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October 16, 2020

*Via Electronic Mail*

Mr. Steve Kahl  
Executive Director  
North Dakota Public Service Commission  
600 E. Boulevard, Dept. 408  
Bismarck, North Dakota 58505-0480  
ndpsc@nd.gov

**In re: Northern Divide Wind, LLC  
Northern Divide Wind Energy Center  
Decommissioning  
Case No. PU-20-270  
Our Matter No. 035218-000045**

Dear Mr. Kahl:

On behalf of Northern Divide Wind, LLC (“Northern Divide Wind”), enclosed for filing in the above-referenced matter is an electronic copy of Northern Divide Wind’s revised decommissioning plan and cost estimate for the Northern Divide Wind Energy Center located in Burke County. The enclosed plan supersedes and replaces the decommissioning plan previously filed as Docket No. 5 in Case No. PU-20-270.

Please feel free to contact me with any questions.

Sincerely,

**CROWLEY FLECK PLLP**



Casey A. Furey

Enc.

cc: Tracy Davis (via e-mail)  
Adam Renfandt (via e-mail)

6 PU-20-270 Filed 10/16/2020 Pages: 16  
Revised Decommissioning plan and cost estimate  
Northern Divide Wind, LLC  
Casey Furey, Crowley Fleck, PLLP

# Northern Divide Wind Energy Center

## Decommissioning Plan and Cost Estimate

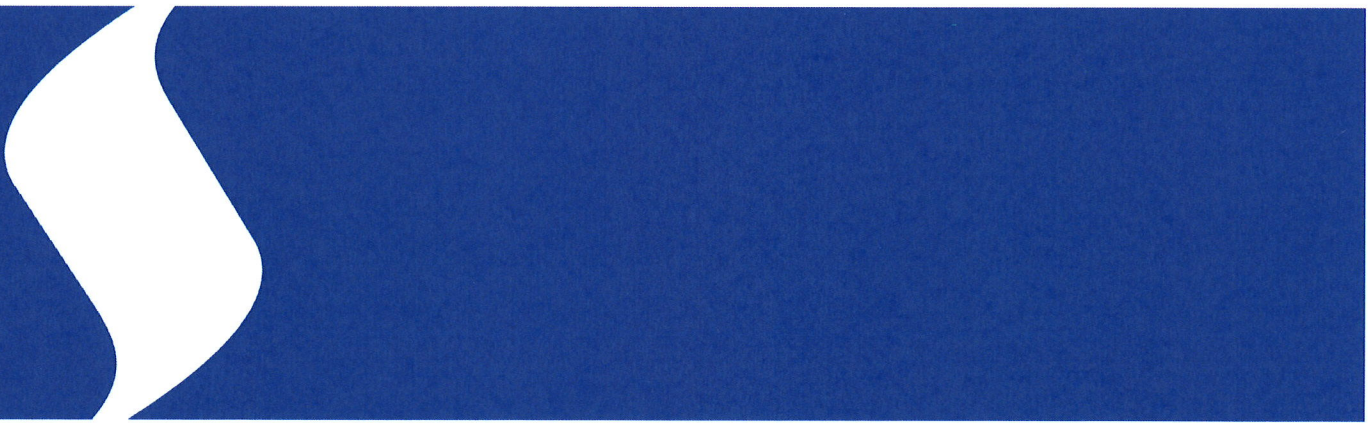
Rev. 1

Prepared for



Northern Divide Wind, LLC

Case No. PU-20-270



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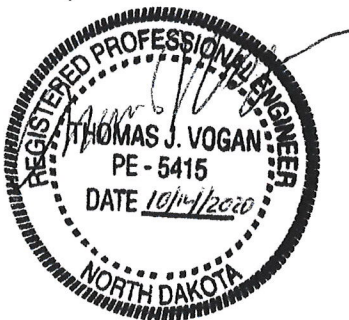
Name: Thomas J. Vogan

State of License: North Dakota

License Number: PE-5414

Date: October 14, 2020

Stamp:




## ISSUE SUMMARY AND APPROVAL PAGE

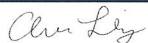
This is to certify that this document has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0405, which is based on ANSI/ISO/ASSQC Q9001 Quality Management Systems.

### Contributors

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Approved by:

M. Rudden for T. Vogan

October 14, 2020

Thomas Vogan  
Senior Manager

Date

## 1. INTRODUCTION

Northern Divide Wind engaged Sargent & Lundy to develop a decommissioning plan and cost estimate for the Northern Divide Wind Energy Center (“Northern Divide” or “Project”) in North Dakota that is planned to achieve commercial operation in 2020.

