APPENDIX P – DECOMMISSIONING PLAN

DECOMMISSIONING COST ESTIMATE

PREPARED FOR:
SCOUT CLEAN ENERGY, LLC

Ref. No.: 19-00177

SWEETLAND WIND FARM
Hand County,
South Dakota

19 February 2019

CLASSIFICATION
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AWS Truepower, LLC
12396 World Trade Dr., Suite 212 | San Diego, CA 92128 | USA
www.ul.com/renewables

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DOCUMENT CONTRIBUTORS

AUTHOR(S)	REVIEWER(S)	APPROVED BY
E. Azanza, K. Kallevig	D. Miranda	J. Tchou

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A	15 February 2019	Initial Draft
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1. INTRODUCTION

AWS Truepower, LLC, a UL Company ("UL"), was retained by Scout Clean Energy, LLC ("Scout" or "Client") to conduct a decommissioning cost evaluation for the Sweetland Wind Farm ("Sweetland" or "Project") located in Hand County, South Dakota.

The decommissioning cost evaluation was completed to estimate costs the Project will incur for removal and disposal of the turbine blades, foundations, and other Project facilities, and for the restoration of the site following the removal of equipment.

The report includes costs and a high-level plan for turbine component removal (disassembly, using cranes, loading on trailers, etc.) as well as foundation removal work (concrete demolition, loading on trucks, turbine pad reclamation, etc.).

For the roads, it has been assumed that all the access roads will be removed at the end of the useful life of the wind farm. The cost to remove the crushed rock, load it onto dump trucks, and haul it off-site is included in the cost estimate.

The report describes assumptions and cost estimates for the following major decommissioning activities:

- Decommissioning Planning and Permitting;
- Component Disassembly;
- Demolition and Removal; and
- Site Restoration.

The estimated decommissioning costs (including contingency provisions) are separated into wind turbine decommissioning costs (nacelle, tower, blades, and foundations) and balance of plant decommissioning costs (transmission line removal, substation removal, and crushed rock road surface removal).

The report summarizes the assumptions used as well as the limitations of the cost estimate. For the decommissioning cost estimate, UL has not considered inflation so all costs are assumed to be in 2019 USD.

As part of the calculations, an estimate of scrap value has been used and it is assumed that all recyclable materials will be recycled to the extent possible to offset decommissioning costs.

2. EXECUTIVE SUMMARY

A decommissioning cost estimate has been prepared for the Sweetland Wind Farm located in Hand County, South Dakota. The Project is expected to be comprised of 71 GE 2.82 MW wind turbine generators ("WTGs") with a 127m rotor diameter and hub height of either 89m or 114m. The Project includes a substation and a 7-mile generation tie ("gen-tie") line. The cost estimate includes costs for each of the two potential hub heights.

This report describes the process for restoring the Project location to its pre-Project state by removing all Project infrastructure, completing site restoration, and properly disposing of materials and waste.

The decommissioning process includes the following activities: pre-dismantling planning activities, road and crane platform reclamation, WTG dismantling and removal, foundation demolition and removal, and removal of the gen-tie line.

The basis of the cost estimate assumes the Project will incur costs for removal and disposal of the blades, foundations, and other Project facilities, and for the restoration of the site following the removal of equipment.

The final estimated costs for the decommissioning of the wind farm are as follows:

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 2.1: Decommissioning Costs, Including 10% for Contingencies and Salvage Value

	Costs (USD)	Costs (USD/WTG)	Salvage (USD)	Salvage (USD/WTG)	Net Cost (USD)	Net Cost (USD/WTG)
Wind Turbine Decommissioning	10,922,000	153,831	-8,972,208	-126,369	**1,949,792**	**27,462**
Substation Decommissioning	214,000	3,014	-	-	**-**	**-**
Transmission Line Decommissioning	714,000	10,056	-30,291	-427	**683,709**	**9,629**
Crushed Rock Road Surface Decommissioning	1,444,000	20,338	-	-	**-**	**-**
TOTAL	13,294,000	187,225	-9,002,499	-126,796	**2,633,501**	**37,091**

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 2.2: Decommissioning Costs, Including 10% for Contingencies and Salvage Value

