

SUNCOR ENERGY ADELAIDE WIND POWER PROJECT DECOMMISSIONING PLAN REPORT

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Prepared for:

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1.0 Introduction

1.1 PROJECT OVERVIEW

Suncor Energy Products Inc. ("Suncor") is proposing to develop the Suncor Energy Adelaide Wind Power Project (the Project) within the Municipality of Adelaide Metcalfe, County of Middlesex, Ontario.

The Project will include 18 wind turbines (Siemens SWT-2.3-113 operated at a 2.221 MW rating) with an estimated total nameplate capacity of up to 40 MW. The proposed Project would also include access roads, meteorological tower (met tower), electrical collector lines, and a substation which would connect the Project with the provincial high voltage transmission system. The Project site plan is provided in the **Project Description Report**.

The Project Location includes all land and buildings/structures associated with the Project and any air space in which the Project will occupy including temporary lands during construction ("constructible areas"). The current land use of the properties utilized for the Project is zoned for agricultural use. It is presumed that at the time of decommissioning, the future land use will remain agricultural and the Project sites will be returned to the existing land use.

1.2 REPORT REQUIREMENTS

The purpose of the Decommissioning Plan Report is to provide the public, Aboriginal communities, municipalities, and regulatory agencies with an understanding of the closure plan for the Project at the end of its useful life, and to describe how Suncor proposes to restore the Project Location to an acceptable condition for its intended use following Project closure.

This Decommissioning Plan Report is one component of the REA Application for the Project, and has been prepared in accordance with Item 3, Table 1 of O. Reg. 359/09 and the MOE's *Technical Guide to Renewable Energy Approvals*. O. Reg. 359/09 sets out specific content requirements for the Decommissioning Plan Report as provided in the following table (**Table 1.1**).

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DECOMMISSIONING PLAN REPORT

Introduction November 2012

Table 1.1: Decommissioning Plan Report Requirements: O. Reg. 359/09

Requirements	Completed	Section Reference
Set out a description of plans for the decommissioning of the renew following:	able energy genera	tion facility, including the
Procedures for dismantling or demolishing the facility.	✓	3.3
Activities related to the restoration of any land and water negatively affected by the facility.	✓	3.4
Procedures for managing excess materials and waste.	✓	3.5

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2.0 Decommissioning During Construction (Abandonment of Project)

In the unlikely event that Suncor cannot successfully complete the construction of the Project, the rights to the Project (and any associated liabilities and obligations) would be sold and the Project would be successfully constructed by the purchasing developer.

In the event that a delay occurs in the purchasing of the Project by another developer, Suncor would be responsible for interim environmental protection. In the event that the Project Location has been cleared and/or excavated in preparation for installation of project infrastructure, appropriate environmental protection measures would be implemented to prevent topsoil erosion and/or watercourse sedimentation. The extent of environmental protection measures required would be dependent on the progress made at the time of Project abandonment and would be determined through site investigations by qualified specialists. Possible measures would include, as appropriate, erosion and sediment control fencing, filling excavated areas, replacement of topsoil and/or reseeding and re-vegetation.

In the event that the Project is not purchased by another developer, Suncor will be responsible for decommissioning of the Project. In such a case the decommissioning process to be followed and the mitigation measures to be implemented will be the same as those detailed in **Section 3.0** for decommissioning after ceasing operation of the Project.

3.0 Decommissioning of Facility after Ceasing Operation

Project components are expected to be in service for the term of the 20 year Ontario Power Authority Feed-In Tariff contract. Following the term of the contract, a decision would be made to extend the life of the facility or to decommission. Decommissioning would entail removal of facility components and restoring the land to an acceptable condition for its intended use. The costs for removal of Project infrastructure will be the responsibility of the owner of the Project.

