ENERGY ISLANDS OUTLOOK 2026

Key drivers for success: Outlook to 2030

ENERGY ISLAND FORUM

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Summary

In 2024, the Energy Island Forum (EIF) was established to strengthen the collaboration among industry, transmission system operators, universities, energy agencies, and public and industry organizations, with the shared goal of making energy islands a success. With its cross-sectoral approach, bringing together stakeholders who have traditionally operated in separate domains, the Energy Island Forum stands out as a unique initiative. By fostering joint efforts, EIF is breaking down silos and building a shared vision for offshore energy development. This unprecedented level of cooperation marks a transformative shift in how the sector is approaching the challenges and opportunities of energy islands. As a key milestone, the EIF presented its strategic roadmap to Members of the European Parliament in December 2024.

The roadmap outlines two key horizons: short term **2030** and long term **2050**. The 2030 horizon focuses on identifying concrete actions to enable the realization of the first offshore energy hubs in the 2030s. These initial hubs will serve as stepping stones, guiding research, innovation and demonstration efforts aimed at making offshore energy hubs increasingly cost-effective, reliable and widespread by 2050. Importantly, key actions for both horizons are being launched in parallel to ensure a coordinated and forward-looking approach.

The roadmap is organised into five key fields of innovation, each addressing critical aspects of offshore energy hub development and giving more specific actions:

1. **Power & Energy Systems**
2. **Offshore Wind**
3. **Power-to-X & Green Fuels**
4. **Society & Environment**
5. **Regulation**

Following the publication of the roadmap, the Energy Island Forum continued its work by developing the roadmap into an implementation plan that is presented in this document.

The implementation plan marks the first step toward realizing the roadmap and concentrates on initiating the key actions aligned with the 2030 horizon. It is guided by a clearly defined overarching strategic goal—**the Northern Star**—which serves as a unifying direction for all stakeholders involved.

The impact framework

To translate the Energy Island Forum's first roadmap into a practical implementation plan, one that bridges long-term ambitions with concrete, actionable steps, the Pluss Leadership Impact Framework, originally developed for Innovation Fund Denmark, has been adopted as a strategic planning and evaluation tool.

This framework is grounded in the understanding that complex challenges demand a mission-driven approach. More than a static planning tool, it is a dynamic system designed to support continuous learning and adaptive decision-making.

For EIF, this adaptability is essential: realizing energy islands requires coordinated efforts across sectors, disciplines, and national borders. By offering a shared structure for alignment, clear measurement points, and mechanisms for strategic learning, the Impact Framework enables EIF to stay responsive and focused as it advances toward its mission.

Defining the Northern Star

Following Pluss Leadership's methodology a Northern Star *"...is an ambitious and overall goal which is time-bound and measurable. It works as a focus point for the mission partnership and is used as navigation in all important decisions and when dilemmas or challenges arise. The Northern Star defines the mission and is fixed, but strategies for how to achieve the Northern Star can be adjusted continuously as new knowledge is acquired."* (Pluss Leadership 2025).

Building on the above, the Energy Island Forum's Steering Committee has agreed on the following definition for its Northern Star:

By 2050, offshore energy hubs are the cornerstone of a resilient, cost-effective, and decarbonized European energy system delivering affordable, secure, and sustainable energy.

Defining the Tipping Points

Following Pluss Leadership's methodology Tipping Points are *"... critical points after which significant changes occur and typically accelerate an irreversible development. [...] Tipping points can have different characteristics. They can be technological, market-related, regulatory, systemic, or cultural, and in some instances a combination of multiple tipping points is necessary to activate large changes."* (Pluss Leadership 2025).