	Costs (USD)	Costs (USD/WTG)	Salvage (USD)	Salvage (USD/WTG)	Net Cost (USD)	Net Cost (USD/WTG)
Wind Turbine Decommissioning	12,250,000	172,535	-10,025,848	-141,209	**2,224,152**	**31,326**
Substation Decommissioning	214,000	3,014	-	-	**-**	**-**
Transmission Line Decommissioning	714,000	10,056	-30,291	-427	**683,709**	**9,629**
Crushed Rock Road Surface Decommissioning	1,444,000	20,338	-	-	**-**	**-**
TOTAL	14,622,000	205,944	-10,056,139	-141,636	**2,907,861**	**40,956**

3. DECOMMISSIONING PLAN

3.1 Project Description

The Sweetland Wind Farm is a 200.22 MW wind project expected to be comprised of 71 GE 2.82 MW WTGs with a 127m rotor diameter and hub height of either 89m or 114m located in Hand County, South Dakota.

The Project substation will have a 230 kV transformer and be located on a 2-acre fenced area with its purpose being to increase the voltage from the underground collection system (34.5 kV) to the voltage of the gen-tie line (230 kV). The 7-mile gen-tie line will connect the Project substation to a switchyard where the Project will interconnect to the electrical grid.

3.2 Decommissioning Requirements and Assumptions

According to the Client, there are no specific decommissioning requirements per either local or state ordinances, permits, or agreements. However, a decommissioning estimate is required for Project review by the South Dakota Public Utilities Commission.

Additionally, the Client has indicated that the following decommissioning considerations are included in Project leases with landowners:

- Below-grade facilities will be removed to not less than 3 feet below grade;
- Below-grade tower foundation areas will be buried with topsoil;
- Tower pad locations will be reseeded with grasses and/or natural vegetation acceptable to the owner;
- There is no obligation to remove cables, lines, or conduits buried more than 3 feet below grade; and
- All access roads will remain on the property unless the owner requests removal.

In accordance with the above, UL has assumed removal of below-grade facilities to 3 feet below grade, below-grade foundation areas to be buried with topsoil, and reseeding and reclamation of tower pad locations. It is assumed that the underground collection system will be left in place and not removed.

Although the land leases allow for access roads to remain, UL has assumed the removal of all access roads, which potentially results in a more conservative decommissioning estimate.

3.3 Decommissioning Tasks

The anticipated life of the Project is estimated to be 35 years. At the end of Project life, depending on market conditions and Project viability, the wind turbines may be “repowered” with new nacelles, towers, and/or blades, thus extending the useful life of the Project and delaying any decommissioning activities. Alternatively, the full Project may be decommissioned, which is the option considered for this cost estimate. The purpose of decommissioning activities is to return the Project and surrounding area to its pre-Project state.

After the turbines and other secondary facilities are removed, the decommissioning work will include the necessary tasks to restore the area to its original condition. UL has assumed that access roads and crane platforms will be restored to the previous condition using appropriate material.

All the wind turbines, including towers, generators, and any other equipment, will be removed as part of the decommissioning process. The concrete foundations of all the wind turbines will be removed to

a depth of 3 feet below grade and backfilled with surrounding subsoil and topsoil. The parts of the foundations that are deeper than 3 feet will be abandoned in place.

The decommissioning process includes the following actions: pre-dismantling activities, reconditioning of roads, construction of the crane platforms, WTG dismantling, foundation demolition, road and crane platform dismantling and reclamation, and removal of the substation and aboveground gen-tie line.

- **Pre-dismantling activities:** This activity includes de-energization and isolation from all external electrical lines. Staging areas should be delineated at each turbine site. All decommissioning activities should be conducted within designated areas, including ensuring that vehicles and personnel stay within the demarcated areas.

- **Reconditioning of roads:** This activity allows cranes and machines access to the wind turbines according to the technical specifications of the Project for roads. All roads and tracks must have enough weight-carrying capacity for each truck axle with a minimum pre-determined road width in straight stretches and a proper layer of graded aggregate. Once turbines are dismantled, these roads will be reclaimed.

