Decommissioning Plan – Alliant Energy & UW-Madison Kegonsa Research Campus Solar and Agricultural Research Project

Township of Dunn, Dane County, Wisconsin

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Alliant Energy & UW-Madison Kegonsa Research Campus Solar and Agricultural Research Project

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Michael Brice
Environmental Scientist

JoAnne J. Blank
Senior Associate

Matthew A. Clementi, PE
Senior Civil Engineer
Registration No. **29864**
State **Wisconsin**

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Alliant Energy & UW-Madison are proposing to construct the Alliant Energy & UW-Madison Kegonsa Research Campus Solar and Agricultural Research Project (Project) in Dane County, Wisconsin. The Project is located in the Township of Dunn, south of Madison, Wisconsin (Figure 1). Major components of the Project include solar modules, racking, inverters, transformers, and other ancillary equipment. The Project facilities, as proposed, will occupy approximately 15 acres of land and will have a maximum nameplate generating capacity of up to 2.25 megawatts (MW) alternating current (AC).

This Decommissioning Plan (Plan) provides a description of the decommissioning and restoration of the Project. Start-of-construction is planned for 2023, with a projected Commercial Operation Date in late 2023 or early 2024. The Project will consist of the installation of the perimeter fencing; solar arrays and associated racking, and steel pile foundations; transformers; inverters; access and internal roads; electrical collection system.

This Plan includes an overview of the primary decommissioning Project activities; dismantling and removal of facilities; and restoration of land.

1.1 SOLAR FARM COMPONENTS

The main components of the Project include:

- Solar panels.
- Solar racking (module mounting structure).
- Driven steel pile foundations.
- Inverter station and transformer.
- Electrical cabling and conduits.
- Perimeter fencing.
- Site access and internal roads.

1.2 TRIGGERING EVENTS AND EXPECTED LIFETIME OF PROJECT

Project decommissioning may be triggered by events, such as: abandonment during Project construction, interruption of minimum generation requirements as defined by the Decommissioning Agreement, or when the Project reaches the end of its operational life.

The expected lifetime of a distribution scale solar panel is approximately 30 years, with an opportunity for a project lifetime of 40 years or more with equipment replacement and repowering. Depending on market conditions and project viability, the solar arrays may be retrofitted with updated components (e.g., panels, frame, etc.) to extend the life of the Project. In the event that the modules are not retrofitted, or at the end of the Project's useful life, the panels and associated components will be decommissioned and removed from the Project site and the Project site will be restored in accordance with this Plan or an updated decommissioning plan agreed to between the Project and applicable regulatory bodies at the time of decommissioning.

1.3 DECOMMISSIONING SEQUENCES

Decommissioning activities will begin within 12 months of the Project ceasing operation and are anticipated to be completed within 12 months. Restoration of the Project may extend beyond 12 months as more time may be required to monitor for revegetation and restoration to ensure its success. The anticipated sequence of decommissioning and removal is described below; however, overlap of activities is expected.

- Reinforce access roads, if needed, and prepare site for component removal
- Install temporary silt fence and other best management practices (BMPs) to protect sensitive resources and control erosion
- De-energize solar arrays
- Remove panels and above ground wiring
- Remove racking and piles
- Remove inverters/transformer stations, along with support piers and piles
- Remove all electrical cables and conduits above and below the surface
- Remove access and internal roads and grade areas, as needed or agreed upon in landowner leases
- De-compact subsoils (if required), restore and revegetate disturbed land to the extent practicable

2.0 PROJECT COMPONENTS AND DECOMMISSIONING ACTIVITIES

The solar facility components and decommissioning activities necessary to restore the Project area are further described within this section.

2.1 OVERVIEW OF SOLAR FACILITY SYSTEM

Alliant Energy anticipates utilizing approximately 4,300 Canadian Solar CS7N-650MV-AG bifacial monocrystalline modules, with a total nameplate generating capacity of up to 2.25 $MW_{[AC]}$. Statistics provided in this Plan are based on decommissioning a 2.25 MW facility. The Project generating facilities will have a footprint of approximately 15 acres of land within the fence lines. The land within the Project footprint is predominantly agricultural land.

