IEA Wind TCP

Global Collaboration in Wind Energy Technology

John Mc Cann, 23 March 2023, Polish TCP Coordination Day

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What is a TCP?

Affiliated Groups

The IEA Technology Collaboration Programme (TCP) is a series of about 40 international partnerships that enable **governments**, **businesses**, **industries**, **international organisations** and **non-governmental organisations** to **share research** on **breakthrough technologies**, to fill existing **research gaps**, build **pilot plants** and carry out **deployment** or **demonstration programmes**.

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4.5 decades of international wind energy R&D

1970s

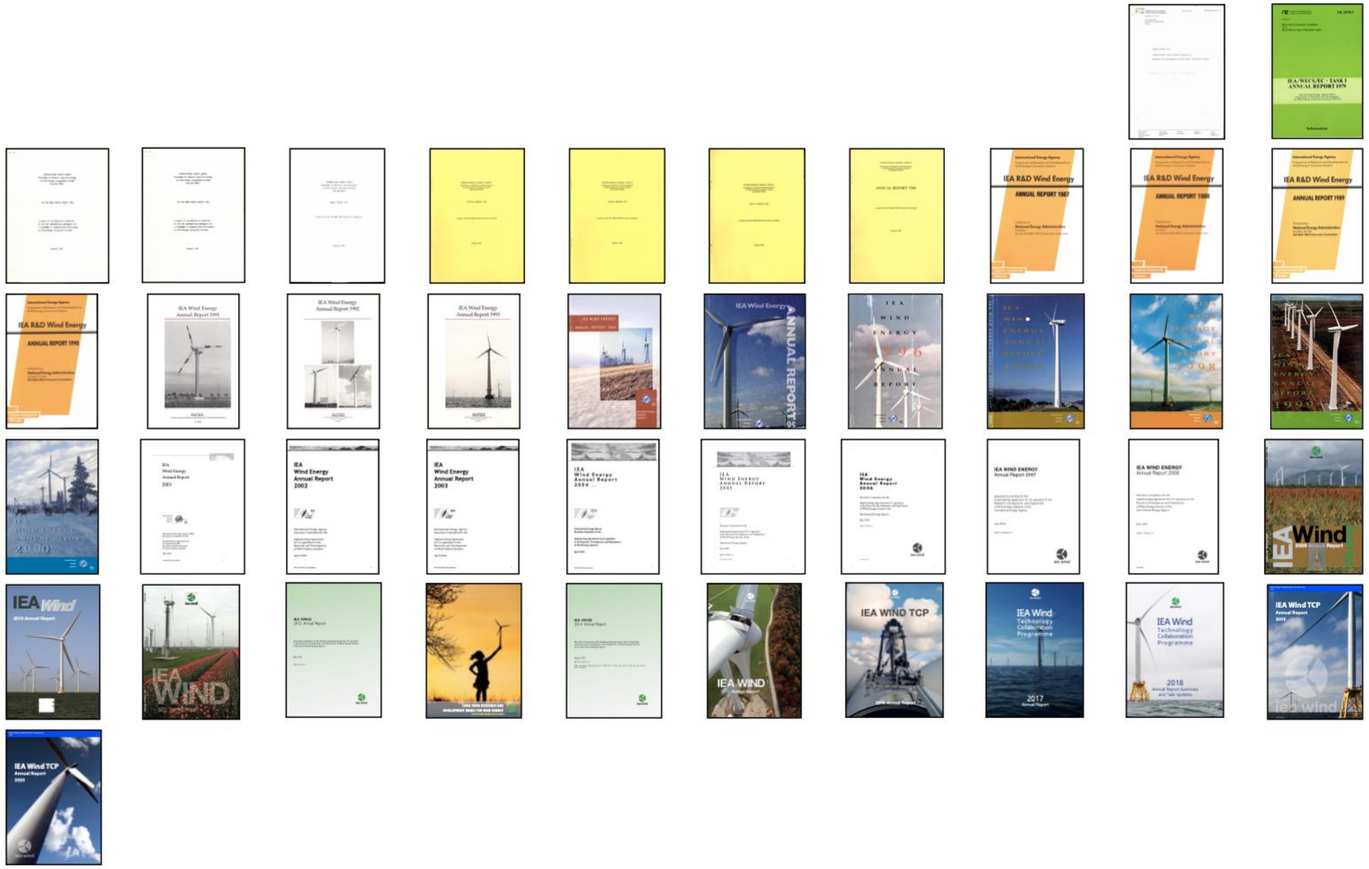
1980s

1990s

2000s

2010s

2020s



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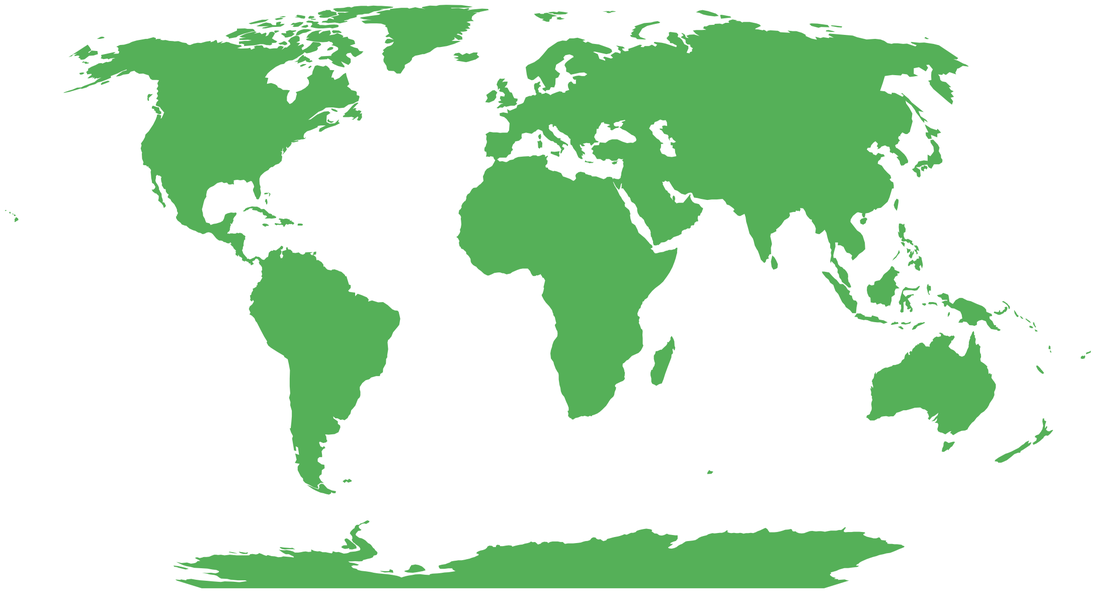
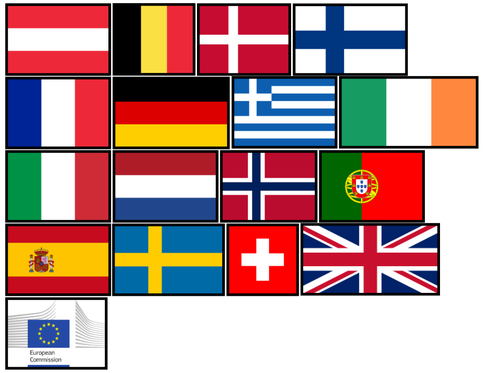
22 members + 2 sponsors (industry associations)



Americas

Asia

Europe



Sponsors

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vision and mission

- **Our vision:** Wind energy leads the global transition to a decarbonized energy supply.
- **Our mission:** Promote high impact wind energy research and communication through international collaboration.

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strategic objectives

- Maximize the value of wind energy in energy systems and markets
- Lower the cost of land-based and offshore wind energy
- Facilitate wind energy deployment through social support and environmental compatibility
- Foster collaborative research and the exchange of best practices and data

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research priorities





- Resource and Site Characterization
- Advanced Technologies
- Energy Systems with High Amounts of Wind
- Social, Environmental, and Economic Impacts
- Communication, Education, and Engagement

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organization and roles

Executive Committee (ExCo)

biannually ExCo Meetings (spring and autumn)

Leadership Team (LT)

meets at least once per month

Chair (DE) + VCs (CH, DE, ES, IR, 2 x US)

Secretariat

daily business

support of ExCo, LT and OAs

Research Committee
Resource & Site Characterization

- Task Operating Agent (OA)
- Task Operating Agent (OA)

Research Committee
Advanced Technologies

- Task Operating Agent (OA)
- Task Operating Agent (OA)

Research Committee
Energy Systems with High Amounts of Wind Energy

- Task Operating Agent (OA)
- Task Operating Agent (OA)

Research Committee
Social, Environmental, and Economic Impact

- Task Operating Agent (OA)
- Task Operating Agent (OA)

Communication Committee
Communication, Education, and Engagement

- Task 11 Operating Agent (OA)

