NET ENERGY METERING SENIOR TASK FORCE (NEMSTF) WORKING PAPER
Stakeholder Interest Identification Regarding Net Energy Metering (NEM) Projects
Version 1.0 – 3-27-12

Unique Groups:

Within a context of PJM planning, operations, administered wholesale markets and market settlements

1. Jurisdiction - Consistent with current federal and state statute and regulation:
    a. Clearly define NEM resources versus BTM and QF resources
    b. Clearly define when a NEM injection may be considered a 'wholesale sale'
    c. Clearly define PJM's accountabilities, obligations and/or liabilities, if any, to NEM resources
    d. Identify and clearly define state jurisdiction over NEM interconnection
    e. Identify and clearly define federal jurisdiction over NEM interconnection
    f. Ensure any NEMSTF sponsored definitions are clear and unambiguous yet able to accommodate or flexibly address operational situations
    g. Describe NEM resource treatment when physical re-configuration (i.e. sectionalizing, re-closure) occurs potentially shifting NEM sourced energy among transmission nodes
    h. Understand differences of NEM resource treatment for 'unregulated' states versus 'traditionally' regulated states

2. Business rules
    a. Propose recommended additions, amendments and or deletion of language within PJM's agreements, Manuals or Tariff to address any services provided by NEM resources
    b. Propose recommended additions, amendments and or deletion of language within PJM's agreements, Manuals or Tariff to address any services provided by grid integrated electric vehicles as NEM resources
    c. Propose recommended additions, amendments and or deletion of language within PJM's agreements, Manuals or Tariff to promote consistency across jurisdictions on NEM topic
    d. Establish clear and consistent definitions of NEM-related terms as may be used in PJM's agreements, Manuals or Tariff (Facilitator's note - potential duplicate w/1.a or a "global" interest?)
    e. Propose revisions to existing PJM business processes and or application performance to accommodate longer data acquisition times and shorter processing/publication times (e.g. eMTR and eSchedules).

3. Modeling
    a. Develop modeling approach to recognize NEM resources as a locational, generating source thereby preserving reliance on accurate LMP price signals
    b. Develop modeling approach using PJM zonal bus models to aggregate small NEM excess injections consistent with existing bus voltage levels and business rules
    c. Develop modeling approach that considers pace and timing of NEM resource attachment (i.e. transmission system models are currently updated on a quarterly basis)

d. Address any modeling changes due to distribution management (e.g. switching and sectionalizing circuits with NEM injections)
e. Locationally recognizing wholesale sales when the transmission bus is not acting as a aggregate excess system generation (energy, MWh) (Facilitator's Note – Clarify this interest – unclear)
f. ANEMs, VNEMs, CEFs – Understand circumstances and methods to model these as a "generator"

4. Settlements
    a. Account for MWh of net excess generation within PJM settlement systems.
    b. Ensure ability to preserve the accuracy of settlements within PJM administered wholesale markets
    c. Establish a revenue stream from net excess generation injections for cost recovery purposes.
    d. Consider possible financial recovery of net excesses for NEMs that are not hourly metered. (e.g. end-of-month meter corrections on both a MWh and dollar basis)
    e. Distinguish NEM net excess generation from other elements within unaccounted for energy ("UFE")
    f. Revise eMTR model to accommodate NEMs with net excess generation without hourly metered data
    g. Clarify the phrase "to the grid" to ensure it means PJM-modeled facilities
    h. Ensure any settlements solutions include the potential of "NEM aggregators"
    i. Ensure any settlement solutions include the potential for Aggregate Net Energy Metering (ANEM) concept
    j. Ensure any settlement solutions include the potential for Virtual Net Energy Metering (VNEM) concept
    k. Ensure any settlement solutions include the potential for Community Energy Facility (CEF) concept
    l. Anticipate and evaluate whether additional metering and new measurement processes or technologies may need to be installed to accommodate proposed NEMSTF recommendations
    m. Anticipate and evaluate whether additional enhancements to settlement systems, processes or technologies may need to be installed to accommodate proposed NEMSTF recommendations
    n. Anticipate and evaluate whether new verification processes or technologies may need to be installed to accommodate proposed NEMSTF recommendations
    o. Determine how settlement systems may address multiple LSEs on a single transmission node when net excess generation occurs

5. Aggregation
    a. Global interest for ANEMs, VNEMs, CEFs - Understand permissibility/feasibility of taking title to energy for NEM energy produced subject to statutory laws and regulations.
    b. Address meter aggregation with respect to proximity laws and regulations

c. Address data aggregation by EDCs that are aggregating numerous NEMs at a node or a bus and presenting PJM with a "net aggregated" value
d. Understand the aggregators' participation and rights (e.g. right to take title for NEM energy or capacity rights) Facilitator's note – potential duplicate?