- **Construction of the crane platforms:** This activity includes clearing the surface vegetation and reconditioning the ground according to the technical specifications of the Project for crane platforms (as it was originally built in the construction phase of the wind farm) in order to provide sufficient area for the laydown of the disassembled wind turbine components and loading them onto trucks. The topsoil at the crane pad will be removed, and compacted crushed gravel will be added. The raised area and the foundation of the platforms must be equivalent to the specifications set for tracks that ensure carrying capacity. Once the turbine disassembly is complete, the gravel area around each turbine will be removed, and the area will be restored to prior use using stockpiled topsoil.

- **Dismantling and removal of the wind turbine generators:** This activity includes the process in which the WTGs are dismantled, which will follow an approach similar to as follows.
  - Disconnect the tower from the collection system, and disconnect the wiring between turbine sections.
  - Disengage rotor from nacelle.
  - Lower rotor to the ground, supporting the nose and keeping the three blades parallel to the ground.
  - Separate the blades from the hub and prepare them for transport (this may include chopping of the blades to reduce length).
  - Remove nacelle from the yaw ring and power cables from generator and control.
  - Lower nacelle to the ground and prepare for transport.
  - Drain the lubricating oil from the gearbox once it has been placed on the ground, and dispose of the oil in accordance with applicable regulations.
  - Unscrew every tower section progressively from top to the ground and preparing for transport.
  - Collect every power cable, control cabinet, and other components in the tower and prepare for transport.

- **Demolition and removal of the foundations:** This activity will reclaim foundations to at least 3 feet below the surface and include a process similar to the following.
  - Clear any vegetation.
  - Dig (mechanically) 3 feet deep around foundations.

- Demolish the upper section of the foundations (above ground foundation slab and 3 feet below surface). The resulting concrete and rebar will be hauled off-site and disposed of at a licensed facility.
- Fill the foundation hole with material previously extracted which is typically from the surrounding soils.
- Fill the foundation upper part with topsoil and seed with native vegetation or regrade for farming use.

- **Dismantling and reclamation of the roads and crane platforms:** This activity will include removing the upper aggregate layer of the roads and then covering the area with topsoil and reseeding with native species or regrading for farming. Some additional restoration work may be necessary for sloping terrain.

- **Electrical infrastructure:** This activity will include removal of all necessary electrical infrastructure and includes a process similar to as follows:
  - The above-ground gen-tie line and substation will be removed.
  - The substation's electrical components will be either removed as a whole or disassembled, pending reuse or recycling.
  - Once cleared, the gravel around the yard will be reclaimed and the fence will be removed.
  - As with the turbine foundation, the substation foundation will be excavated, and the top 3 feet of concrete will be demolished and hauled off-site to be disposed of at a licensed facility.
  - The excavated area will then be filled in with soil, regraded, and seeded with native vegetation or regraded for farming.
  - All materials will be recycled, where possible, or disposed off-site at an approved and appropriate facility.

- **Auxiliary installations:** This activity includes removal of all other auxiliary items and includes removal of potential items similar to listed below.
  - Road signs along with the necessary restoration of affected land.
  - Meteorological masts, including foundations, along with the necessary restoration of affected land.

3.4 Estimated Decommissioning Cost

The basis of the decommissioning cost evaluation assumes that the Project will incur costs for removal and disposal of the blades, foundations, and other project facilities and for the restoration of the site following the removal of equipment. The cost to remove the Project components and crushed rock, load it into trucks, and haul it off-site will be at the expense of the Project.

The decommissioning estimated costs include the costs to return the site to a condition compatible with the surrounding land and similar to the conditions that existed before development of the Project. Included are the costs to dispose of or recycle the Project's wind turbines as well as the Project's balance of plant facilities.

The decommissioning costs for the Project have been divided into the following categories.

- **Wind Turbine Decommissioning:**
  - Setup of the crane pad and work area to be used for dismantling of each wind turbine;
  - Dismantling of the wind turbine and removal of all of its components, proceeding in reverse order to assembly operations, including the demolition and removal of the visible part of the foundation and 3 feet below the surface; and
  - Dismantling of the crane pad and work area and reclamation of the surrounding terrain, which reclamation is comprised of gravel removal, flattening of the ground to the original level, and subsequent seeding with native species or regrading for farming.