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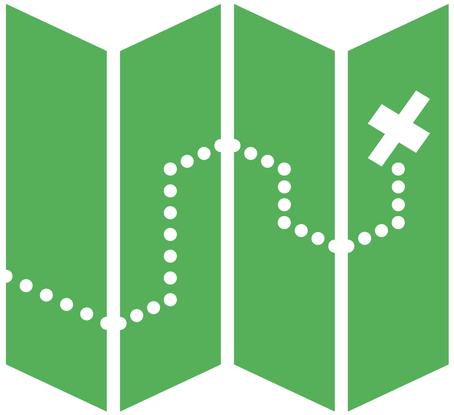
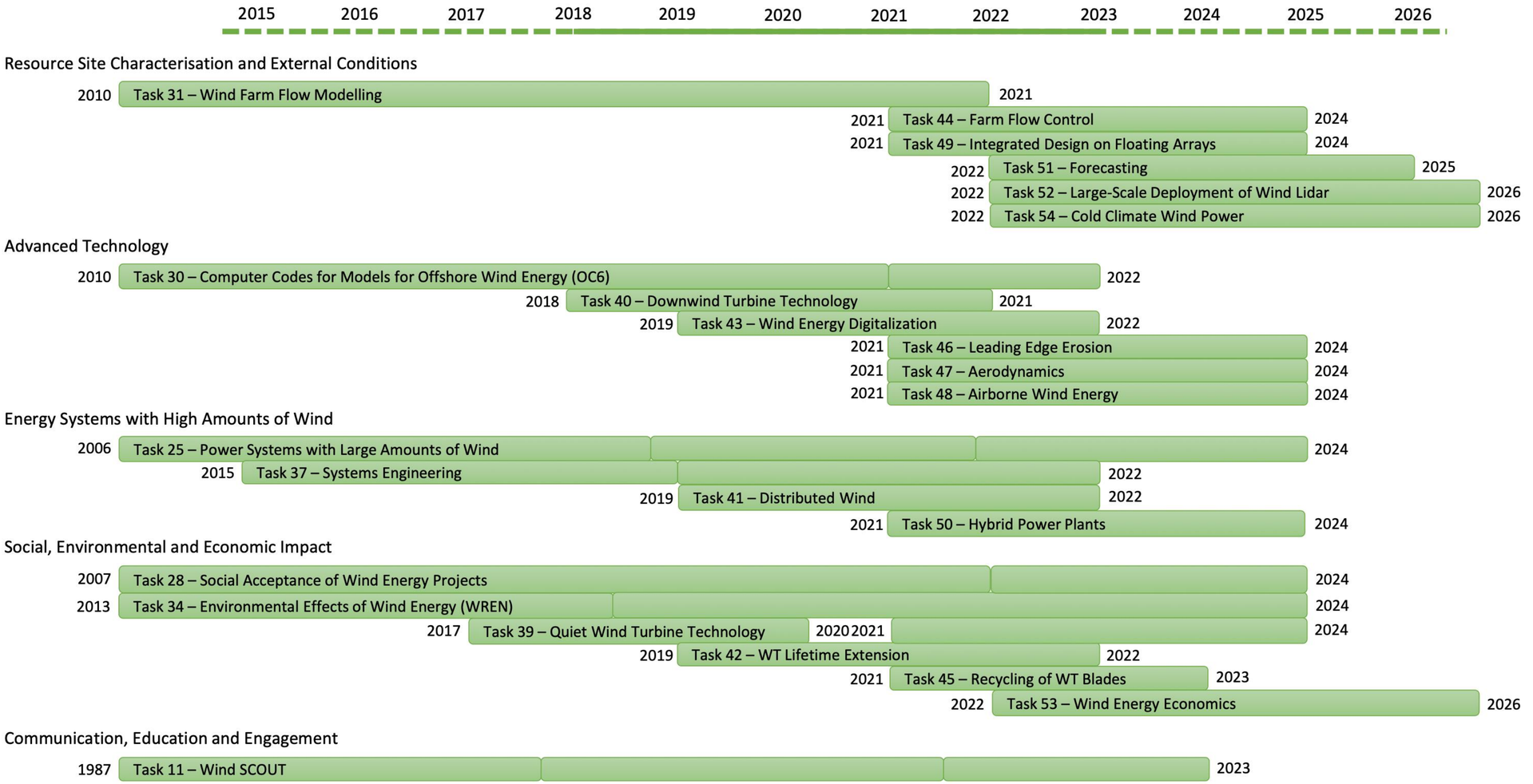
task portfolio





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Task 11 - Wind SCOUT

- A key task through its organization of more than 100 Topical Expert Meetings (TEMs) since 1978.
- Outcomes of Topical Expert Meetings may be a standalone reports/outputs or, where a significant research gap is identified, a new Task may be scoped.