6. Excess Generation
    a. Understand the treatment of net energy generated in excess of load
    b. Understand the treatment of net energy generated in excess of statutory or regulatory cap
    c. Ensure ability to preserve the reliability within PJM operations
    d. Ensure net excess generation data are shared with PJM (Facilitator's note – real-time and hourly)
    e. (Orig Parking Lot) Review Electric Distribution Companies (EDC) treatment of incidental energy injections
        i. California Rule #21 "Inadvertent export" and "Hybrid Units" (BTM + NEM)
        ii. What does PJM desire of or by EDC's
        iii. What do EDC's desire of or by PJM

7. Reliability
    a. Understand real-time implications of solar or other variable generation to PJM reliability and dispatch
    b. Understand data and information requirements for real time operations, including day ahead requirements to ensure reliable operations
    c. (Orig Parking Lot) Identify whether more granular NEM data and information may be required (identify BTM resource information or if annual recertification is needed)

8. Threshold
    a. (Orig Parking Lot) Include a reference to a MW threshold(s) below which PJM procedures would not apply unless and until a potential issue or reliability impact is identified.
    b. Examine similar/differing levels across interconnection, modeling, real-time metering and or revenue metering procedures, manuals or standards.
    c. Review aggregated "threshold" criteria. Review materiality and variability with respect to aggregate totals.
    d. Conclusively establish thresholds and boundaries for level of output relative to the self-generator's usage that the customer becomes an independent power producer subject to all applicable PJM requirements of an IPP and no longer qualifies as a net metering customer.

9. Solution/Recommendation Efficiency
    a. Seek recommendations that avoid the imposition of additional costs and administrative burdens.
    b. (Orig Parking Lot) If there is a rapid proliferation of NEMs, desiring to work directly with the PJM administered markets, it may require revisions of PJM workflows and processes.

c. *(Orig Parking Lot) General concerns to ensure administrative burdens are not increased due to NEM.*
d. *(Orig Parking Lot) NEMSTF may examine precedents established in other North American regions regarding NEM's*

10. Miscellaneous
    a. **Capacity -** understand capacity impacts of/by/for NEMs
    b. **Interconnection -** understanding interconnection impacts of/by/for NEMs
    c. **Interconnection -** *Determine whether studies or which projects require interconnection studies*
    d. Understand impacts of NEM to those parties providing services to transmission dependent utilities.

EXHIBIT – ORIGINAL TEXT AND GROUPING OF STAKEHOLDER INTERESTS

- **Jurisdiction -** Consistent with FERC and State Regulations or laws, clarify or define overarching jurisdictional issues with the FERC staff, i.e., QF versus BTM versus NEM versus when excess generation injected to the grid becomes a wholesale sale under FERC jurisdiction.
  a) Include interest to make clear the associated PJM requirements, accountabilities, obligations, liability(ies)
  b) Note - Nos. 11 , 13 and 15 appear to have commonality of interest – seek to group/refine
- **Jurisdiction -** Identifying and clearly defining state and federal jurisdiction over interconnections and transactions for purposes of inclusion in PJM tariffs, procedures, and business rules. Such definitions should be flexible yet robust enough to accommodate a variety of operational situations. Also, to the extent load is shifted from one transmission node to another as referenced below, determine how the settlement should be handled.
- **Jurisdiction -** understanding how NEMS are handled both jurisdictionally and traditionally through EDC and state;
- **Jurisdiction (Duplicate Interest?) -** What does it mean to be a QF (or not)?