- **Balance of Plant:**
  - Substation Removal;
  - Gen-tie line removal;
  - Crushed Rock Road Surface Removal
    - Reconditioning of the site roads for use by the cranes and necessary transportation vehicles used for the dismantling and removal of the wind turbines. This includes flattening the roads, placement of additional gravel, and road compaction according to the Project's specifications;
    - Dismantling of roads and reclamation of the terrain, which reclamation is comprised of gravel removal, flattening the ground to the original level, and seeding of native species or regrading for farming;
    - Dismantling of trenches and reclamation of terrain as well as subsequent sowing of native species or regrading for farming; and
    - Reclamation of terrain in any other areas that were impacted by the Project, but not included in the previous points, including ground improvement; removing and refilling of trenches, piping, road, and platforms with topsoil and reseeding with native species or regrading for farming.

3.4.1 Disassembly Assumptions

For the calculation of the disassembly costs of the Project WTGs, UL has estimated 1.25 days of a wheeled crane and a support crane per wind turbine in the case of the 89 m hub height model and 1.4 days per turbine in the case of the 114 m hub height model. UL estimates a price of approximately $60,000 per day for the wheeled and support cranes. The foundations of the wind turbines have been estimated to be approximately 32.2 cubic meters with a cost to decommission of approximately $188 per cubic meter.

It is assumed that 100% of the access roads will be decommissioned. According to the layout of the wind farm, the length of the access roads will be approximately 21 miles. The width of the roads is assumed to be approximately 16 feet and they will be remediated to a depth of 3 feet.

For the calculation of the costs it has been assumed that all the crane pads will be reclaimed and an approximate surface area of 600 square meters has been considered for each crane pad. Approximately 63,700 cubic meters of crushed rock was calculated by UL for removal. UL estimates a cost of approximately $10 per cubic meter for decommissioning and removal.

The costs for disassembly of the substation include the costs of the required machinery to disassemble the HV equipment and transformers, demolish the control building, and complete foundation removal and restoration. The substation has a voltage of 230 kV and it has been assumed that the volume of the substation foundations is close to 180 cubic meters with a gravel volume of 225 cubic meters. UL has estimated debris removal of 1,275 cubic meters and 8,100 square meters of surface restoration.

3.4.2 Removal Assumptions

After the wind turbines have been disassembled, the costs to transport the dismantled wind turbines have been estimated. These costs depend on the size and weight of the main components (blades, hub and tower) and the transport distance. In the case of the GE 2.82-127, each blade has a length of approximately 62.2m and a weight of 14.6 tons. The nacelle weighs 92 tons and the hub 34.5 tons. Finally, the steel tower has a length of 84m (weight of 240 tons) and is composed of 4 sections. In the case of the 114m tower, the weight is 296 tons and the tower is composed of 5 sections. It has been assumed that the transportation distance for wind turbine component disposal is approximately 300 miles.

As previously noted, it is assumed that 63,700 cubic meters of crushed rock is to be removed. The estimated dump truck capacity is assumed to be 11.5 cubic meters and the transportation distance is estimated to be 30 miles, resulting in a removal cost of approximately $11 per cubic meter.

Finally, for the substation removal it has been estimated that the distance to transport the foundations, gravel and the building debris is approximately 30 miles, whereas for the transformers, other HV equipment and other dead-end structures, the transportation distance is assumed to be 300 miles. The dump truck capacity is assumed to be 11.5 cubic meters.

3.4.3 Cost Summary

3.4.3.1 Wind Turbine and Balance of Plant Decommissioning Costs

The following tables show the estimated decommissioning costs for wind turbine and balance of plant components, including disassembly and removal.

