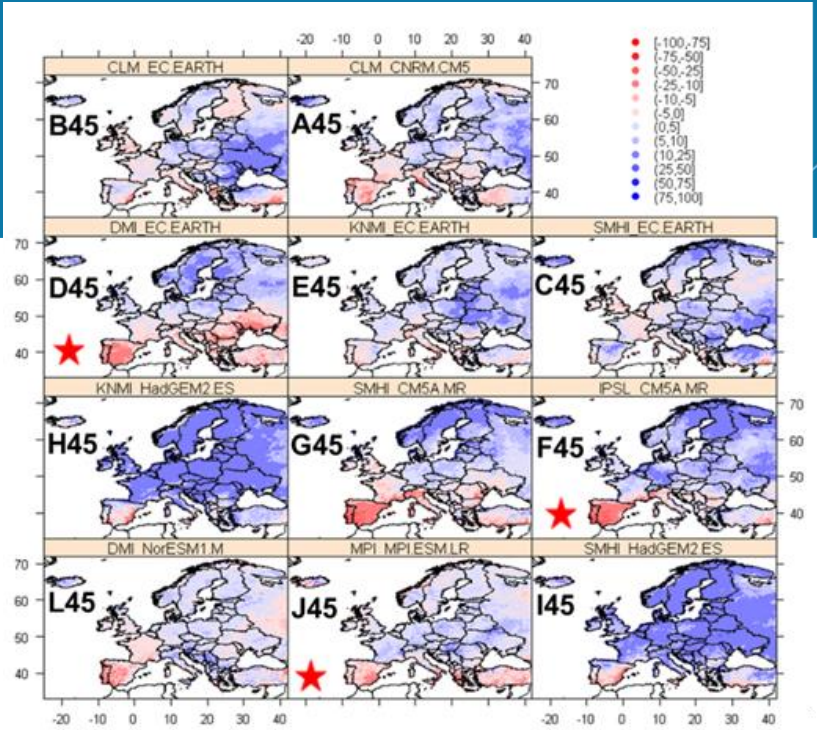


Variation in average precipitation until 2045



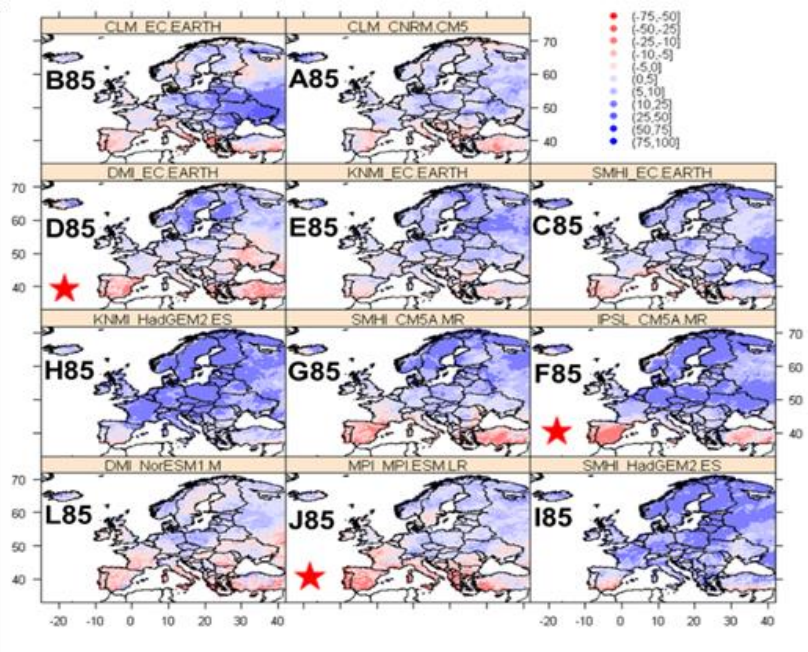
Precipitation 1976-2005