Decommissioning requirements for the Project are specified by the North Dakota Administrative Code (N.D. Admin. Code), Title 69, Article 69-09, Chapter 69-09-09 [1]. This decommissioning plan was developed in accordance the specific decommissioning plan stipulations as described within N.D. Admin. Code Sections 69-09-09-05 and 69-09-09-06.

The purpose of this decommissioning plan is to consider the Northern Divide facilities and provide a recommended decommissioning plan for retiring the Project at the end of its useful life. A decommissioning cost estimate, based on the parameters of this decommissioning plan, is included in Exhibit A. The cost estimate is provided to show the estimate with the project salvage value both included and excluded, consistent with N.D. Admin. Code Section 69-09-09-06(3)(b).

### 1.1. SARGENT & LUNDY BACKGROUND

Sargent & Lundy is one of the oldest and most experienced full-service architect-engineering firms in the world. Founded in 1891, the firm is a global leader in power and energy with expertise in grid modernization, renewable energy, energy storage, nuclear power, and fossil fuels. Sargent & Lundy delivers comprehensive project services—from consulting, design, and implementation to construction management, commissioning, and operations/maintenance—with an emphasis on quality and safety. The firm serves public and private sector clients in the power and energy, gas distribution, industrial, and government sectors.

Sargent & Lundy has extensive wind project decommissioning experience, having provided decommissioning cost estimations, decommissioning studies, and related services for more than 25 clients at more than 80 stations in addition to hundreds of retrofit projects with demolition scope. Additionally, Sargent & Lundy is well versed in developing cost estimates for power facility dismantlement. Over the past 10 years, Sargent & Lundy has prepared more than 270 such estimates for 10 clients, encompassing 80 different units.

Additionally, Sargent & Lundy has extensive wind experience in North Dakota. Since 2007, Sargent & Lundy has performed project design, due diligence reviews, and independent engineering analyses for numerous North Dakota wind projects, encompassing over 370 turbines and more than 660 MW of generation. Sargent & Lundy prepared the decommissioning cost estimate for Northern Divide Wind’s affiliate, Emmons-

Logan Wind, LLC, which was filed with the North Dakota Public Service Commission (“Commission”) in Case No. PU-19-179 and approved by the Commission in December 2019.

## **1.2. FACILITY OVERVIEW**

Northern Divide consists of 74 wind turbine generators (WTGs) totaling 197.92 MW:

- 66 General Electric (GE) 2.72-MW WTGs with 116-m rotor diameters and 90-m hub heights (HH) supported by 58.5-ft diameter spread-footing foundations
- 8 GE 2.3-MW WTGs with 116-m rotor diameters and 80-m HH supported by 55.5-ft diameter spread-footing foundations

In addition to this equipment, Northern Divide also includes one 345-kV substation, an underground collection system to transmit power from the individual WTGs to the project substation, site access roads, one operations and maintenance (O&M) building, two meteorological (met) towers built with monopole steel members, and one aircraft detection lighting system (ADLS) tower. The decommissioning plan, and the resulting decommissioning cost estimate, includes only those items specifically listed above.

The Northern Divide project has a planned commercial operation date (COD) in 2020. The anticipated life of the Project is 35 years.

## 2. DECOMMISSIONING REQUIREMENTS

The Project is located in North Dakota, and decommissioning requirements are governed by N.D. Admin. Code, Chapter 69-09-09. The governing organization is the Commission, which is the regulatory authority approving the siting of the Project. The Commission has jurisdiction to grant the necessary approval to begin operation and requires wind energy conversion facilities in North Dakota to maintain an authorized decommissioning plan that must be presented along with the Project parameters.

In this section, Sargent & Lundy provides the requirements for physical decommissioning of a wind power project in North Dakota, noting that financial assurance will be provided by others in accordance with parameters defined by the Commission. The requirements are as such:

- A facility is considered at the end of its useful life if its annual capacity factor (CF) is less than ten percent for two consecutive years.
- Decommissioning and abandonment shall begin within 12 months following the end of its useful life and must be completed within 24 months once initiated.
- Requirements must include the following:
  - Dismantling and removal of all towers, turbine generators, transformers, substations, fencing, and overhead cables
  - Removal of underground cables to a depth of 24 in (2 ft)
  - Removal of foundations, buildings, and ancillary equipment to a depth of 48 in (4 ft)
- Site reclamation is required to meet the original topography with topsoil respreads to a depth that existed prior to the disturbance.
- Grading and reseeding will be governed by Natural Resource Conservation Service recommendations.
- Once the Commission approves the decommissioning plan, the owner must update the plan ten years later, followed by updates every five years thereafter until decommissioning is complete.

