FILED
June 3, 2025
INDIANA UTILITY
REGULATORY COMMISSION

VERIFIED DIRECT TESTIMONY

OF

DAVID BARRIE

WOOD PLC

ON BEHALF OF

INDIANAPOLIS POWER & LIGHT COMPANY

D/B/A AES INDIANA

Cause No. 46258

SPONSORING AES INDIANA ATTACHMENT DB-1

VERIFIED DIRECT TESTIMONY OF DAVID BARRIE

ON BEHALF OF AES INDIANA

1. INTRODUCTION

Q1. Please state your name, employer, and business address.

A1. My name is David Barrie. My employer is Wood Canada Limited (Wood) at Wood Centre, Suite 420, 2535 3 Ave SE, Calgary, Alberta, T2A 7W5, Canada, affiliated with Wood Group USA, Inc at 17325 Park Row Ste 500, Houston, Texas 77084.

Q2. What is your position with Wood?

A2. I am the Director of Advisory Services for Wood's Consulting business unit in the Americas region.

Q3. On whose behalf are you submitting this direct testimony?

A3. I am submitting this testimony on behalf of AES Indiana.

Q4. Please describe your duties as Director of Advisory Services.

A4. As the Director of Advisory Services at Wood, I am responsible for leading or overseeing a team undertaking technical analysis of renewables projects, including energy yield assessments, due diligence assignments, development planning, decommissioning studies, and other bespoke assessments. I work collaboratively with the project delivery teams to assess project technical definitions and risks, and support our project management team to ensure that assignments from clients are delivered to Wood's internal quality control and assurance processes.

Q5. Please summarize your education and professional qualifications.

A5. I hold a bachelor's degree in Mechanical Engineering from the University of Calgary (2007). I am a registered Professional Engineer in the provinces of Alberta and British Columbia.

Q6. Please summarize your prior work experience.

A6. I started my career working in the construction industry supporting initiatives in the green building and construction industry prior to a shift in focus to renewable energy systems. I have been involved in the renewable energy sector for approximately 15 years in various capacities. This has included managing and supporting environmental assessment processes for renewable projects, which included an overall assessment of flora, fauna, social, and cultural impacts from the development, construction, operation, and decommissioning of renewable energy projects. I have further been involved in the identification, siting, permitting, energy assessments and technical definition (equipment selection and locating) of wind and solar energy projects across the United States, Canada, and Latin America. In my present role, the majority of my time is spent supporting clients in the development, acquisition, or financing of renewable energy projects, which touches on all stages of a project's lifespan.

Q7. Have you testified previously before the Indiana Utility Regulatory Commission ("Commission") or any other regulatory agency?

A7. No. This is the first utility commission testimony.

Q8. What is the purpose of your testimony in this proceeding?

A8. My testimony discusses the decommissioning study that Wood undertook for the Hoosier Wind Farm, which is owned by AES Indiana.

Q9. Are you sponsoring or co-sponsoring any financial exhibits or attachments?

A9. Yes. I am sponsoring the following:

a. AES Indiana Attachment DB-1 – Decommissioning Cost Study – Hoosier Wind Farm. Document Number: 261839-US-AV-REP-0001, Revision 4. Dated 1 April 2025.

Q10. Was the attachment identified above prepared or assembled by you or under your direction or supervision?

A10. Yes. The sponsored attachment was prepared under my direction or supervision.

Q11. Please describe AES Indiana Attachment DB-1.

A11. The objective of Wood's Decommissioning Cost Study is to provide a reasonable, present-day estimate of the net demolition costs to completely decommission and demolish the Hoosier Wind Farm (including salvage credits). A copy of Wood's Decommissioning Cost Study is provided as AES Indiana Attachment DB-1.

Q12. What is the purpose of a decommissioning cost study?

A12. The purpose of a decommissioning cost study is to provide a present-day estimate for the cost of removing all equipment and infrastructure from the project's site and restoring the project site to a condition where its original use can be reinitiated. These studies are often used to either: (i) size securities needed by local municipalities or regulators that provide protection to rate payers or tax payers in the event that the owner of the facility defaults on decommissioning obligations or becomes insolvent in decades that may pass between permitting a project and its end of life; or, (ii) ensure facility owners maintain expected future liabilities in their financial plans to ensure they can comply with project obligations at the end of their facility's life.

