Exhibit V

Generation of Solid Waste and Wastewater

Bakeoven Solar Project
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Prepared for

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Acronyms and Abbreviations

Applicant	Bakeoven Solar, LLC
BMP	best management practice
ESCP	Erosion and Sediment Control Plan
Facility	Bakeoven Solar Project
Li-ion	Lithium-ion
MW	megawatt
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
OAR	Oregon Administrative Rule

1.0 Introduction

Bakeoven Solar, LLC (Applicant) proposes to construct and operate a solar energy generation facility and related or supporting facilities in Wasco County, Oregon. This Exhibit V was prepared to meet the submittal requirements in Oregon Administrative Rule (OAR) 345-021-0010(1)(v).

2.0 Applicable Rules and Standards

This exhibit provides evidence of compliance with the Waste Minimization standard of OAR 345-022-0120:

OAR 345-022-0120 Waste Minimization

(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that, to the extent reasonably practicable:

(a) The applicant's solid waste and wastewater plans are likely to minimize generation of solid waste and wastewater in the construction and operation of the facility, and when solid waste or wastewater is generated, to result in recycling and reuse of such wastes;

(b) The applicant's plans to manage the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility are likely to result in minimal adverse impact on surrounding and adjacent areas.

(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

(3) The Council may issue a site certificate for a special criteria facility under OAR 345-015-0310 without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

3.0 Major Types of Waste Produced with Quantity Estimates

OAR 345-021-0010(1)(v) Information about the applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120. The applicant shall include:

(A) A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate, including an estimate of the amount of solid waste and wastewater.

To address the Waste Minimization standard, this exhibit describes the Applicant's plan to minimize the generation of solid waste and wastewater during construction, operation, and decommissioning of Bakeoven Solar Project (Facility) components associated with the Facility. The types of solid waste and wastewater generated during Facility construction, operations, and decommissioning, as well as the procedures and practices used to handle these materials, are discussed in the following sections to follow.

3.1 Solid Waste

3.1.1 Construction

Solid waste generated from construction will include discarded construction materials, packaging materials, and spent erosion control materials. Wood form work used for cast-in-place foundations for the substation, inverter pads, and battery pads will be discarded. Concrete used for pilings will have no associated form work. Other discarded construction material could include scrap metal from damaged pilings or racking equipment, or unused wiring. Solar photovoltaic modules, battery parts, and associated electrical equipment will be delivered to the site in cardboard and plastic packaging, along with wood pallets. This packaging will be recycled to the extent possible and disposed of off site. Erosion control material will be removed following site stabilization and disposed of at a landfill, as these materials are typically not recyclable.

The nonhazardous waste produced during construction will be managed by a local solid waste hauler. Estimated volume of construction waste will be one to four 40-cubic-yard roll-offs per week during active construction (9 to 12 months), for a total of approximately 4,000 to 7,000 cubic yards for Facility construction. Overall, solid waste types and quantities from construction are typical of any large-scale construction project, and likely less than many non-residential buildings relative to total size.

3.1.2 Operations

Little solid waste will be generated from Facility operations. Office waste, such as paper and food packaging and scraps, will be generated at the operations and maintenance (O&M) building. An estimated 6 yards of solid waste will be generated per month.

Repair or replacement of solar array and associated electrical equipment could generate incidental solid waste. However, a solar array typically lasts more than 30 years without significant degradation in function and will be replaced infrequently, if at all. Operation of the solar array will not result in a significant amount of solid waste.

The battery storage system may also generate incidental waste from repair or replacement of electrical equipment. In addition, solid waste will be generated when batteries are replaced. Lithium-ion (Li-ion) batteries will need to be changed out periodically (estimated at approximately every 5 to 10 years, on average). Flow batteries have a lifespan of approximately 10 to 20 years and will need to be replaced at least once during Facility operation.

3.1.3 Decommissioning

The solar array components will be constructed with steel, aluminum, concrete, solar photovoltaic modules, cable, and plastics, as described in Exhibit G. When the Facility is decommissioned, the components as well as other aboveground equipment, such as the O&M building, rock and gravel aggregate, transmission line, poles, and other associated structures, will be disassembled and the materials will be recycled or reused, sold for scrap, or taken to a landfill. As an alternative to demolition, the landowner may opt to use the Facility's O&M building for agricultural purposes. Internal roads, fences, and gates will be removed and the area revegetated unless otherwise requested or agreed to by the landowner. Ancillary components, such as the buried collector line, concrete pads, and gravel, will be removed to a minimum depth of 3 feet below grade but left in place below that point. To allow for agricultural activities, concrete foundations will be removed, recycled, and replaced by suitable clean fill.

The decommissioning of the battery storage system will involve disposing of battery components at an off-site facility designed and approved for disposal or recycling of batteries. Ancillary components of battery storage system will also be removed in a manner similar to the methodology of the other concrete pads.