11 different climate models



RCP4.5

Severe climate change



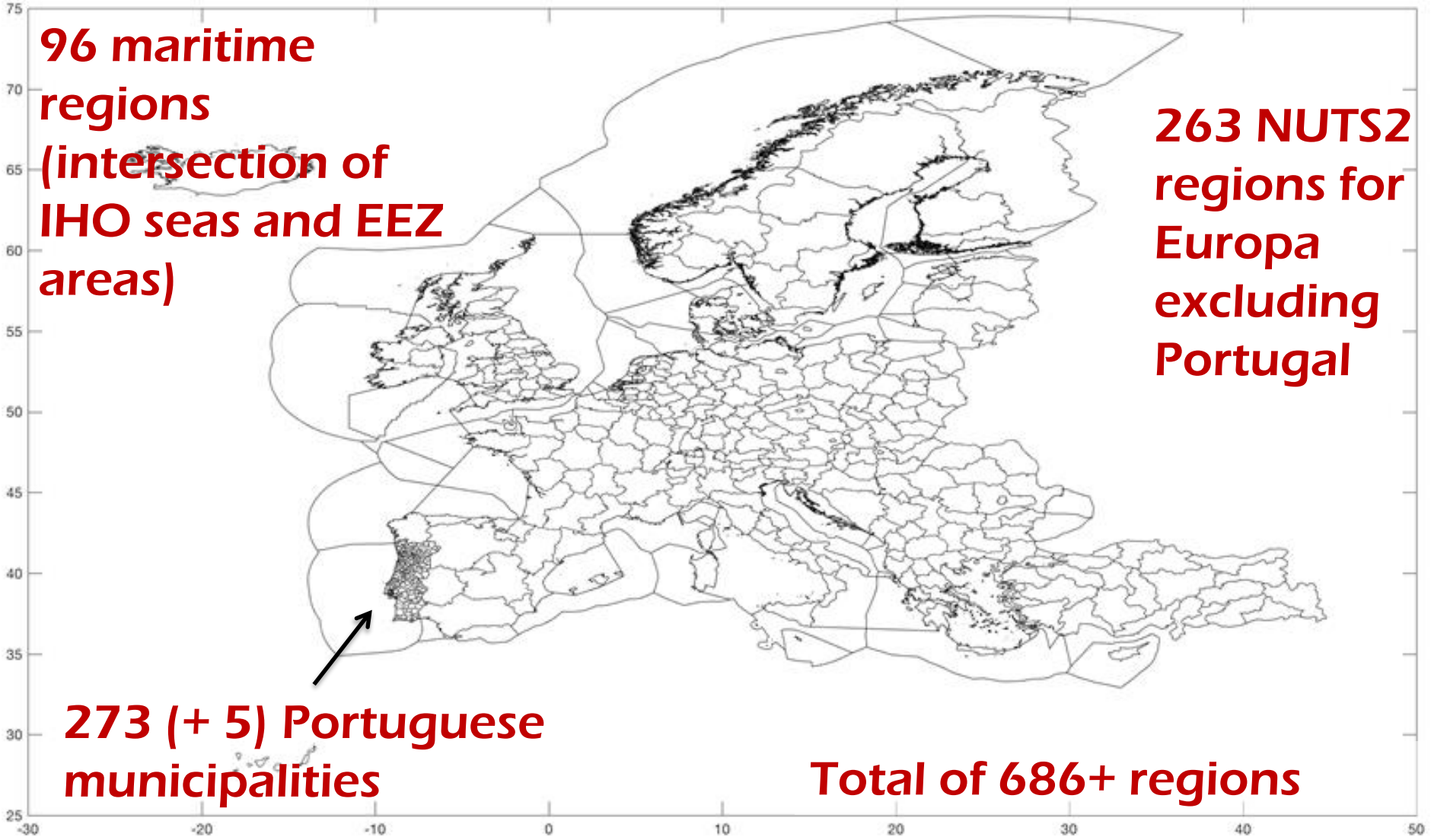
RCP8.5

Very extreme climate change

% anomalies 2016-2045

