



Energy Storage Integration

Feedback Update

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August 4, 2016

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Discussion Topics

- **Background**
- **Initiative Scope**
- **Updates**
- **Feedback Received**
 - *Storage Use Cases*
 - *Mobile Storage*
 - *Fuel Constrained Bidding*
 - *Runtime Performance (Capacity) Model*
 - *Aggregations*
 - *Fast Response Product*
 - *Over/Under Bid*
- **Questions/Feedback**
- **Next Steps**

Background

- **Since the announcement of the NYS PSC REV initiative, there has been a growing interest in wholesale market participation of storage resources**
- **Currently, the NYISO has several resource classifications that can accommodate participation of storage in the wholesale markets**
 - ***Energy Limited Resource (ELR)***
 - ***Limited Energy Storage Resource (LESR)***
 - ***Demand Side Ancillary Services Program (DSASP)***
 - ***Special Case Resource (SCR)***

Initiative Scope

- **In the short term, the NYISO is evaluating its current programs in which energy storage resources can participate and assessing potential needs for expanding and/or enhancing such existing programs**
- **In the longer term, the NYISO will evaluate storage optimization techniques that will provide additional tools to aid the scheduling of energy storage resources**
- **This initiative is for wholesale grid connected storage resources only (*i.e.*, resources in front of the meter on the transmission system without any load, all other storage resources will be addressed as part of the NYISO's distributed energy resource [DER] program initiative) and the remainder of this presentation addresses such grid connected energy storage resources**

Updates

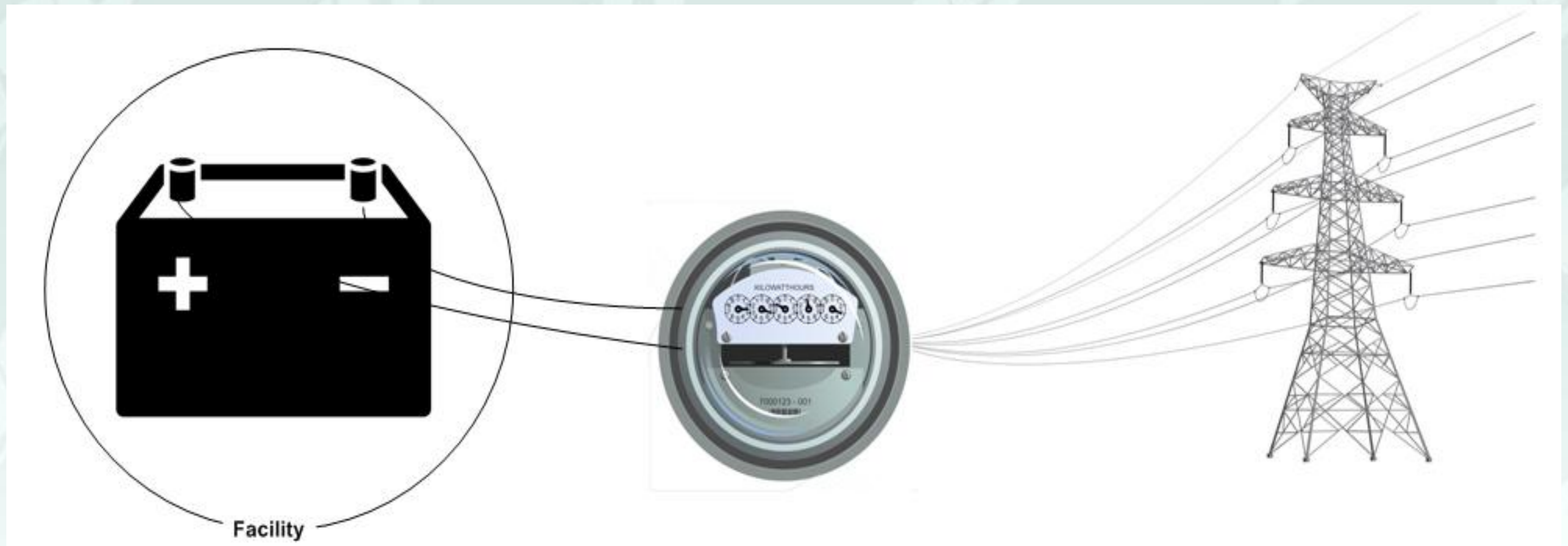
- **State of Charge Management**
 - *There is a proposed project for 2017 to assess making “State of Charge Management” for regulation signal available to more storage resource types than just LESRs*
- **Energy Storage Optimization and Integration**
 - *There is a proposed project for 2017 to continue this project and assess further opportunities to optimize and integrate grid connected energy storage resources in the wholesale market*