3.2 Wastewater

3.2.1 Construction

Sanitation during construction activities will be addressed through the provision of portable toilets located throughout the construction area at locations determined by the construction contractor. Portable toilets will be provided by a licensed subcontractor, who will be responsible for servicing the toilets at regular intervals and disposing of wastewater in accordance with local jurisdictional regulations. The construction contractor will ensure that a sufficient number of toilets are provided. Small amounts of wastewater will be generated from washdown of concrete trucks after concrete loads have been emptied. Washdown methods will be determined by the contractor and may occur at contractor-owned batch plants or a designated concrete washout.

During construction of the Facility, the Applicant will ensure that no water used for construction will be discharged into wetlands, streams, or other waterways. The Applicant will implement erosion control measures required by its National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Discharge General Permit 1200-C and its associated Erosion and Sediment Control Plan (ESCP) to control stormwater runoff.

3.2.2 Operations

Minimal water will be used during operations and will primarily be related to sanitation at the O&M building. The on-site septic system will be licensed and constructed in compliance with state permit requirements and will have a discharge capacity of up to 7,500 gallons.

Operational wastewater sources will also include the solar array and battery storage system elements. There will be periodic washing of the solar modules to minimize the effects of dust and dirt on energy production. Assuming the solar modules are washed two times a year, with each wash requiring 475,950 gallons of water, up to approximately 1 million gallons of water per year will be required for this purpose (0.5 gallon per module per wash). The water used for array cleaning is not anticipated to require off-site disposal due to the extremely high evaporation rate at the site. Any wastewater will likely evaporate before it could be collected for transport off site. Therefore, washwater will be evaporated or infiltrated into the ground. The Applicant shall ensure that there is no runoff of washwater from the site or discharges to surface waters, storm sewers, or dry wells. No acids, bases, or metal brighteners will be used in the washwater and biodegradable, phosphate-free cleaners may be used sparingly.

Liquid waste associated with the battery storage system will vary depending on the type of technology installed at the Facility. Li-ion battery systems are typically air cooled and do not have a liquid component. However, there are some Li-ion battery systems that are liquid cooled, such as the Tesla Powerpack which uses coolant similar to automotive antifreeze. The coolant is recirculated through a closed system to cool the batteries.

Flow batteries use nontoxic ionized fluids as a key component in energy storage. The entire battery component will need to be replaced at least once during Facility operation. A flow battery system will also require infrequent replacement of the electrolyte solutions because there is negligible degradation of the battery (i.e., electrolyte solutions) over time. This analysis assumes 7,000 gallons per 1 megawatt (MW) of electrolyte solution will be needed every 20 years. For the proposed 100 MW battery system, about 1.4 million gallons of solution will be replaced during the life of the Facility. No other liquid or wastewater will be generated using this storage technology.

3.2.3 Decommissioning

Minimal wastewater will be generated during decommissioning of supporting facilities including electrical systems, roads, and buildings. Likewise, decommissioning of the solar array and related electrical components will not generate any wastewater.

If flow technology is selected for battery storage, then nontoxic ionized solutions will be disposed of at an approved location at the time of decommissioning. If Li-ion technology is selected, no wastewater will be generated at the time of decommissioning.

4.0 Structures, Systems, and Equipment to Manage and Dispose of Waste

OAR 345-021-0010(1)(v)(B) A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and storm water.

4.1 Construction

Construction will not require the use of specialized structures, systems, or equipment for waste management or disposal. Standard construction waste bins will be kept on site to keep construction debris until it is hauled off site. Separate containers for small quantities of hazardous materials, such as oily rags or contained soil from minor spills, will be provided according to the contractor's spill prevention, containment, and countermeasures plan. Wastewater and stormwater will be managed through measures outlined in the ESCP.

Generation of waste from construction will be minimized through detailed estimating of materials needs and through efficient construction practices. As noted earlier, materials will be recycled as feasible.

4.2 Operation

As described above, the Facility will generate electricity without producing significant solid waste, wastewater, or stormwater. The Facility is designed to operate without replacement parts, but some repair or replacement of electrical, solar, or battery equipment is expected over the life of the Facility. Damaged equipment will be removed and disposed of at the nearby Wasco County Landfill, or other approved disposal facility.

Waste from the O&M building and other solid waste generated on site will be collected and recycled as feasible. Non-recyclable wastes will be collected and transported to a local landfill. Disposal of materials for routine maintenance and housekeeping, such as lubrication oils and cleaning supplies, will be managed according to the pertinent regulations and the guidelines outlined in Exhibit G.