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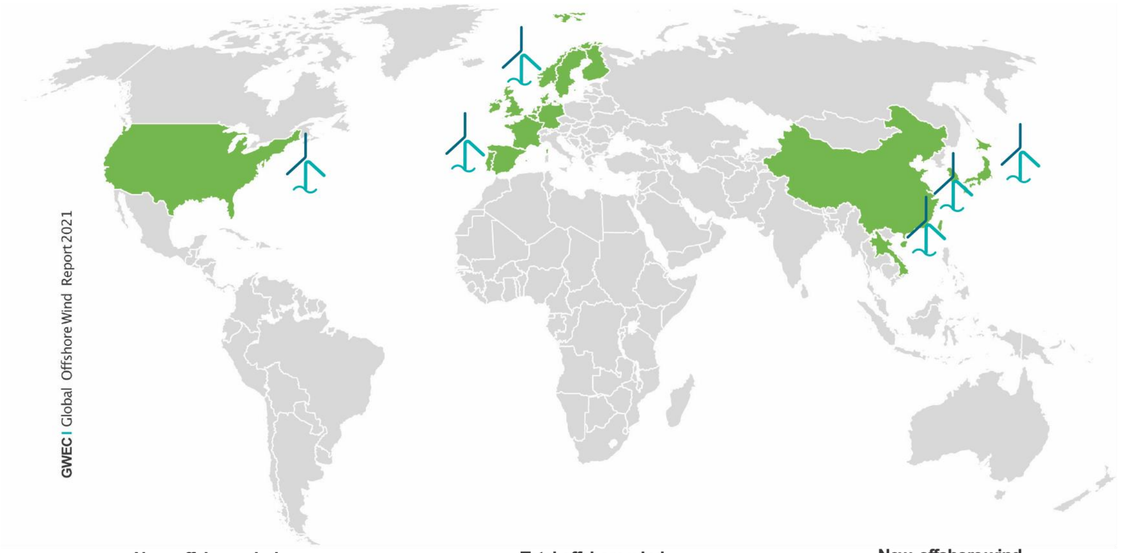
Task 11 - Wind SCOUT

TEM #99	Jul. 2020	Floating Offshore Wind Arrays	Task 49
TEM #100	Dec. 2020	Aviation System Cohabitation: Best Practices & Policies	
TEM #101	Aug. 2020	Hybrid Power Plants	Task 50
TEM #102	Sep. 2020	Airborne Wind Energy: Challenges and Opportunities	Task 48
TEM #103	Feb. 2022	Offshore Wind Project Consenting	
TEM #108	Jan. 2023	Technology Transfer	
TEM #109	Feb. 2023	Grand Challenges in Wind Energy	

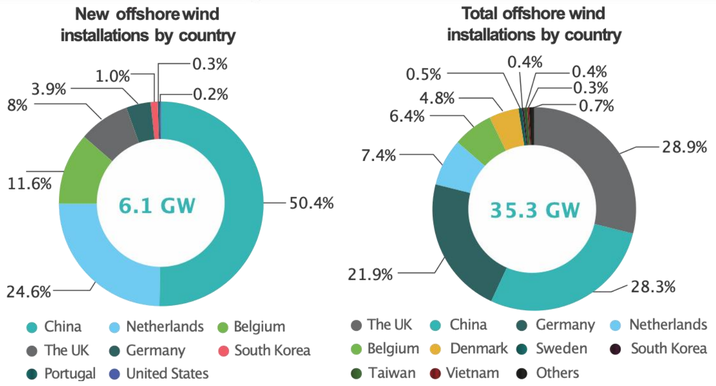
Advanced Technology

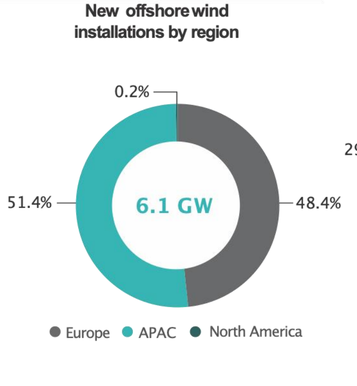
enhancements and novelties – a critical mass is needed to start a task

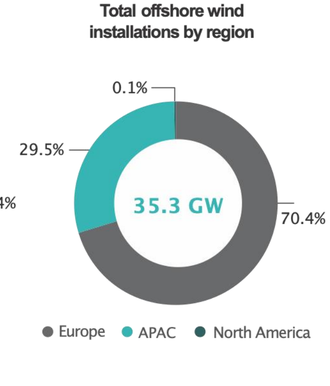


FLOATING WIND

- 16.83 MW floating wind installed in 2020, of which 16.8 MW is from Portugal and 0.03 MW from Spain;
- As of 2020, a total of 73.33 MW net floating wind was installed globally, of which 32 MW is located in the UK, 25 MW in Portugal, 12 MW in Japan, 2.3 MW in Norway and 2 MW in France.







