Energy & Meteorology and the European Climatic Energy Mixes (ECEM)

Alberto Troccoli & ECEM Team

Met Office

University of East Anglia & World Energy Meteorology Council



World Energy & Meteorology Council (WEMC)

Our primary goal is to enable improved

Sustainable energy

For a low carbon economy

Resilience

Of energy infrastructures

Efficiency

Of energy systems







Under ever changing weather and climate



WEMC work focuses on

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Enhancing productivity and policy formulation for the energy industry Achieving improved adoption of weather, climate and other environmental information by the energy industry Maximizing the exchange of relevant information between developed and developing countries

Icons designed by Smartline and Gregor Cresnar on flaticon.com



http://www.wemcouncil.org/

Energy and meteorology go hand in hand





Motivation

Increasing share of power supply from variable renewable energy (RE) sources. Demand variability is also increasing. The transformation is taking place against a **variable and changing climate**.



European Climatic Energy Mixes (ECEM)

ernicus

Europe's eyes on Earth





Integration of energy & climate information for energy mixes assessment

- ★ Is climate important for energy planning?
- ★ What can climate R&D learn from interaction with energy sector and make output more easily adopted by the industry/policy makers?

European Climatic Energy Mixes (ECEM) is developing a demonstrator to assess how well **different energy supply mixes** in Europe will meet demand, over different time horizons, focusing on the role climate has on the mixes.









Issues considered by e-Highway 2050

- ★ Technical
- ★ Economic/financial
- Political/socio-political and environmental
- Research, development and deployment (RD&D)



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However climate not very prominent in eHW2050 even though ...

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Target

- **★** Energy Mix assessment for:
 - ★ Present day
 - ***** Seasonal Forecasts
 - ★ Climate Change







Five Scenarios (from e-Highway 2050)

Five scenarios







European Commission





From Climate variables to Energy systems



Multi-faceted Stakeholder Engagement

- ★ Workshops
- ★ Advisory Committee
- ★ Survey
- ★ Presentation at events
- ★ Webinars
- ★ Web site
- ★ Twitter













Stakeholder Engagement: Workshops

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European Climatic Energy Mixes 1st Stakeholder Workshop

Paris, Tuesday 16 February 2016, 09:00-17:00 The Workshop is kindly hosted by EDF at their Chatou Campus

Help us shape the European Climate Services in support of the Energy Sector of the future!





EUROPEAN CLIMATIC ENERGY MIXES



Shaping European Climate Services to support the Energy Sector of the future!







Copernicus Symposium on Climate Services for the Energy Sector



22-23 February 2017 Barcelona (Spain) – Venue to be confirmed

The European <u>Copernicus Climate Change Service</u> (C3S) programme, funded by the European Commission and operated by the European Centre for Medium-range Weather Forecasts, aims to deliver cuttingedge climate and sectoral information for the society facing climate change adaptation and mitigation. As part of the C3S programme, several <u>demonstration products</u> are being developed and trialled for the energy sector.

This symposium brings together leading climate and energy scientists, industry practitioners and policy makers, to present and explore newly emerging tools and opportunities for managing climate information for the energy sector.

Attendees will also be given hands-on access to the latest developments from the C3S energy-climate services prototypes - and invited to shape the ongoing development of forthcoming publically-available C3S products.



For more info, please contact: <u>Robert.Vautard@cea.fr</u> & <u>A.Troccoli@uea.ac.uk</u>





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Stakeholder Engagement: Workshops



17-19/10/2016, SIS Workshop, Reading (UK)

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Stakeholder Engagement: Committee & GFCS

★ Advisory Committee

- ★ Christoph Grafe (Eurelectric)
- ★ Rafael Sanchez Duran (Endesa)
- ★ Virginie Dordonnat (RTE)
- ★ Fabio Monforti-Ferrario (JRC)
- ★ Sophie Voirin (Climpact-Metnext)
- ★ Steve Dorling (WeatherQuest)
- ★ Isadora Jimenez (BSC)
- ★ Close links with the Global Framework for Climate Services



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Climate Variables: Bias-Adjustment

Fit of 10 m observations to Weibull distribution

Jan (Obs Weibull AIC GOF)

Jul (Obs Weibull AIC GOF)



Low number (blue) good fit; high number (red) poor fit





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Energy data: where can we find them?

The DATA ISSUE: There is no single reference database for energy Many data sources, inconsistencies between them, incompleteness, access rights (few open data) ...

- Need high level support to make things evolve
- ECEM will demonstrate that good data allows good service !



Demand modelling

Challenge: identify role of climatic factors







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Historical monthly generation

Monthly hydropower production in Norway

Monthly solar generation in Germany

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- ★ Statistical models: no big differences between different models (MLR, SVR, GAM, CARTs ...) → ideal for monthly time scales @ country level
- ★ Where no data is available for learning, observed predictands necessary to use physical models

Achieved so far:

- Historical period, statistical models for demand and generation (Hydro, Solar, Wind), monthly & country level
 - Historical period, GAM model for demand, daily & country (Fr, It, Au)







Solar Power Load Factor: France



Wind Power Load Factor: France



The purpose of the ECEM demonstrator is to enable the energy industry and policymakers to assess how

well different energy supply mixes in Europe will meet demand, over different time horizons (from seasonal to long-term decadal planning), focusing on the role climate has on the mixes.



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An online interactive tool to test energy mixes



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An online interactive tool to test energy mixes



Summary

Integration of energy & climate information for energy mixes assessment

- ★ Is climate important for energy planning?
- What can climate R&D learn from interaction with energy sector and make output more easily adopted by the industry/policy makers?









Get involved



ECEM/CLIM4ENERGY Workshop Barcelona (Spain), 22-23 February 2017

http://ecem.climate.copernicus.eu/

4th International Conference Energy & Meteorology

Weather and Climate for the Energy Industry

SAVE THE DATE 12-16 June 2017 Beijing, China

http://www.wemcouncil.org/





Thank you