Collection cabling will be installed below the surface at a depth of at least three feet (36 inches) to remain in compliance with National Electrical Code (NEC). All foundations, steel piles, and electric cabling and conduit below the soil surface will be removed. Access roads may be left in place, depending on the future use of the property. Public roads damaged or modified during the decommissioning and reclamation process will be repaired upon completion of the decommissioning phase.

Estimated quantities of materials to be removed and salvaged or disposed of are included in this section. Most of the materials described have salvage value; although, there are some components that will likely have no such salvage value at the time of decommissioning. All recyclable materials, salvaged and non-salvage, will be recycled to the furthest extent possible. All other non-recyclable waste materials will be disposed of in accordance with state and federal law in an approved licensed solid waste facility. Solar panels may have value in a resale market, depending on their condition at the end of the Project life. For purposes of this report, salvage values only, not resale, were considered, as this is the more conservative estimate strategy. Table 1 presents a summary of the primary components of the Project included in this decommissioning plan.

Table 1 Primary Components of Solar Farm to be Decommissioned

Component	Quantity	Unit of Measure
Solar Modules (approximate)	4,300	Each
Racking System	135	Each *
Steel Piles (including panel support & inverter stations)	1,343	Each *
Inverters	18	Each *
Transformer	1	Each *
Electrical Cables and Conduits	1,971	Lineal Feet *
Underground Primary Cable & Fiber	1,320	Lineal Feet *
Perimeter Fencing	3,650	Lineal Feet *

*Estimated metrics

2.2 SOLAR MODULES

Alliant Energy is considering the Canadian Solar CS7N-650MV-AG bifacial monocrystalline modules, for the Project. Each module assembly (with frame) has a total weight of approximately 83.6 pounds. The modules will be approximately 93.9 inches by 51.3 inches size and are mainly comprised of non-metallic materials such as silicon, glass, composite film, plastic, and epoxies, with an anodized aluminum frame.

At the time of decommissioning, module components in working condition may be refurbished and sold in a secondary market yielding greater revenue than selling as salvage material.

2.3 SOLAR RACKING SYSTEM AND SUPPORT

The solar modules will be predominantly mounted on a fixed tilt racking system, such as those manufactured by RBI Solar. A section of the array may include the use of single-axis tracking system. Smaller racks will be employed at the edges of the layout or near inverters, to efficiently utilize available space. The racking system is mainly comprised of galvanized and stainless steel; steel piles that support the system are assumed to be comprised of structural steel.

The solar arrays will be deactivated from the surrounding electrical system and made safe for disassembly. Electronic components, and internal electrical wiring will be removed and salvaged. The steel piles will be completely removed from the ground during decommissioning.

The steel foundations, and steel components from the racking system can be salvaged and sold to provide revenue to offset the decommissioning costs.

2.4 INVERTERS AND TRANSFORMERS

String inverters will be located within the arrays. A transformer station will sit on small concrete footings or steel piles within the array. The inverters and transformers will be deactivated, disassembled, and removed. Depending on condition, the equipment may be sold for refurbishment and re-use. If not re-used, they will be salvaged or disposed of at an approved solid waste management facility.

2.5 ELECTRICAL CABLING AND CONDUITS

The Project's medium voltage electrical collection system will be installed below ground. For direct buried cables without conduit, the minimum cover shall be 48 inches (four feet) from top of cable to finished grade. All cabling, regardless of depth, will be removed and salvaged.

2.6 UNDERGROUND PRIMARY SERVICE

An approximately quarter mile primary cable and fiber feeds the facility from Schneider Drive. This primary cable and fiber will be installed underground. At decommissioning, the primary cable and fiber can be removed back to Schneider drive if desired.

2.7 PERIMETER FENCING, SITE ACCESS AND INTERNAL ROADS

The Project will include a security fence around the perimeter of each array site. The perimeter fence will be completely removed from the Project site during decommissioning.

Access roads will allow access to the solar facility from local roads. The access drive will be approximately 15 feet wide and total approximately 800 linear feet (.15 miles). It is anticipated that only the road to the solar facility will be surfaced with aggregate.

The estimated quantity of gravel and geogrid is provided in Table 2.