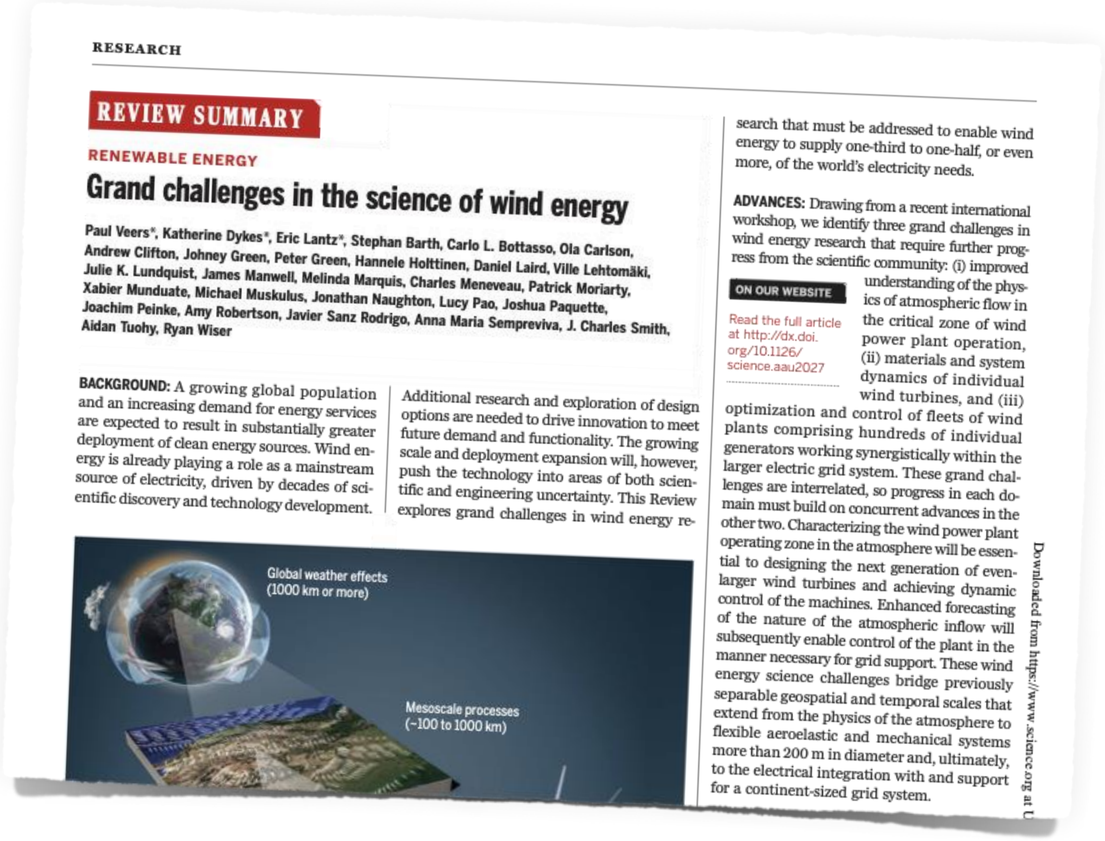
»Special Edition« TEMs - #89

a grand vision for wind energy

Purpose: Explore the question of how to enable a future in which wind energy achieves its full potential as global energy resource

Participants: Over 70 experts representing 15 different countries over 2 years

Outcomes: *Grand Challenges of Wind Energy Science*



RESEARCH

REVIEW SUMMARY

RENEWABLE ENERGY

Grand challenges in the science of wind energy

Paul Veers*, Katherine Dykes*, Eric Lantz*, Stephan Barth, Carlo L. Bottasso, Ola Carlson, Andrew Clifton, Johney Green, Peter Green, Hannele Holttinen, Daniel Laird, Ville Lehtomäki, Julie K. Lundquist, James Manwell, Melinda Marquis, Charles Meneveau, Patrick Moriarty, Xabier Munduate, Michael Muskulus, Jonathan Naughton, Lucy Pao, Joshua Paquette, Joachim Peinke, Amy Robertson, Javier Sanz Rodrigo, Anna Maria Sempreviva, J. Charles Smith, Aidan Tuohy, Ryan Wiser

BACKGROUND: A growing global population and an increasing demand for energy services are expected to result in substantially greater deployment of clean energy sources. Wind energy is already playing a role as a mainstream source of electricity, driven by decades of scientific discovery and technology development. Additional research and exploration of design options are needed to drive innovation to meet future demand and functionality. The growing scale and deployment expansion will, however, push the technology into areas of both scientific and engineering uncertainty. This Review explores grand challenges in wind energy research that must be addressed to enable wind energy to supply one-third to one-half, or even more, of the world's electricity needs.

ADVANCES: Drawing from a recent international workshop, we identify three grand challenges in wind energy research that require further progress from the scientific community: (i) improved understanding of the physics of atmospheric flow in the critical zone of wind power plant operation, (ii) materials and system dynamics of individual wind turbines, and (iii) optimization and control of fleets of wind plants comprising hundreds of individual generators working synergistically within the larger electric grid system. These grand challenges are interrelated, so progress in each domain must build on concurrent advances in the other two. Characterizing the wind power plant operating zone in the atmosphere will be essential to designing the next generation of even-larger wind turbines and achieving dynamic control of the machines. Enhanced forecasting of the nature of the atmospheric inflow will subsequently enable control of the plant in the manner necessary for grid support. These wind energy science challenges bridge previously separable geospatial and temporal scales that extend from the physics of the atmosphere to flexible aeroelastic and mechanical systems more than 200 m in diameter and, ultimately, to the electrical integration with and support for a continent-sized grid system.

