# IEA Wind
# Topical Expert Meeting 111

# Reanalyses for Wind Energy

*Rémi Gandoin (C2Wind, DK), Justin Sharp (EPRI, US), Rogier Floors (DTU, DK)*
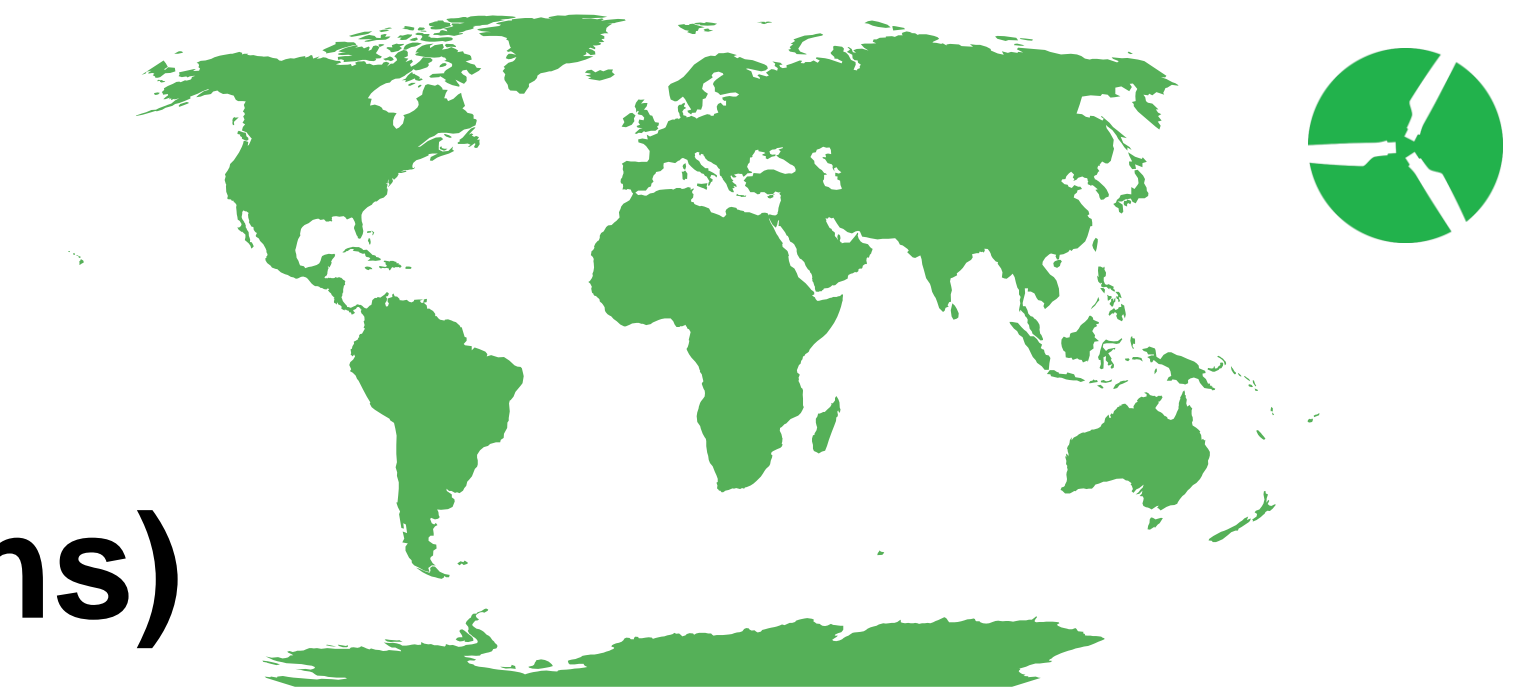*Jacob Tornfeldt Sørensen (DHI, DK), Julia Gottschall (Fraunhofer IWES, DE)*

Technology Collaboration Programme
by iea

# Outline

**1)** **Who we are**

**2)** **Reanalyses: workhorses of Wind Energy + Power Grid engineering**

**3)** **TEM#111: connecting reanalysis and Wind + Power Grid communities**

**4)** **Way forward: how *you* can get involved!**

# IEA Wind TCP

## 23 members + 2 sponsors (industry associations)

- **Vision:** Wind energy leads the global transition to a decarbonized energy supply.