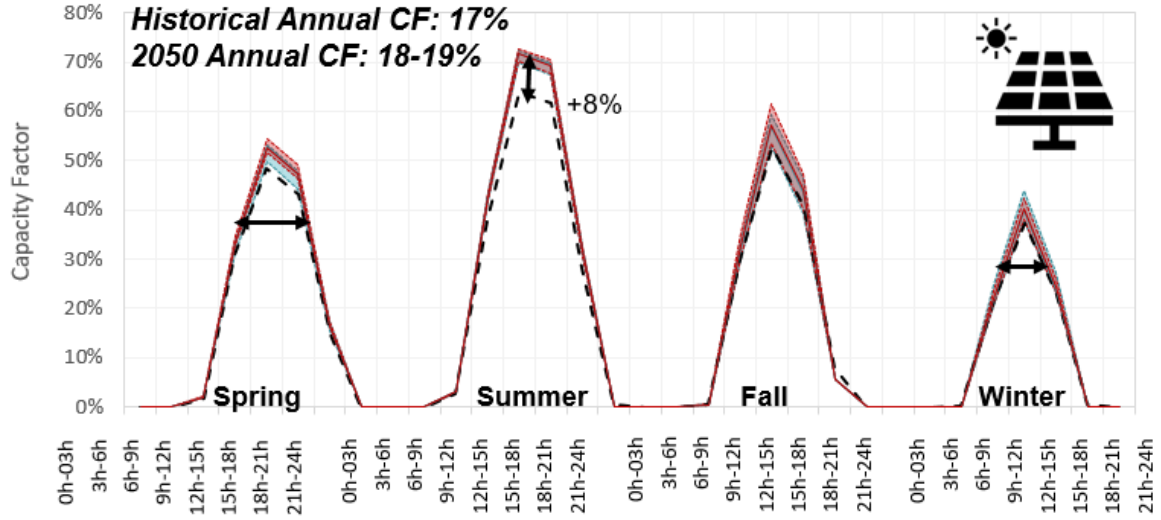
(red means less precipitation, blue is more)

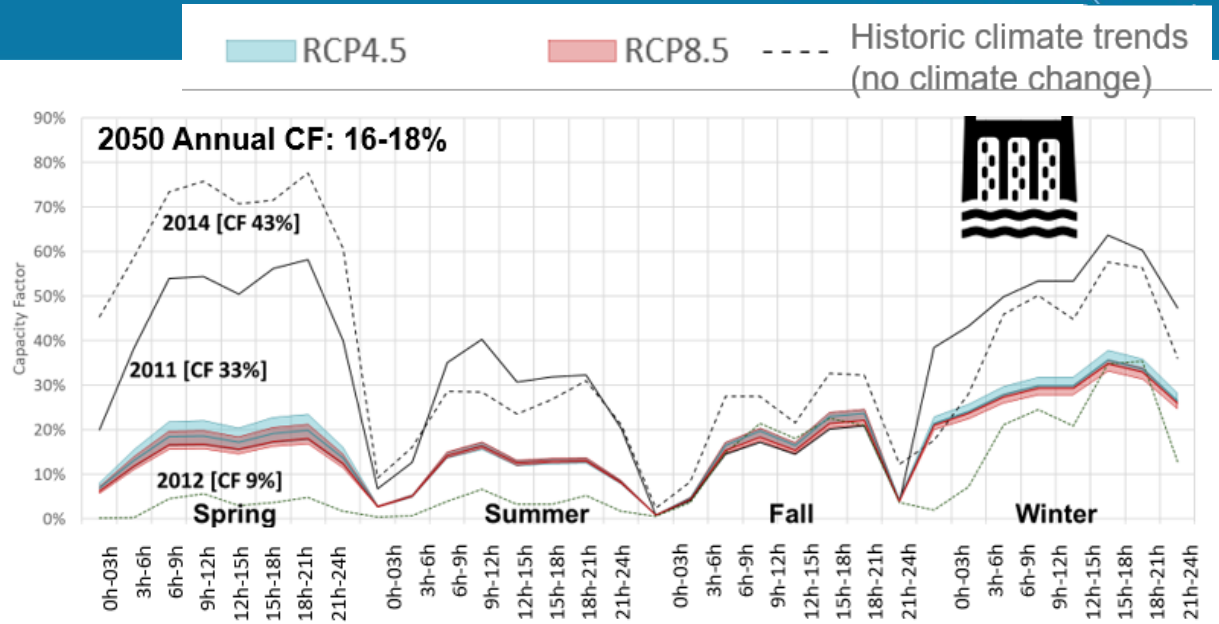
Challenge of considering climate with sufficient detail