ON OUR WEBSITE

Read the full article at http://dx.doi.org/10.1126/science.aau2027

Downloaded from https://www.science.org at U

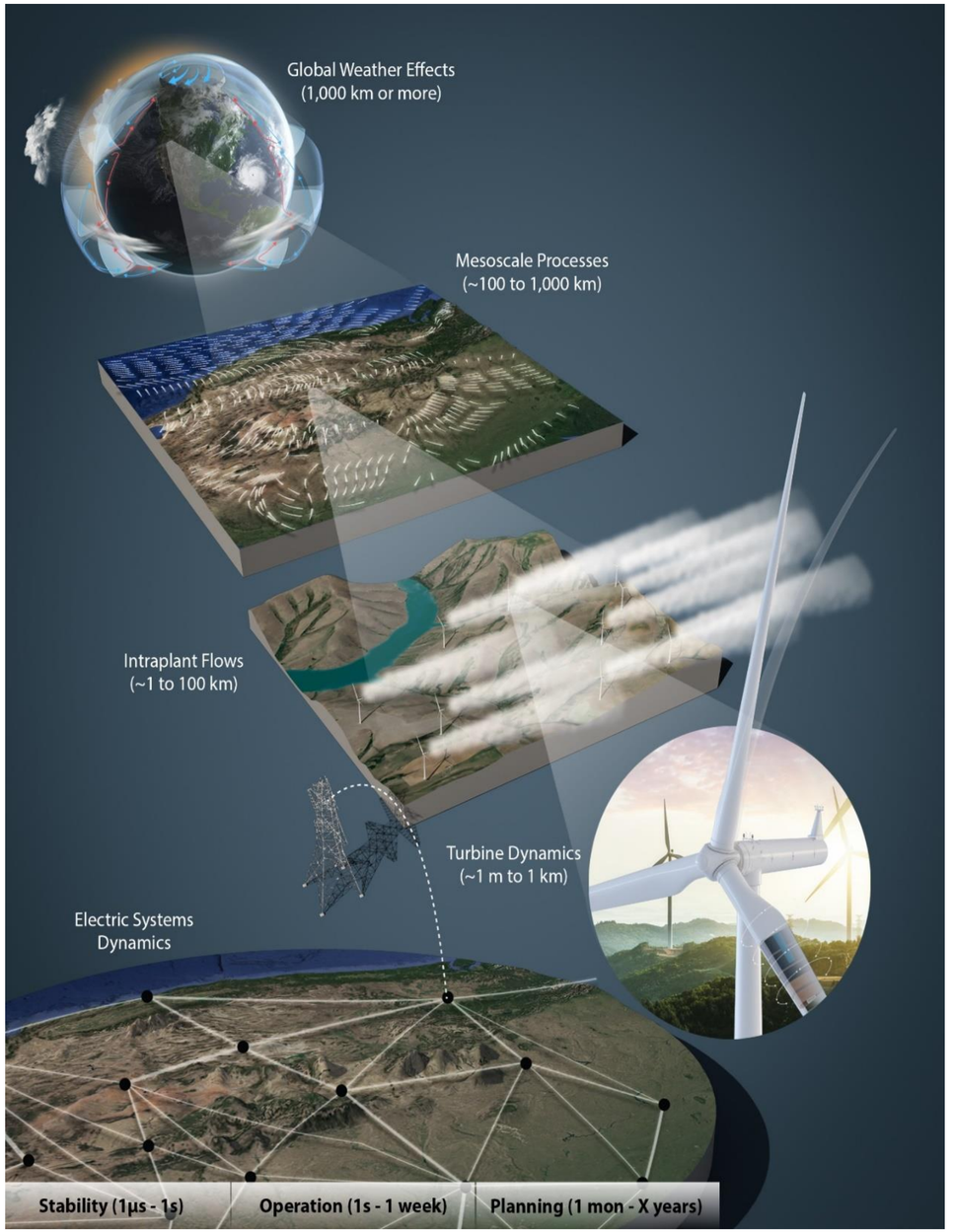
IEA Wind Led Initiative

the grand challenges

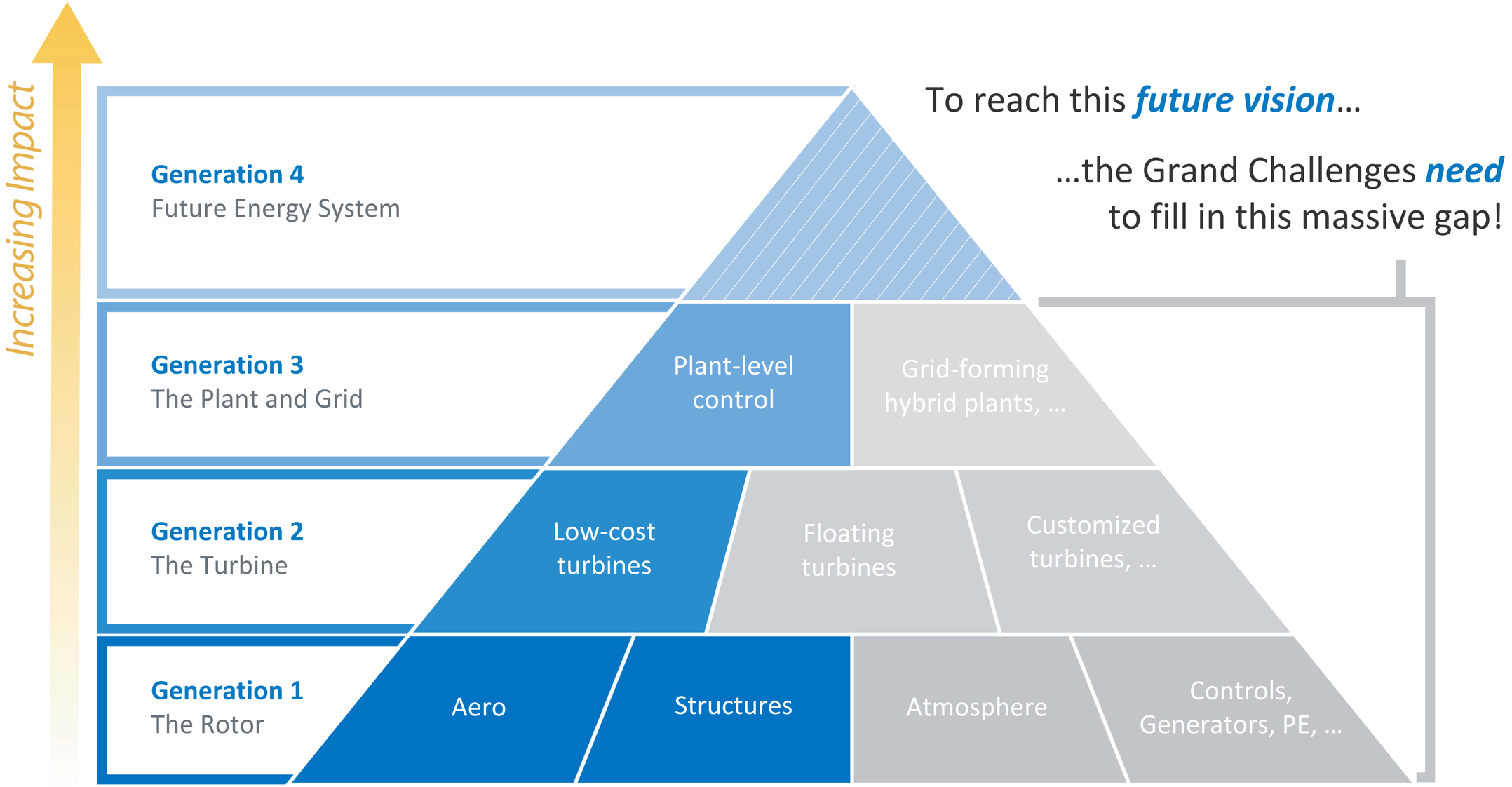
1) Understanding the wind from global to local scales

