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Repowering Wind Energy Projects

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Background

When a wind energy development reaches the end of its lifecycle, there are two options for the project. The first is **decommissioning**, whereby the turbines and all equipment are removed and the land is restored.[i] The alternative is **repowering** the wind energy project, which involves replacing old turbines with new, updated ones.

There are strong benefits to repowering wind energy developments, despite more attention on decommissioning. Repowering may be less expensive than building a new project elsewhere since much of the support infrastructure is already in place. Repowering also reinvests in the neighboring community, whose members already have familiarity with wind energy technology and likely wish to retain the economic benefits.[ii]

No wind projects in Michigan have yet undergone the process of repowering because even the oldest turbine projects have just passed a decade of operation. There are examples, however, of repowered wind projects in other states.

- Community Wind North Repower Project (Minnesota): partial repowering, amendment to the original site permit[iii]
- Jeffers Wind Energy Center Repower Project (Minnesota): amendment to the original permits[iv]
- Wagner Wind Project (California): full repowering, in a Wind Energy Overlay Zone with a new conditional use permit[v]
- Mendota Hills Wind Farm (Illinois): full repowering, special use permit[vi]

Communities that decide proactively how to handle wind project repowering will be well served as projects age and repowering becomes a common practice. Though it's impossible to know at the start of a project whether the owner will decommission or repower the project at the end of its life, local governments can take steps to prepare for either eventuality. It is already a commonly recommended practice for communities planning and zoning for renewable energy to require a decommissioning plan as part of the application and approval process. As energy projects age and the need for renewable energy production continues to grow, communities can also consider planning for repowering wind energy systems.

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Find this document and more about the project online at graham.umich.edu/climate-energy/energy-futures.

Repowering Considerations

There are two kinds of repowering—full and partial.[vii] Full repowering involves decommissioning the existing turbines and replacing them completely with new ones. Partial repowering allows some portions of the existing turbine to remain. Only certain components are replaced or refurbished.

With support infrastructure in place for the existing project, repowering generally involves replacing turbine components or whole turbines with more technologically advanced models. Partial repowering projects may require only small infrastructure updates. Full repowering projects may require larger infrastructure updates to support completely new turbines.

It is likely, especially with full repowering projects, that there will be changes to a project's layout and dimensions. Full repowering projects that involve removing older turbines and replacing them with more efficient ones may result in fewer (in some cases, substantially fewer) turbines on the site.[viii] A repowering project could reduce the visual impact of the development on the landscape by reducing the land and the number of turbines used to generate comparable power. However, when older turbines are replaced with new, taller ones, the repowering project may be perceived as more visually intrusive than the original.

In all cases, repowering projects require an extension of many of the agreements associated with the development, such as power purchase agreements and land lease agreements. Extensions of lease agreements may be welcomed by landowners as an opportunity to continue receiving revenue from hosting turbines on their land, though some leaseholders may opt to not extend the lease, at which point decommissioning would begin.[ix]

Permitting and Review Requirements/Approval

Just as wind energy developments go through a process to receive permits and approval at the original time of project siting, most repowering projects require additional review or amendments to the original approval conditions.[x] A partial repowering with insignificant changes might only require a study to determine if the proposed changes meet zoning standards. A full repowering might require changes to the allowable height and setback requirements, updated/additional assessments of development impacts (e.g., visual impact, transportation impact, environmental impact, etc.), and/or other significant amendments. Temporary approvals or permit extensions may be required, as well.

"Nonconforming" status can pose particular challenges to repowering. If zoning regulations or surrounding land-use conditions have changed since the original approval of the existing project, the existing project may be considered a nonconforming structure, sit on a nonconforming parcel, or be a nonconforming use. Ideally, communities should proactively determine rules that explain when repowering constitutes an unlawful expansion of the nonconformity.[xi]

Now is the time for proactive planning from local governments. Planning ahead will avoid confusion and conflict as aging projects come to the end-of-life point.

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ii "A Scoping-Level Study of the Economics of Wind-Project Repowering Decisions in California." KEMA Inc., Consultant Report prepared for the California Energy Commission, Aug. 2008, https://ww2.energy.ca.gov/2008publications/CEC-300-2008-004/CEC-300-2008-004.PDF.

iii "Site Permit Amendment Application: Community Wind North Repower Project." Westwood Professional Services, Inc., 25 Mar. 2019. https://mn.gov/eera/web/project-file/11015/.

iv "Site Permit Amendment Application: Jeffers Wind Energy Center Repower Project." Westwood Professional Services, Inc., 25 Mar. 2019, https://mn.gov/eera/web/project-file/10985/.

v City of Palm Springs, California Planning Commission Agenda, 23 Jan. 2019, https://destinyhosted.com/palmsdocs/2019/PLAN/20190123_151/AGENDApacket__01-23-19_2050_151.pdf.

vi Lee County, Zoning Board of Appeals Minutes, 8 Sept. 2016, https://www.leecountyil.com/ArchiveCenter/ViewFile/Item/143.

vii "Repowering wind turbines adds generating capacity at existing sites." U.S. Energy Information Administration, 6 Nov. 2017, https://www.eia.gov/todayinenergy/detail.php?id=33632.

viii Lantz, Eric and Leventhal, Michael and Baring-Gould, Ian. "Wind Power Project Repowering: Financial Feasibility, Decision Drivers, and Supply Chain Efforts." National Renewable Energy Laboratory, Dec. 2013, https://www.nrel.gov/docs/fy14osti/60535.pdf.

ix Powers, Mary B. "Upgrades Improve Wind Farms' Performance and Bottom Line." Engineering News-Record, 2 May 2018. https://www.enr.com/articles/44435-upgrades-improve-wind-farms-performance-and-bottom-line.

x Minnesota Commerce Department, "Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota," May 2019, https://mn.gov/eera/web/doc/13641/.

xi "Establishing Legal Nonconformities: Excerpted from Zoning Administration, a Michigan Association of Planning publication," Michigan Planner, March/April 2021 Issue, Volume 25, No. 2.