

Repowering and Lifetime Extension: making the most of Europe's wind energy resource

THE EUROPEAN WIND INDUSTRY'S VIEWS ON MANAGING WIND ENERGY
ASSETS AT THE END OF THEIR OPERATIONAL LIFETIME

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INTRODUCTION

As every energy technology, wind energy assets have an end to their operational lifetime. A significant proportion of the installed EU wind fleet will come to the end of its lifetime between 2020 and 2030. These decommissioned wind energy assets will not count for the delivery of the EU 2030 renewable energy target¹.

A pro-active approach to repowering and lifetime extension - alongside new projects - is critical to deliver on the EU's objective to meet a 50% share of electricity generated by renewables by 2030. Sound repowering policies will help make the EU an example for successful management of the energy transition and secure its position as world number one in renewables. An enabling framework for repowering and lifetime extension should remove unnecessary administrative barriers and give asset owners sufficient flexibility to make decisions based on the site-, project- and country-specific economic case.

Tapping into the potential of repowering depends on the existence of a robust regulatory framework which creates the business case for such projects. To date, only six EU Member States have included definitions of repowering in their national legislation. Only one country – Italy – has enacted incentives for repowering. And not a single Member State has implemented shorter permitting procedures for repowered projects.

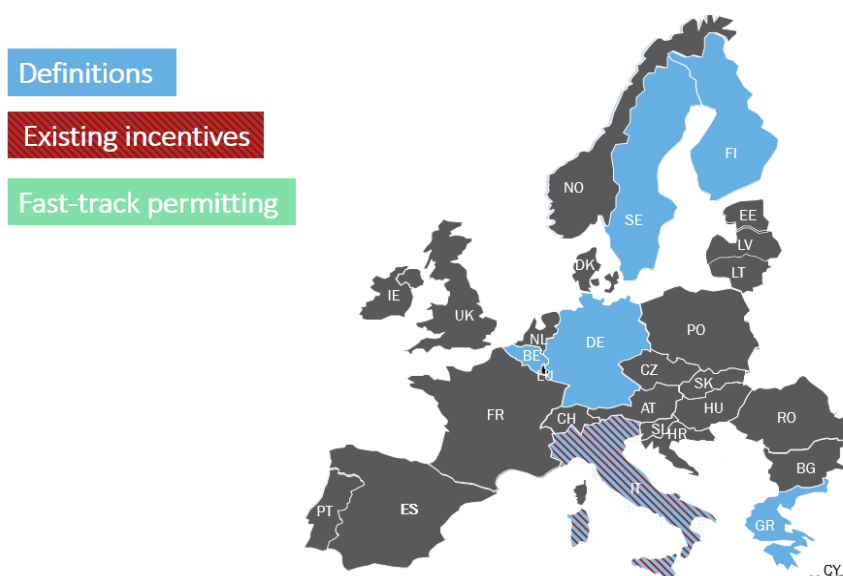
WindEurope fully endorses the repowering proposals presented by the European Commission in the Clean Energy Package.

This paper seeks to align approaches on repowering across the EU in line with the proposed post-2020 renewable energy regulatory framework. The repowering provisions in the Clean Energy Package would guarantee that Member States are able to harness a higher share of wind energy at the best wind sites to the benefit of European consumers by 2030.

WindEurope considers that repowered projects could be further provided with a clear path-to-market via:

- Full implementation of the Clean Energy Package provisions on repowering in national legislation. This includes outlining policy measures for repowering in 2030 National Energy and Climate Plans and ensuring streamlined administrative and permitting procedures;
- Topping-up national deployment volumes with the yearly decommissioned wind energy volumes in line with the three-year schedule for public support allocation in the new Renewables Directive;
- Ensuring that fully repowered projects compete on par with new installations in competitive tenders or other state aid-compatible systems; and
- Retaining the flexibility of Member States to define a national regulatory framework for lifetime extension projects in consultation with the national wind industries.

Figure 1: Regulatory framework for repowering in EU, 2016



¹ WindEurope, [Repowering – framing note](#), June 2016

WHAT IS REPOWERING?

Multiple drivers affect wind energy asset owners' decision to repower their sites. These include, but are not limited to:

- the end of the public support;
- the end of the building permit;
- the end of the land lease licence;
- the end of operation and maintenance contract; or
- the end of the operational lifetime of the turbine.

The asset manager generally has two options to deal with assets at end of life:

- Full repowering: the wind turbines are dismantled. New wind turbines are installed in a brownfield and/or greenfield site.
- Lifetime extension: some of the components of an existing wind turbine are upgraded (e.g. generator). The overall external layout of the farm remains unchanged (e.g. hub height, siting, size). Lifetime extension differs from a normal operation and maintenance activities. New technology is installed or components are replaced instead of the initial equipment of the turbine. Depending on the Member State, this option is also referred to as refurbishment, enhancement, reactivation.

