Addendum 1 – Minimum Electrical Requirements

Basic materials and methods

1. Design and installation must comply with the Latest edition of the National Electrical Code
2. Inter-connection to the "grid" shall follow applicable IEEE standard and must satisfy the Utility company requirements.
3. Low voltage conduits shall be non-ferrous material. Aluminum conduits and associated couplings and connectors are preferred.
4. Conduit racks and fasteners shall also be non-ferrous. No materials shall be buried in the land fill area.
5. Only one 3 phase circuit shall be allowed per conduit. All conductors shall be copper, with code applicable insulation (e.g. XHHW).
6. *General Guidance Subject to Change After Site Visits and Q&A*
    a. *1 MW at 480v (typical inverter output) is approximately 1200 Amps. This could (for example) be 3 circuits at 400 amps each requiring a 4" conduit each. 1200 amp rated panelboards are a typical size. Using 600v as the inverter output would be about 1000 amps.*
    b. *5 MW would require 6000 Amps at 480v and 5000Amps at 600v, which is not a typical size.*
    c. *In order to limit the number of panelboards to 2, each would be rated for 2.5 MW, or approximately 3000 Amps. So in option #2, the initial panelboard would be rated for 3000 Amps, with the capability to add a second one when upgrading to 5 MW. This would only add marginally to the initial cost, but reduce the cost and complexity to expand to 5 MW.*
7. All switchgear, panelboards, and electrical enclosures shall be rainproof (NEMA 3R or better). Stainless steel is preferred.
8. Low voltage circuit breakers shall be supplied with electronic trip units.
9. Low voltage transformers and inverters shall be mounted above grade to prevent snow from entering the cabinet.
10. Step-up (low voltage – medium voltage) transformer(s) shall be located outside of the land fill area. The associated medium voltage circuit breaker with its enclosure shall be located nearby or integral with the transformer.
11. Liquid filled transformers shall use the most environmentally friendly fluid available.
12. The pad for the transformer shall contain means to capture the full contents, in the event of a transformer leak, but shall prevent the accumulation of water from rain or snow.
    a. Note that option #2 (1 MW -5MW) will require that the original transformer pad be sized for the 5 MW transformer, in order to enable an easy swap out, when the system is upgraded.

13. Bushings on the transformer shall be fully insulated in order to prevent electrical hazard and personal injury. Proper signage to prevent injury shall be provided as required by industry standards. Fencing to enclose the transformer shall be provided, as required by applicable codes.
14. Distribution power poles from the transformer to the WWTP shall be the same as those used by the local utility, and install in accordance with their standards. Poles shall not be installed in the landfill area.
15. MV Distribution cables shall use "spacer cable system". The cable for all options shall be sized for the full 5 MW system. (*5 MVA at 12,470 volts. 3 phase, is approximately 235 Amps)*
16. An Arc flash analysis shall be performed based upon the final equipment selection. SKM software shall be utilized for this analysis. Hazard classifications shall be posted in accordance with the NEC and NFPA 70 requirements. Graphical one-line diagrams shall be submitted, showing short circuit levels, arc flash data, etc. available from the software. Time current coordination curves showing the actual breaker settings shall also be provided. *(these are required in order to calculate the Hazard classification).*
17. Submittals with RFP
    a. Equipment.
    b. Design.
18. Submittals for approval after award of contract
    a. Equipment.
    b. Design.