With either Li-ion or flow battery technologies, self-contained battery components will be removed and disposed of or recycled by a licensed vendor. Li-ion battery modules will require replacement periodically because the modules lose their effectiveness through repeated charge/discharge cycles. The frequency of replacement will depend on operational parameters that are not yet fully designed, but for purposes of this analysis, it is conservatively assumed that batteries will require replacement every 7 years, or five times over the 40-year life of the Facility. The following procedures will be implemented for battery replacement:

- The Facility operator will disconnect and de-energize the battery system prior to removal from the installed racks, and package the batteries for transport to an approved facility.
- At the recycling facility, the qualified contractor will dismantle battery modules and prepare individual cells for metals recovery.

- Individual cells will be processed in a furnace to recover metals. Recovered metals may include aluminum, calcium, lithium, and a metal alloy comprising cobalt, copper, nickel, and iron.
- Recovered metals will be recycled or separated to recover individual metals where economically viable.

Flow batteries will also require replacement at least once during Facility operation. Similar to the procedures for Li-ion batteries, the batteries will be de-energized, removed, and transported to an approved facility where they will be recycled or properly disposed of.

Operation of the solar array will result in some wastewater during period washing and is not considered industrial wastewater (see Exhibit O for further information). The limited quantity of washwater will evaporate or will infiltrate into the ground near the point of use. No additional structures, systems, or equipment are required for solar array washwater.

The Facility will increase the impervious area within the watershed with the installation of the battery storage containers, collector substation, O&M building, and post concrete foundations for supporting the solar array. The increase in impervious area will not likely result in a significant amount of additional stormwater during operations.

4.3 Decommissioning

Waste produced from decommissioning activities will be managed in a similar manner to the waste produced during construction and operations (see Sections 4.1 and 4.2 above). To the extent practicable, Facility components will be sold for reuse or scrap, which will minimize the amount of waste requiring disposal at a solid waste facility. As noted above, the landowner may opt to use the Facility's O&M building for agricultural purposes. Similar best management practices (BMPs) will be implemented to protect stormwater quality.

The solar array will be removed and recycled or disposed of at Facility decommissioning. At the expected Facility life span of 40 years, an available solar array could still be capable of generating 80 to 85 percent of its initial capacity, in which case the Facility array will be repurposed for use at other locations. If continued reuse is not practical, the array will be dismantled and recycled to reclaim constituent parts such as glass, aluminum, silicon solar cells, and metals.

The battery storage system will require disposal of the steel container structures housing the batteries and their constituent parts. If Li-ion technology is selected, batteries will be disposed of at decommissioning in the same manner described above for operations replacement. If flow technology is selected, the nontoxic ionized fluids contained in the battery modules will be transported off site for disposal at an approved wastewater disposal location. Electrical systems and associated equipment will be disposed of as incidental waste and will be collected and recycled, as feasible. Non-recyclable wastes will be collected and transported to the Wasco County Landfill.

4.4 Solid Waste Disposal Site

The incorporated communities near the Facility will provide solid waste management services to their respective incorporated areas. Waste Connections, Inc. provides collection, transfer, and recycling services in the Wasco County area. Solid waste disposal for the Facility will be provided through a private contract with local commercial haulers. The public landfill nearest to the site boundary is the Wasco County Landfill, owned by Waste Connections, Inc., in The Dalles, and have stated they have the capacity to accommodate the Facility's waste through its 40-year lifespan (see Exhibit U, Attachment U-2). The Wasco County Landfill expanded its capacity in 2001 and currently has a solid waste disposal permit that is valid until 2024 (ODEQ 2014).

5.0 Water Use Reduction

OAR 345-021-0010(1)(v)(C) A discussion of any actions or restrictions proposed by the applicant to reduce consumptive water use during construction and operation of the facility.

Water will be used on an as-needed basis to construct concrete foundations and pads, suppress dust on the roads (and other areas disturbed by grading), and wash out concrete truck chutes. To reduce the water used for dust suppression, stabilization materials such as mulch, soil tackifiers, and soil binders may be placed on exposed soils to minimize dust generation without the use of daily water.

During operations, water used for solar panel washing will be limited to the minimum necessary for effective panel cleaning. No additional water use, and therefore no additional actions to limit water use, will result from installation of the battery storage system. Water will be trucked to the Facility and held in a water tank or pond or obtained from an on-site well. The water used at the O&M building(s) will meet building code requirements for water conservation practices.

6.0 Plans for Recycling and Reuse

OAR 345-021-0010(1)(v)(D) The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).

Waste generated during construction will be minimized by implementing efficient construction practices and detailed estimates of material needed. Waste generated through each phase of the Facility will be recycled as appropriate and feasible. Waste that can typically be recycled includes metals, glass, paper, wood, and concrete. Damaged solar modules or used Li-ion batteries may be returned to the manufacturer for recycling or reuse. When recycling is not practicable, the materials will be sorted and stored in dumpsters or other suitable containers, and transported by a licensed waste hauler to an approved disposal location where necessary. Employees will be trained to minimize and recycle solid waste.