Q13. Please describe Wood and its qualifications and experience with preparing decommissioning cost estimates.

A13. Wood has extensive decommissioning experience including dismantling, demolition, and site restoration for both renewable and fossil-fired power plants as well as onshore and offshore facilities. Wood has drafted decommissioning plans and provided decommissioning cost estimates to over 50 clients at more than 130 facilities. Wood's experienced decommissioning staff provides the capabilities to:

- Conduct Comprehensive Planning: developing decommissioning procedures for all major plant equipment, MET stations, buildings and their foundations including detailed steps to remove systems, dispose of, or recycle components.
- Account for Site Restoration: Wood's plans include site restoration to prepare the property for its next chapter, whether a new project or returning the land/water to its original state.
- Providing Reasonable Cost and Salvage Value Estimates: Wood's cost estimating services provide a detailed assessment of assets at the end of life of the project in the form of decommissioning costs and salvage value to meet financial bond requirements. An in-house decommissioning estimate model & scenario tool facilitates a structured approach to developing cost, manhour and equipment estimates, directly from the individual facilities characteristics & take-off quantities.

Q14. Please provide a brief description of the Hoosier Wind Farm.

A14. The Project is located on 6,500 acres of agricultural land outside of the small town of Fowler in Benton County, Indiana. It consists of 53 Senvion MM92 wind turbine generators (WTGs) with a hub height of 80 meters, a rotor diameter of 92.5 meters, comprising a total project capacity of 106 MW. The commercial operational date of the Project was November 2009.

Q15. What are the estimated decommissioning costs for the Hoosier Wind Farm?

A15. The costs for the scope of works prior to salvage reclamation would be on the order of $10.7 million. It is estimated that the Project should anticipate a net decommissioning cost of approximately $5.8 million. It should be noted that the decommissioning works are expected to be offset by 45% from the anticipated scrap metal value. The values presented include a 20% reduction on salvage value and 20% addition in material, labor and work costs to account for potential contingency.

Q16. What were the key inputs to the decommissioning cost estimate and how was the final cost calculated?

A16. Key inputs consist of data extracted from engineering drawings from the WTG foundation, met towers, O&M building, substation, and the WTG. Any information on material, dimensions, volume, and/or weight from the categories named above is considered a key input. Information not provided are assumed based on our own internal database. The key inputs are then used to determine the salvaging value and dismantle/transport costs to calculate the net decommissioning cost.

Q17. Please describe the main assumptions made in the calculation of decommissioning costs.

A17. Most assumptions occur due to lack of information provided in documentation pertaining to the wind farm, such as precise weights and materials of components of the WTG, for example. Information not provided are assumed based on our own internal database and past experience with decommissioning studies.

Other assumptions include salvaging percentage (90%) of materials due to contamination and/or decommissioning process, base prices of transportation to account for the use of escorts, permits, and additional logistics from using oversized vehicles, price per mile for transportation based on size and national flatbed rates from DAT Freight and Analytics, labor hours and rates from our EPC review experience and US Department of Labor statistics, and conservative estimates on scrap yard buy prices in Illinois obtained through scrapmonster.com.

Q18. Are the decommissioning costs present or future cost estimates and when may they be incurred?

A18. Costs presented by Wood are present costs that do not account for inflation or variation in potential future scrap or labor rates at the time of decommissioning. This is done as Wood is unaware of any specific date upon which the project will need to be decommissioned.

Q19. What alternatives are there to decommissioning of the wind farm?

A19. The base case assumption for the decommissioning of a wind farm is a process that largely reverses the construction processes. Alternative methods may include controlled demolitions but those have not been explored in Wood's present analysis. Outright abandonment of the wind farm is not considered a viable option, considering the risk that such large structures would pose to the public if abandoned and unmaintained for a prolonged period of time.