- **Mission:** Promote high impact wind energy research and communication through international collaboration.

Members of the ExCo are government representatives like energy agencies, DOE, energy ministries and wind energy associations Participants in Tasks include universities, industry, certification bodies, etc
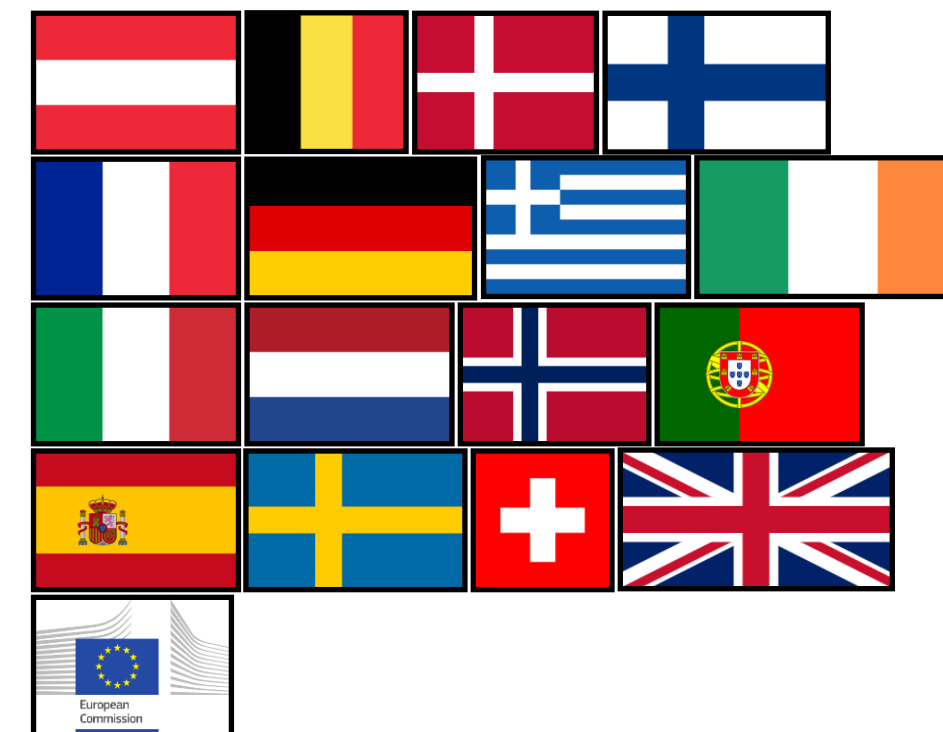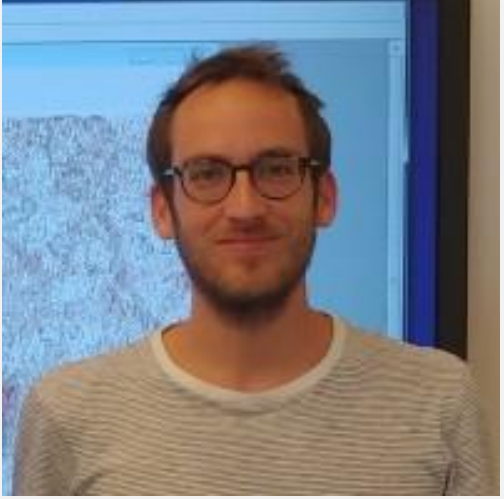
Americas