2) Handling the dynamics and design of skyscraper size machines on land and offshore

3) Supporting electricity and energy system operation and reliability from the near term (seconds) to long term (years)



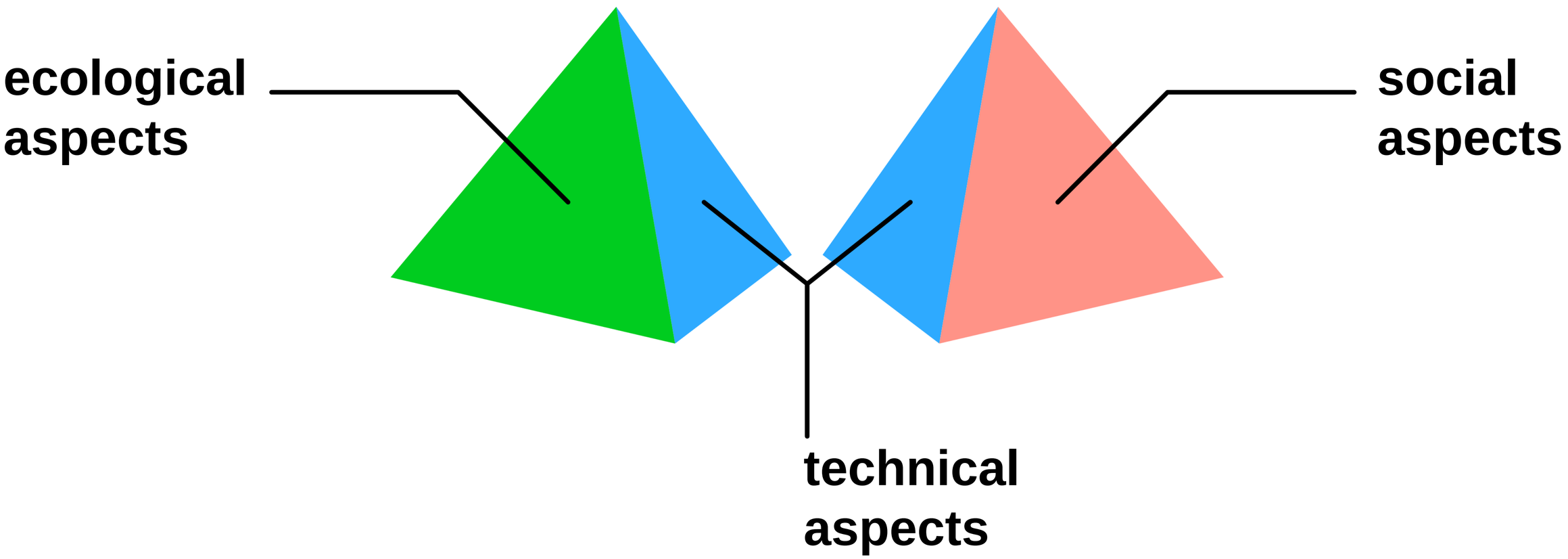
Paul Veers Pyramid: The Generations Build on Each Other