WHAT IS THE POTENTIAL OF REPOWERING?

WindEurope has developed a model to forecast a range for the potential repowering volumes every year. The model takes into account variation of turbines' lifetimes between 20 and 25 years and the increase in turbine ratings. It relies on "Low repowering" and "High repowering" scenarios.

The "Low repowering" assumes that:

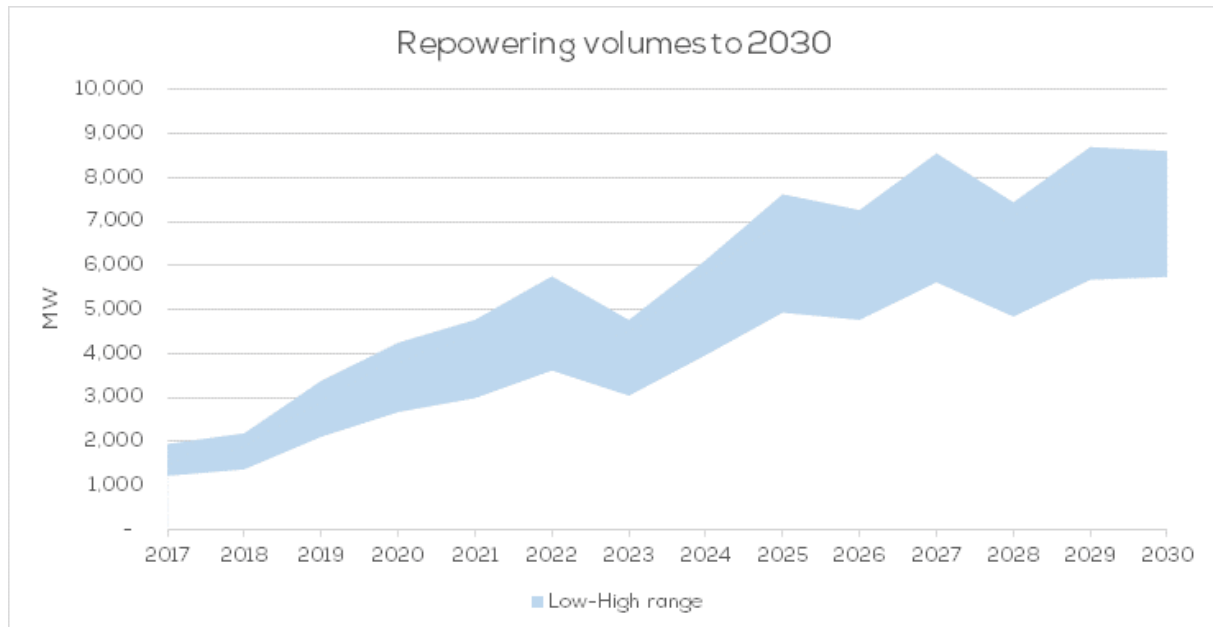
- New turbine average rating: 3.2 MW;
- 30% of turbines repowered after 20 years; and
- 20% of turbines repowered after 25 years (lifetime extension of 5 years).

The "High repowering" assumes that:

- New turbine average rating: 3.2 MW;
- 50% of turbines repowered after 20 years; and
- 25% of turbines repowered after 25 years.

WindEurope estimates that the yearly repowering volume grows from 1-2 GW in 2017 and stabilises to 5.5-8.5 GW by 2027. The main markets will be Germany, Spain, Italy, Denmark, Portugal and France.

Figure 2: Repowering volumes to 2030



WHAT ARE THE BENEFITS OF REPOWERING?

1. DRIVING FURTHER COST REDUCTIONS IN WIND ENERGY

Repowering of wind assets in the post-2020 period presents a clear opportunity for modernising the European wind fleet with the newest technology available. The provision of appropriate market arrangements and stable regulatory frameworks for repowering will unlock further cost reductions in wind generation by 2030 and will deliver the EU decarbonisation objectives at the least cost for society.

2. ENSURING BETTER INTEGRATION OF THE WIND RESOURCE IN ELECTRICITY GRIDS

Replacing old turbines with state-of-the-art units, able to provide grid support services, will ensure the better integration of the variable wind resource into electricity grids compared to first or second generation machines. Repowered projects contribute to system stability and flexibility in line with the ongoing EU power market design reform.