Wood further notes that the need for the decommissioning of wind energy projects has become less prevalent within the industry with the advent of repowering and life extension programs which can uprate the wind farm to increase generation or extend the lifetime of operations. This, however, requires a review and renewal of many technical, commercial and regulatory aspects of the wind farm.

Q20. Please summarize your testimony and recommendations.

A20. In summary, this testimony provides the estimated cost associated with the total decommissioning and demolition of the Hoosier Wind Farm to allow alternate use of site areas afterward. Decommissioning plans and cost estimates are recommended to ensure appropriate budgeting is considered to mitigate the risk of an unmaintained asset after the end of life of the project.

Q21. Does this conclude your verified pre-filed direct testimony?

A21. Yes.

VERIFICATION

I, David Barrie, Director of Advisory Services, Americas, affirm under penalties for perjury that the foregoing representations are true to the best of my knowledge, information, and belief.

____

David Barrie

Dated: May 20, 2025

Decommissioning Cost Study

AES Indiana

Hoosier Wind Farm

1 April 2025

Proposal reference: 261839-US-AV-REP-0001

Revision 4

Technical Report

Executive Summary

Wood Group USA Inc.
17325 Park Row Dr
Houston, Texas 77084
T: 281-828-3500
www.woodplc.com

1 April 2025

AES Indiana

Attention: Garrett Sherwood

Reference: Technical Report

Dear Mr. Sherwood,

Wood was appointed by AES Indiana (the Client) to undertake a decommissioning cost study of the Hoosier Wind Farm (the Project), which is owned and operated by the Client. This decommissioning cost study is being provided to align with what Wood understands are conditions imposed on the Project by the requirements set forth in Section 8.24(k) of the Zoning and Subdivision Code of Benton County.

This decommissioning cost study is anticipatory in nature and does not take into account legal or commercial perspectives that may be relevant at the future time of decommissioning. This study also does not consider the time value of money or fluctuations in commodity values, which are volatile and difficult to predict over a horizon spanning the useful life of the Project. The values for commodities used in this study correspond to the market rates at the time of this writing.

The net decommissioning cost for the Project is found by netting the salvage value from the total of the disassembly and removal costs. Table 4-1 summarizes the net calculations taken from Wood's decommissioning model. Wood estimates that the Project should anticipate a net decommissioning cost of approximately $3.0M USD prior to contingencies.

The costs for the scope of works prior to salvage reclamation would be on the order of $9.0M. The cost for the decommissioning works is expected to be offset by 67% of the anticipated salvage value. Please do not hesitate to contact us if you have any questions or comments about this study.

It should be noted that a 20% reduction on salvage value and 20% addition in material, labor and work costs are applied on the previous estimates for contingency which exhibited a decommissioning cost of $5.8M USD and cost of scope of works prior to salvage reclamation as $10.7M. The cost for the decommissioning works is expected to be offset by 45% by the anticipated scrap metal value.

Regards,

Wood Group USA Inc

R Gavidia

René Gavidia

Report Details

Prepared for:	AES Indiana
Client Contact:	Garrett Sherwood (garrett.sherwood@aes.com)
Report Distribution:	
AES Indiana	Garrett Sherwood
Wood:	René Gavidia, Matthew Gagne, David Barrie
Report Classification:	Confidential

Approval Record

	Name	Job Title	Signature
Prepared by:	René Gavidia	Senior Consultant	R Gavidia
Reviewed by:	Matthew Gagne	Principal Renewable Energy Consultant	
Authorized by:	David Barrie	Director of Advisory Services, Americas	
Date of issue:	1 April 2025		

Amendment Record

Revision Number	Date	Summary of Amendments	Purpose of Revision
0	17 May 2024	Initial Issue	External release
1	31 May 2024	Addition of O&M building	External release
2	05 July 2024	Applying 20% reduction in salvage value and 20% increase in decommissioning cost	External release
3	22 August 2024	Minor text revisions	External release
4	1 April 2025	Scrap value updates	External release