Table 2 Typical Access Road Construction Materials

Component	Quantity	Unit of Measure
Geogrid (If required)	1,333	Square Yards *
Aggregate, 8-inch thick	296	Cubic Yards *

*Estimated metrics

Decommissioning activities include the removal of any surface aggregate not needed for long-term use of the property, de-compaction with deep ripper or chisel plow (ripped to 18 inches), backfilling and re-grading as needed to maintain drainage patterns, consistent with future use of the property.

3.0 LAND USE AND ENVIRONMENT

3.1 EXISTING LAND USE

The solar facility will be located on land previously used for agricultural purposes.

3.2 RESTORATION AND REVEGETATION

Project areas that have been excavated and backfilled will be graded to maintain drainage and support any future use of the property. Soils compacted during decommissioning activities will be de-compacted, as necessary, to restore the land to pre-construction conditions. Disturbed areas will be seeded with vegetation comparable to what was present during the life of the solar plant. Work will be completed to comply with the conditions agreed upon by Alliant Energy and UW-Madison and as directed by other federal, state, and local regulations in effect at the time of decommissioning.

3.3 SURFACE WATER DRAINAGE AND CONTROL

As previously described, the proposed Project area is predominantly located in actively drained agricultural land. The terrain varies and consists of rolling hills. The Project facilities are being sited to avoid wetlands, waterways, and drainage ditches to the extent practicable.

Surface water conditions at the Project site will be reassessed prior to the decommissioning phase. An Erosion Control Permit will be obtained in accordance with WDNR requirements in effect at the time. BMPs may include construction entrances, temporary seeding, permanent seeding, mulching (in non-agricultural areas), erosion control matting, silt fence, filter berms, and filter socks.

3.4 MAJOR EQUIPMENT REQUIRED FOR DECOMMISSIONING

The activities involved in decommissioning the Project include removal of the above ground components of the Project: solar modules, racking, foundations and piles, inverters, transformers, access roads, perimeter fencing, electrical cabling and conduits. Restoration activities include de-compaction of subsoils and re-grading project areas that have been excavated or back-filled.

Equipment required for the decommissioning activities is similar to what is needed to construct the solar facility and may include, but is not limited to: small cranes, low ground pressure (LGP) track mounted excavators, backhoes, LGP track bulldozers, LGP off-road end-dump trucks, front-end loaders, deep rippers, water trucks, disc plows and tractors to restore subgrade conditions, and ancillary equipment. Over-the-road dump trucks will be required to transport material removed from the site to disposal facilities.

4.0 DECOMMISSIONING COST ESTIMATE SUMMARY

Expenses associated with decommissioning the Project will be dependent on labor costs at the time of decommissioning. For the purposes of this report, 2022 average market values were used to estimate labor expenses. Fluctuation and inflation of the labor costs were not factored into the estimates.

4.1 DECOMMISSIONING EXPENSES

Project decommissioning will incur costs associated with disposal of components not sold for salvage, including materials which will be disposed of at a licensed facility, as required. Table 3 summarizes the estimates for activities associated with the major components of the Project. The total estimated decommissioning cost in Table 3 also covers costs for backfilling, grading and restoration as described in Section 2.

Table 3 Estimated Decommissioning Expenses – 2.25 MW Solar Array

Activity	Unit	Number	Cost per Unit	Total
Overhead and management (includes estimated permitting required)	Lump Sum	1	$13,000	$13,000
Solar modules; disassembly and removal *	Each	4,300	$4.60	$19,780
Racking System disassembly and removal *	Each	135	$310	$41,850
Steel pile/post removal	Each	1,343	$9.70	$13,027
String inverters	Each	18	$900	$16,200
Transformer and foundation	Each	1	$1,700	$1,700
Access road excavation and removal	Lump Sum	1	$4,000	$4,000
Rehabilitation of site	Lump Sum	1	$11,000	$11,000
Perimeter fence removal	Linear Feet	3,650	$2.80	$10,220
Underground medium voltage, primary cable and fiber optic removal (less than one mile total)	Lump Sum	1	$8,000	$8,000
Total estimated decommissioning cost				**$138,777**

*Cost of equipment removal would be higher if retaining for resale rather than salvage; however, the increased revenue would offset the added costs.

