



Grand Renewable Solar Park Project

FINAL DESIGN AMENDMENT REPORT

OCTOBER 2014

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1. Introduction

On September 27, 2013, Grand Renewable Solar LP/ Grand Renewable Solar GP Inc. was issued an amended Renewable Energy Approval (REA) [REA#: 9560-8UJXS] to develop and operate a 100-megawatt (MW) solar photovoltaic project to be known as the Grand Renewable Solar Park Project (GRS) (see **Appendix A**) This project, together with the 148.6 MW wind project known as the Grand Renewable Wind Project (GRW), comprise the Grand Renewable Energy Park (GREP).

The solar and wind projects will jointly own and share a transformer substation (with separate transformers), an Operations and Maintenance building and a transmission line. At this time, GRS is seeking a technical change amendment to the REA issued for the GRS.

The project modifications incorporated in this amendment include: addition of two (2) DSTATCOM units, addition of one (1) Line Reactor, manufacturer-specified transformer noise data for the substation transformers, and minor changes to site layout, including the relocation of some of the dominant noise sources, all of which are within 10 metres of the already approved locations in Schedule B of the Approval.

2. Overview of the Minor Amendment

The basis for this technical change amendment is the addition of new electrical equipment, consisting of two (2) DSTATCOM units and one (1) Line Reactor. Furthermore, the location of some of the dominant noise sources changed in the final design stage of the project. All final locations of the noise sources are within 10m of the locations specified in Schedule B of the REA. The purpose of using the DSTATCOM units is to maintain high MVAR output at depressed system voltages. The purpose of the Line Reactor is to filter out spikes of current that may exist between power generation and load.

Through consultation with the MOECC in September 2014, it is expected that the proposed changes within this amendment report are insignificant in nature and represent a reduction in overall environmental effects of the project (see **Appendix B** for agency correspondence). As such, the proposed changes constitute a technical change amendment.

This Modifications Document focuses on the following proposed changes:

- Addition of two (2) DSTATCOM units

- Addition of a Line Reactor
- Manufacturer specified transformer noise data for the substation transformers
- Minor changes to the site layout

3. Proponent Contact Information

Should there be any questions about the technical changes proposed for GRS please contact:

Full Name of Company:	<u>Grand Renewable Solar LP</u>
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Prime Contact:	<u>Mr. David Oxtoby</u>
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4. Project Size and Layout

The nameplate capacity of the project as outlined in the REA application has been maintained at 100 MW, alternating current (AC). The GRS Project will consist of approximately 440,000 – 450,000 solar photovoltaic (PV) modules. These will be contained in a series of fixed racking systems which will be attached to fixed ground-mounted racking structures organized into 100-1 MW solar arrays. In addition to the modules, medium voltage stations, a main substation, and underground cabling will be installed to convert DC to AC current and boost the voltage for connection to the grid. To accommodate modifications incorporated as part of this technical change amendment, minor changes to the site layout will be required; all of which are within 10 meters of the already approved locations. A comparison figure showing the previously approved layout and the revised layout is provided in **Appendix B**.

5. Ministry of Natural Resources and Forestry

Further consultation with the Ministry of Natural Resources and Forestry (MNRF) was not warranted for the proposed technical changes. As the final design for the project does not exceed the original project location boundary, no amendments to the Natural Heritage Assessment are required. The MNRF has

been circulated as part of the stakeholder notification that there are proposed technical amendments proposed to this project. Any correspondence received in response from the MNRF will be subsequently forwarded to the MOECC.

6. Ministry of Tourism, Culture and Sport

The technical changes described in this report do not require amendments to either the Cultural Heritage or Archaeological Assessments completed and reviewed by the Ministry of Tourism, Culture and Sport (MTCS). The extent of the project location did not change and the project area was studied and commented on in the original REA submission. The locations of the project components, installation methods or equipment specifications would not change the results or information presented related to cultural heritage or archaeological resources for this project. The MTCS has been circulated as part of the stakeholder notification that there are proposed technical amendments proposed to this project. Any correspondence received in response from the MTCS will be subsequently forwarded to the MOECC.

7. DSTATCOM Inverter System

The proposed modifications to the GRS will include the addition of two (2) Distributed STATic COMPensator (DSTATCOM) inverter systems, which will maintain high mVAR output at depressed system voltages. Since the DSTATCOM can maintain constant current over its operating voltage range, the mVAR output of the system is linearly proportional to the system voltage. The DSTATCOM also has a short-term transient current rating, which allows it to provide even more mVAR to assist in the recovery of depressed voltages.

Each of the DSTATCOM inverter systems includes four (4) inverter blocks which are mounted in a single self-standing frame and are enclosed in a steel container (DSTATCOM container). Each inverter has its own controls, circuit breaker and a small AC filter used to eliminate any high-frequency harmonic voltages in the output of the PWM waveform coming from the inverter. Each inverter is connected to a 2.5 MVA pad-mounted transformer (a total of four transformers per DSTATCOM inverter system). One of the DSTATCOM systems has a power rating of 10 mVAR and the other 8.75 mVAR.

8. Line Reactor

The GRS substation will include one (1) 3-phase Line Reactor (LR) with a max power rating of 26 mVAR for connection to the grid. The function of the line reactor is to filter out spikes of current that may exist

between power generation and load (the grid). The line reactor consists of three isolated inductors, one for each of the three line phases. The noise for the line reactor was calculated using manufacturer specified data and calculation of spectrum similar to that of a transformer.

9. Manufacturer Noise Data for Substation Transformers

Noise measurement data from the transformer manufacturer, Hyundai Heavy Industries Co. Ltd. for the substation transformers were obtained and incorporated in the noise assessment for the project (see **Appendix D**).

10. Supporting Documentation

The proponent has prepared a revised *Noise Study Report (NSR)*, as included in **Appendix D**, based on the technical changes discussed above. The revised NSR indicates that with the implementation of the recommended mitigation measures GRS will be in compliance with the applicable MOECC noise criteria. The complete revised *Noise Study Report* is presented in **Appendix D**.

11. Environmental Effects

There are no additional potential environmental effects as a result of the proposed technical change amendment that were not previously anticipated in the *Project Description Report, Design and Operations Report, Construction Plan Report, Natural Heritage Assessment Reports, Water Assessment and Water Body Report* and *Decommissioning Plan Report* that were submitted as part of the original REA application. Mitigation measures proposed to reduce or eliminate potential negative effects to the natural and human environments are documented in the *Construction Plan Report, Design and Operations Report, Water Assessment and Water Body Report* and *Natural Heritage Assessment Reports* provided with the original application.

12. Summary

Our view is that the above-listed amendments to the GRS Project are improvements for the operational efficiency and neighbouring residents and the environment. None of the amendments will create any potential negative environmental effects to natural features or neighbouring residents for which

mitigation was not already proposed in the original REA submission. A Notice of REA Amendment and covering letter outlining the proposed changes were distributed to all project stakeholders on October 8, 2014 and published in the “Haldimand Press” and “The Brantford Expositor” newspaper on October 8, 2014. A copy of the letter and notice are included in **Appendix E**.