

# CLIM2POWER

THIRD PROJECT NEWSLETTER



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## The Latest Updates from Clim2Power

The Clim2Power project is delighted to bring you its third project newsletter, which covers all our activities of the past six months. We are currently entering the last year of our project timeline and sharing the results of our work with users and the general public. Partners have continued engaging with end users through national user board meetings and participating in international conferences in order to share the consortium's experience and to peer review the last stage of the co-development of the Clim2Power Climate Service.

*Highlight: 2<sup>nd</sup> National User Board meeting in Austria, 25 June 2019*





Danube at Litz by Mwinog2777 at English Wikipedia [CC BY-SA 3.0]

## What is Clim2Power?

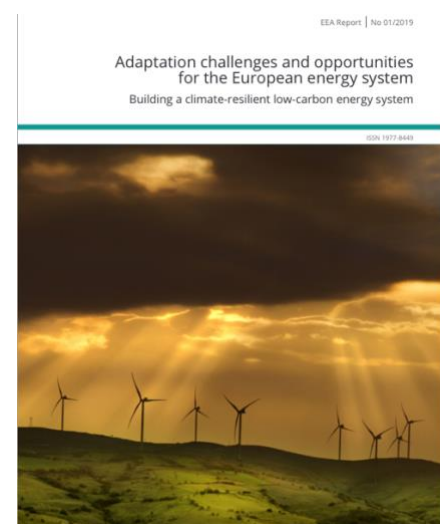
### A JPI Climate-funded international research project

The Clim2Power project is a research project aiming to “climate-proof” the current European electricity system, including operation and planning, to ensure that energy and power models respond to climate variability. Clim2Power aims to build a bridge between complex scientific model-based knowledge and targeted, usable information for end users within climate, environment, energy and water communities by delivering a tailored Climate Service (CS) web-application co-developed with final users to inform decision-making.

Two levels of climate services are produced to make the project useful for society and policymakers: 1) operational information mainly targets power companies, namely seasonal weather decision-support information for the optimal operation of hydro, wind, and solar; and 2) investment decision information for policymakers, which focuses on long-term analysis. Power generation & trading companies, power system operators & regulators, power consumers, and water managers will particularly benefit from the outcome of the project through better decision-making, planning, and operation.

## Reaching goals

To ensure that user needs continue to be addressed throughout the development of the Clim2Power Climate Service, the Usability Evaluation Framework resulting from WP1 has guided the process of tracking the interests and needs of end users at the national user board meetings. Members of the consortium continue running the seasonal forecast pipeline efficiently. We have released an evaluation report on downscaling forecasts and have already delivered eleven long-term climate scenarios as part of WP2. Solar, wind and hydro capacity factors have been processed timely within WP3. Partners continue running the eTIMESEU and eTIMES\_PT models and developing the AT-DE machine learning as part of WP4. Clim2Power’s work has been highlighted recently on the 12th issue of the ERA4CS Newsletter (August 2019) and on the report *Adaptation challenges and opportunities for the European energy system: Building a climate-resilient low-carbon energy system* by the European Environment Agency (June 2019).



**CLIM2POWER**  
Translating Climate Data into  
Power Plant Operational Guidance  
[www.clim2power.com](http://www.clim2power.com)

**CLIM2POWER CONSORTIUM**  
Coordinated by FCT-NOVA  
The CLIM2Power consortium brings together 10 partners from 6 European countries, combining leading expertise in the fields of low carbon energy systems modelling, seasonal forecasts, climate analysis, climate change mitigation and adaptation, hydrological and power market modelling, water management, policy support, software development, and stakeholder engagement.

**OUT PUT**  
We'll develop a climate service with information for end-users in climate, environment, energy, and water industries.

FOLLOW ALONG WITH US ON TWITTER  
**@CLIM2POWER** #climateservices #renewable #energy

## Recent conference presentations

### EMS 2019, European Meteorological Society Annual Meeting, Lyngby, 9th–13th September 2019

Valentina Sessa, Edi Assoumou and Mireille Bossy presented the conference paper 'Modeling the climate dependency of the run-of-river based hydro power generation using machine learning techniques: an application to French, Portuguese and Spanish cases'. Jennifer Ostermüller, together with other Clim2Power partners, also brought to the conference the poster 'Generating highly resolved seasonal forecasts for hydropower and energy system modelling in the CLIM2POWER project'.

### ETSAP 2019, 75th Semi-annual Energy Technology Systems Analysis Program Meeting, Paris, 7th June 2019

Filipa Amorim, Sofia Simões, Gildas Siggini and Edi Assoumou presented the paper 'Clim2Power – Integrating climate data on a highly resolved TIMES model'. It summarised the next steps for the project, which include the assessment of the effect of generation of PV and wind on changes in power & heat demand variability in the electricity mix, the assessment of thermal power plant efficiency changes, as well as expanding the set of technologies to offer system flexibility options.