To reach this ***future vision***…

…the Grand Challenges ***need*** to fill in this massive gap!

There are more sides to the pyramid



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grand challenges TEM sequels

- What have we missed?
- What has changed?
- What is new?
- Provide the global forum for strategic prospects in wind energy R&D.

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Why get involved?

- Unique forum for research, industry, sponsor organizations, governments.
- Recognized and trusted body for pre-standards and best practices.
- Activities are not driven by funding, i.e. the interest in collaborating is key.
- Existing framework for global cooperation.
- It is flexible. Partners can join and leave.
- »Expanding to Cross-TCP activities«

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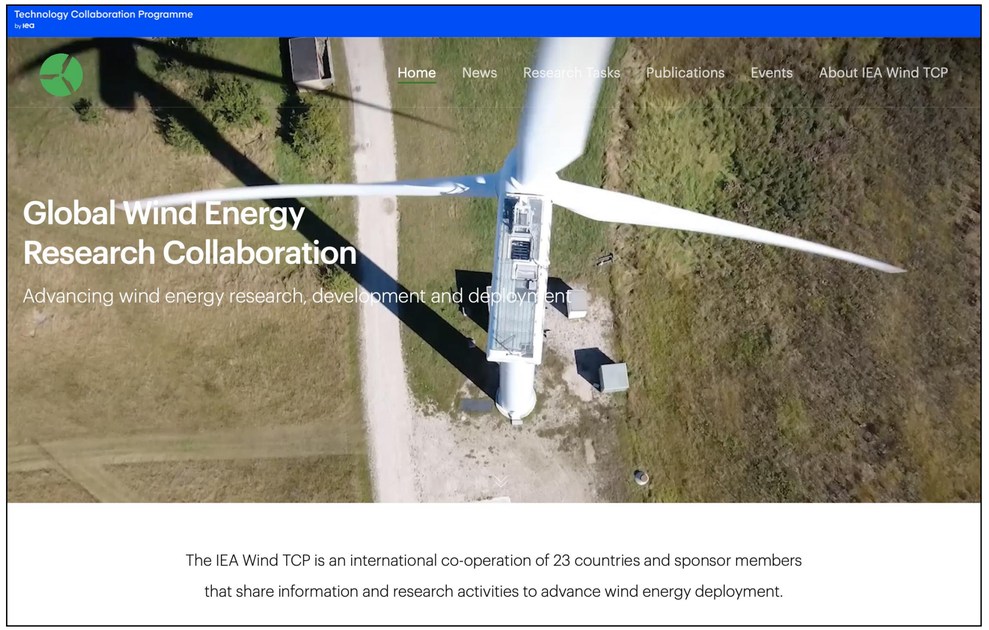
How to get in touch?

https://iea-wind.org



https://www.linkedin.com/company/iea-wind

IEA Wind Publications

annual reports, recommended practices, reports

IEA Wind Annual Report

Contents

- Global overview of wind energy deployment, technology and R&D
- Combined wind energy statistics for member countries
- Update on progress within IEA Wind Tasks
- Member country policy and deployment updates
- Member country R&D highlights

https://iea-wind.org

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The IEA Wind TCP agreement, also known as the Implementing Agreement for Co-operation in the Research, Development, and Deployment of Wind Energy Systems, functions within a framework created by the International Energy Agency (IEA). Views, findings, and publications of IEA Wind do not necessarily represent the views or policies of the IEA Secretariat or of all its individual member countries.