NOTICE AND DISCLAIMER

1. This document entitled Decommissioning Cost Study, document number 261839-US-AV-REP-0001, revision 4, dated 1 April 2025 has been prepared solely for AES Indiana ("the Client") in connection with Hoosier Wind Farm. This document in whole, or in part, may not be used or relied upon by any other person for any other purpose, without the express written permission of Wood Group USA, Inc ("the Consultant") and any such approval shall be subject to receipt by the Consultant from the prospective person of a countersigned copy of the Consultant's reliance letter format (available upon written request). Any liability arising out of use of this document by the Client for any purpose not wholly connected with the above shall be the responsibility of the Client who shall indemnify the Consultant against all claims, costs, damages and losses arising out of such use. Any liability arising out of the use of this document by a third party shall be the responsibility of that party who shall indemnify the Consultant against all claims, costs, damages and losses arising out of such use.
2. The Client will indemnify the Consultant from and against any losses, claims, demands, damages, costs, charges, expenses or liabilities (or actions, investigations or other proceedings in respect thereof) which the Consultant may suffer or incur or which may be made against the Consultant relating to or arising directly or indirectly out of a claim by a third party where the Client has disclosed the document or has permitted the document to be disclosed to such third party without the prior written consent of the Consultant, and will reimburse the Consultant for all costs and expenses (including legal and other professional fees) which are incurred by the Consultant in connection with investigating or defending any such claim or proceeding
3. The Consultant accepts no liability whatsoever in relation to:
    a. documents or advice marked as "indicative", "preliminary" or "draft";
    b. non-technical matters, including but not limited to legal, financial and insurance considerations - it is recommended that the Client obtains advice on non-technical matters by suitably qualified parties; and
    c. any omission or inaccuracy arising directly or indirectly from an omission, or error, in the data supplied by the Client, or any other party, to conduct the scope of work.
4. Other than where specifically agreed in writing, data has not been independently verified and is assumed to be accurate and complete at the time of data provision. This applies to any data used in conducting the scope of work, whether or not specifically referenced in this document.
5. Energy yield estimations presented in this document are based on the data provided and assumptions made at the time of writing. Energy yield estimations are subject to a level of uncertainty and as such actual energy yield values may differ from those detailed in this document. A party must use its own skill and judgement in deciding the applicability and appropriateness of the estimation in any given situation.
6. The Consultant accepts no liability in relation to its opinion on construction schedules, financial contingency or predicted operational expenditure, due to inherent uncertainty and unforeseen factors.
7. Any technology and technical design reviews are non-exhaustive. Unless expressly agreed, no design calculations have been checked.
8. Assessment of financial model technical inputs does not include review of any financial statements, either for accuracy or for conformance with relevant accounting standards. Furthermore, the integrity of the computations of the financial model have not been verified.

Contents

1 Introduction

1.1 Overview

Wood has been appointed by AES Indiana (the Client) to undertake a decommissioning cost study of the Hoosier Wind Farm (the Project) in Benton County, Indiana, which is owned and operated by the Client. Wood has been provided with a high-level project summary and various as-builts to review as part of the decommissioning cost study. This decommissioning study is being provided to align with what Wood understands are conditions imposed on the Project by the requirements set forth in Section 8.24(k) of the Zoning and Subdivision Code of Benton County[1]. Key assumptions made in reference to the decommissioning requirements are as follows:

- Wind turbine generator (WTG) pads, foundations, meteorological towers, transformers, substations, O&M building and any other infrastructure penetrating the surface will be removed and the ground restored down to a depth of 48 inches below ground level.
- Decommissioning will be conducted in order to allow agricultural use of the area after decommissioning.
- Land will be de-compacted and restored to original contour where applicable.
- All site roads are assumed to be removed during decommissioning and the land restored for agricultural use.
- The interconnecting transmission line is assumed in this study to not require decommissioning. The line is owned by transmission company.
- The issued for construction (IFC) collection line drawings provided by the Client show that the collector system is underground. The collection system cables will be abandoned in place as they are more than 60 inches underground. Any portion of the collection system above this level, such as termination or junction boxes, will be removed.
- The project data as provided by the Client is accurate.

