Policy Brief: The potential of Wind Repowering Towards 2030 Targets - Challenges and Policy Asks

Introduction

Wind repowering presents a pivotal opportunity for advancing Europe's renewable energy sector. By modernizing existing wind farms with state-of-the-art, more efficient turbines, repowering can deliver substantial increases in energy output, minimize environmental impacts, and meet rising energy demands—all while avoiding the need for additional land. This strategy is especially valuable in regions where land for new wind projects is limited and where ambitious renewable energy targets necessitate innovative and efficient solutions.

Why Repowering Matters

Wind energy has the potential to become Europe's largest power resource by 2030, a distinction that is unique to the continent. Additionally, doubling repowering rates alone could provide one-third of the capacity needed to meet this 2030 target.

Repowering is not just about replacing old turbines with new ones; it's about revolutionizing wind energy production. By leveraging existing infrastructure, repowered projects can double installed capacity, reduce the number of turbines by half, and even triple energy production.

Modern turbines are engineered to operate at lower wind speeds, providing a more stable and reliable energy supply. This enhances the productivity of wind power plants while aligning them more effectively with the needs of the power system. Furthermore, wind power offers a generation profile that complements PV both seasonally and hourly. Over the long term, this synergy is crucial, as a well-balanced mix of wind and PV creates a "naturally" stable energy production. This balance significantly reduces the resources required to address increasing flexibility demands, delivering important cost and efficiency savings.

In jurisdictions where windy areas are limited, repowering offers a strategic solution. Upgrading existing wind farms optimizes the use of the limited wind, enabling these areas to boost energy output without expanding their geographic footprint. This approach is particularly vital for countries facing significant challenges in meeting renewable energy penetration targets.

In addition to its technical and strategic benefits, repowering makes strong economic sense for the system. By utilizing existing grid connections, when possible, the development process is

simplified and financial uncertainty reduced, making projects more attractive to banks and investors. Additionally, compared to greenfield projects, repowering is considered a lower-risk investment because it avoids many of the risks typically associated with building a new project (e.g. improved community acceptance, preexisting grid connection, well known wind resources).

From a societal perspective, repowering enjoys higher levels of local acceptance compared to new projects. Communities already familiar with wind farms are more likely to support upgrades, especially when they see the tangible benefits—such as fewer turbines and improved aesthetics.

The Challenges Ahead

Despite its promise, repowering faces several hurdles:

1. **Complex and Lengthy Permitting Processes**

   Developers often struggle with delays caused by complicated environmental regulations and legal challenges. For instance, biodiversity concerns, like the potential impact on wildlife, can stall projects that could otherwise deliver immense public and environmental benefits

2. **Economic Pressures**

   Repowering projects tend to be more expensive than new wind farms, due to decommissioning expenses and operational downtime during upgrades. These expenses, combined with the capital required for installing new turbines and the loss of revenue from the existing operations, can make repowering projects financially daunting.

   Additionally, the wind sector is facing slower cost reductions compared to solar PV, creating an uneven playing field. While solar PV benefits from rapidly declining costs, wind energy—particularly repowering in certain jurisdictions —requires tailored solutions and policy support to ensure its competitiveness and viability.

3. **Grid and Infrastructure Bottlenecks**

   While the fact that repowering projects use pre-existing grid connections simplifies some aspects of the grid connection process, the sheer volume of renewable energy projects waiting for connection highlights the need for better planning in most European countries.

The existing queues may hinder repowering projects aimed at increasing the capacity of the older plant.

4. **Environmental & technical limits**

Some countries hold significant potential for wind repowering, but regulatory barriers often impede progress. Aeronautical constraints - such as interference with military and weather radars - as well as stringent permitting and environmental impact assessment processes, can significantly delay projects.

One of the most pressing challenges is lifting height restrictions, which disproportionately impact repowering efforts in certain jurisdictions (e.g. France). As turbine manufacturers phase out older, shorter turbine models, such restrictions limit the feasibility of repowering, increase its cost and compromise its potential to contribute to renewable energy targets.

