Appendix K

1. Application Requirements (a-b): Broad ESS study vs narrow ESS study
   - Broad study would allow battery usage to be flexible in the future
   - Narrow study would limit battery usage to what was defined initially
   - SI would like multiple options to be available for #1 Application Requirements where they would like a worst-case study but have the option for non-worst-case use. Flexibility in metering type is essential for assuring potential customers on the use of batteries.
   - JU is concerned about doing a study at the present for a future use where there may be significant changes to the circuit that the current study would not capture. JU would like a new application for change in battery use case.
   - DPS opinion is that this is a higher-up decision.

1. Application Requirements (c-d-e):
   - Storage capacity (kWh)
     - SI would like to remove this metric for the study because it does not affect export since that was already declared.
     - JU states that they need capacity information for tracking and reporting purposes. NWA cases may require kWh to be known.

1. Application Requirements (g): Submit control schemes, electrical configurations and sufficient detail for the utility to review and confirm acceptance of proposal.
   - SI recommends moving this to Protection System Verification
   - JU is OK with this recommendation

1. Application Requirements (j): Storage longevity (cycle, storage components)
   - SI would like to remove this since this information may be sensitive to the manufacturers

1. Application Requirements (k): Power factor operating range
   - SI would like to remove this section as it is stated in section 2(c)

1. Application Requirements (m):
   - SI recommends moving this to Protection System Verification
   - JU is OK with this recommendation

1. Application Requirements (n):
   - SI recommends moving part iii to General Information Section
   - JU isn’t expecting SI to meet SunSpec Common Smart Inverter Profile but was included in the section for more informational purpose

2. System Operating Characteristics (a):
   - SI wants to make sure equipment load (such as HVAC used by ESS) will not be used for metering considerations.

2. System Operating Characteristics (d): Maximum Frequency of change in operating modes
   - SI states this is not a factor in other storage markets

2. System Operating Characteristics (e):

2. System Operating Characteristics (k-l-m):
   - SI would like to move k/l/m to General Information Section
Voltage Flicker

- SI agrees with JU’s proposed changes
- DPS would like an effective date for voltage flicker changes

Material Modifications

- Define what constitutes a significant change to the system
- Typical Material Modification (>50kW)
  - A change in point of interconnection (POI) to a location served by a different circuit, moved to a different line segment (i.e. 3-phase to 1-phase segment, or change in zone of protection), change in site control or any change in point of interconnection (POI) for projects interconnecting to network systems.
  - A change from certified (NRTL, e.g. UL listed) to non-certified devices.
  - An increase in the name plate of the DG or ESS facility of more than 2%, or any increase causing adverse impact to subsequent applications’ ability to interconnect.
  - Addition of DG at the facility (other than the 2% increase in nameplate) not disclosed in the application. This would include existing non-disclosed and requested additional generation.
  - Change in DER proposed operating characteristics or schedules, such as operating mode and smart inverter settings unsolicited by the utility.
- Typical NON-material modifications (>50kW)
  - A change or replacement of generating equipment such as generator(s), inverter(s), transformers, relaying, controls, etc. that is like-kind substitution in size, ratings, impedances, efficiencies or capabilities of the equipment specified in the original or preceding Interconnection Request as long as the net export does not increase beyond the 2% threshold described above.
  - A change of transformer connection(s) or grounding from that originally proposed.
  - A change reducing the AC output of the generating facility.
  - A change in point of interconnection (POI) to a new location not described under material modifications.
  - A change in ownership of a generating facility.
  - Any necessary change not associated with the project modification or a suggested change requested by the utility.

Effective Grounding/Transient Overvoltage

- NYSEIA Presentation
  - Supplemental Ground Sources provides no benefit for reducing ground fault overvoltage unless island is dominated by line-to-line load
  - Hawaii utility HECO (Hawaiian Electric) Approach
    - Self-certification to endure inverters meet transient overvoltage requirements
    - Inverter manufacturers are required to pass transient test developed by NREL and HECO
  - Technical documentation questioning the use of grounding banks
- IEEE Guide for Application of Neutral Grounding in Electrical Utility Systems - C62.92.6-2017
- NREL Inverter Ground Fault Over-Voltage Testing – 2015
- IEEE – Impact of IEEE 1547 Standard on Smart Inverters (B.1.3.2) – May 2018
  - Recommendation
    - Follow HECO self-certification process for new installations
    - Create utility sub-group to consolidate concerns regarding transient overvoltage documentation mentioned

ESS Relaying and M/C

- Export Hours
  - Several utilizes enforcing requirement to open relays outside 10AM – 7PM window
    - Prevents solar export on long summer days
    - >50% PV production often reached before 10AM
      - Protection or tariff concern
      - Required for all project sizes?
      - What is the impact on the grid in cases of significant ESS penetration?
    - Can JU perform 2 studies so developers can choose export option:
      - 10AM -7PM export
      - 24HR export

- Reverse Power Relaying (AC coupled PV + ESS)
  - Several utilities requiring additional protective relaying to ensure both the ESS and PV are not exceeding stated output. SI notes that there are already existing protective devices which essentially does the same task.
  - Some utilities are requiring reverse power relaying to ensure ESS does not charge from the grid (as per their appendix K operating declaration). SI concerned about additional costs.

- M/C
  - Questions were raised about <500kW M/C requirements and cost impact
  - JU would like to see real-world examples or cases where M/C requirements were impacting projects

Wrap Up

- Appendix K: DPS will take to higher-ups at the department
- Voltage Flicker: Written documentation to be published
- Effective grounding: Scope of work by June
- M/C: Discussion in June