3.1 GENERAL ENVIRONMENTAL PROTECTION DURING DECOMMISSIONING

During decommissioning and restoration activities, general environmental protection and mitigation measures would be implemented. Many activities during decommissioning would be comparable to the construction phase; including restoring constructible areas around all Project infrastructure, such as widening access roads and constructing crane pads. General mitigation measures and best management practices, including natural heritage mitigation, erosion and sediment control, air quality and noise mitigation, and contingency plans for unexpected finds and spills, are provided in the Construction Plan Report. All decommissioning and restoration activities will be performed according to the requirements of relevant government agencies, and will be in accordance with all relevant statues in place at the time of decommissioning. In addition, all decommissioning activities will be restricted to the constructible areas as defined in the Construction Plan Report which have been previously assessed for natural heritage and archaeological/cultural heritage resources. Given that decommissioning of the Project will take place in a similar manner to the construction of the Project and that decommissioning works will be restricted to previously assessed areas, the potential effects documented within the Construction Plan Report could be considered similar to the potential effects associated with decommissioning.

Where complete removal of Project infrastructure is not proposed, partial removal will minimize the potential effects associated with complete removal which would exceed the potential effects (e.g., erosion, sedimentation, noise, and ground and vegetation disturbance) of leaving the buried infrastructure in place. In addition, partial removal of infrastructure to a depth of approximately 1.2 m below grade, which is the current standard management approach, will permit the intended future use of the site (agricultural). Further, the Project components remaining in the subsurface, these would be inert and would not pose a risk to the surrounding environment.

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Decommissioning of Facility after Ceasing Operation
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3.3 PRE-DISMANTLING ACTIVITIES

At the end of the Project's useful life, it will first be de-energized and isolated from all external electrical lines.

Prior to any dismantling or removal of equipment, staging areas would be delineated at each turbine site and at the substation property. All decommissioning activities would be conducted within designated areas; this includes ensuring that vehicles and personnel stay within the demarcated areas. Crane pads would be re-installed at each turbine site as part of the pre-dismantling activities. This involves site grading and the use of geotextile with a granular surface. Following turbine removal, the crane pads would be removed and the areas restored to pre-existing conditions.

3.4 EQUIPMENT DISMANTLING AND REMOVAL

3.4.1 Staging Areas

A temporary staging area at each turbine location would be used for temporary storage of the turbine components, parking, and excavated foundation. The staging area would not exceed the 140 m x 140 m constructible area identified on the Site Plan contained in the **Project Description Report**. Portions of this area would be cleared of top soil which would be temporarily stored onsite during decommissioning activities. The area would be graded and gravelled to provide a level surface for temporary storage for turbine components as they are disassembled and loaded on transport trucks for removal from site. The staging areas would be restored to pre-existing conditions at the end of the decommissioning phase by removal of all granular material and replacement of top soil.

3.4.2 Turbines

The turbines would be disassembled into their original component parts. A crawler crane and heavy lift cranes would be used to carry out the reverse sequence of steps that occurred during turbine assembly (detailed in the **Construction Plan Report**).

The turbine components would be temporarily stored at the staging areas until removed from the site by truck. Once the components are disassembled and at ground level, the materials will be transported to various salvage facilities. Prior to salvaging material, materials will be sorted to determine which items have useful life and can be sold to other operating wind farms with the same technology. The main sources of salvage material are steel, copper, fibreglass and plastic, which may be sold to recycling facilities. All non-salvageable components will be processed and safely transported to an MOE-approved disposal facility.

3.4.3 Turbine Transformers

The small transformer associated with each turbine will be removed for resale, reuse, reconditioning, or disposal.

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3.4.4 Turbine Foundations

Turbine foundations will be removed as per Suncor's lease agreement with the landowner. Concrete foundations will be removed to a minimum depth of 1 m below ground surface. Partial removal will enable natural areas restoration and normal agricultural practices to be conducted over the foundation areas. The concrete would be removed from the site by dump truck. A permit will be required if blasting is to be used to facilitate the removal of the foundation.

