



**Rugby Wind, LLC**  
**Rugby Wind Facility, Pierce County, ND**  
**Decommissioning Plan**

**October 2, 2013**

**1** **PU-13-844** Filed: 10/15/2013 Pages: 6  
**Decommissioning plan and cost estimate**

Rugby Wind LLC

## **Introduction**

Rugby Wind LLC is a wholly-owned subsidiary of Iberdrola Renewables, LLC and has prepared the following Decommissioning Plan, consistent with the requirements outlined by ND Administrative Code Section 69-09-09-06. Rugby Wind Farm received a Certificate of Site Compatibility from North Dakota Public Service Commission (ND PSC) on October 3, 2005 in Case No. PU-05-47.

The Rugby Wind Plant (Rugby) is located near Rugby, North Dakota, in Pierce County. The plant has 71 Suzlon S88 2.1 Megawatt (MW) turbines with a name plate capacity of 149.1 MW and started commercial operation on December 23, 2009. The Rugby wind plant turbines, roads, and collector line are primarily located on privately-owned agricultural land.

Iberdrola Renewables, LLC, formerly PPM Energy, Inc., stated in the application for Certificate of Site Compatibility that:

“6.6 DECOMMISSIONING AND RESTORATION: PPM has a contractual obligation to the landowners to remove the Wind Facilities, including foundations to a depth of four feet, when the wind easement expires. PPM also reserves the right to explore alternatives regarding Project decommissioning at the end of the Project Certificate term. Retrofitting the turbines and power system with upgrades based on new technology may allow the wind farm to produce efficiently and successfully for many more years. Based on estimated costs of decommissioning and the salvage value of decommissioned equipment, the salvage value of the wind farm will exceed the cost of decommissioning.”

Properly maintained wind turbines will have a minimum design life of 30 years. At the end of the project life and depending on market conditions and project viability, the wind turbines may be “re-powered” with new nacelles, towers, and/or blades. Alternatively, the wind turbines may be decommissioned. The major components of the wind turbines (the tower, the nacelle and blades) are modular items that allow for ease of construction and disassembly of the wind turbine during decommissioning or replacement. The tower is constructed of a combination of steel along with various other materials. Portions of the components within the nacelle and generators can also be salvaged for scrap value.

## **Decommissioning Requirements**

NDCC Section 69-09-09-05 describes decommissioning requirements as:

“Decommissioning and site restoration includes dismantling and removal of all towers, turbine generators, transformers, and overhead cables; removal of underground cables to a depth of twenty-four [60.96 centimeters] inches; removal of foundations, buildings, and ancillary equipment to a depth of three feet [91.44 centimeters] and removal of surface road material and restoration of the roads and turbine sites to substantially the same physical condition that existed immediately before construction of the commercial wind energy conversion facility or wind turbine. The site must be restored and reclaimed to the same general topography that existed just prior to the beginning of the construction of the commercial wind energy conversion facility or wind turbine and with topsoil respread over the

disturbed areas at a depth similar to that in existence prior to the disturbance. Areas disturbed by the construction of the facility and decommissioning activities must be graded, topsoiled, and reseeded according to natural resource conservation service technical guide recommendations and other agency recommendations, unless the landowner requests in writing that the access roads or other land surface areas be retained.”

**Decommissioning Sequence**

In the event the Rugby Wind facility requires decommissioning, the following sequence for removal of the components will be used:

- Remove wind turbines -- blades, towers, hubs, and generators
- Remove wind turbine foundations to a depth of two feet
- Remove underground collection lines to a depth of three feet
- Remove overhead collection lines and structures
- Remove collection transformers
- Remove project substation equipment
- Remove access roads (unless landowner requests they remain in writing)
- Areas disturbed by decommissioning will be graded, topsoiled, and seeded

**Description of Decommissioning Process**

Decommissioning will involve the removal of all wind facilities including towers, turbine generators, transformers, overhead and underground cables, foundations, buildings, and ancillary equipment. The wind facility consists of the following primary components:

Wind Turbines and Foundations	71
Medium Voltage Cable (underground collection system)	155,662 lineal foot
Medium Voltage Cable (overhead collection system)	33,678 lineal foot
High Voltage Cable (overhead transmission system)	53,796 lineal foot
Transformers (step up)	71
Access Roads	90,758 lineal foot

As specified in Rugby’s lease agreements with project landowners, decommissioning will include the dismantling of all turbines, towers, transformers and related aboveground equipment. Subsequent decommissioning steps include the removal of concrete turbine pads to three feet below the soil surface. Underground electrical cabling that is below a depth of two feet will be left in place as such materials left at greater depths are not expected to affect long-term land use and will minimize

unnecessary soil disturbance. The substation and associated overhead power lines (structures, conductors, and cables) would be removed. One of the final steps in decommissioning will be removal of access roads. All access roads will be removed unless the affected landowner provides written notice that the road or portions of the road will be retained. Decommissioned roads will be reclaimed to restore the surface grade and soil to agricultural use.

