Renewable Projects End of Useful Life Plans July 31, 2022

Innovators Building A Sustainable World



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RENEWBABLE PROJECT DEVELOPMENT CORE BUSINESS



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Award-winning asset manager and operator for owners of renewable energy facilities





Experience developing 1,400+ miles of transmission infrastructure to bring power to market

Renewables End-of-Life Strategies

Repowering

• By upgrading the turbines or panels with more efficient technology at the end of the existing life, a project can be 'repowered'. Some portions of existing infrastructure remain in place, minimizing land use impacts. Can require new permitting approvals.

Repurposing

- Emerging market for used solar panels, often for off-grid applications or electrification in developing countries
- Blades and panels that are no longer operable are also used in workforce training

Recycling

• Much of a project's equipment can be recycled, with growing markets for renewable recycling



Decommissioning Renewable Energy Projects

- Decommissioning is the removal of equipment and restoration of a site to a substantially similar state as it was before the project.
- Developers propose a decommissioning plan prior to construction, and sometimes, prior to permitting.
- Some municipalities and state permitting bodies require decommissioning plans as a permitting conditions and decommissioning commitments are included in individual lease agreements.
- For states where projects are permitted at the state level, decommissioning plans are already commonly required.

Landowners and host communities **are never responsible** for decommissioning once they've reached their end-of-life cycle.



Decommissioning Plan Components

A decommissioning plan generally includes:

- Specifications for removal of all aboveground and some underground facilities and infrastructure,
- A detailed plan for returning the property to its preconstruction condition,
- Estimated cost for decommissioning the project, paid for by project owner,
- A timeline for decommissioning work,
- Financial security for covering the cost of decommissioning.





Decommissioning Best Practices

Removal and Recovery:

- Decommissioning a project requires removal of aboveground facilities and removal of underground facilities to a specified depth, often 3 feet
- Any portions of the site with compacted soil will be de-compacted and any excavations backfilled to restore the site for future use. As a final step of decommissioning, the site will be revegetated to help with erosion and dust control as required or returned to agricultural use.

Timeline:

- Decommissioning typically begins within 12 months of the project's end-of-life determination and is completed within 24 months from the beginning of removal
- Plans should be re-assessed periodically

Financial Assurance:

- Costs include disassembly, removal, and disposal of the facility components and restoration of the land, less the salvageable value of components.
- For solar, the salvage value of modules, PV racking, steel posts and copper wiring can exceed the costs of equipment removal and land restoration
- Financial assurance can be based on the estimated decommissioning cost inclusive or exclusive of salvage value and is provided to the beneficiary at different times relative to the start of a facility's operation, ranging from prior to operations or not until year 15 of operations.
- Financial assurance may be in the form of a bond, irrevocable letter of credit, parent company guarantee or escrow
- 3rd parties are often involved to determine costs



Example project: Badger Hollow Solar

Iowa County, WI

300 MW in two phases

Approx 900,000 bifacial solar modules

Decommissioning costs—the sum of the cost of removal and disposal-- may be offset by the gains from the salvage value of materials.

Point: strong incentive to maximize salvage value.





Recycling and Disposal: Wind

- About 85% of wind turbine component materials are recyclable. From steel and gearing to copper wire and electronics. The remaining 15% is comprised of fiberglass in the blades.
- Invenergy has an agreement with Carbon Rivers to recycle blades while recovering fiberglass
- Recycling opportunities for a circular economy are currently being explored and include breaking down turbine blades for bridges, decking, insulation, pallets, and more.
- On an annual basis, wind turbine blades make up as little as 1/2000th, or 0.05 percent, of the volume of municipal solid water going into landfills. Plastic plates and cups alone make up 10x as much.



Decommissioning and Recycling Legislative Strategies

Over a dozen states introduced legislation in 2022 regarding the decommissioning or recycling of renewable energy projects, including: IL, IN, KY, PA, TN, MN, SD, NY, VA, WA, OK

Legislative trends have focused on:

- Initiating a study on the decommissioning of projects
- New requirements to submit a decommissioning plan for a project to a state agency
- Fees to create and fund new stewardship programs for end-use of project materials

Best policy principles:

- Provide reasonable timelines and flexibility in financial assurance
 - Decommissioning bonds should not be required after a project has been operational for several years, and not at the commencement of construction
 - Financial assurance should include a letter of credit, bond, escrow account, parent/corporate guaranty
 - Decommissioning security should not be inclusive of salvage value
- Requirements for removal aligned with reasonable best practices
 - Land should be returned to a substantially similar state
 - Removal of under-ground equipment to a depth of 36"



Thank you!Colleen SmithDirector, Government Affairscpsmith@invenergy.com309-643-0298

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