Asia
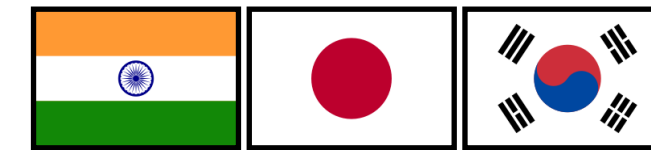
Europe

Sponsors

**Under the umbrella of the International Energy Agency**

# 1) Who we are

## Wind, Marine and Power Grid engineers and scientists

| Rémi Gandoin<br>*C2Wind, Denmark* | Jacob Tornfeldt Sørensen<br>*DHI, Denmark* | Justin Sharp<br>*EPRI, USA* | Julia Gottschall<br>*Fraunhofer IWES, Germany* | Rogier Floors<br>*DTU, Denmark* |
|---|---|---|---|---|
| Offshore wind engineer<br><br>Yield Assessment, Site Conditions, Integrated Load Analysis | Innovation and Product Portfolio Manager, Energy and Ports<br><br>Metocean (waves hydrodynamics) hindcast modelling | Renewable Energy and Meteorology Subject Matter Expert<br><br>Energy Meteorology | Chief Scientist Wind Farm Development<br><br>Operating Agent of IEA Wind Task 52 'Wind Lidar'<br><br>https://iea-wind.org/task52/ | Senior Researcher at DTU Wind Energy<br><br>ABL meteorology and flow modelling. |

# 2) Reanalysis matters.

## Reliable workhorses for wind farms and power grids

- **Reanalysis datasets are <u>necessary</u> to the success of these projects**

  - Weather- and climate are key drivers for design and operation

  - Used **directly**, or **downscaled**

- **Reanalysis datasets are used for:**

  - Characterising wind, waves, water levels and currents for **offshore wind farms design**

  - Predicting long-term **wind farm production**

  - Planning and modelling **power grids**

# 2) Reanalysis matters: offshore wind



Shares of electricity generation by technology in the European Union, Sustainable Development Scenario