4.2 DECOMMISSIONING REVENUES

Revenue from decommissioning the Project will be realized through the sale of the solar facility components and construction materials. As previously described, the value of the decommissioned components will be higher in the early stages of the Project and decline over time. Resale of components such as solar panels is expected to be greater than salvage (i.e., scrap) value for most of the life of the Project.

Modules, the substation, and other solar plant components may be sold within a secondary market for re-use. A current sampling of reused solar panels indicates a wide range of pricing depending on age and condition ($0.10 to $0.30 per watt). Future pricing of solar panels is difficult to predict, due to the relatively young age of the market, changes to solar panel technology, and the ever-increasing product demand. A conservative estimation of the value of solar panels at $0.10 per watt would yield $279,500. Increased costs of removal, for resale versus salvage, would be expected to preserve the integrity of the panels; however, the net revenue would be substantially higher than the estimated salvage value.

The resale value of components such as trackers, may decline more quickly; however, the salvage value of the steel that makes up a large portion of the tracker is expected to stay at or above the value used in this report.

The market value of steel and other materials fluctuates daily and has varied widely over the past five years. Salvage value estimates were based on an approximate five-year-average price of steel and copper derived from sources including on-line recycling companies and United States Geological Survey (USGS) commodity summaries. The price used to value the steel used in this report is $241 per metric ton; aluminum at $0.40 per pound; silicon at $0.40 per pound and glass at $0.05 per pound. The main component of the tracking system and piles is assumed to be salvageable steel.

Solar panels are estimated to contain approximately 75 percent glass, 8 percent aluminum and 5 percent silicon. A 50 percent recovery rate was assumed for aluminum and all panel components, due to the processing required to separate the panel components. Alternative and more efficient methods of recycling solar panels are anticipated before this Project is decommissioned, given the large number of solar facilities that are currently being developed. Table 5 summarizes the potential salvage value for the solar array components and construction materials.

Table 4 Estimated Decommissioning Revenues (Salvage Value Only)

Item	Unit	Salvage Price per Unit	Units per Item	Total Salvage Price per Item	Number of Items	Total
Panels - Silicon	Pounds per Panel (Item)	$0.40	2.1	$0.840	4,300	$3,612
Panels - Aluminum	Pounds per Panel (Item)	$0.40	3.3	$1.320	4,300	$5,676
Panels - Glass	Pounds per Panel (Item)	$0.05	31.3	$1.565	4,300	$6,730
Tracking System and Posts	Tons per $MW_{[DC]}$	$241	32.0	$7,712.0	2.795	$21,555
Total Potential Revenue						**$37,573**

* Revenue based on salvage value only. Revenue from used panels at $0.10 per watt could raise $279,500 as resale versus the estimated salvage revenue.

4.3 DECOMMISSIONING COST SUMMARY

The following is a summary of the net estimated cost to decommission the Project, using the information detailed in Sections 4.1 and 4.2. Estimates are based on 2022 prices, with no market fluctuations or inflation considered.

Table 5 Net Decommissioning Summary

Item	Cost/Revenue
Decommissioning Expenses	**$138,777**
Potential Revenue – salvage value of panel components and recoverable materials	**$37,573**
Net Decommissioning Cost	**$102,204**

The cost estimates included in this Plan are based on preliminary Project design information and may change prior to final Project construction. The costs have been prepared utilizing industry standard construction estimating software and engineer's knowledge for the types of activities required to decommission and restore the site.

During the first 10 years of Project operation, it is anticipated that the revenue to be gained by the resale of the solar modules will be greater than the cost of decommissioning; thereby resulting in a net positive revenue on decommissioning. However, to be conservative and ensure sufficient funds are available to decommission the Project, Alliant Energy will provide financial assurance based on the estimated Net Decommissioning Cost of $102,204. Alliant Energy proposes to submit an updated Decommissioning Plan, cost estimate, and corresponding financial assurance every five (5) years to adjust for inflation, improvements in technology, and market considerations.

Based on the present estimated Net Decommissioning Cost and an average inflation factor of three percent (3%), the decommissioning net cost in Year 5 would be estimated at $118,482. This amount is based on unknown future inflation rates and other factors; therefore, a five-year Plan update would provide confidence that sufficient future decommissioning funds are available.

Figure 1 Site Location