With this report Wood is providing an indicative decommissioning plan as well as an estimate of the anticipated decommissioning costs. This decommissioning study is anticipatory in nature and does not consider legal or commercial considerations that may be relevant at the future time of decommissioning. This study also does not consider the time value of money nor commodity value fluctuations, which are volatile and difficult to predict over a horizon spanning the useful life of the Project. The values for commodities used in this study correspond to the market rates at the time of this writing.

[1] https://647f8571-53e4-45ca-9582-a5d9e0915a3e.usrfiles.com/ugd/647f85_97a32ec14cc4457aac7263145610f687.pdf

1.2 Project Characteristics

The Project consists of 53 Senvion MM92 WTGs with a hub height of 80 m and a rotor diameter of 92.5 m. Specifications, weights, and materials for the WTG components were derived from the documentation[2] provided for the WTG. Project access roads are from county or local roads and are assumed to be approximately 5 m (16 ft) in width and non-paved. The terrain in the Project area is simple, flat farmland, and does not pose complications for the large equipment required for decommissioning. Table 1-1 provides a summary of the site characteristics.

Table 1-1: Project Characteristics

Characteristic	Detail
Location	Benton County, Indiana
No of WTGs	53 x Senvion MM92
Hub Heights	80 m
WTG Transformers	Pad mount
Substation Transformers	1
O&M Building	1 building (two-story)
Total Generating Capacity	106 MW
Commercial Operation Date	November 2009

[2] 'App. 2.1 Technical Description MM92-Turbine_60Hz' and 'App. 2.7 Tower Specification'

1.3 Assumptions

Wood has taken its broad experience with wind farm engineering, procurement and construction, along with the associated costs of labor, equipment and materials, to develop its internal baseline decommissioning model. This model is then customized with project-specific information. No specific quotes were obtained for this study. All costs are in present day USD. Sales and excludes excise taxes, and legal fees. Design and engineering are estimated within the analysis based on Wood's project experience. Cost assumptions for the decommissioning study are based on Wood's experience and publicly available data. Salvage estimates for metals were derived Scrap Monster[3] for Illinois based on the assumption that most salvage will happen in the Chicago area. Since most of the metal from the Project are likely to require processing, Wood assumed it is unlikely they would fetch full value for salvage. Wood made an assumption based on multiple factors and categories for each type of metal from Scrap Monster. Wood also assumed that there will be some loss of the metals through the decommissioning process and made an assumption that 90% of the calculated steel, copper, and aluminum weights would actually be able to be salvaged.

Weight of materials was derived from the WTG manufacturer's technical specifications. Estimates for labor, transportation costs, and machinery in Indiana were derived from Wood's experience and multiple online resources[4].

Further assumptions for specific components of the Project can be found within the sections below.

2 Decommissioning Plan

It is anticipated that the decommissioning works will resemble, in large part, the wind farm assembly works but in reverse. There will be a disassembly and dismantling of the various components, followed by a removal to either a scrap resale facility or a landfill. For this study and for conservatism, Wood is not considering any WTG component resales, which might be possible if a secondary market exists at the time of decommissioning. Upon removal of the site equipment, site restoration and reclamation will be completed.

The following sections describe the decommissioning plan in more detail.

[3] Scrap Prices in Illinois - United States, Illinois Scrap Yards (scrapmonster.com)

[4] National Flatbed Rates - DAT; AAA Gas Prices

2.1 Mobilization, Logistics, Soft Costs, and Construction Management

Prior to decommissioning a wind farm, it will be necessary to organize and plan the works carefully. Proper permits, licenses, and environmental studies should be obtained, and hazardous material handling needs to be considered. Crane mobilizations to the site, as well as partial or full tear downs while at the site (to crossroads or transmission lines), will need to be closely analyzed. Management trailers and temporary laydown yards will need to be provided and/or constructed.

Wood assumed that these mobilization, management and soft costs would amount to 8% of the total works.

2.2 Wind Turbine Generators

Dismantling of the WTGs will occur after crane mobilization and will be done in the reverse manner as installation. First the tower and WTG internals will be prepped and readied for disassembly. The hub and rotor will be removed first, followed by the nacelle and tower sections. Oils and fluids will be drained and safely disposed of or recycled.