- Offshore wind
- Onshore wind
- Nuclear
- Bioenergy
- Solar PV
- Hydro
- Natural gas
- Coal
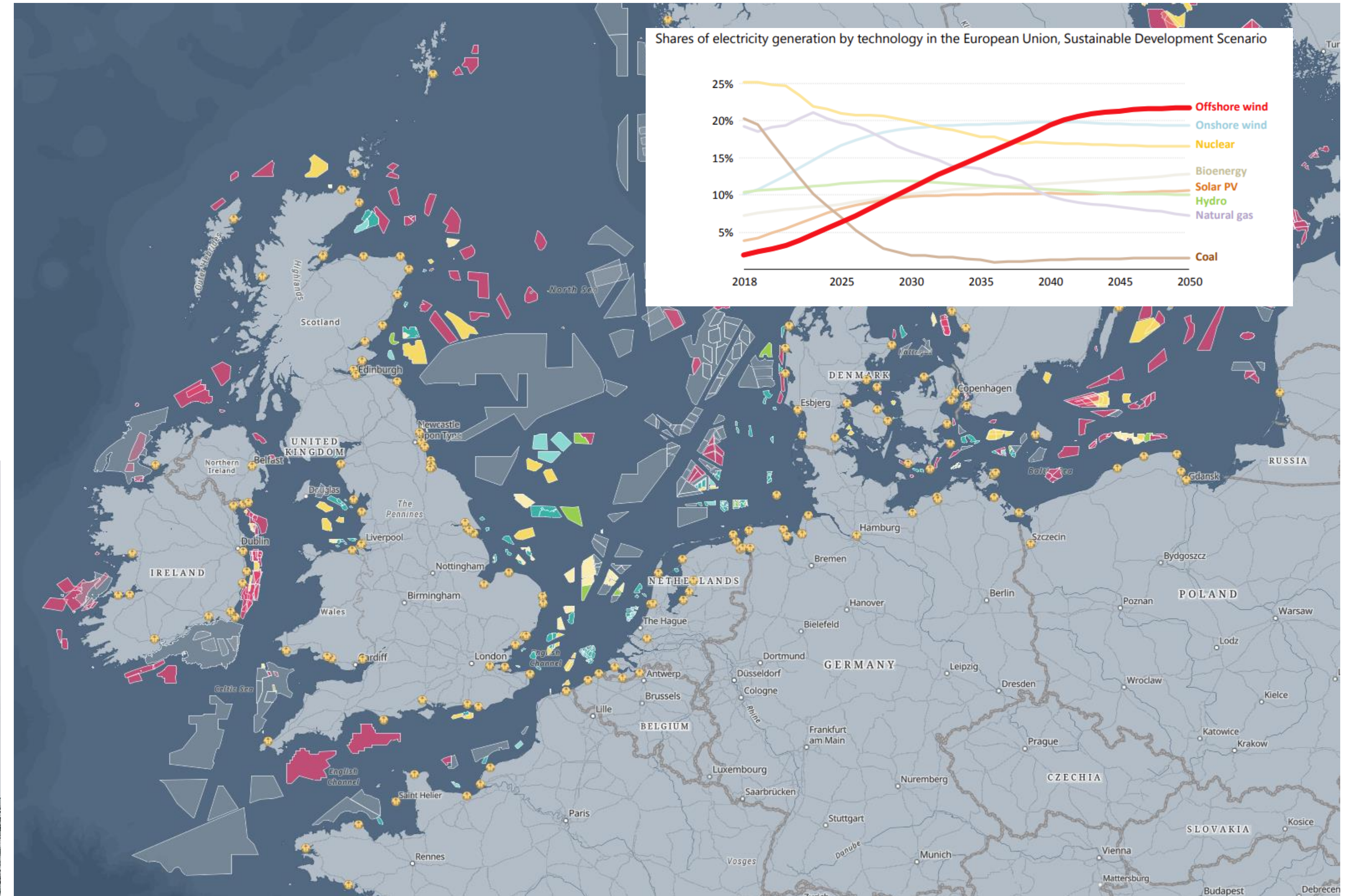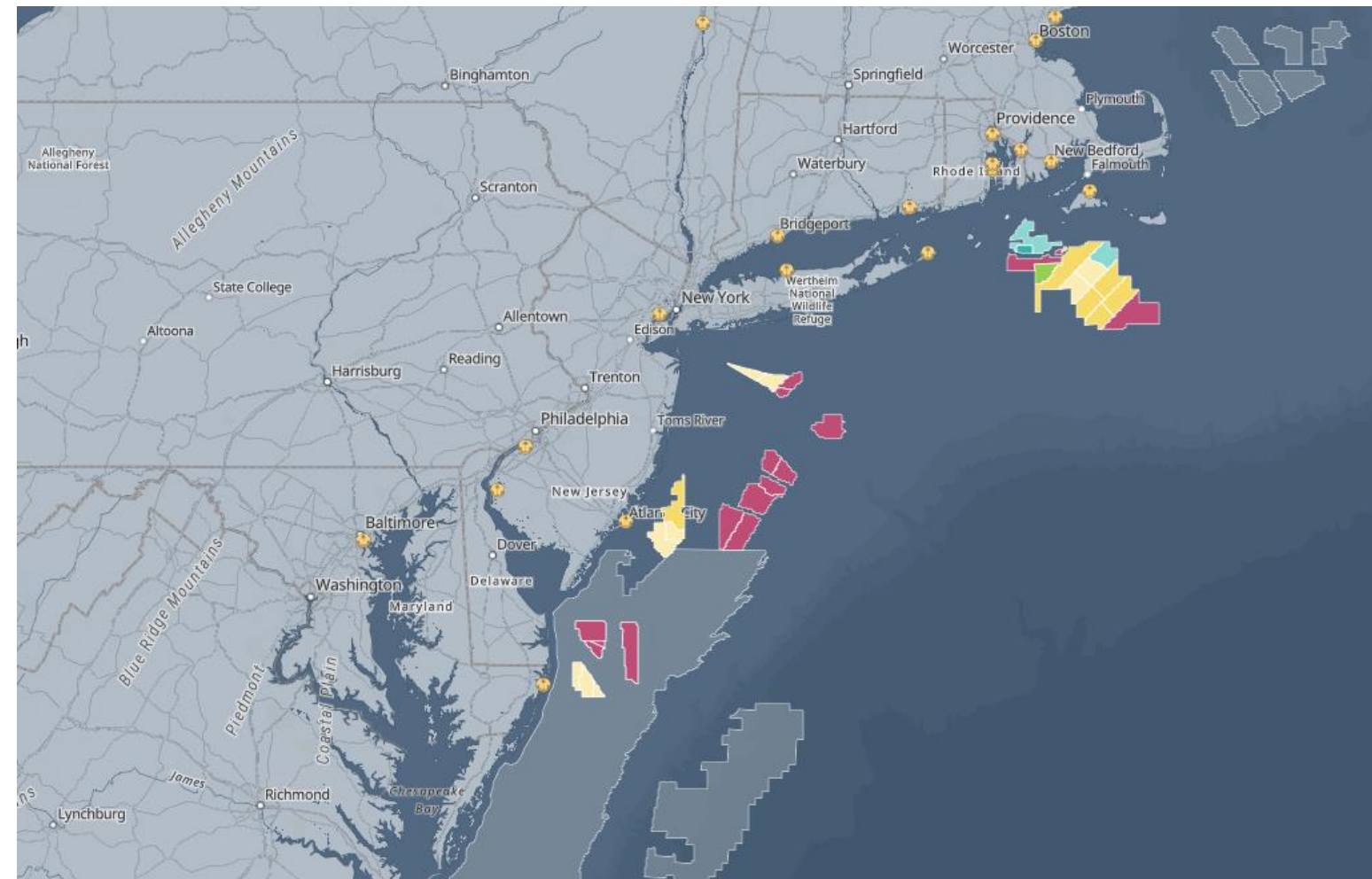
# 2) Reanalysis matters: power grids