5. **Decommissioning Strains**

The substantial amount of wind turbines being dismantled in coming years requires the wind industry continue to innovate and improve the handling of decommissioned components. The industry has already committed a Europe-wide landfill ban by 2025, ensuring that decommissioned turbines avoid landfilling altogether, and implemented dismantling practices that align with this target. Original equipment manufacturers (OEMs) are also advancing technologies to enhance the recyclability of blades, moving beyond energy recovery to fully circular solutions. While significant progress has been made, the industry must continue its commitment to improving recycling processes to ensure a sustainable and scalable approach to managing decommissioned components.

What Needs to Be Done

To overcome these challenges, a collaborative approach between policymakers, industry stakeholders, and communities is essential. The following recommendations emerge as key priorities:

1. **Set Clear Ambitions for Repowering and Prioritize Repowering (especially in land-constrained regions)**

To give operators greater certainty when deciding which wind farms to repower, the EU and national governments should set out their ambitions for repowering at the EU, national and regional level, while ensuring that greenfield capacity targets are met. Policymakers,

especially those in jurisdictions with limited availability of windy areas, should recognize the systemic value of repowering in meeting renewable energy targets and repowering should be prioritized as a core strategy for maximizing energy output without expanding the geographic footprint.

2. Simplify Permitting Processes

Environmental regulations and assessments must be streamlined to avoid unnecessary delays while maintaining high standards. Existing EU provisions (e.g. environmental impact assessment to be carried out on a differential basis) must be urgently transposed in national legislation by Member States. Collaboration with biodiversity experts and military authorities can help balance the need for environmental protection and National protection with energy goals. The adoption of a dedicated, enforceable permitting framework (e.g. allowing higher tip heights while decreasing the number of turbines) would be a more effective solution to streamline processes and unlock the full repowering potential.

3. Improve Grid Planning and Infrastructure

Introduce simplified grid connection procedures which can anticipate and upgrade grid connections facilities to accommodate increased capacity from repowered projects, particularly in areas where grid capacity is already strained. Dividing countries into smaller regions for infrastructure planning could also optimize integration.

4. Adapt Auction Frameworks

Auctions play a critical role in shaping the renewable energy landscape, and they must include the unique characteristics of repowering projects. Auctions should:

- Be tailored to factor in the higher costs of decommissioning and of the new installations taking into account national specific context.
- Recognize the downtime and financial risks involved during project transitions.
- Reward the systemic and environmental benefits of utilizing existing sites, such as minimizing land use and leveraging established community acceptance.
- Account for the decommissioned capacity of repowered projects by including only the additional capacity in auction volume calculations.[1]

[1] For example, in a repowering project where the installed capacity of a wind farm increases from 20 MW to 30 MW and a CfD is awarded for the full 30 MW, only the additional 10 MW (the difference) should count toward the auction volume.

By adapting auction frameworks (higher volume for example), policymakers from each Member States can ensure that repowering remains a competitive and attractive investment option for developers.

5. **Promote Sustainability in the Supply Chain**

Recycling innovation, especially for turbine blades, needs to be accelerated. Efforts should focus on developing technologies, sustaining local recycling value chains and reducing cost pressures on manufacturers to ensure the sector remains resilient and sustainable.

Conclusion

Wind repowering offers a unique opportunity to drive Europe's energy transition forward, contributing significantly to the 2030 renewable energy targets. Its value is particularly critical in regions where land availability is limited, and achieving renewable energy penetration targets is a pressing challenge. Moreover, repowering serves as the tool to counteract, at a system level, the inevitable phase-out of existing capacity, destined to be dismantled due to its age. By addressing the barriers identified here, we can unlock this potential and ensure that wind energy continues to play a central role in a decarbonized future.

This policy brief draws on insights shared during the ERGLab session titled "*Potential of Wind Repowering Towards 2030 Targets: Challenges and Policy Asks*" held in Paris on the 27th of November 2024 and aims to guide stakeholders in creating a supportive framework for repowering. Through targeted action, collaboration, and innovation, we can maximize the impact of this critical technology for Europe's renewable energy landscape.

(Prepared under the Chatham House Rule to ensure confidentiality.)