Turbine towers, nacelles, and pad-mounted transformers and overhead cables are expected to have considerable value and will be removed and sold for reuse or recycled (scrap). Unsalvageable material will be disposed of at authorized sites in accordance with applicable rules. Additionally, any disturbed surface will be graded, reseeded, and restored as nearly as possible to its preconstruction condition.

### Estimated Cost of Decommissioning

Wind turbine towers, hubs, blades, and generators are modular, which allows for ease in removal, reconditioning, and reinstallation. The cost estimate includes removal of all turbines, transformers, aboveground collector lines, and met towers; excavation of foundations to a minimum depth of three (3) feet and underground collector lines to a minimum depth of two (2) feet; and the return of all soils to preconstruction grade, including the removal or restoration of roadways. The revenue from the scrap value of steel was calculated based on market values as provided from a survey of US scrap metal dealers (<http://scrapmetalpricesandauctions.com/us/>). Heavy iron prices are in the range of \$220 to \$290 per ton.

Based on the details presented for the Suzlon 2.1 MW turbine and associated tower and components, it is assumed that both the tower and nacelle will yield approximately 85% salvageable materials. Copper salvage estimates were derived by assuming 5% of the total tower and nacelle weight consists of copper bearing materials. Since the construction of the rotor/blades are predominantly non-metallic materials (fiberglass reinforced epoxy and carbon fibers), thus no salvage value for the rotor/blades was used to develop the decommissioning cost estimate. The current market value of scrap copper is approximately \$2.00 per pound (\$4,000 per ton). Steel salvage estimates were derived by assuming 80% of the total tower and nacelle weight consists of steel materials.

Estimates of decommissioning costs were performed, producing a total cost of approximately \$99,000 per turbine. To the extent that there is an industry standard, decommissioning costs are estimated to range from \$73,100 to \$107,500 per turbine in current dollars, depending on the size of the turbine so this estimate for Rugby is considered reasonable.

### Salvage Value Calculations per Wind Turbine

Description	Quantity	Scrap %	Scrap Quantity	Unit	Unit Cost /Net Ton	Total
Tower – Steel	203.8	80	163.0	Ton	\$235	\$38,305
Tower - Copper	203.8	5	10.2	Ton	\$4000	\$40,800
Nacelle – Steel	79.2	80	63.4	Ton	\$235	\$14,899
Nacelle - Copper	79.2	5	4.0	Ton	\$4000	\$16,000
Total Salvage						\$110,004

Based on current scrap metal prices, the scrap value per turbine is estimated to be approximately \$110,000. The salvage value for the wind turbines exceeds the decommissioning cost by approximately \$11,000 per turbine assuming use of the Suzlon S88 2.1 MW turbines.

#### **SUMMARY OF DECOMMISSION COSTS**

The following is a summary of the total costs for the decommissioning of the Rugby Wind facility. This estimate was developed using the salvage value per turbine listed above, and the various cost and salvage estimates listed below:

- Supported Aluminum Transmission Line Salvage of 230 pounds per 1,000 linear feet
- Contractor will be allowed to stage construction to obtain the most efficient work flow possible
- Contractor will be allowed to use the most appropriate, safest, and efficient methods available to them at the time of performing the work
- Contractor will secure and provide any required demolition permits or certificates
- Salvage material buyer will provide own transportation equipment at each demolition site
- Demolition contractor will load salvage materials in appropriate sizes and weights at each site to salvage material buyer's vehicle(s)
- Site restoration includes roadway removal and regrading of site, including deep tiling to remove compaction of soils at tower site, topsoil amendment, and seeding according to USDA Natural Resource Conservation Service technical guide recommendations, or farmable condition, depending on original land use.
- Salvaged roadway material is stockpiled or delivered within a 20 mile radius of each turbine site. No disposal or recycle value is assigned to such roadway material
- All poles, hardware and aluminum cable for overhead collector and transmission lines are removed
- Two days of decommissioning preparation per site including oil removal are allowed prior to crane dismantling
- All recycled material is processed to manageable sizes for transport from site
- Substation transformers are assumed to be salvaged for metal only

<u>Decommissioning estimate for the Project:</u>	
General Conditions	\$293,345
Operation & Maintenance Buildings	\$45,053
Substation Deconstruction	\$171,892
Towers, Wind Turbine Deconstruction	\$746,849
Access Road Preparation	\$317,370
Blade Disposal	\$994,710
Foundation Removal	\$1,572,934
Site Restoration	\$349,959
Tower Dismantle and Salvage Preparation	\$2,352,372
Electric Line and Pole Removal	\$178,407
Total estimated decommissioning cost	\$7,022,891
Total estimated decommissioning cost/turbine	\$98,914
Salvage value/wind turbine	\$(110,004)
<b>Total net decommissioning cost per wind turbine minus salvage value</b>	<b>\$(11,090)</b>

Therefore, it is anticipated that the total decommissioning costs of the Rugby Wind facility will be more than offset by the salvage value of the recovered materials from the facility.

**Decommissioning Period**

Rugby Wind, LLC will begin decommissioning a commercial wind energy conversion facility or wind turbine within eight months after the time the facility or turbine reaches the end of its useful life, as determined in section 69-09-09-03. Decommissioning must be completed within eighteen months after the facility or turbine reaches the end of its useful life.