The removal of the main components from the Project will occur on trucks similar to those used to transport components to the site prior to erection. The one exception will likely be the blades, which are expected to be cut into smaller sections for reduced cost of transport and ease of disposal. It is anticipated that steel components will be transported to a recycling or smelting facility in the industrial areas of the United States, likely near the city of Chicago, Illinois. Transport of the minor components will likely be to locations closer to the Project and use lower cost transport, i.e. non-oversized vehicles. Landfill and waste components will be a net cost to the Project. Transport distances for recycling the large WTG components are assumed to be within 150 km. Distances to a facility that can properly dispose of the blades and other general waste as either a landfill or incinerator are also assumed to be within 150 km.

Numerous salvage and scrap resale opportunities exist within the 150 km radius of the Project, particularly for: tower and drivetrain steel; copper in the generators, transformer and wiring; and aluminum internals such as ladders and platforms. It is assumed that nacelle and blade glass reinforced plastic (GRP) will be disposed of at a landfill or incineration facility. It should be noted that recycling for this material is approaching commercial readiness levels and will likely be available at the time of decommissioning. However, costs are unknown at this time, and any estimates on future costs would remain speculative.

Table 4-8 uses commodity and landfill prices current at the time of this writing. It should be noted that copper, steel, and aluminum prices fluctuate on a daily basis, and, as such salvage costs at time of decommissioning are likely to vary.

2.3 WTG Foundations

The WTG foundations are to be removed down to 48 inches below grade, using hydraulic hammers, wire saws, or similar. The rebar and concrete are expected to be either disposed of locally or crushed and recycled as aggregate and scrap.

The foundation holes will be backfilled with the soil that was excavated, and the foundation areas regraded to as close as reasonably possible to the original topography. Topsoil may need to be added as necessary.

Table 4-1 includes the net costs for decommissioning the WTG foundations, which are calculated within the decommissioning cost category of the WTG.

2.4 Collection System

It is understood that the collection system will largely be abandoned in place, as it is 60 inches below ground level. Terminations and above ground junction boxes will be removed. Wood recommends revisiting this assumption in the future, as commodity prices for the copper and aluminum may yield positive returns for the efforts of removal.

Table 4-1 assumes a small nominal cost per WTG for the above ground collection system removal.

2.5 Project Substation

The Project has one 34.5/69 kV substation which will be dismantled and removed. There is one main power transformer (MPT) as well as grounding transformers, bus bars, protections and disconnect switches, circuit breakers, dead-end structures, control building, voltage and current sensors, and cabling. As utility-scale electrical components are expected to have a longer service life than WTGs, it is expected that these components will mainly be removed for resale. Wood has assumed that the transformer can be resold at approximately 25% of their new value.

Foundations of the structures and the main transformer oil containment pit will need to be dismantled.

Transport of the main components from site is expected to occur on trucks similar to those used to deliver the components to site. If not destined for resale, the smaller components will have a recycling scrap value.

2.6 O&M Building

The Client provided images of O&M drawings. As per the drawings, the Project has an O&M building which will be dismantled and removed. There is a large stone area outside the building along with a driveway and parking. Additionally, there is a concrete approach just besides the main building.

Foundations of the structures will need to be dismantled.

Transport of the debris and concrete after dismantling is expected to occur on trucks similar to those used to deliver the components to site. Excluding some steel and stone which will have a salvage value, everything else will be disposed of at a landfill.

2.7 Transmission Line

The interconnecting transmission line is owned by the transmission company and is not considered in this study.

2.8 Site Access Roads and Meteorological Masts

It is assumed for this study that all access roads will be reclaimed. However, this may not be necessary if there is a desire from landowners to keep some or all of them. Decommissioning of the site access roads will require stripping them and replacing them with topsoil and or natural vegetation in line with the pre-project topography and flora. For this study only reseeding is assumed.

Based on georeferencing, Wood has assumed 18.4 km of roads.