- **Business Rules -** Adaptation of PJM business rules, tariffs and agreements to all of the above.
- **Business Rules -** Battery assets (i.e. electric vehicles) may participate in NEM in DE per legislation (9/2009). Interest to establish PJM rules/tariffs for consistency across jurisdictions on this topic.
- **Business Rules -** Establishing clear and consistent definitions of terms, especially as these terms might be used in PJM tariffs, procedures, and business rules.
- **Performance, Business Rules -** (Orig Parking Lot) Consider data volume risk and run time/processing time impacts to existing PJM applications (14hrs eSchedules, 12 hrs eMTR). May require longer data acquisition times, and shorter processing publication times

- **Modeling -** Accommodation of PJM zonal bus models to aggregate small NEM excess injections
  a) Consistent with bus voltage levels;
  b) Include an interest to understand modeling effects and timing of NEMs (PJM and Member models are currently updated on a quarterly timing)
- **Modeling & Settlements -** If multiple distribution circuits fee from the same node, but only one distribution circuit has a pre-existing delivery point that has triggered FERC jurisdiction, are the other distribution circuits that are feed from that node also considered FERC jurisdictional by virtue of their sharing some common facilities (e.g., transmission to distribution transformer) between the PJM node and where the facilities divide-off into multiple distribution circuits?
  a) Note – investigate. General sense is that the issue is addressed by assets registered with FERC rather than conductivity of adjacent assets establishing nexus.
- **Modeling & Settlements/Jurisdiction -** What is the implication for switching loads among different circuits? Our company is ramping up its Distribution Automation Process. Therefore, we are starting

to migrate functions and swap load among circuits as part of a normal course of business with the goal of optimizing efficiency. This means that, on any given day, load could be swapped among many different circuits. Given the dynamic nature of this load and the possibility that different load and delivery points could be moved to different circuits and even to different PJM nodes, what are the implications to defining a particular circuit as FERC jurisdictional, when the characteristics (load served) of that circuit could change several times a day?

a) New Interest – Understand and recommend suggestions regarding "feeder" metering and or metering algorithms

- **Modeling -** Locationally recognizing wholesale sales when the transmission bus is not acting as a aggregate excess system generation (energy, MWh)

- **Settlement -** Establishment of a revenue stream from net excess generation injections to the electrical system for cost recovery purposes.
- **Settlement -** Accounting for MWhs of net excess generation within PJM settlement systems.
- **Settlement -** Possible financial recovery of net excesses for NEMs that are not hourly metered by have "net excess" for which they are paid per retail tariffs at some measured interval (i.e., monthly, yearly). Our thinking is that there might be some revenue recovery possible through the PJM settlements system (MSRS) in the same manner that end-of-the-month meter corrections are accounted for and allocated on both a MWh and dollar basis (i.e., "net excess" MWhs or KWhs are input at end of month, which could accommodate yearly, with the charges spread across the EDC's LSEs and the credits going to the EDC to partially offset what the EDC is required to pay the NEMs @ retail.
  a) Similar interest added for unaccounted for energy ("UFE")
- **Settlement -** Accommodation of PJM eMTR model to NEMs injecting excess to the grid
  a) Including an interest for the potential of "aggregators"
  b) Include an interest to clarify the phrase "to the grid"
  c) Note – the interest assumes use of eMTR requires hourly metered NEMs
- **Settlement / Aggregation -** Aggregate Net Energy Metering (ANEM) concept and incorporation within wholesale markets as administered by PJM.
  a) Global interest for Nos. 7, 8, 9, for ANEMs, VNEMs, CEFs - Understand permissibility/feasibility of taking title to energy for NEM energy produced subject to statutory laws and regulations.
  b) Global interest for Nos. 7, 8, 9, for ANEMs, VNEMs, CEFs – Understand circumstances and methods to model these as a "generator".
- **Settlement / Aggregation -** Virtual Net Energy Metering (VNEM) concept and incorporation within wholesale markets as administered by PJM. (example - single customer focus)
- **Settlement / Aggregation -** Community Energy Facility (CEF) concept and incorporation within wholesale markets as administered by PJM. (example – multiple customer focus)
- **Metering, Settlements -** Thoroughly evaluating how metering, accounting, billing, settlement and modeling functions may be affected by any proposed needed changes identified by the Task Force. Of particular concern is whether additional metering, enhancements to settlement systems, and

new measurement and verification processes or technologies may need to be installed to accommodate changes to PJM tariffs, procedures, or business rules that may occur as a result of the work of the Task Force.