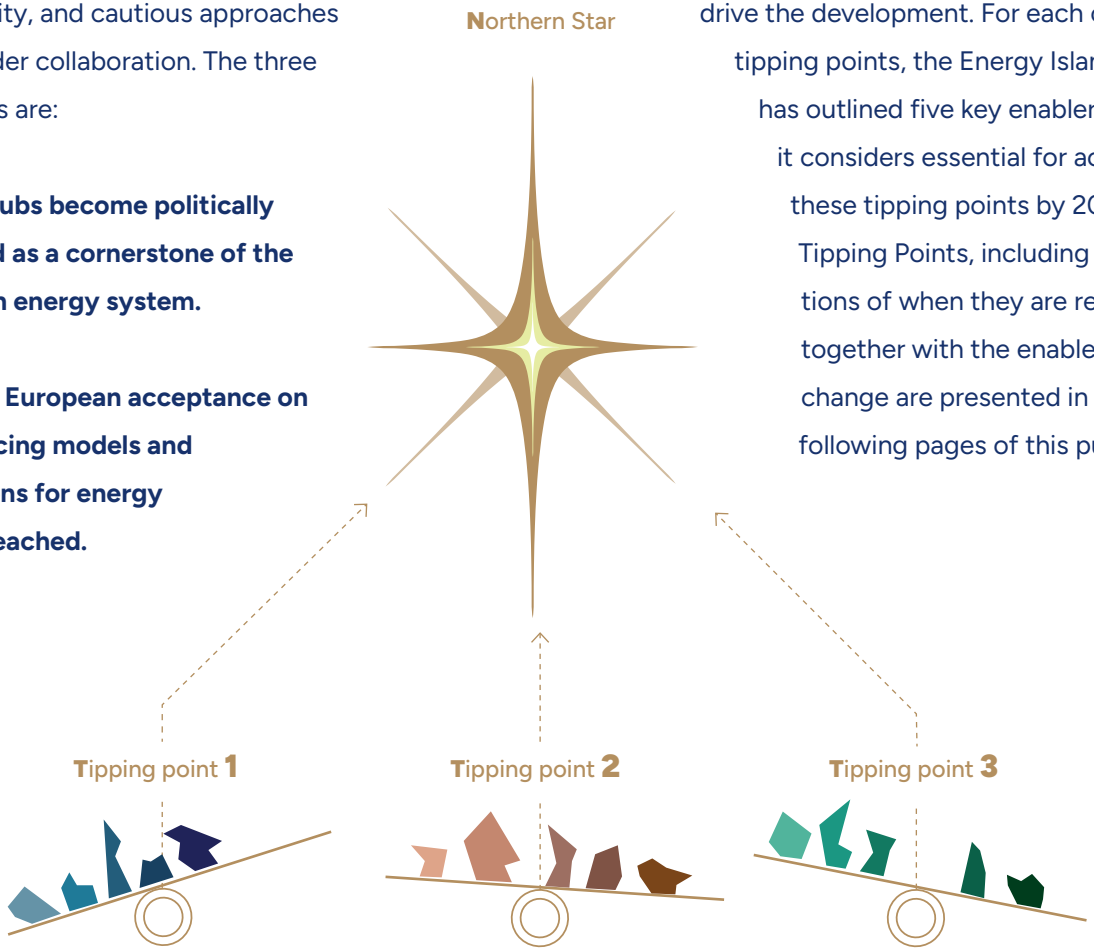
Building on this definition, the Steering Committee has agreed to prioritize three initial Tipping Points. They have been selected to address the mounting challenges that have affected the development of offshore energy hubs in 2024 and 2025. The challenges include sharply increased infrastructure costs, disruptions across supply chains, and a more complex political landscape characterized by heightened focus on resilience, energy security, and cautious approaches to cross-border collaboration. The three tipping points are:

1. **Energy hubs become politically accepted as a cornerstone of the European energy system.**

2. **A shared European acceptance on co-financing models and regulations for energy hubs is reached.**

3. **Integrated energy hubs actively enhance system security and drive cost-efficiency in modern power systems.**

For reaching a tipping point, several underlying enablers of change are identified. They each serve as important steps towards the tipping point and will clarify which actions and research questions are needed to drive the development. For each of the three tipping points, the Energy Island Forum has outlined five key enablers of change it considers essential for achieving these tipping points by 2030. The Tipping Points, including descriptions of when they are reached, together with the enablers of change are presented in the following pages of this publication.