## Communicating our research

Clim2Power updated the overall structure and look of the project website (<http://www.clim2power.com>) in order to facilitate access to new relevant information. The project website has continued to be updated with news, visual materials and downloadable versions of research outputs designed specifically for the public, including newsletters, brochures, flyers, posters, and scientific powerpoint presentations produced by members of the consortium with associated summaries. The team continues using in-house expertise in graphic design and science communication for the production of these and other deliverables of WP6.

A promotional flyer for the project was distributed at ECCA2019 and will be used at future outreach and engagement events. The flyer was designed to appeal to broad audiences, both within academic contexts and to the wider public, by distilling the main details and goals of the Clim2Power project into an attractive and understandable visual graphic. The graphic doubles as both an infographic for web purposes, and an A5 printed asset that can be distributed at events while using less paper than a standard A4. It can be downloaded from the Posters & Outreach Materials section of our website:

<https://clim2power.com/outputs/promotional-material/>.



## **ECCA 2019, 4th European Climate Change Adaptation conference: Working together to prepare for change, Lisbon, 28th–31st May**

Project coordinator Sofia Simões and researcher Filipa Amorim introduced the project to members of the scientific community participating in the JPI Climate side-event ‘Climate services: state of affairs, relevance for users and the way forward’, on Monday 27th May 2019. This event showcased various Europe-made climate services and set-up a discussion on different aspects concerning their development: methods and engagement processes for user-tailored development; the role of climate services in societal transformation; actionable climate services – next steps for JPI Climate; looking for synergies with other initiatives and international (science) networks: valorisation, matchmaking and outreach; exploring the role of climate services in supporting sustainable finance and investments. Clim2Power project also participated in the ECCA science session ‘Knowledge co-production and brokerage for climate services’, which focused on the most recent research results related to the use and application of Shared Socioeconomic Pathways (SSPs), Representative Concentration Pathways (RCPs), narratives and scenarios, along with impact modelling for the projection and assessment of sectoral climate risks.



## **EGU 2019, European Geosciences Union General Assembly, Vienna, 7th–12th April 2019**

Johann Baumgartner, Johannes Schmidt and Katharina Gruber presented the scientific communication ‘Using machine learning to predict renewable electricity generation, electricity demand, and electricity prices from climate data’. Their research assesses if machine learning can be successfully applied as a means to derive predictions of nationally aggregated electricity generation from renewable energy sources (i.e. wind, photovoltaic and hydro power) for Austria and Germany and electricity market determinants such as load and electricity prices for the formerly combined electricity market zone of Germany and Austria. Ignacio Martin Santos, Mathew Herrnegger, Jennifer Ostermüller, Kristina Fröhlich and Hubert Holzmann presented poster ‘Analysis of seasonal hindcast for mean term hydrological forecasting in the Upper Danube River Basin’.

## **Upcoming conferences:**

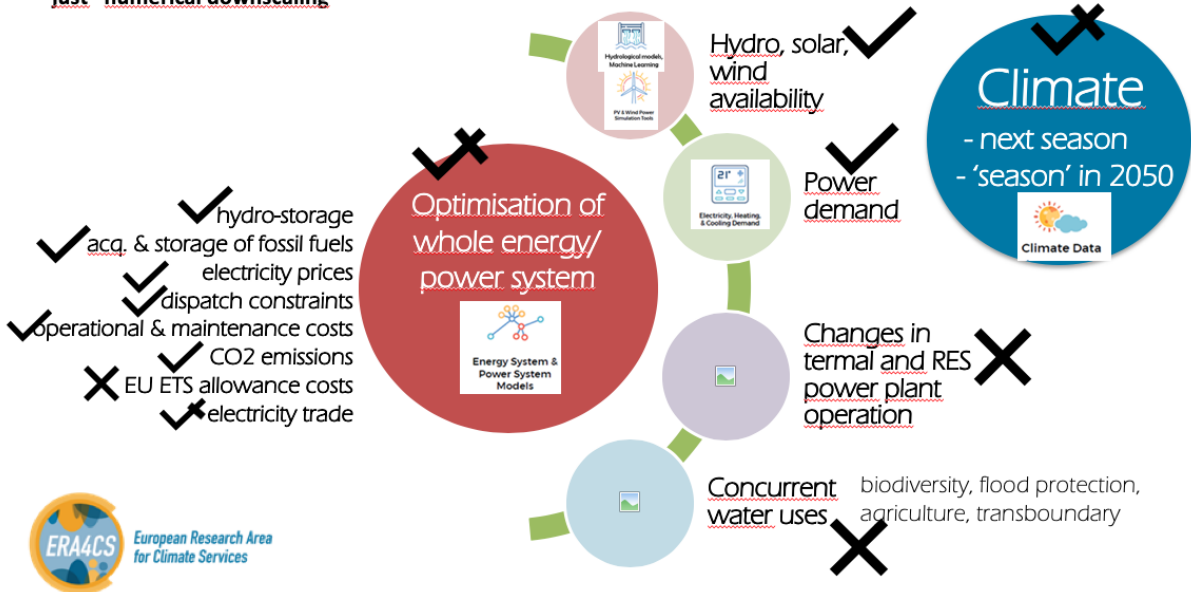
### **Symposium Future Trends in Civil Engineering, Zagreb, 17 October 2019**

Holzmann, H. (2019) Short term and seasonal forecasts of hydro-power production by means of hydro-meteorological prediction.