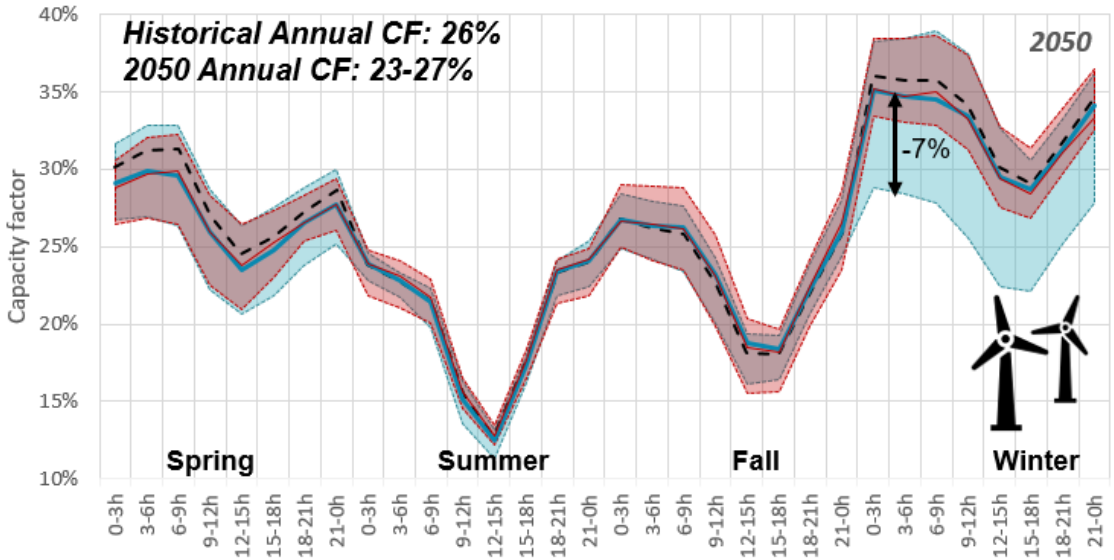


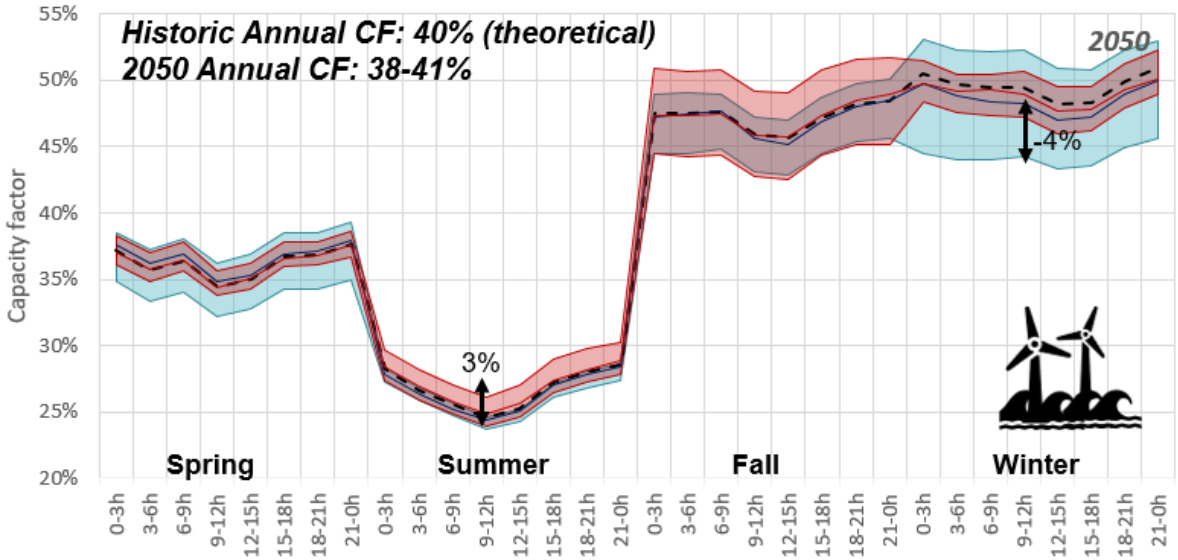
IHO: international hydrographic association, EEZ: exclusive economic zone, NUTS: Nomenclature des unités territoriales statistiques