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 3.1: Wind Turbine and Balance of Plant Decommissioning Costs

	Total (USD)	Per WTG (USD)
Wind Turbine Decommissioning	9,928,836	139,843
Balance of Plant Decommissioning	2,155,122	30,354
TOTAL	12,083,958	170,197

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 3.2: Wind Turbine and Balance of Plant Decommissioning Costs

	Total (USD)	Per WTG (USD)
Wind Turbine Decommissioning	11,135,836	156,843
Balance of Plant Decommissioning	2,155,122	30,354
TOTAL	13,290,958	187,197

If a 10% extra is included for contingency, the final estimated costs for decommissioning of wind turbines and balance of plant is as follows:

Scenario 1 (71 GE 2.82MW with a hub height of 89m):

Table 3.3: Wind Turbine and Balance of Plant Decommissioning Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Wind Turbine Decommissioning	10,922,000	153,831
Balance of Plant Decommissioning	2,371,000	33,394
TOTAL	13,293,000	187,225

Scenario 2 (71 GE 2.82MW with a hub height of 114m):

Table 3.4: Wind Turbine and Balance of Plant Decommissioning Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Wind Turbine Decommissioning	12,250,000	172,535
Balance of Plant Decommissioning	2,371,000	33,394
TOTAL	14,621,000	205,930

3.4.3.2 Disassembly Costs

The following tables break out the wind turbine and substation disassembly costs, including a 10% contingency.

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 3.5: Wind Turbine Disassembly Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Hub and Blades Dismantling	1,757,000	24,746
Nacelle Dismantling	1,757,000	24,746
Tower Dismantling	2,343,000	33,000
Foundation Demolition	594,000	8,366
TOTAL	6,451,000	90,859

Table 3.6: Substation Disassembly Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Dismantle HV and Main Transformer	13,000	183
Building Demolition	70,000	986
Foundation Demolition	37,000	521
Site Restoration	51,000	718
TOTAL	171,000	2,408

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 3.7: Wind Turbine Disassembly Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Hub and Blades Dismantling	1,804,000	25,408
Nacelle Dismantling	1,804,000	25,408
Tower Dismantling	2,952,000	41,577
Foundation	594,000	8,366
TOTAL	7,154,000	100,761

Table 3.8: Substation Disassembly Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Dismantle HV and Main Transformer	13,000	183
Building Demolition	70,000	986
Foundations	37,000	521
Site Restoration	51,000	718
TOTAL	171,000	2,408

3.4.3.3 Project Removal Costs

Removal costs are presented in the following tables, including a 10% contingency.

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 3.9: Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Wind Turbine Removal	4,471,000	62,972
Substation Removal	43,000	606
Transmission Line Removal	19,000	268
Crushed Rock Road Surface Removal	763,000	10,746
TOTAL	5,296,000	74,592

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 3.10: Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Wind Turbine Removal	5,096,000	71,775
Substation Removal	43,000	606
Transmission Line Removal	19,000	268
Crushed Rock Road Surface Removal	763,000	10,746
TOTAL	5,921,000	83,394

3.4.3.4 Breakdown of Wind Turbine and Substation Removal Costs

In the next tables the breakdown of the costs related to wind turbine and substation removal are presented, including a 10% contingency.

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 3.11: Wind Turbine Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Blades Removal	595,000	8,380
Hub Removal	625,000	8,803
Nacelle Removal	701,000	9,873
Tower Removal	2,499,000	35,197
Foundation Removal	51,000	718
TOTAL	4,471,000	62,972

Table 3.12: Substation Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
HV Equipment and Transformers Removal	15,000	211
Dead-end structures Removal	7,000	99
Building debris, Foundations and Gravel Removal	20,000	282
TOTAL	43,000	592

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 3.13: Wind Turbine Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
Blades Removal	595,000	8,380
Hub Removal	625,000	8,803
Nacelle Removal	701,000	9,873
Tower Removal	3,124,000	44,000
Foundation Removal	51,000	718
TOTAL	5,096,000	71,775

Table 3.14: Substation Removal Costs, Including 10% for Contingencies

	Total (USD)	Per WTG (USD)
HV Equipment and Transformers Removal	15,000	211
Dead-end structures Removal	7,000	99
Building debris, Foundations and Gravel Removal	20,000	282
TOTAL	43,000	592

UL's estimates and projections of decommissioning costs are based on UL's experience, qualifications, and judgment and from review of the Project's design as well as information from similar projects in the region. These assumptions are based on reasonable expectations of costs from current economic conditions and the assumed requirements of the decommissioning and remediation process. These cost estimates could deviate in the actuality due to weather, cost and availability of labor, material and equipment, labor productivity, construction contractors' procedures and methods, and other factors, and as such UL cannot guarantee the accuracy of its estimates and projections.