https://www.esig.energy/weather-data-for-power-system-planning/

SUMMARY REPORT

**Weather Dataset Needs for Planning and Analyzing Modern Power Systems**
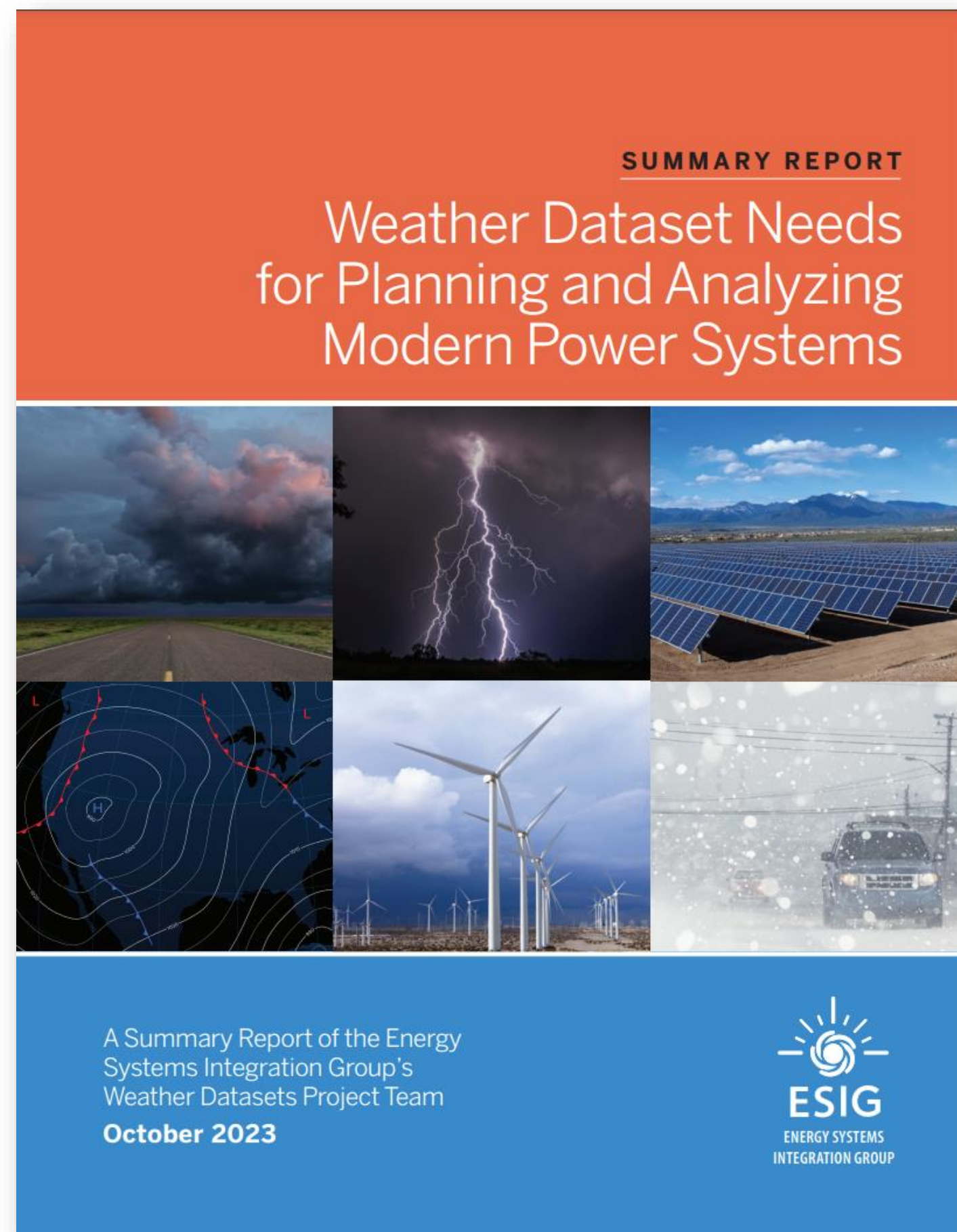
A Summary Report of the Energy Systems Integration Group's Weather Datasets Project Team