Tipping Point 1

Energy hubs become politically accepted as a cornerstone of the European energy system

The tipping point is reached when there is active engagement on both national and European level for increased regional collaboration on energy hubs. These are recognized as crucial for strengthening security of supply, energy independency and enabling efficient integration of offshore renewables into the European transmission system. Energy hubs are seen as a key energy technology, contributing to European innovation, overall cost efficiency, and lower electricity prices by reducing grid bottlenecks and supporting a meshed European grid.

Enablers of Change

Energy hubs become part of Energy Highways: Energy hubs are formally recognized as part of the European Energy Highways. They are seen as strategic nodes and a solution to alleviate transmission bottlenecks and enable efficient cross border electricity flows, supporting the development of a meshed transmission grid.

Economic impact assessments: Agreed upon simulations show where, when and how energy hubs will reduce congestion costs, improve cross-border flows and contribute to competitive electricity prices. Among others, the factors included are alleviating transmission bottlenecks, enabling smoother power exchange between regions and countries, and improving the distribution of low-cost renewable electricity.

Evaluation of the overall impact of hubs: Assessment of the advantages and disadvantages of energy hubs becomes more comprehensive. This allows politicians, researchers and local communities to evaluate how and to what extent the positive effects of energy hubs over a longer timeframe may outweigh the potential challenges effects on environment, local communities and economy. In achieving this, transparent evaluation builds acceptance among communities and stakeholders.

National recognition of energy collaboration: In recognition of their positive impact on the socio-economics in hosting nations, energy hubs are integrated into national plans for energy independence, security of supply and energy collaboration with neighbouring countries. An acceptance on local and national level will foster further regional collaboration on energy hubs.

Political instruments and frameworks: Political support for European and regional collaboration with clear governance models for TSOs and market participants becomes stronger. This cover responsibilities for the cross-border ownership and sharing of risks, costs and benefits to effectively govern and co-finance the energy hubs. This political momentum will go hand in hand with the enablers of change of tipping point 2, where the development and use of new regulation and financing models will enhance the political support and confidence.

Tipping Point 2

A shared European acceptance on co-financing models and regulations for energy hubs is reached

The tipping point is reached when regulation and financial structures for both transmission infrastructure and offshore wind power plants are designed and implemented. For production, this includes establishing mechanisms to share risks, costs, and benefits between developers and involved nation-states. For transmission infrastructure, this covers regulation for cross-border ownership and co-financing models.

Enablers of Change

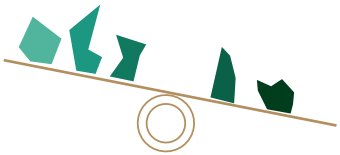
Socio-economic modelling: New frameworks are developed and utilised for multilateral approaches to model and estimate the socio-economic benefits of cross-border production and transmission at the regional level.

Cross-border ownership of critical infrastructure: A framework for cross-border co-financed ownership of critical infrastructure is established. This will provide confidence and enable several countries to share the cost and ownership of assets within a single country, with sufficient security of investment and finance through tariffs and bottleneck revenues.

Risk and benefit sharing for production: Frameworks for national and regional sharing of risks and cost-benefits of offshore wind power plants connected are established and agreed upon. This includes price and volume risks; liability, including long-term political risks; further build-out risk and its impact on existing projects; and green credentials for renewable power.

Transmission infrastructure for alternative fuels: Regional and European agreements on financing cross-border transmission infrastructure for alternative fuels are established. This will foster and strengthen the market for alternative fuels, such as hydrogen, methanol and ammonia, and allow for the increased utilization of electricity from offshore wind to decarbonise hard-to-abate sectors.

Regional co-finance models: Regional co-financing models for energy hubs are being developed and are becoming widespread, where hubs are recognised as shared beneficial assets. These mechanisms cover pooling costs, benefits, and risks in a region to share the financing of infrastructure and production while recognising the hosting country of the hub.



Tipping Point 3

Integrated energy hubs actively enhance system security and drive cost-efficiency in modern power systems

The tipping point is reached when, through innovation and full-scale demonstrations, it is proven that offshore energy hubs can be developed, integrated, and scaled at competitive costs compared with alternatives. At the same time, they increase the overall system stability and security of supply.