How capacity factors could look like in 2050









Modelling system wide interactions

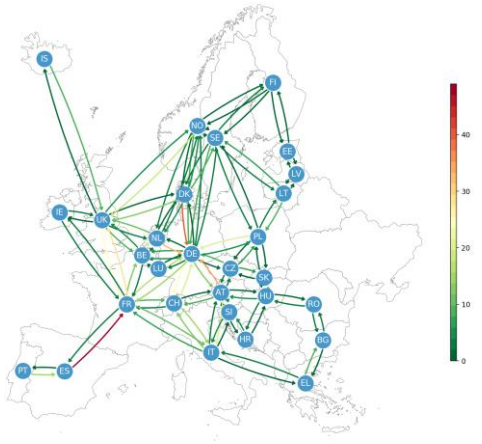
Integrating the building blocs

Consistent set of EU-wide time series of climate variable

Country scale VRES dynamics

Other RES supply

Coal, Gas, Oil, Nuclear supply



Systemic effect

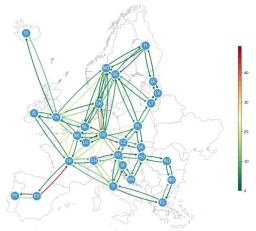
- Short term balancing decisions
- Long term planning and investment decisions
- Short-term markets