October 2023

ESIG
ENERGY SYSTEMS
INTEGRATION GROUP

TABLE ES-1

**The Main Attributes of Time Series Data Necessary to Meet General Power System Modeling Needs**

| | |
|---|---|
| **Including the necessary variables** | Include the necessary variables at sufficient spatio-temporal resolution and accuracy to reflect actual conditions that define the generation potential at current and future wind/solar sites and temperature at load centers |
| **Covering multiple decades with ongoing extension** | Cover multiple decades with consistent methodology and be extended on an ongoing basis to capture the most recent conditions and allow climate trends to be identified |
| **Coincident and physically consistent** | Are coincident and physically consistent, in space and time, across weather variables |
| **Validated** | Are validated against real conditions with uncertainty quantified |
| **Documented** | Are documented transparently and in detail, including limitations and a guide for usage |
| **Periodically refreshed** | Are periodically refreshed to account for scientific and technological advancements |
| **Available and accessible** | Publicly available, expertly curated, and easily accessible |

Source: Energy Systems Integration Group.

# An *organic* success story …

## …  but a risky journey

- ☐ **Will reanalysis keep being produced and continuously updated?**

- ☐ **Which ones? Where? When? What data?**

- ☐ **Will known biases be fixed?**

- ☐ **Who should take care of validation and applicability checks, where should these be reported?**

# 3) The TEM#111

## Connecting Reanalysis & Wind/Power Grid practitioners

- Improve **access and documentation** of reanalysis datasets.

- Promote and foster validation and advertise successful **applications** of reanalysis datasets for Wind Energy / Power Grid applications, and thereby improve their value.

- Act as a **point of contact / collaboration forum** between reanalysis providers and the Wind Energy communities.

TEM #111
Reanalyses for Wind Energy
April 25–26, 2024

And many others..

Proceedings: https://iea-wind.org/task11/tems/

# 3) The TEM#111

**Connecting Reanalysis & Wind/Power Grid practitioners**

**The TEM#111 succeeded in:**

- **Connecting Wind Energy / Global & Regional Reanalysis communities**

- **Summarizing state of the art (use cases, reanalysis advancement)**

- **Agreeing on follow-up actions:**

  - ✓ **Testing of new reanalyses (*ERA6 testing*)**

  - ✓ **Keep both communities up to date (*newsletter*)**

  - ✓ **Collecting user requirements for future datasets (*workshops*)**

  - ✓ **Validation using high quality in-situ datasets (*catalog of public data*)**