Enablers of Change

Shared technical terminology: A common and standardised terminology for the various technical and regulatory types of energy hubs is defined, documented, and formally adopted by European regulators, TSOs, and developers.

Common cost-benchmark: A common cost-benchmark methodology for hub configurations and transmission options specifying the baseline for offshore energy hubs is established. Bornholm Energy Island will serve as a baseline, encompassing defined cost categories, technical assumptions, and input parameters.

0-inertia grid and grid codes: Concepts for an islanded zero-inertia AC system, combining simpler and system specific grid code requirements, are proven through simulations and tests.
The overall objective is to avoid costly technical solutions that are not necessary for energy hubs by optimally utilizing the capabilities of all components. The boundaries for acceptable system behaviour during failures and operational disturbances are adapted to these new types of large power systems.

Hydrogen and P2X integration: Technical concepts for integrating hydrogen production and P2X processes on offshore energy hubs, islands, or within turbines are developed and tested. This will include compatibility with electrical grid design and enhance the system integration of energy hubs.

System integration of hubs: Proof-of-concept solutions are developed and demonstrated, illustrating how energy hubs can enhance the reliability and resilience of connected onshore systems by preventing cascading failures across hybrid systems through defined failure and outage scenarios.

Acknowledgements

The Energy Island Forum (EIF) would like to express its appreciation to all individuals and organizations who have contributed to the development of the EIF Outlook 2026 and this first implementation plan.

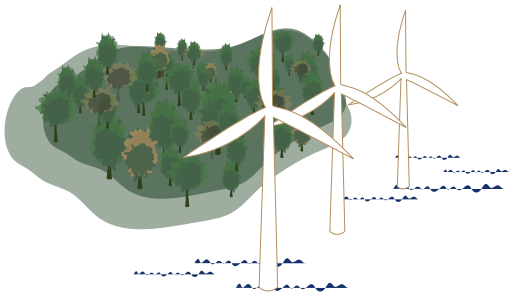
EIF was created as ***"a partnership for stakeholders engaged in energy islands, offshore hubs and grids,"*** and the work presented in this document reflects the strength of that partnership. By ***"bringing together stakeholders in the development of third-generation wind energy,"*** the Forum has fostered a unique and ambitious collaboration across industry, transmission system operators, universities, research institutions, energy agencies, public authorities, and industry. Their dedication to working across traditional boundaries has been vital in shaping a shared vision for Europe's offshore energy future.

The Steering Committee has played a central role in defining the Northern Star and the three critical Tipping Points that guide this work. These decisions mark a key transition for the Forum: from setting direction to activating the concrete actions, research questions, and collaborative initiatives needed to reach these key milestones. With a shared mission now clearly established, EIF enters a new phase of focused execution.