3.4.5 Electrical Infrastructure

Electrical Collector Lines

Underground collector lines on leased property may remain in place, with both ends that come to the surface excavated to approximately 1.2 m below grade, in consultation with the landowner and in accordance with the land lease agreements. Collector lines installed in the road allowances would be removed, if required by the agreements with the Municipality and County.

Substation

The substation would be dismantled as agreed to, or as necessary, in accordance with the land lease agreement. The transformers, fencing, switchgear, and grounding grid would be removed, and the concrete foundation would be completely removed. All granular and geotextile materials would be removed from the site by dump truck. All electrical system components would be taken off-site by truck.

3.4.6 Access Roads

All access roads would be removed, including culverts, the geotextile material beneath the roads and granular material. The access roads would be returned to a similar condition as prior to Project commencement. Excavated areas on agricultural land would be brought to grade with fill and topsoil to be taken from surrounding land. All materials would be removed from the site by dump truck. Where the landowner sees it advantageous to retain access roads, these would be left in place. Leaving in place the access roads is not expected to result in adverse impacts to the future use of the land (agricultural).

3.5 SITE RESTORATION PLAN

3.5.1 Natural Heritage Features

Natural heritage features such as woodland and water bodies which may be impacted by the removal of facility components would be reviewed with the Ministry of Natural Resources (MNR) prior to removal. Mitigation and monitoring measures may also be required including plans for replanting and restoration of natural features and would also be reviewed and implemented in consultation with the MNR.

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3.5.2 Agricultural Lands

Areas that may have compacted due to decommissioning activities would be restored through the use of deep ploughing equipment.

Any agricultural drainage tile damaged during decommissioning would be repaired by a drainage tile contractor. Land owner approval will be obtained as per Suncor's lease agreement. All repairs will be recorded and photographed.

Topsoil stockpiled during decommissioning will be replaced above restored subsoil.

3.5.3 Municipal Road Allowances

Where Project infrastructure has been removed, roadside ditches would be seeded with quick growing native species to prevent topsoil erosion; the seed mixture would be determined at that time in consultation with the Municipality and/or Conservation Authority. Erosion and sediment control measures at the ditch would be left in place until seed is fully established, as determined by an environmental advisor.

3.5.4 Potential Contamination

During the construction and operation of the Project, environmental management practices would be in effect, such as secure containment of potential hazardous materials, to minimize the potential for spills and thus the need for removal of contaminated lands. Should soil contamination be noted, the impacted soils will be delineated, excavated, and removed, to the standards of the day. The contaminated material will be disposed at an MOE-approved and appropriate facility, and will be replaced with appropriately compatible material.

3.6 MANAGING EXCESS MATERIALS & WASTE

All wastes would be managed in accordance with *Ontario Regulation 347, General – Waste Management* (O.Reg.347) and with reference to *Ontario Provincial Standard Specification 180 - General Specification For The Management of Excess Materials* (OPSS 180), or relevant regulations and specifications in effect at that time.

Major pieces of equipment may be sold, recycled or reused. The steel towers may be sold for scrap. Electrical equipment could either be salvaged for reuse or recycled. According to a 2011 Garrad Hassan study, components such as the generators and cabling are likely to have a high resale value due to copper and aluminum content (see **Appendix A**). Concrete from footings will be separated from the reinforcement steel, and could be crushed and recycled as granular fill material. The steel will then be sold as scrap metal. Spent oils could be recovered for recycling through existing oil reprocessing companies.

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As much of the facility would consist of reusable or recyclable materials, there would be minimal residual waste for disposal as a result of decommissioning the facility. Small amounts of registerable waste materials would be managed in accordance with O. Reg. 347 or subsequent applicable legislation. Residual non-hazardous wastes would be disposed at a licensed landfill in operation at the time of decommissioning.

3.7 MONITORING

Follow-up monitoring may be conducted following site restoration based on the requirements identified by the MNR at the time of decommissioning. For municipal road allowances, a review may occur of the establishment and health of re-vegetation. Additional monitoring activities may also be conducted, depending upon the site conditions at the time of decommissioning. If negative impacts are noted during monitoring activities, appropriate remediation measures would be implemented as necessary, and additional follow-up monitoring would be conducted, as determined by an environmental advisor.