# 4) Way forward: how *you* can get involved!

## Connecting Reanalysis & Wind/Power Grid practitioners

**Are you doing reanalysis?**

- **Ask** for user requirements

- **Validate** your model results

- **Plan** for the next steps

**Are you using reanalysis?**

- **Provide** user requirements

- **Know** what's coming

- **De-risk** future data and use cases

# 4) Way forward: how *you* can get involved!

## Connecting Reanalysis & Wind/Power Grid practitioners
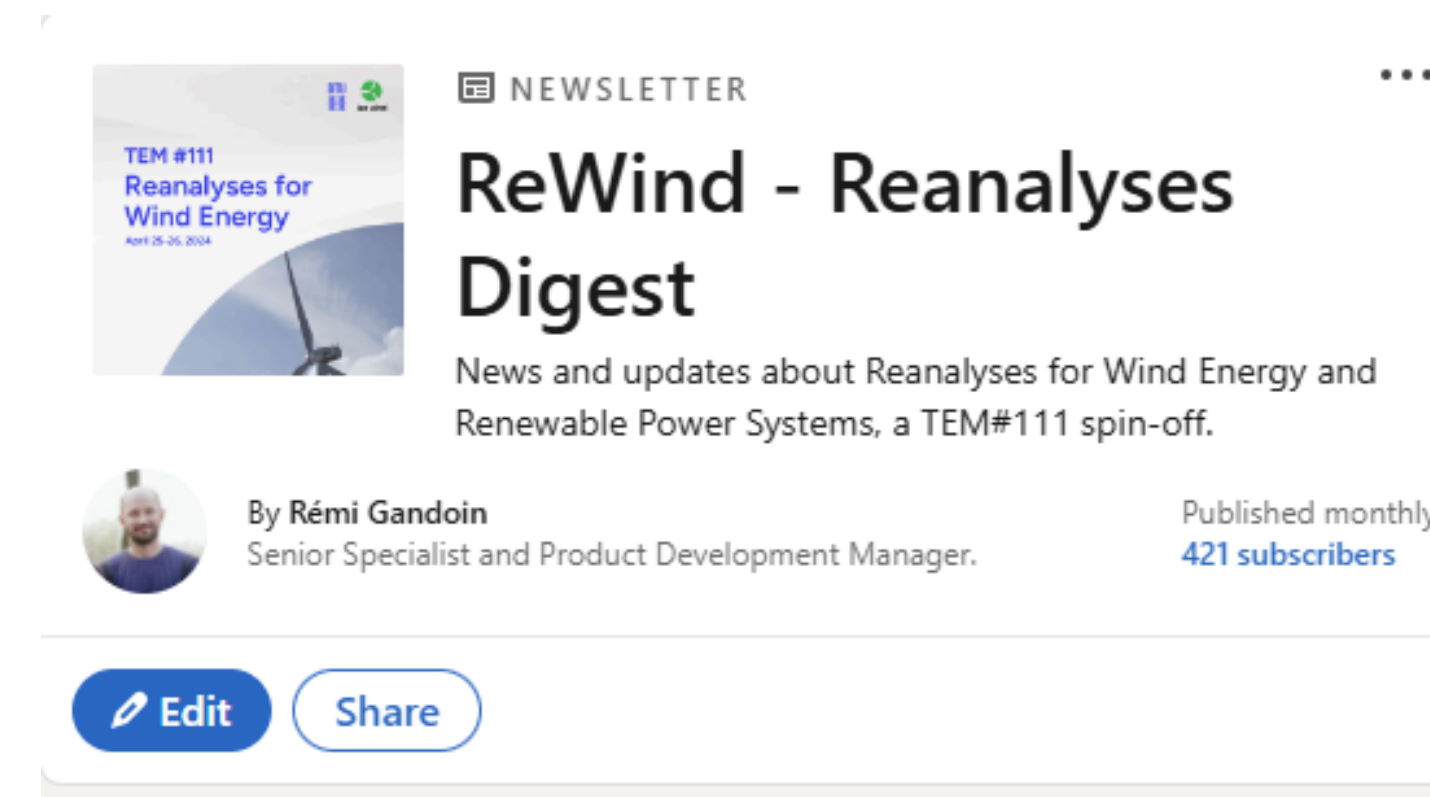
**Get in touch!**

Write to us:

- Rémi Gandoin rga@c2wind.com
- Justin Sharp jsharp@epri.com
- Jacob Tornfeldt Sørensen
  jts@dhigroup.com
- Julia Gottschall
  julia.gottschall@iwes.fraunhofer.de
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Newsletter:
https://www.linkedin.com/newsletters/7231744
153947144194/



**We shall soon find a "home" outside of Wind / Power Grid silos …**

**… check this space and reach out if you are interested in joining us!**

# Thank you.