Based on the 2020 COD, 35-year anticipated life, and requirement to begin decommissioning within 12 months after the end of the Project's useful life, decommissioning could commence in 2055 and be completed within 24 months following the end of the Project's useful life.

### **3. DECOMMISSIONING AND DEMOLITION EXECUTION**

This section describes the decommissioning process.

#### **3.1. WIND TURBINE GENERATOR NACELLES AND TOWERS**

Decommissioning of the WTG nacelles and towers will follow the “reverse construction” or “careful disassembly” method. Initially, a crane will be moved using a mobile crane mat to each WTG tower location. The outriggers will be supported by mobile crane mats designed for that purpose. Crane mats are typically made of a series of square timber beams long enough to accommodate the width of crane tracks. The beam height (thickness) is typically between six and 12 inches. The timber beams are moved in series to allow a crane to reposition from one WTG to the next. The use of crane mats is required by many rental companies to ensure cranes are safely moved around agricultural land and supported at each WTG site. The use of crane mats and mats for crane outriggers during the decommissioning process is typically sufficient to complete the work while minimizing disruption to the underlying soil.

The wind turbine blades will be lowered to ground level and cut into pieces. The nacelle and hub will be dismantled and processed at ground level. The tower will be dismantled into sections, starting at the top, and lowered to ground level to be processed and moved offsite. The base will be disconnected from the foundation and moved offsite. All WTG components and material will be transported to the appropriate facilities for salvage and/or disposal.

#### **3.2. WIND TURBINE, TRANSFORMER, AND SUBSTATION FOUNDATIONS**

The WTG foundation locations will be excavated and demolished to four feet below ground level. Excavated foundation materials will be processed for removal from site. The remaining foundation components below this depth will remain in place.

Transformer foundation pads will be excavated and demolished to four feet below ground level or removed in their entirety. Excavated foundation materials will be processed for removal from the site.

Foundation sites will be graded to match surrounding contours and restored to conditions that will support surrounding vegetation. All anchor bolts, rebar, embedded conduits, and concrete will be removed to a depth of four feet. The remaining excavation will be filled with subgrade material of comparable gradation to the immediate surrounding area. The subgrade material will be compacted to a density similar to surrounding subgrade material. All unexcavated areas compacted by equipment used in decommissioning will be de-compacted to adequately restore the topsoil and subgrade material to a proper density consistent and compatible with the surrounding area.

All voided areas will be reclaimed to the original topography of the site. Topsoil will be spread to a depth corresponding to adjacent underlayment. Grading and reseeding will be in accordance to the Natural Resource Conservation Service recommendations.

In accordance with North Dakota Century Code § 49-02-27, the location of any portion of underground foundation not removed during decommissioning will be recorded with the county recorder in the county in which the facility is located.

### **3.3. OTHER STRUCTURES AND MISCELLANEOUS MATERIALS FOR REMOVAL**

#### **3.3.1. Met Towers**

The Project met towers will be decommissioned in the reverse construction method similar to that described for the WTGs. Foundations will be removed to four feet below ground level in accordance with the WTG foundation decommissioning procedure.

#### **3.3.2. O&M Building**

The O&M building and any auxiliary buildings will be demolished. The building structure will be removed in its entirety and disposed with other site group materials. All underground support foundations/slabs within the building footprint will be removed to a depth of four feet.

All voided areas will be reclaimed to the original topography of the site. Topsoil will be spread to a depth corresponding to adjacent underlayment. Grading and reseeding will be in accordance to the Natural Resource Conservation Service recommendations.

#### **3.3.3. ADLS Tower**

The ADLS tower will be decommissioned in the reverse construction method similar to that described for the WTGs. The foundation will be removed to four feet below ground level in accordance with the WTG foundation decommissioning procedure.

#### **3.3.4. Hazardous Materials**

Any hazardous materials stored by the Project will be removed and properly disposed.

### **3.4. WTG ACCESS ROADS AND SITE ROADS**

Typical wind project site roads consist of crushed compacted gravel. Approximately 29 miles of Project roads are proposed for Northern Divide [2]. The aggregate base of the Project roads will be removed from the site, and the remaining subgrade will be graded to match existing and natural grade. The Project roads

at Northern Divide will be reclaimed to approximate original topography unless otherwise requested by a landowner and approved by the PSC.