3.8 OTHER APPROVALS

Prior to decommissioning activities commencing (six months prior), Suncor will update the Decommissioning Plan and submit it to the MOE for approval. Suncor will commit to work with regulatory bodies to determine the appropriate decommissioning requirements in affect at the time of decommissioning. For example, Nav Canada and Transport Canada will be notified regarding the removal of the wind turbines for the purposes of updating aeronautical databases. In addition, conservation authority permits may also be required for decommissioning activities within regulated areas. Given it is anticipated that the future land use will remain agricultural, a Record of Site Condition would not be required.

4.0 Emergency Response and Communications Plans

The Project's Emergency Response Plan and Communications and Complaint Response Protocol (as discussed in the **Design and Operations Report**) would be in effect for all phases of the Project including decommissioning. In addition, the programs, plans, and procedures (such as personnel training and a public safety plan) described within the **Design and Operations Report** will be carried forward during the decommissioning of the Project.

4.1 DECOMMISSIONING NOTIFICATION

Prior to decommissioning (six months prior), Suncor will consult with interested parties regarding the details of decommissioning and would amend this Decommissioning Plan to meet regulatory requirements in effect at that time. Notification of decommissioning will follow the Emergency Response Plan and Communications and Compliant Response Protocol as well as be provided to Project stakeholders (including public, municipal and aboriginal communities) prior to undertaking decommissioning activities. Notification may be in the form of letters, newspaper notices, or direct communications.

5.0 Conclusion and Signatures

This Decommissioning Plan Report for the Suncor Energy Adelaide Wind Power Project has been prepared by Stantec for Suncor in accordance with Item 3, Table 1 of Ontario Regulation 359/09 and the MOE's *Technical Guide to Renewable Energy Approvals*.

This report has been prepared by Stantec for the sole benefit of Suncor, and may not be used by any third party without the express written consent of Suncor. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

STANTEC CONSULTING LTD.

Project Manager

Rob Rowland

Senior Project Manager

Appendix A

Garrad Hassan Study

Wind Farm Decommissioning Costs A Look at End of Life Scenarios

GL Garrad Hassan



Abstract

nental authorities to ensure that a plan and security are posted prior to project acceptance for disposing of the project infrastructure at the end of its service or table to a NIMBY component accompanying the penetration of wind into more opposition-prone regions. Until recently, fittle attention has been placed on end Parrad Hassan has observed that requests for project decommissioning studies have been increasing in North America. Many of these studies are mandated by local govern gnittle. Other inquiries for decommissioning analyses sten from asset retrement obligation stipulations within lease structures. Lastly, some of this increased interest is attrib escenarios and future wind farm net decommissioning costs.

Having performed to date various decommissioning studies throughout North America and around the world, GL Carrad Hassan is able to make a number of conclusions. First, each decommissioning scenario is respective project. Which infrastructure can project with the current industry design fife), some project's infrastructure are direct costs. These costs are indirectly offset by salvage or scrap values which are time dependent. For shorter bine horizons (within the current industry design fife), some projects could see a positive net decommission will be offset by scrap values, but still register a net cost. The author notes that while commodity prices will greatly influence eventual scrap values, the estimates presented in the paper are based on present day values. Lastly, going contesting and removal costs will need to be taken into account when making an ultimate decommissioning decision.

Objectives and Methods

and cost to benefit analysis with which the project owner will

The objective of this presentation is to present to the reader the likely scenarios that a wind project will encounter once it reaches the end of its design life. The goal is to present the challenges and cost to benefit analysis with which the project owner will have an appreciation for the issues and financial ramifications that end-of-file scenarios present for a wind project.