# Climate data, hydro production & power system modelling

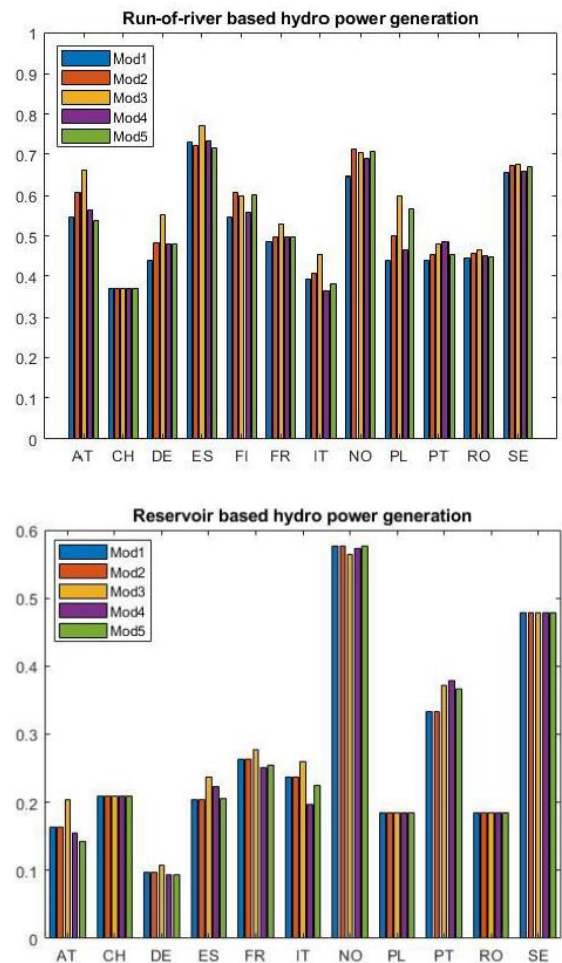
## Progress of the Project Objectives:

- making energy and power models respond to climate variability
- statistical meaningful approach to enhance the predictive skill of the current models over Europe, instead of "just" numerical downscaling



## Variability of long-term estimates hydro power generation on a European scale

Europe is expected to strongly expand its wind and solar power capacity by 2050 to meet its climate goals. In an interconnected system, balancing these highly intermittent sources by hydro power will also involve a European-wide evaluation of the variability of HP generation for future climatic conditions. The methodological framework described by Clim2Power partners in the paper offers the possibility of addressing this issue. The two main ingredients are: the formalization of an accurate ML model and the long-term climate forecasts. Their combination provides an overview of the long-term variability of capacity factors at the country scale for Europe. The figure below shows the annual mean of the predicted capacity factor for the five different scenarios. As expected, since we are looking at an average behaviour, the results for all models are quite similar. The graphs show a predominance of North European countries, followed by the Iberian Peninsula, France, Italy and Northeast Europe.





## National User Board Meetings

Lisbon, Portugal, 13th May

Vienna, Austria, 25th June

During the 2nd National User Board in Portugal, project coordinator Sofia Simões provided an overview of Clim2Power's objectives. Filipa Amorim presented some of the first results on climate impact on the EU power system and Paulo Diogo discussed results on hydrological modelling and hydropower production in Portugal. The interactive session with users focused on exploring the policies and operation criteria to be considered (energy, climate, reservoir operation, considering concurrent water uses, e.g.: ecological flows, flood protection, agriculture, transboundary) while developing the Clim2Power Climate Service.

In Vienna, members of the Clim2Power consortium presented the seasonal forecasts for Austria (hydro, wind, solar, demand, prices) and provided background information about the project and also about similar initiatives in Europe. The interactive session with users explored the most appropriate data, formats and exchange platforms to meet the overall objective of the project of translating complex datasets into usable information.



## What's Ahead?

Clim2power's partners will meet next November in Nice to coordinate efforts for the last stage of the project. Our third and last User Board Meeting will take place in Brussels in February 2020. It will allow us to conclude the co-development of the Clim2Power Climate Service by testing the final prototype with end users. We will continue using our off-line and online communication channels to keep the project connected to the rest of the academic community, our end users and the general public.

Follow us at [www.clim2power.com](http://www.clim2power.com) as we post news, and on our Twitter: [@clim2power](https://twitter.com/clim2power).