Wood assumes that the crane pads have already been reclaimed at this site. Therefore, temporary crane pads will need to be constructed in order to undertake WTG decommissioning works, after which they will require reclamation. While the reclaimed aggregate will offset some of the costs, the mobilization, works, and reseeding will be a net cost to the Project.

Two meteorological (met) towers were installed at the Project will be decommissioned in concert with the crane works occurring for WTG dismantling. While a small gain from the recycled metal will offset some of the costs, dismantling and transportation will dominate the cost of this activity.

Table 4-1 shows the net costs for decommissioning the site access roads and met tower.

3 Conclusions

The net decommissioning cost for the Project is found by netting the salvage value from the total of the disassembly and removal costs. Table 4-1 summarizes the net calculations taken from Wood's decommissioning model.

As per the client's request, a 20% reduction on salvage value and 20% addition in material, labor and work costs is applied on the previous estimates. Wood estimates that the Project should anticipate a net decommissioning cost of approximately $5.8M USD. It should be noted that the costs for the scope of works prior to salvage reclamation would be on the order of $10.7M. The cost for the decommissioning works is expected to be offset by 45% by the anticipated scrap metal value.

4 Decommissioning Cost Calculations

Table 4-1: Decommissioning Summary in Real 2025 USD

Infrastructure Category	Dismantle	Remove / Transport	Salvage / Disposal	Net Decommissioning Value/(Cost)
WTG (inc. Foundations)	(3,296,658)	(3,363,243)	5,439,948	(1,219,953)
Roads and Crane Pads		(1,185,706)	133,486	(1,052,220)
Met Tower	(16,000)	(10,000)	10,000	(16,000)
Collection System	(30,917)			(30,917)
HV Substation	(170,088)	(25,675)	518,783	323,021
O&M Building	(84,562)	(70,053)	(21,934)	(176,549)
Mob, Management, Logistics and Soft Costs	--	--	--	(792,279)
Total (2025 $)	**(3,598,225)**	**(4,654,676)**	**6,080,283**	**(2,964,897)**
After 20% decrease in salvage and 20% increase in cost (contingencies)	**(4,317,870)**	**(5,585,612)**	**4,864,226**	**(5,831,534)**

Table 4-2: WTG Dismantling Cost Breakdown

Item	Cost ($/WTG)
Hub & Blades	(14,927)
Nacelle	(11,876)
Tower & Truck Loading	(26,311)
Padmount Transformer	(1,445)
Foundations	(7,642)
Total / WTG	**(62,201)**

Table 4-3: WTG Component Transport Cost Breakdown

Item	Qty	Trucks	Distance (km)	$/km	Base Price ($)	Total
Blades	3	3	150	1.65	4,200	(13,476)
Hub	1	1	150	1.80	8,250	(8,564)
Nacelle	1	1	150	1.80	8,250	(8,564)
Tower Sections	3	3	150	1.80	8,250	(25,693)
Internals	1	1	150	1.50	2,050	(2,319)
Transformer	1	1	150	1.65	4,200	(4,492)
Crushed Foundation	1	2.25		0	155	(349)
Total/WTG						(63,457)

Table 4-4: WTG Salvage Breakdown

Component	Cu (T)	$	Fe (T)	$	Al (T)	$	Total Value ($)
Blades			3.14	796			796
Nacelle/Hub Copper	3.15	17,244					17,244
Nacelle/Hub steel			46.8	11,865			11,865
Main shaft			5.9	1,506			1,506
Gearbox			14.2	3,605			3,605
Generator	3.0	16,652	4.6	1,157			17,809
Tower steel			129.2	32,744			32,744
Internals	1.4	7,390	4.95	1,255	6.3	5,180	13,825
Transformer	1.1	5,912	1.35	342	0.45	370	6,624
Total/WTG							**106,018**

Table 4-5: WTG Disposal Breakdown

Component	GRP (m3)	Cost ($)	Industrial waste (m3)	Cost ($)	Gen waste (m3)	Cost ($)	Total ($)
Blades	11.1	(1,383)					(1,383)
Nacelle/hub GRP	1.9	(236)					(236)
Gearbox			0.3	(27)			(27)
Internals			0.2	(18)			(18)
Transformer			1.4	(127)			(127)
Crushed Foundation					35.0	(1,587)	(1,587)
Total/WTG							(3,378)
Net Salvage-Disposal per WTG							**102,641**