The cost estimates were prepared based on current knowledge of site conditions, current regulations, and current hazardous material classifications. UL's estimates do not include allowances for unforeseen environmental liabilities associated with unexpected environmental contamination due to events not considered as part of normal operations, such as fuel tank ruptures, oil spills, etc. Estimates also do not include allowances for environmental remediation associated with changes in classification of hazardous materials. Given these uncertainties, UL has included a contingency margin in all estimates (10% extra).

3.4.4 Salvage Values

The major components of the wind turbines (tower, nacelle, and blades) are modular items that allow for ease of construction and disassembly of the wind turbines during replacement or decommissioning. The salvage potential of decommissioned turbines and balance of plant infrastructure will help the Project's owners to save on decommissioning costs [1]. These components are easily recyclable and there is a mature market for scrap metals. Additionally, transformers and collection lines are designed for upwards of a 50-year lifespan, so these items could potentially be refurbished and sold for reuse.

It is assumed that the nacelle will yield approximately 80% salvageable materials from the 150 tons of weight. The weight of each steel tower is approximately 194 tons. Since the hub assembly and bedplate is manufactured steel, it is anticipated that the hub will yield 100% salvageable metallic materials from the 30 tons of weight. Copper salvage estimates were derived by assuming that 5% of the nacelle weight consists of salvageable copper bearing materials. At the time of writing this report, the composites used in blade manufacturing cannot be recycled. In the absence of a recycling solution at the time of decommissioning, blades will be chipped before disposal at the nearest landfill that accepts them.

Concrete from turbine foundations, unit transformer pads, main power transformer footings, and substation control building footings will be separated from the reinforcing steel and can be crushed and recycled as granular fill material. The steel will then be sold as scrap metal.

It is assumed that most of the aggregate material from the decommissioning of the crane pads, the road aggregate, and the gravel can be salvaged for future use as aggregate base. The remaining materials would be viable for general fill in non-structural fill areas. Any topsoil that cannot be used in site remediation will be given to the landowner, removed and reused, or disposed of in a manner outlined by the local municipality.

Based on the Project details, UL has considered the following salvageable quantities of steel, copper, and aluminum.

- **Scenario 1, GE 2.82MW 89m HH**
  - Steel: 356.9 tons/WTG
  - Copper: 5.15 tons/WTG
- **Scenario 2, GE 2.82MW 114m HH**
  - Steel: 412.9 tons/WTG
  - Copper: 5.15 tons/WTG
- **Transmission Line**
  - Aluminum: 18.32 tons

Based on a review of U.S. government data [2] and rates published by scrap metal recyclers, UL has assumed the following scrap commodity prices:

- Steel: $265/ton
- Copper: $6,173/ton
- Aluminum: $1,653/ton

Based on the weight of turbine components, and the scrap commodity prices, the following tables estimate the potential salvage value for the above-referenced weights and components.

Scenario 1 (71 x GE 2.82MW with a hub height of 89m):

Table 3.15: Salvage Values

Component	Total (USD)	Per WTG (USD)
Turbine Steel Salvage Value	6,715,074	94,579
Turbine Copper Salvage Value	2,257,134	31,791
Total Turbine Salvage Value	**8,972,208**	**126,369**
Transmission Line Salvage Value	30,291	427
TOTAL	**9,002,499**	**126,796**

Scenario 2 (71 x GE 2.82MW with a hub height of 114m):

Table 3.16: Salvage Values

Component	Total (USD)	Per WTG (USD)
Turbine Steel Salvage Value	7,768,714	109,419
Turbine Copper Salvage Value	2,257,134	31,791
Total Turbine Salvage Value	**10,025,848**	**141,209**
Transmission Line Salvage Value	30,291	427
TOTAL	**10,056,139**	**141,636**

UL notes that commodity prices are volatile and therefore, UL is not able to comment on the potential pricing of such materials 35 years in the future.

3.5 Waste Management

As discussed above, the waste generated by the decommissioning of the Project is minimal, and toxic waste is not anticipated. Any waste generated, such as gearbox oil, will be disposed of according to the applicable standards with the emphasis on recycling materials whenever possible. Materials will be broken down into manageable sizes for transport to suitable disposal and salvage facilities. The main sources of salvage material are steel, copper, and aluminum, which may be sold to recycling facilities. All non-salvageable components will be processed and safely transported to an approved disposal facility.