1980s

First-generation

onshore wind energy



2000s

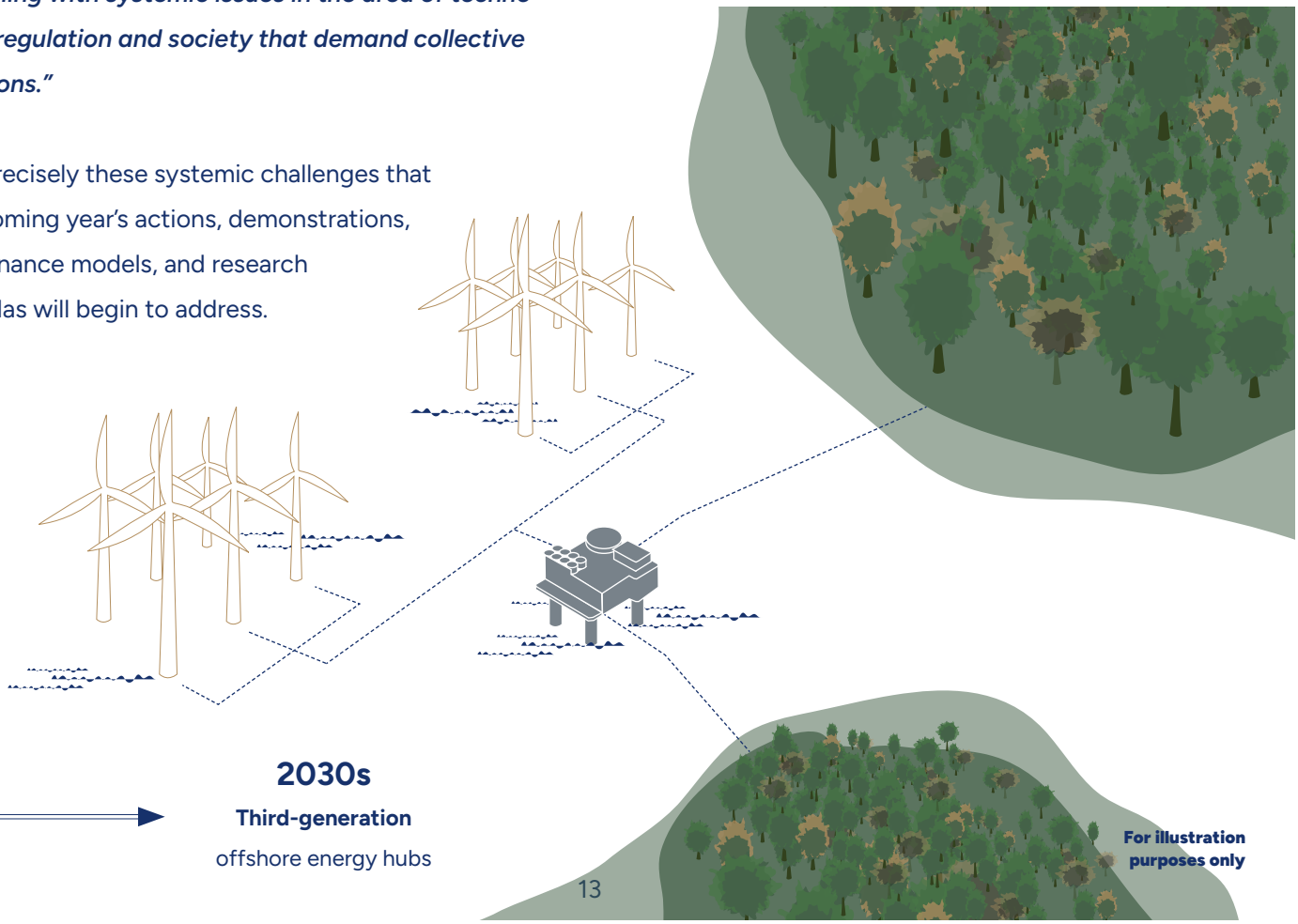
Second-generation

offshore wind energy

We also acknowledge the valuable contribution of Pluss Leadership, whose Impact Framework has provided a structured and adaptive approach for navigating this next phase. This strategic clarity is particularly important given the scale and complexity of the challenge ahead. As noted, ***"establishing a robust and efficient network of energy islands is akin to embarking on a Mars Mission for the energy system. We are not merely confronted with isolated technological challenges but are instead grappling with systemic issues in the area of technology, regulation and society that demand collective solutions."***

It is precisely these systemic challenges that the coming year's actions, demonstrations, governance models, and research agendas will begin to address.

Looking forward, EIF will further engage across Europe through a series of roundtables, dialogues, and collaborative activities. These events will bring together partners who are not yet part of the Energy Island Forum, fostering new alliances and strengthening cooperation across borders. Through this outreach, EIF aims not only to share knowledge and align efforts but also to expand the partnership, ensuring the Forum grows in breadth, relevance, and impact as the mission progresses.



2030s

Third-generation

offshore energy hubs

For illustration purposes only

Finally, we thank all experts, working group participants, and contributors who have dedicated time, insight, and commitment throughout 2024 and 2025. Your efforts have helped build a shared understanding of the challenges and opportunities ahead, and your contributions continue to drive the momentum required to make offshore energy hubs a cornerstone of Europe's future energy system.

The progress reflected in this document is the result of collective vision, trust, and cooperation. We look forward to continuing this journey together.

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