### **3.5. COLLECTION SYSTEM**

Cable to a depth of two feet or less will be removed. As part of the decommissioning, the cables and conduits items will be cut back to the required depth of two feet. All cable and conduit and other materials buried below the required depth will be left in place and abandoned. No special cable cutting is required, so the simplest means should be implemented.

### **3.6. SUBSTATION**

Substation components, buildings, and material will be transported to the appropriate facilities for salvage, and/or disposal. All underground support foundations/slabs and cabling within the substation footprint will be removed to a depth of four feet.

#### 4. DECOMMISSIONING COST ESTIMATE

The decommissioning and demolition plan described in the prior section is used as input for the generation of the decommissioning cost estimate for Northern Divide.

Project quantities of WTGs, wind turbine towers, wind turbine foundations, met towers, and the O&M building were taken from the site layout plan [2]. Site road lengths shown on the site plan were estimated to be 29 miles in length. Unit pricing for decommissioning, demolition, removal, and scrap value was taken from representative contractor price quotations and information provided by Northern Divide. Transportation costs are included in component removal and salvage value unit pricing. A detailed line item breakout of each cost category is shown in Exhibit A.

Estimated decommissioning costs for Northern Divide are summarized in the following table.

**Table 4-1 — Northern Divide Decommissioning Cost Estimate**

Description	Scrap Value Consideration	Cost (2020 USD)
Northern Divide Decommissioning Total	Excluding Scrap Value	\$13,585,520
Northern Divide Decommissioning per WTG	Excluding Scrap Value	\$183,588
Northern Divide Decommissioning Total	Including Scrap Value	\$10,021,364
Northern Divide Decommissioning per WTG	Including Scrap Value	\$135,424

Sargent & Lundy considers the costs shown in the table above to be reasonable estimates of the costs to decommission the Project.

## **5. CONCLUSION**

Sargent & Lundy developed this decommissioning plan and cost estimate for retiring the Northern Divide Project at the end of its useful life in accordance with N.D. Admin. Code Chapter 69-09-09.

Based on experience with similar requirements for wind project decommissioning, Sargent & Lundy does not expect the decommissioning of Northern Divide to negatively impact present or future natural resource development in the area.

## **6. REFERENCES**

1. North Dakota Administrative Code, Title 69, Article 69-09, Chapter 69-09-09.
2. Northern Divide Wind, LLC - Northern Divide Wind Energy Center, Overall Site Plan, Issue Date 06-29-2020.

## **Exhibit A. Decommissioning Cost Breakdown**

Project:	Northern Divide	October 14, 2020 Rev. 1
Owner:	Northern Divide Wind, LLC	
Location:	North Dakota	

**Wind Tower Decommission and Site Restoration Estimate – WTG Salvage Estimate**

**1.0 Turbines and Towers**

Decommission of turbines and towers for this estimate includes dismantling of turbine components and transportation off site for disposal. Price excludes deduct for salvage value of the components.

Turbines: - GE 1.715 & 2.72

Towers: 66 90m Steel Tower 116m rd

Towers: 8 80m Steel Tower 116m rd

		Quantity	Unit Cost	Extended Cost	Assumptions
1.1	Dismantle Turbine & Towers	74 ea	\$ 85,000.00	\$ 6,290,000	Weighted average cost of removal and disposal of turbines and towers.
1.2	Removal of Transformers	74 ea	\$ 2,805.00	\$ 207,570	Removal and disposal of transformers.
1.3	Hauling of Turbines, Towers, and Transformers	74 ea	\$ 30,000.00	\$ 2,220,000	Assumed 200 mile haul distance
				<b>1.0 Turbine and Tower Totals: \$</b>	<b>8,717,570</b>

**2.0 Tower Foundations**

Tower foundations will be removed to a depth of four (4) feet below existing grade. Transformer foundations will be removed to four (4) feet below grade or in their entirety. Conduit connections embedded in concrete will be removed to a depth of four (4) ft below grade. Foundation sites will be graded to match surrounding contours and restored to conditions that will support surrounding vegetation.