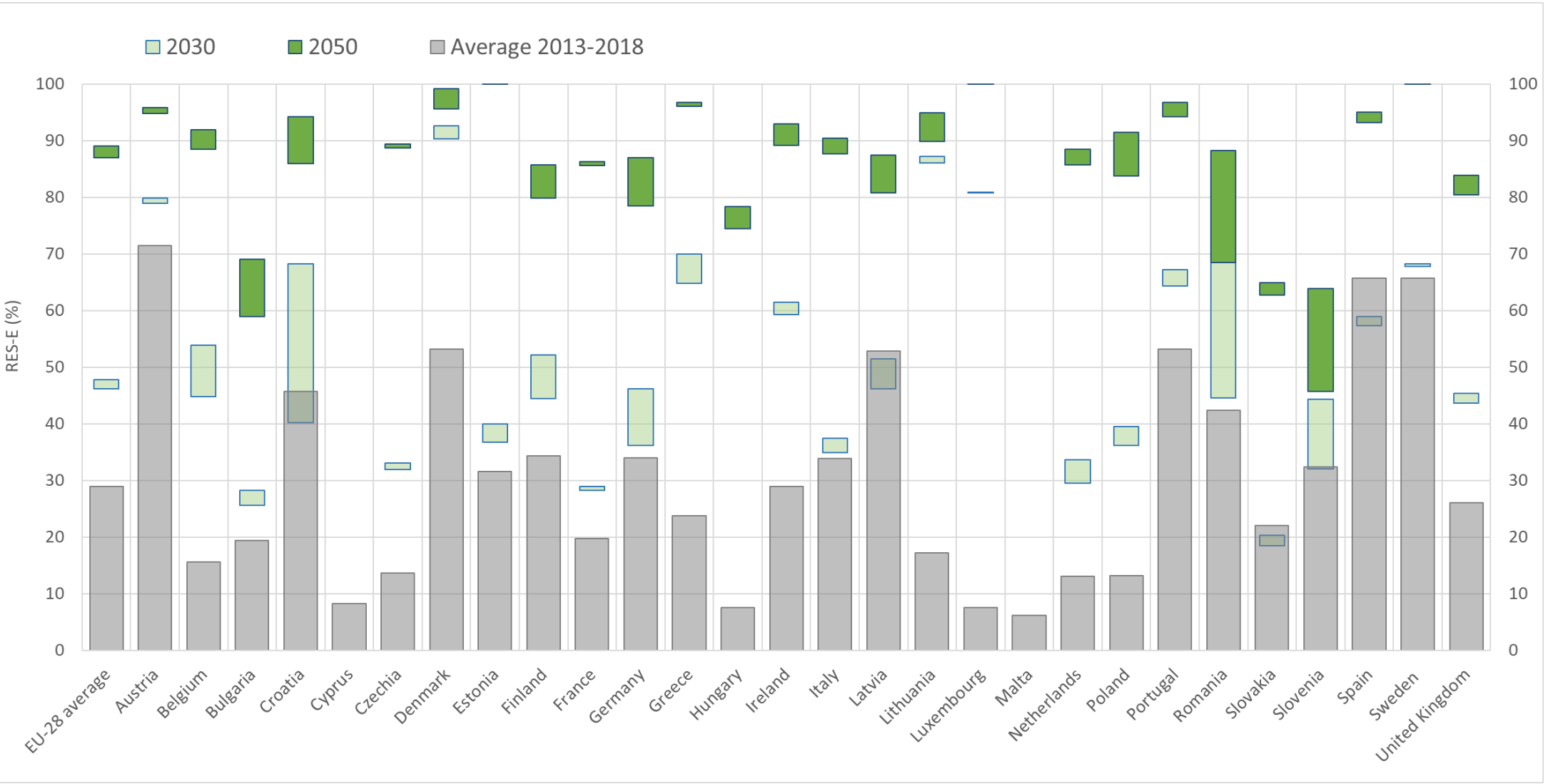
Country scale loads

2791 TWh in 2018
~900 GW of installed capacity
Hourly load ramps ~ -62/99 GW

To provide insights at the system level

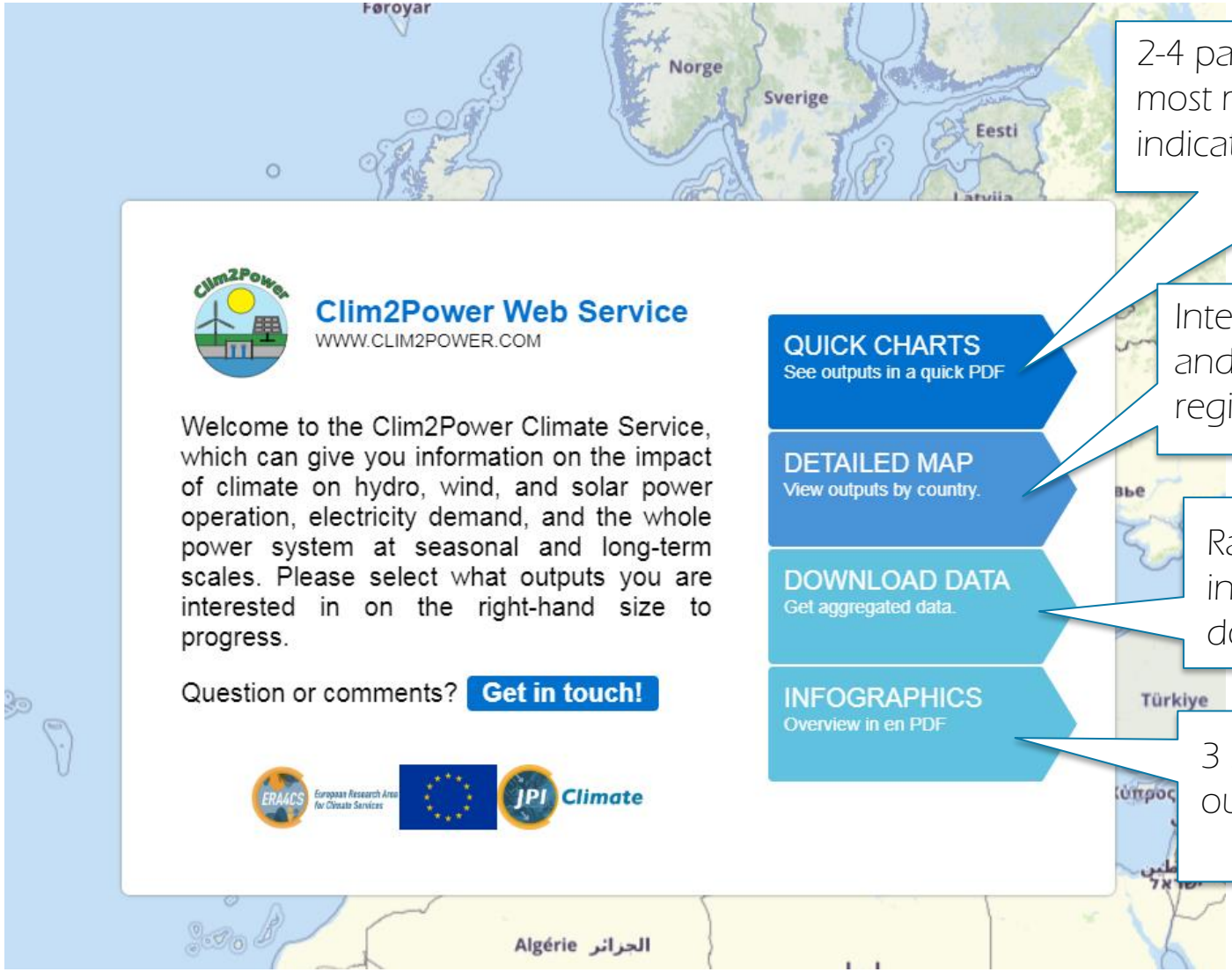
Evolution of % RES power across Europe





Clim2power webservice

http://viewer.webservice-energy.org/clim2power/



2-4 pages report (pfd) with most relevant output indicators per country

Interactive maps for outputs and indicators per country, region or whole of Europe

Raw data (output indicators) to be downloaded)

