

ENERGY ISLANDS

Developing Renewable Energy Hubs

Webinars organized under the auspices of the
IEA Experts' Group on R&D Priority-setting and Evaluation (EGRD)
Hosted by the Danish Ministry of Climate, Energy and Utilities

Tuesday 29 September 2020

10:00-11:15 (CEST)

13:00-14:25 (CEST)

Onshore, nearshore or offshore seems to be one of the central choices governments face when preparing for large scale wind energy in the transformation of the energy system. Each siting comes with its pros and cons. As of today, the Levelized Cost of Energy (LCoE) of onshore wind power is more cost competitive than offshore wind but are also subject to increasing public resistance. Moving nearshore does not address this challenge, but are associated with lower installation and operation and maintenance costs compared to offshore.

However, offshore wind energy has proven to be a prosperous venue. Moving wind energy generation offshore took off just a few decades ago with the first ever offshore farm in Danish Vindeby in 1991. Throughout the 2000s, offshore wind continued to expand in Northern Europe, primarily in the North Sea, which offers near ideal conditions for energy generation with strong winds, average wind speeds over 8 meters per second and relatively shallow water depths. The globally installed offshore wind capacity reached nearly 30 GW by June 2020. The UK remains the world's largest offshore wind sector, with a cumulative capacity of 10.4 GW followed by Germany with 7.7 GW and China with 6.4 GW.¹

With ambitious national targets for a combination of renewable energy and CO₂ emission cuts, countries face the challenge of how to effectively deploy and integrate large scale offshore wind energy in the energy system that can go beyond traditional flexibility measures and cross-border transmission lines. In 2019 a number of ambitious infrastructure projects coupling offshore wind energy to gas storage facilities and power-to-gas grids were presented. The international consortium partners of the North Sea Wind Power Hub (NSWPH) presented the prospects of wind power hubs in the North Sea, the so-called Hub-and-Spoke projects, combining wind power connection, coupling of energy markets through interconnection and smart integration in the onshore energy grid, including power-to-gas. Some of these projects are foreseen nearshore, others offshore, some plan with building an artificial island, combining the features of nearshore and offshore.

This series of webinars will focus on the rationale and advantages of these infrastructure projects, the technological, regulatory, environmental and economic challenges, the lessons learned so far and the unknowns to be addressed and solved. More specifically the webinars will provide insights in different renewable energy islands/hubs cases, the opportunities and challenges they pose for the transformation of the energy system and how they might be further facilitated.

¹ https://wfo-global.org/wp-content/uploads/2020/08/WFO_Global-Offshore-Wind-Report-HY1-2020.pdf

Webinar 1 will take place 10:00-11:15 (CEST) and focus on renewable energy islands:

- What are the rationale and concept of different energy islands
- What are the main technological, regulatory, environmental and economic challenges of the island/hub?
- What are the recommendations to accelerate the roll-out of such islands/hubs?

Webinar 2 will take place 13:00-14:25 (CEST) and focus on technologies and system integration:

- What are the knowledge gaps and gains in power-to-gas technologies and their integration in the system
 - Prospects of different electrolysis technologies
 - Their competitors – blue hydrogen (based on natural gas), batteries etc.
 - Models for the power-to-gas infrastructure (e.g. landing zone, on-site, distributed)

Webinar 1: Energy Islands	
1:00-10:10	Welcome by Dr. Birte Holst Jørgensen, Chair of EGRD
10:10-10:25	The Danish energy islands by Marie Hindhede, Deputy Permanent Secretary of The Ministry of Climate, Energy and Utilities
10:25-10:40	The IJVER Energy Island by Ernst van Zuijlen, Offshore Service Facilities
10:40-10:55	Perspectives on offshore wind and its integration in the energy system by NN, Equinor - Renewable & Low carbon technology
10:55-11:15	Discussion and concluding remarks

Webinar 2: Power-to-gas Technologies and System Integration	
13:00-13:10	Welcome by Dr. Birte Holst Jørgensen, Chair of EGRD
13:10-13:25	NEDO's Power to Gas technology development activity by Eiji Ohira, Director, Fuel Cell and Hydrogen Technology Group, Advanced Battery and Hydrogen Technology Department, New Energy and Industrial Technology Development Organization (NEDO)
13:25-13:40	Westküste100 - Complete sector coupling: Green hydrogen and decarbonisation on an industrial scale by Dr. Marcel Goelden, Raffinerie Heide GmbH
13:40-13:55	Hydrogen Initiative Energy Model Region Austria Power & Gas (WIVA P&G) by NN
13:55-14:10	Game changes for PtX and infrastructure by Tor Elmelund, Danish TSO Energinet
14:10-14:25	Discussion and concluding remarks

Webinar 1: Registration: <https://register.gotowebinar.com/register/6384353159121963280>

Webinar 2: Registration: <https://register.gotowebinar.com/register/8512851539846462731>

International Energy Agency (IEA)

The IEA is an autonomous agency established in November 1974. Its mandate is two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply and to advise member countries on sound energy policy. The IEA carries out a comprehensive programme of energy co-operation among 30 advanced economies. The Agency aims to:

- Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations, and other stakeholders.

Since the 1980s, the IEA has continued to build good working relationships with countries beyond its membership, in particular major energy consuming, producing and transit countries. Co-operation with partner countries cover a wide range of activities, from joint workshops to in-depth surveys of specific energy sectors or data exchange. Combined, the IEA co-operates with more than 69 countries worldwide.

IEA Energy Technology Network

The IEA Energy Technology Network is an ever-expanding, co-operative group of more than 6,000 experts that support and encourage global technology collaboration. At the head of this vast network is the Committee on Energy Research and Technology (CERT).

Committee on Energy Research and Technology

Comprised of senior experts from IEA member governments, the CERT considers effective energy technology and policies to improve energy security, encourage environmental protection and maintain economic growth. Under the guidance of the IEA Governing Board, the CERT oversees the technology forecasting, analyses and the research, development, demonstration and deployment strategies of the IEA Secretariat, notably through its flagship publication, *Energy Technology Perspectives*, and the series of energy technology roadmaps. The CERT also provides guidance to its working parties and experts' groups to examine topics that address current energy technology, or technology policy, issues.

Experts' Group on R&D Priority-Setting and Evaluation (EGRD)

The EGRD examines analytical approaches to energy technologies, policies, and RD&D on targeted, timely topics. The results and recommendations support the CERT, feed into IEA analysis, and enable a broad perspective of energy technology issues. Recent topics analysed include Energy Communities (2020), Green Fuels (2019), System Resiliency and Flexibility (2019), and Future Energy Market Design (2018). Workshop summaries are available here: <https://userstcp.org/iea-egrd>.