The author begons by analyzing three possibles scenarios that a wind film, could be scenarios, and the scenarios that a wind project is unique and contains its own parameter which include, but are not limited to: investor expectations for service if its, site conditions and their impact on the part, wind resource and power easile. Then the operational expense burden which can be incurred, and of prospects for resale. Generic—but not atypical—values are used in the analysis. Decommissioning operations were divided into three phases. It is disassembly, 2) removal, and 3) salvaging and/or scrapping. The decommissioning cost is alculated as the difference between the sum of parts resale and scrap revenue, less the landfill cost of the remaining material. The net decommissioning cost and the net salvage value.

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Scenario 1 - Going Concern

Step 1: Determine if it is physically possible for the wind project to continue operations beyond its design life. The structural integrity of the non-replaceable portions of the plant must be determined, and while everything theoretically can be replaced at some cost, for practical and safety purposes such structures as the foundations, tower sections, hub castings, main shafts, and nacelle bed plate are assumed non-replaceable.

Germanischer Lloyd establishes an analytical or a practical method for accomplishing this task¹. Utilizing both would be recommended to ensure conflued operations don't affect the safety of the plant. Analytical methods would include design loads analysis (site specific) to ensure fatigue loading is still within the margins of safety. Practical methods would include thorough inspections of the equipment, with particular attention to those portions identified by the analytical methods as having lower factors of safety or being critical failure modes.

must be performed by qualified, independent experts for wind turbines This step

If Step 1 reveals that continued operations is not safe, Scenarios 2 or 3 may have to be implemented.

Determine a periodic monitoring program for continued operations ments recommendations of the certiffying expert which performed Step 1.

Step 3. Determine if continued operations is financial feasible. While the wind resource may be familiar at this point, revenues will be impacted by future power pricing as well as an expected lowering of turbine availabilities. On the expense side, an increase in operational costs for extended life operations can be expected. The periodic monitoring program as well as increases in scheduled and unscheduled maintenance should be modeled. Fortunately, project debt should have already been paid off, so an increase of some O&M costs should be able to be absorbed.

Below are generic examples for O&M costs and availability assumptions which have to be modeled. Actual values will depend on technology type, service contracts in place, and site conditions.

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Step 4: If re-powening the site with new technology is an option, this option should be financially weighed against the continued operations with the existing plant. Consideration should be given to existing leases, land-owner relationships, interconnection agreements, and the decommissioning costs given in Scenario 2 and Scenario 3 to make an informed financial decision.

Scenario 2 - Decommission to Scrap

Results

If decommissioning is to occur a long time beyond the design life of the project, for example as part of the asset retirement obligations of two back to back twenty year leases, then it should be assumed that all the plant will go to scrap and no components will be resold. For this example, it will be assumed that the option to decommission at 30 years will fall into this category. The following are typical costs that can be expected from our generic wind farm through this decommissioning process.

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Dispuntly tower sections, VWTU (internals neladed)	\$13,710	HV SUBSTATIC
Disaparable external god mount transformer	\$2,410	TRANSMISSION
Distribute bething foundation to (-3R) below grade	\$4,080	ACCESS ROAD
Total per WTG	\$48,389	MET MASTS
		AND PARTIES

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Step 2: Removal Costs

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Transformer		\$423	Г		1	W. ESV KO
(Treshed foundation (25ex?)		\$ 100	Г			MET MAST
Total Wind Turbine Removal Cost (per WTG)	(per WTG)	\$61,270	Г		3	N TO THE
Step 3: Salvage and Disposal	sposal					
Commodity / Disposal Price Assumptions!	sumpgous	_				_
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TRANSAISSION LINE	\$232,500	Towns	1		1	1	1		1			1			8101,780
ACCESS ROADS & CRANE PAIN	\$412,500														
MRT MASTS	\$2018														
TOTAL PROJECT SALVACE	\$4,214,857														

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Note: This Scenario yields a total decommissioning cost to the Project owner. Such a scenario would be more likely for decommissionings beyond the existance of a secondary parts market. However, the scrap metal value serves to significantly offset the total cost.