3.6 Assumptions and Limitations

This decommissioning cost estimate has been completed to assist the Project owner in fulfilling requirements for review by the South Dakota Public Utilities Commission.

The Project owner will ensure that the decommissioning of the Project is carried out in accordance with safety requirements and the measures/practices as described in this report as well as any conditions imposed by the laws in the US and/or the state of South Dakota.

The firm responsible for decommissioning will ensure that employee health and safety is maintained and will implement the following safety procedures and protocols as appropriate in an effort to ensure that employee safety is addressed throughout decommissioning activities:

- Personal protective equipment (PPE), including non-slip footwear, eye protection, clothing, and hardhats, will be worn by personnel when on duty;
- Elevated platforms, walkways, and ladders will be equipped with handrails, toe boards, and non-slip surfaces; and
- Electrical equipment will be insulated and grounded in compliance with the appropriate electrical code.

As appropriate, the firm responsible for decommissioning will develop or have an existing training program to ensure that personnel receive appropriate training in relation to decommissioning programs; environmental, health, and safety procedures; and the emergency response plan.

During all decommissioning and restoration activities, general environmental protection and mitigation measures may need to be implemented including measures related to stormwater and erosion control. All decommissioning and restoration activities will be performed according to the requirements of relevant government agencies and will be in accordance with all relevant statutes in place at the time of decommissioning.

Prior to decommissioning, consultation with the landowners will be conducted to determine the level and type of decommissioning work to be performed on their land. Some infrastructure may be useful beyond the lifespan of the wind farm, such as roads. Although the cost estimate herein assumes removal of all access roads, the owner will confirm with landowners whether certain access roads should remain in-place.

Although strict spill prevention procedures will be in place, there is the potential (throughout the decommissioning process) for small spills of solvents or fuels. The soil conditions of the turbine areas will be surveyed to determine if any impacts have occurred. Should soil impacts be noted, the impacted soils will be identified, excavated, and removed according to the applicable standards from the site for disposal at an approved and appropriate facility. A manager responsible for safety should be present on-site for the duration of the work. The removed soils will be replaced with stockpiled subsoil and topsoil if such are available. If none are available, clean fill and topsoil will be imported.

Other than the concrete and the underground collection system, which will remain 3 feet below the soil, no other residual impacts are foreseen. Decommissioning may temporarily affect the agricultural practices directly around the access roads, substation, and turbine locations, but only during their removal. Limited impacts to terrestrial vegetation are expected. Wildlife, including birds and bats, may be temporarily disturbed by decommissioning activities. The most significant risk to the aquatic environment will be when the access roads near drains or municipal drain crossings are removed. Similar to the construction phase, decommissioning should follow a storm water protection plan that will ensure that proper steps are followed to mitigate erosion and silt/sediment runoff.

Any proposed decommissioning works within or near watercourses would be discussed with the relevant agencies to determine any applicable guidelines, permitting, site-specific mitigation, and/or remediation plans. It is envisioned that the same mitigation and monitoring measures implemented during construction will be used for the decommissioning of the Project.

Decommissioning of the wind turbines should not result in any impacts to surface or groundwater quality. After the decommissioning process is completed, the land will be returned to existing agricultural conditions. Site rehabilitation/restoration activities explained during decommissioning planning should be updated as necessary based on the standards and best practices at the time of decommissioning, and these updates should occur in consultation with landowners and the appropriate regulatory and government bodies.

As with the Project's construction, noise levels around the decommissioning work will be higher than average. Proper steps will be followed to minimize this disturbance, such as avoiding work outside of

daylight hours. Also, as with the Project's construction, road traffic in the area will increase temporarily due to crews and heavy equipment movements. If required, a traffic management plan will be prepared to mitigate the effects of increased road traffic in consultation with the local municipality.

4. REFERENCES

[1] D. Raimi, "Decommissioning US Power Plants - Decisions, Costs, and Key Issues," 2017.

[2] "USGS Commodity Statistics and Information, https://minerals.usgs.gov/minerals/pubs/commodity/," 2019.