At the time of decommissioning, the Applicant seeks the ability to reuse the Facility's collector substation and transmission line for another use. The ability to repurpose or reuse transmission infrastructure by another company not associated with the Applicant can minimize the generation of solid waste. For example, wind projects are being developed to take advantage of existing transmission infrastructure made available by retiring coal plants. It is difficult to forecast the future energy infrastructure needs; therefore, it is uncertain if the Facility collector substation and transmission line will be used.

7.0 Impacts of Project Waste

7.1 Description of Impacts

OAR 345-021-0010(1)(v)(E) A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.

The Facility will not generate significant quantities of solid waste, wastewater, or stormwater during construction and operation, and no adverse impact on surrounding or adjacent areas is anticipated. Most waste will be removed from the site and either reused, recycled, or disposed of at permitted disposal facilities. Any waste disposed of on site (for example, concrete waste and wastewater) will be inert. This waste will be disposed of in a manner consistent with applicable regulations and protective of human health and the environment.

Wastewater will be collected and treated using an on-site septic tank and drain field during operation of the Facility. Therefore, no aboveground accumulation or transportation of this waste will be needed. During construction, portable toilets will be serviced regularly. As necessary, wastewater generated during construction will be transported by a local contractor via tank trucks to a treatment facility. Water used for dust suppression will percolate into the ground.

Stormwater generated on site during construction and operation is expected to be minimal. Stormwater controls will be implemented on site as needed in accordance with the NPDES Construction Stormwater Discharge General Permit 1200-C and associated ESCP. During operations, the stormwater will infiltrate into the ground.

7.2 Evidence that Impacts are Minimal

OAR 345-021-0010(1)(v)(F) Evidence that adverse impacts described in (D) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.

Section 7.1 summarizes the reasons why no adverse impacts on surrounding and adjacent areas from solid waste, wastewater, and stormwater are expected during construction and operation of the Facility. Further evidence is provided in Section 3, describing the overall low quantities of solid waste and wastewater for a commercial project of this size, particularly as the Facility will not

create wastes directly from the generation of electricity. Disposal and waste reduction methods are described above in Sections 4, 5, and 6. All proposed waste management practices are consistent with applicable regulations and protective of human health and the environment. Given this evidence, there will be no or minimal impacts from Facility-generated waste.

8.0 Monitoring Program

OAR 345-021-0010(1)(v)(G) The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.

The Applicant will monitor impacts from construction stormwater in accordance with a NPDES Construction Stormwater Discharge General Permit 1200-C to be issued by the Oregon Department of Environmental Quality, and an associated ESCP. The ESCP describes BMPs for erosion and sediment control, spill prevention and response procedures, regular maintenance for vehicles and equipment, employee training on spill prevention, and proper disposal procedures.

No significant impacts from solid waste and wastewater are expected from construction and operation of the Facility. Therefore, no monitoring program aside from the ESCP is proposed.

9.0 Conclusion

The evidence provided above demonstrates that the Oregon Energy Facility Siting Council's Waste Minimization standard is met because waste generated as a result of the Facility will be minimized, reused, or recycled where feasible and because minimal adverse impacts on the surrounding or adjacent areas will result from the management of waste related to the Facility.

10.0 Submittal Requirements and Approval Standards

10.1 Submittal Requirements

Table V-1. Submittal Requirements Matrix

Requirement	Location
OAR 345-021-0010(1)(v) Information about the applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120. The applicant shall include:	–
(A) A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate, including an estimate of the amount of solid waste and wastewater.	Section 3.0
(B) A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and storm water.	Section 4.0

Requirement	Location
(C) A discussion of any actions or restrictions proposed by the applicant to reduce consumptive water use during construction and operation of the facility.	Section 5.0
(D) The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).	Section 6.0
(E) A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.	Section 7.1
(F) Evidence that adverse impacts described in (D) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.	Section 7.2
(G) The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.	Section 8.0

10.2 Approval Standards

Table V-2. Approval Standard

Requirement	Location
OAR 345-022-0120 Waste Minimization	
(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the Council must find that, to the extent reasonably practicable:	–
(a) The applicant's solid waste and wastewater plans are likely to minimize generation of solid waste and wastewater in the construction and operation of the facility, and when solid waste or wastewater is generated, to result in recycling and reuse of such wastes;	Sections 3.0 through 8.0
(b) The applicant's plans to manage the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility are likely to result in minimal adverse impact on surrounding and adjacent areas.	Sections 3.0 through 8.0
(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.	Sections 3.0 through 8.0
(3) The Council may issue a site certificate for a special criteria facility under OAR 345-015-0310 without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.	N/A

11.0 References

ODEQ (Oregon Department of Environmental Quality). 2014. Solid Waste Disposal Site Permit No 53. Issued by ODEQ December 11, 2014.