3 infographics for selected output indicators

GWh hydro in a Spring day in Romania "now" and in future

http://viewer.webservice-energy.org/clim2power/

Clim2Power
Climate Web Service
www.clim2power.com

Policy Scenario :
Carbon neutral

Summer | Winter
Spring | Autumn

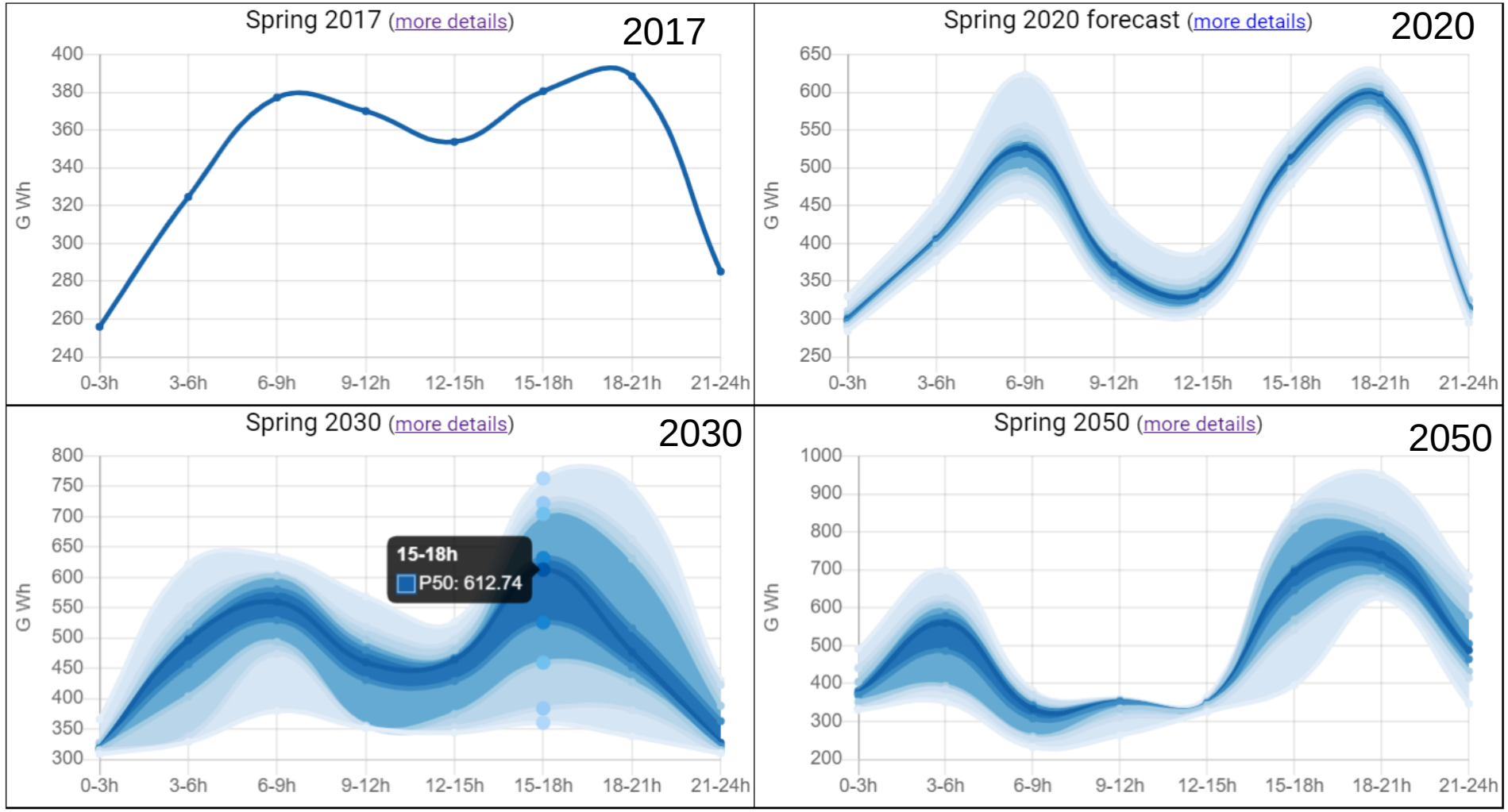
EUROPE | REGIONAL | NATIONAL

Working Days | Weekend

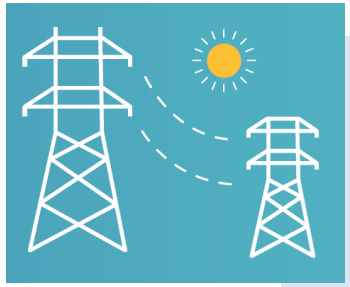
Relative | Absolute

HOME | Download Data

Total of electricity generated from hydropower — ROMÂNIA



Some messages to take home



We are combining impact of climate (seasonal and long-term) in the whole interconnected European power system – we assume the country generating the "cheapest" power at any given moment can trade freely their power across Europe

In the long-term overall EU renewable electricity and CO_2 emission reduction targets are "climate sound", but this is due a the expense of very different roles and power sector changes in different countries. Some countries are more "climate sensitive" than other. If we do not have free power trade and very fast investment in across Europe, it could by much trickier to climate proof the EU (and national) energy and climate policies

Thanks everyone!

More on CLIM2POWER:

https://clim2power.com/

sofia.simoes@lneg.pt

Project CLIM2POWER is part of ERA4CS, an ERA-NET initiated by JPI Climate, and funded by FORMAS (SE), DLR (DE), BMWFW (AT), FCT (PT), EPA (IE), ANR (FR) with co-funding by the European Union (Grant 690462).