Table 4-6: Roads and Crane Pads Restoration

Cost Item	Qty	Unit Price ($)	Cost ($)
Stripping Roads	18.4	18,137	(333,714)
Stripping Pads	53	1,814	(96,124)
Building Pads	53	8,502	(450,582)
Reseeding Roads	18	1,814	(33,371)
Reseeding Pads	53	181	(9,612)
Truck Hauls	1,157	227	(262,301)
Total			(1,185,706)

Table 4-7: Roads Aggregate Salvage

Item	Qty	Unit Price ($)	Cost ($)
Road Aggregate	18.4	7,255	133,486

Table 4-8: Metal Price and Disposal Cost

Item	Value/(Cost) $
Scrap steel or iron ($/tonne)	254
Scrap copper ($/tonne)	5,474
Scrap aluminum ($/tonne)	822
Industrial waste ($/m^3)	(91)
General waste ($/m^3)	(45)
GRP end of life cost($/m^3)	(125)

Table 4-9: Substation Dismantle Breakdown

Cost Item	Days	Rate ($)	Cost ($)
Preparation	2	4,137	(8,275)
High Voltage Structures	5	5,894	(29,472)
Main Power Transformer (MPT)	6	5,894	(35,366)
Control Building	5	5,894	(29,472)
Foundations/fill	10	4,137	(41,374)
Large machinery	10	1,190	(11,902)
Small machinery	10	595	(5,951)
Reclaim	2	4,137	(8,275)
Total			(170,088)

Table 4-10: Substation Removal Breakdown

Cost Item	Truck hauls	Rate ($)	Cost ($)
HV structures	2	5,894	(11,789)
MPT	2	5,894	(11,789)
Control Building	1	1,145	(1,145)
Crushed foundations	5	119	(595)
Gravel	3	119	(357)
Total			(25,675)

Table 4-11: Substation Salvage/Disposal Breakdown

Component	Cu (T)	Value ($)	Fe (T)	Value ($)	Al (T)	Value ($)	Landfill (m3)	Cost ($)	Gravel (yds)	Value ($)	Net Scarp/Resale Value ($)
HV equip, structures	11	60,216	15	3,803	2	1,644					65,663
Main Power Transformer	25% of new value to be recovered during resale										475,000
Control building					2	1,644	130	(11,789)			(10,144)
Crushed Foundations (m^3)							162.5	(14,736)			(14,736)
Yard gravel (m^3)									300	3,000	3,000
Total											**518,783**

Table 4-12: O&M Building Dismantle Breakdown

Cost Item	Days	Rate ($)	Cost ($)
Prep	2	4,137	(8,275)
Building (Civil)	6	4,137	(24,825)
Building (Electrical)	2	5,894	(11,789)
Concrete approach	1	4,137	(4,137)
Stone area	2	4,137	(8,275)
Foundations/fill	3	4,137	(12,412)
Large machinery	6	1,190	(7,141)
Small machinery	6	595	(3,571)
Reclaim	1	4,137	(4,137)
Total			**(84,562)**

Table 4-13: O&M Building Removal Breakdown

Cost Item	Truck hauls	Rate ($)	Cost ($)
Building	8	5,894	(47,155)
Concrete approach	3	1,145	(3,435)
Stone area	10	1,145	(11,449)
Crushed foundations	7	1,145	(8,014)
Total			**(70,053)**

Table 4-14: O&M Building Salvage/Disposal Breakdown

Component	Fe (T)	Value ($)	Al (T)	Value ($)	Landfill (m^3)	Cost ($)	Stone (m^2)	Cost ($)	Net Scrap/Resale Value ($)
Building	33.4	8,479			245	(22,185)			(13,706)
Concrete approach					28	(2,497)			(2,497)
Stone area							334.5	334	334
Crushed foundations					66.9	(6,066)			(6,066)
Total									**(21,934)**