3. IMPROVING SOCIAL ACCEPTANCE AND BENEFITS TO LOCAL COMMUNITIES

Replacing ageing assets with fewer modern ones is likely to harness higher amount of power with comparatively less land use. Local communities are already used to the presence of wind farms which means that sometimes repowered projects can be more easily accepted by local communities. In contrast to the full decommissioning of wind farms, repowering preserves local job creation and provides municipalities with continuous revenues in the form of local taxes from operating wind farms.

4. USING THE WIND ENERGY RESOURCE AT BEST SITES EFFICIENTLY

Repowering offers a clear opportunity to harness higher shares of wind energy at the best wind sites in the post-2020 period. Through higher output and improved grid-compliance characteristics, repowered projects will play an increasing role in the 2020s in fulfilling, and exceeding, the EU 2030 renewables target.

WHAT REGULATORY FRAMEWORK DOES REPOWERING NEED?

The choice between full repowering or lifetime extension depends on the existence of a business case (electricity prices, support regime and planning policies) and is strictly site-, project- and country-specific. Asset managers carefully weigh the cost of decommissioning against the costs of different repowering options.

Market considerations, in particular the electricity price or other incentives that can cover up the capital investment, are crucial in choosing an option. The current lack of an adequate price signal is the major impediment to new and repowered projects alike. To ensure a good economic case for investing in renewables in the next decade, the post-2020 Clean Energy Package should make the EU power market fit for renewables².

1. PERMITTING IS KEY IN UNLOCKING THE REPOWERING POTENTIAL

When mandated at national level, faster and easier permitting and administrative processes for wind energy projects in the post-2020 period will be crucial for repowering going forward.

Planning a fully repowered project is equally complex and presents similar risks as planning a new project. A fully repowered project involves new turbine models, generally higher tip heights, bigger rotor diameters and the modification of the wind farm layout & design. These types of fully repowered projects usually call for an updated Environmental Impact Assessment (EIA), a new building and operation permit and potentially a new grid connection.

Fully repowered projects will qualify to obtain a new planning consent under the three year deadline outlined in the post-2020 Renewable Energy Directive. National authorities should strive to expedite the administrative and permitting process for fully repowered projects by considering the elements of the original EIA still relevant for the new project. Projects should not be considered as fully repowered when no change of the tip height, size or location occur.

Lifetime extension projects will be able to make full use of the simplified permitting procedures outlined in the post-2020 Renewable Energy Directive, when needed, since neither the tip height nor the layout of a site is changed. Member States should ensure that projects that have completed a successful planning and permitting procedure in the past, and that have been factored in the national and/or regional grid planning, do not undergo again the full administrative process. The number of changes an installation can undertake and the definition of the technical limits of these changes is project- and site-specific and should therefore be analysed on a case by case basis by the planning authorities of the concerned Member State.

² WindEurope, [Building an European energy market fit for the energy transition](#), March 2017

For both repowering options, administrative and permitting deadlines should cover potential public consultations and legal appeals to wind energy projects. This will ensure that existing obstacles to wind energy deployment are removed for the post-2020 period and repowered projects can give their fair share in fulfilling the EU 2030 renewable energy objective.

2. FULL REPOWERING IS ON PAR WITH NEW PROJECTS

Fully repowered projects should compete on par with new installations for public support. Member States shall perform a year-on-year assessment of the volumes coming offline. In order for the decommissioned wind energy capacities not to put at risk the fulfillment of national 2030 renewable energy commitments, the size of the decommissioned capacity should come on top of the planned deployment volumes.

The three-year public support schedule proposed by the European Commission in the post-2020 Renewable Energy Directive offers a great opportunity for Member States to plan ahead on how to compensate for decommissioned sites and provide a secure yearly project pipeline.

3. LIFETIME EXTENSION NEEDS A REVENUE STABILISATION MECHANISM

In the absence of an adequate market price signal, and in the transition period of the full implementation of the Clean Energy Package, asset managers would need revenue stabilisation mechanisms for lifetime extension projects. In particular, public support should reflect the value of the lifetime extended wind plant to the power system and in helping the Member State to fulfill its renewable energy obligations.

Currently, Italy is the only EU Member State offering a concrete incentive for lifetime extension projects. Under the national regulatory framework, four types of interventions are considered as repowering and can compete for a financial incentive awarded through a tender: refurbishments, total rebuilding, enhancements, and reactivation. The support scheme for each option is capped to a certain percentage from the full tariff (e.g. 0.9% for total rebuilding, 0.5% for refurbishment).

Member States should retain flexibility on defining a supporting mechanism for lifetime extension projects which suits the national circumstances. Options to support lifetime extension projects could include, but are not limited to, an administratively-set premium or participation in a competitive bidding system. The definition of an appropriate support framework should be developed in close consultation with the national wind energy industry.

Figure 3: Options for a regulatory framework for different