New interest - Another area of interest is how multiple LSEs on a single Transmission node should be addressed

- **Aggregation -** understanding aggregation:
  a) **Aggregation -** Where aggregation concerns meter aggregation (e.g. a customer with multiple sites/meters to be aggregated) and a NEM source to be allocated to these sites. Understand any laws impacting proximity or service by same EDC (Wawa example),
  b) **Aggregation -** Where aggregation refers to an Aggregator of NEMS customers and participating in PJM administered wholesale markets. Understand the aggregators participation and rights (example regarding right to take title for NEM energy or capacity),
  c) **Aggregation -** Where aggregation refers to the EDCs aggregating numerous NEMs at a node or a bus and presenting PJM with a "net aggregated" value

- **Excess Generation, Reliability, Settlements -** interest for those NEMs with generation in excess of 100% of load. Understand the treatment of energy generated in excess of i) of load and ii) of statutory or regulatory cap/boundary
- **Excess Generation, Reliability, Settlements -** Recognizing that EDCs will be presented with NEM challenges – an NEMSTF interest includes the ability to preserve the reliability, interconnection, accuracy of settlements within PJM operations and administered wholesale markets. An interest to ensure that aggregated NEM injections are shared with PJM
- **Excess Generation, Aggregation -** understanding the effect of aggregating excess system distribution generation above a "threshold" and onto a transmission bus; Determining how to model aggregated excess NEM distribution system generation entering the transmission (example – PJM transmission model is currently updated quarterly)
- **Excess Generation** - (Orig Parking Lot) Review Electric Distribution Companies (EDC) treatment of incidental energy injections
  a) California Rule #21 "Inadvertent export" and "Hybrid Units" (BTM + NEM)
  b) What does PJM desire of or by EDC's
  c) What do EDC's desire of or by PJM

- **Reliability, Intermittent Generation Sources -** understanding real-time implications of solar or other variable generation to PJM reliability/dispatch
- **Reliability, Data Requirements -** Understand data and information requirements for real time operations, including day ahead requirements, as it relates to reliable operations

- ***Reliability, Data Requirements –*** *(Orig Parking Lot) Identification of potential gap in order to accommodate any NEM projects more granular data/information may be required (identify BTM resource information or recertify annually)*

- **Threshold -** (Orig Parking Lot) Suggest that the net metering "parking lot" include a reference to a MW threshold(s) below which PJM procedures would not apply unless and until a potential issue/impact on the grid is identified. (Note - this may require an examination of similar/differing levels across interconnection, modeling, real-time metering and or revenue metering procedures, manuals or standards.
- **Threshold -** (Orig Parking Lot) Review aggregated "threshold" criteria. Review materiality and variability with respect to aggregate totals. (Example: 1MW on a 34kV circuit and, footnote #3 from Jurisdictional decision table - 300kW).
- **Threshold/IPP/Qualified NEM's/Business Rules -** Conclusively establishing at what level of output, relative to the self-generator's usage, the customer becomes an independent power producer, subject to all applicable PJM requirements associated with the status of being an independent power producer, and no longer qualifies as a net metering customer.

- **Solution/Recommendation Efficiency -** Assuring that any recommendations resulting from the work of the Task Force avoid the imposition of additional costs and administrative burdens to the maximum extent practicable.
- **Solution/Recommendation Efficiency -** (Orig Parking Lot) If there is a rapid proliferation of NEM's, desiring to work directly with the PJM administered market, it may require revisions of PJM workflows and processes
- **Solution/Recommendation Efficiency, Interconnection -** (Orig Parking Lot) General concerns to ensure administrative burdens are not increased due to NEM. Determine whether studies or which projects require interconnection studies
- **Solution/Recommendation Efficiency -** (Orig Parking Lot) NEMSTF may examine precedents established in other North American regions regarding NEM's
- **Solution/Recommendation Efficiency (Duplicate Interest?) -** Final STF recommendations must be designed with ample flexibility to accommodate changing NEM standards and regulations

- **Capacity -** understand capacity impacts of/by/for NEMs

- **Interconnection -** understanding interconnection impacts of/by/for NEMs

- **EDC Servicing TDU's -** A party selling energy to distribution cooperatives that resell the energy to the ultimate end-user. As such, the party does not have any NEM projects. However, some of the

distribution cooperatives that purchase energy from that party have NEM projects and for that reason the party is interested in this issue. Our Company plans for and acquires the future energy needs of its member-cooperatives. As NEM projects continue to increase in number, they could affect future energy requirements. Additionally our company will follow the development of net metering policies because they could influence the development of distributed and customer owned generation which would impact planning.