Renewable Projects
End of Useful Life Plans
July 31, 2022

Innovators Building A Sustainable World
Our Foundation
Developing and operating the technologies of the renewable energy future

Wind
109 projects
17,276 megawatts

Solar
48 projects
5,832 megawatts

Storage
18 projects
1,611 megawatt hours
486 megawatts

Transmission
1,400+ miles operating or under contract

DIVERSED SOLUTIONS

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

Invenergy Transmission
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.
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.
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.**
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!

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