Type: 66 58.5 ft diameter spread footing foundations

Type: 8 55.5 ft diameter spread footing foundations

		Quantity	Unit Cost	Extended Cost	Assumptions
2.1	Foundation	74 ea	\$ 21,955.50	\$ 1,624,707	Removal, hauling and disposal of foundation concrete and steel. Site regraded to existing contours.
2.2	Transformer Pad	74 ea	\$ 2,214.00	\$ 163,836	Removal, hauling and disposal of transformer pads
2.3	Hauling of Aggregate/Soil	74 ea	\$ 5,000.00	\$ 370,000	Assumed 200 mile haul distance
				<b>2.0 Tower Foundation Totals: \$</b>	<b>2,158,543</b>

Project:	Northern Divide	October 14, 2020 Rev. 1
Owner:	Northern Divide Wind, LLC	
Location:	North Dakota	

**Wind Tower Decommission and Site Restoration Estimate – WTG Salvage Estimate**

**3.0 Other Structures**

Removal of meteorological towers and O&M building included.

	Quantity	Unit Cost	Extended Cost	Assumptions
3.1 296 Feet Meteorological Towers	2 ea	\$ 28,050.00	\$ 56,100	Removal and disposal of meteorological towers
3.2 O & M Building	1 ea	\$ 51,000.00	\$ 51,000	Removal and disposal of O&M facility
3.3 58 Feet, Lattice Construction ADLS Tower	1 ea	\$ 9,350.00	\$ 9,350	Removal and disposal of ADLS tower
3.4 Hauling of Other Structures	4 ea	\$ 50,000.00	\$ 200,000	Assumed 200 mile haul distance
<b>3.0 Other Structures Totals:</b>			<b>\$ 316,450</b>	

**4.0 Tower Access and Site Roads**

Aggregate base roads will be scarified, loaded and removed from site. Remaining subgrade will be decompacted and graded to match existing and natural grade. Any vegetation will be re-established.

Type: Average 16 ft wide roads with 6 inches of compacted aggregate base

	Quantity	Unit Cost	Extended Cost	Assumptions
4.1 Roads	155,295 lf	\$ 8.67	\$ 1,346,411	Aggregate base will be removed and hauled off site; assumed 6" thick @ 16' wide.
<b>4.0 Tower Access Road Totals:</b>			<b>\$ 1,346,411</b>	

**5.0 Collection System**

Removal of termination sections near transformer to a depth 24" below existing ground line.

Type: Terminations

	Quantity	Unit Cost	Extended Cost	Assumptions
5.1 Collection system terminations	74 ea	\$ 2,346.00	\$ 173,604	Removal, hauling and disposal of collection system terminations
<b>5.0 Collection System Totals:</b>			<b>\$ 173,604</b>	

Project:	Northern Divide	October 14, 2020 Rev. 1
Owner:	Northern Divide Wind, LLC	
Location:	North Dakota	

**Wind Tower Decommission and Site Restoration Estimate – WTG Salvage Estimate**

**6.0 Substation**

Substation excludes deduct for salvage value of the components.

	Quantity	Unit Cost	Extended Cost	Assumptions
6.1 Substation Foundations, Fence, Steel and Grading	1 LS	\$ 275,400.00	\$ 275,400	Removal hauling and disposal of foundations and fencing. Includes grading costs.
6.2 Substation Equipment	1 LS	\$ 260,000.00	\$ 260,000	Removal hauling and disposal of substation equipment
6.3 Hauling of Substation Equipment	1 ea	\$ 60,000.00	\$ 60,000	Assumed 200 mile haul distance
<b>6.0 Substation Totals:</b>			<b>\$ 595,400</b>	

**7.0 Mobilization/Demobilization**

	Quantity	Unit Cost	Extended Cost	Assumptions
7.1 Mobilization/Demob	1 LS	\$ 277,542.00	\$ 277,542	Typical industry price quote for mob/demob of crane at similar site location. Single mobilization and demobilization is assumed.
<b>7.0 Mob/Demob Totals:</b>			<b>\$ 277,542</b>	

**Site Decommission Totals (Exclude Salvage Value): \$ 13,585,520**

**Site Decommission per WTG (Exclude Salvage Value): \$ 183,588**

**8.0 Project Salvage Value**

	Quantity	Unit Cost	Extended Cost	Assumptions
8.1 Project Steel Salvage Value	13,697 TN	\$ (225.00)	\$ (3,081,719)	Varying steel compositions are grouped together as mixed steel. Quantities for tonnage based on prior project experience for similar wind projects
8.2 Project Copper Salvage Value	255 TN	\$ (1,892.00)	\$ (482,437)	Quantities for tonnage based on prior project experience for similar wind projects.
<b>8.0 Project Salvage Totals:</b>			<b>\$ (3,564,156)</b>	

**Site Decommission Totals: \$ 10,021,364**

**Site Decommission per WTG: \$ 135,424**