

Solar Panels - Disposal Operations for Photovoltaic (PV) power systems

Executive Summary

Following the introduction of the Feed-In Tariff (FIT) program in Ontario in 2009, there has been a rapid expansion in the use of photovoltaic (PV) power systems. This includes both residential and large-scale commercial systems. Between currently installed and in-development systems, there is currently 2,300 MW of solar power produced in Ontario, which correlates to approximately 11.6 million installed solar panels. PV modules generally have a useful life of 25 years and there is a need in the Ontario market to be able to effectively disposal of modules that have reached their end-of-life in order to ensure the continued sustainability of the industry. This report outlines an operations strategy for a hypothetical company that specializes in the disposal of PV modules, along with additional guidance on key operational decisions required to support the successful implementation of the strategy.

The following key steps were performed in the process of developing the operations strategy:

- 1) Establish an understanding of the nature of the components in need of disposal and their estimated useful life.
- 2) Establish an understanding of the scale of operations that are required to be able to dispose of existing PV modules and forecasted installation initiatives going forward.
- 3) Benchmarking of industry best practices.
- 4) Development of an operations strategy that distinguishes between order winners and order qualifiers, including prioritization of order winners.

- 5) Identification of key functions of company operations (e.g., supply chain, maintenance, inventory management) and corresponding implementation strategies to align with the overall operations strategy.

Disposal operations will focus exclusively on PV modules given that a future demand of 464,000 modules per year is anticipated based on current market conditions. This supports the adoption of an operations strategy based on providing disposal services at the lowest cost in a large-scale dismantling facility.

Benchmarking of existing capabilities within Ontario regarding the disposal of PV modules produced the following findings:

- 1) There currently exists no capability within Ontario to dispose of PV modules. This supports a strategy to implement a large-scale dismantling facility to achieve economies of scale in disposal operations.
- 2) The PV disposal industry in Ontario is currently in the “Introduction” stage of the product life cycle. Efforts in the foreseeable future need to be focused on optimizing the process design and establishing partnerships with suppliers and customers to ensure that disposal of PV modules can be performed in the most cost-effective manner.

Benchmarking of best practices worldwide with regards to PV modules produced the following findings:

- 1) There is precedent for the use of a large-scale disposal facility. PV CYCLE, an international PV industry program has been established to address the recycling challenge in Europe. The first dismantling facility was introduced in Europe in 2009.
- 2) There is a need to possess the capability to separately process crystalline-silicon and thin film PV modules, as these module types comprise the majority of the currently installed capacity.

- 3) There exists technologies for the disposal of crystalline-silicon and thin film PV modules which can be readily adopted.

Findings from benchmarking activities were used as inputs to the overall company operations strategy. To support the implementation of the overarching operations strategy, additional guidance is provided in the following areas:

- Layout Strategy;
- Maintenance Management Strategy;
- Process Design and Work Flow;
- Supply Chain Management; and
- Inventory Management.

The contents of this report will be of interest to entrepreneurs who may be considering how to capitalize on the unmet need in the Ontario market with regards to the disposal of PV module.

This report provides the framework for the operations of a PV module disposal company that can serve as a starting point for establishing operational activities in the level of detail that would be necessary to support the commercialization of this concept.

It is recommended that entrepreneurs interested in pursuing opportunities in this industry use the contents of this report to engage in discussions with potential customers and suppliers to obtain feedback on the proposed operational model. This will enhance the robustness of the operational framework and support the development of close working relationships with customers and suppliers that are critical to the successful implementation of the operations strategy outlined in this report.