Scenario 3 - Decommission with Partial Resale

If Decommissioning is to occur immediately after the design life of the Project, it can be assumed that some of the turbine components could be resold in a secondary parts market. The validity of this assumption will be based on several project-specific factors. The turbine type and technology employed on the project, the degree to which that particular WTG penetrated the market, the commercial operation date of the project vis a vis other projects employing the same turbine, and the proximity of the other wind fams continuing operations beyond our project's decommissioning date will all be critical in understanding the viability of such a secondary parts market.

For conservatism, it will be assumed that only those parts replaced within the last five years before decommissioning will be considered for resale. The only exception to this assumption is the turbine transformer, which is assumed to have a higher design life and for which half are assumed available for resale. Furthermore, any part which fails during that time and which would not be able to pay for itself within the time left before decommissioning, will not be considered for resale. In order to implement the previous statements, a rigorous failure scheme as well as an understanding of individual turbine annual revenues is prerequisite. 25% of the values of the new parts costs are assumed as proceeds of any resale. For further conservatism, only the gearbox, generator, blades, transformer, and main bearings of a WTG are considered for resale. It is highly probable that many more minor components will be able to be resold.

of Components Rer Step 1: Detern



Removal Costs

2004
1,000,500
18,000,500
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nine Resale Impacts on Salvage and Scrap Values

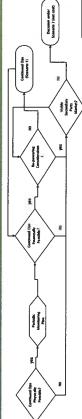
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Orosa Remie Total			$\left[\left[\left[\left[i \right] \right] \right] \right]$	12,156,775	1330,885
			III		\$1,00,015
Firms Lots of Scrap					81,425,890
Net Remain Total	-	1	ĩ		
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Man Interfermen		-	57.300.0	2425,000	B
Grows Remajo				\$625,000	88
Mirror Loss of Serve	202			\$139,400	8
Met Resolu				SAMS,4400	8

Net Step 3:

Net Decommissioning Cost - Resule of Selected Components	oning Cost	- Resale	of Selected	Componer	its
	İ]]	Not Park	¥ 1
WTO	\$2,419,000	\$3,063,500	(005,780,88)	(\$1,825,890)	(\$1,430,890)
COLLECTION SYSTEM	\$247,500	\$ 24,830	(\$\$12,609)		\$ 19,721
HV SUBSTATION	\$134,620	\$43,130	(\$167,710)	(8-415,600)	(\$473,560)
TRANSMISSION LINE	\$847,500	\$57,340	(\$232,500)		\$612,340
ACCESS ROADS & CRANE PAIX	\$500,000	\$165,000	(\$412,500)		\$232,500
MET MASTS	13,564	\$10,150	(\$2,034)		\$15,706
MOBILIZATION/SOFT COSTS	\$424,491				\$424,491
PROJECT TOTALS	\$4,582,678	\$3,423,980	54,582,673 \$3,423,980 (\$4,214,857) (\$2,311,490)	(\$2,311,490)	(\$519,692)
TOTAL PROJECT NET DECOMPRESSIONING			(Kale den)	SSTWARD Inc (S10.354) mer WTG	WTC)
VALUE					

Note: This Scenario yields a total decommissioning value to the Project owner. Such a scenario would be more likely for decommissionings which occur in the presence of a secondary parts market. However, it would still be the responsibility of the Project owner to coordinate the

Conclusions



Wind farm end of life scenarios are explored, along with the likely decision-making process required. It is found that many project-specific factors will influence the net cost or net gain yielded from such scenarios. The largest full-lunching factor affecting decommissioning costs, apeat from commodity prices which are not predicted in this subcy, is the existance of a viable secondary parts market for project component resales. Depending on the decommissioning horizon, a project will yield a net gain or net cost to decommission.

References

Guideline for the Continued Operation of Wind Turbines, Germanischer Lloyd Rules and Guidelines, IV Industrial Services, Part 1, 2009 Edition

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3-6 October, Vancouver