Feedback Received on Storage Use Cases

**Potential Models for Grid Connected Energy Storage Resources
(GCSR)**

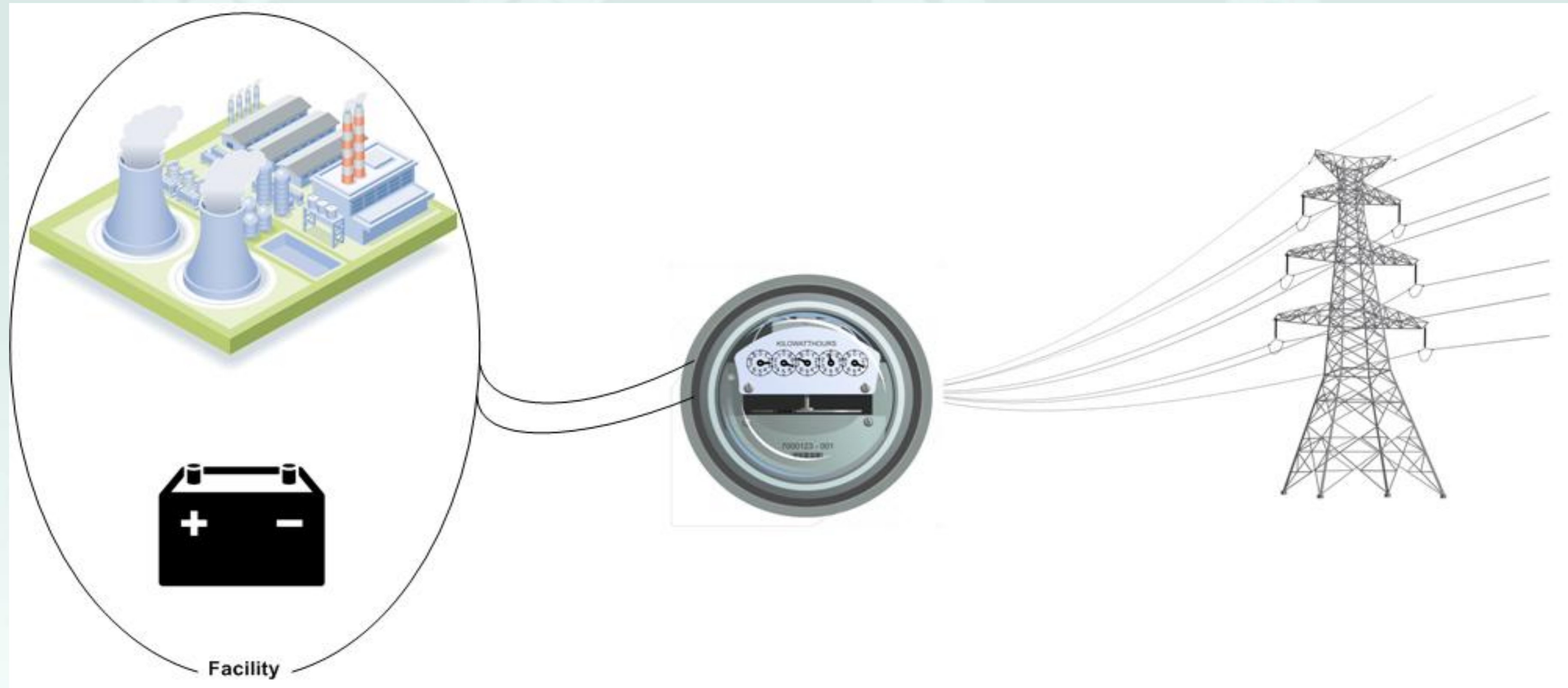
Energy Storage resource only

- *Examples may include: pumped storage hydro, battery, flywheel, and thermal*
 - *Capacity and/or Energy and/or Ancillary Services*



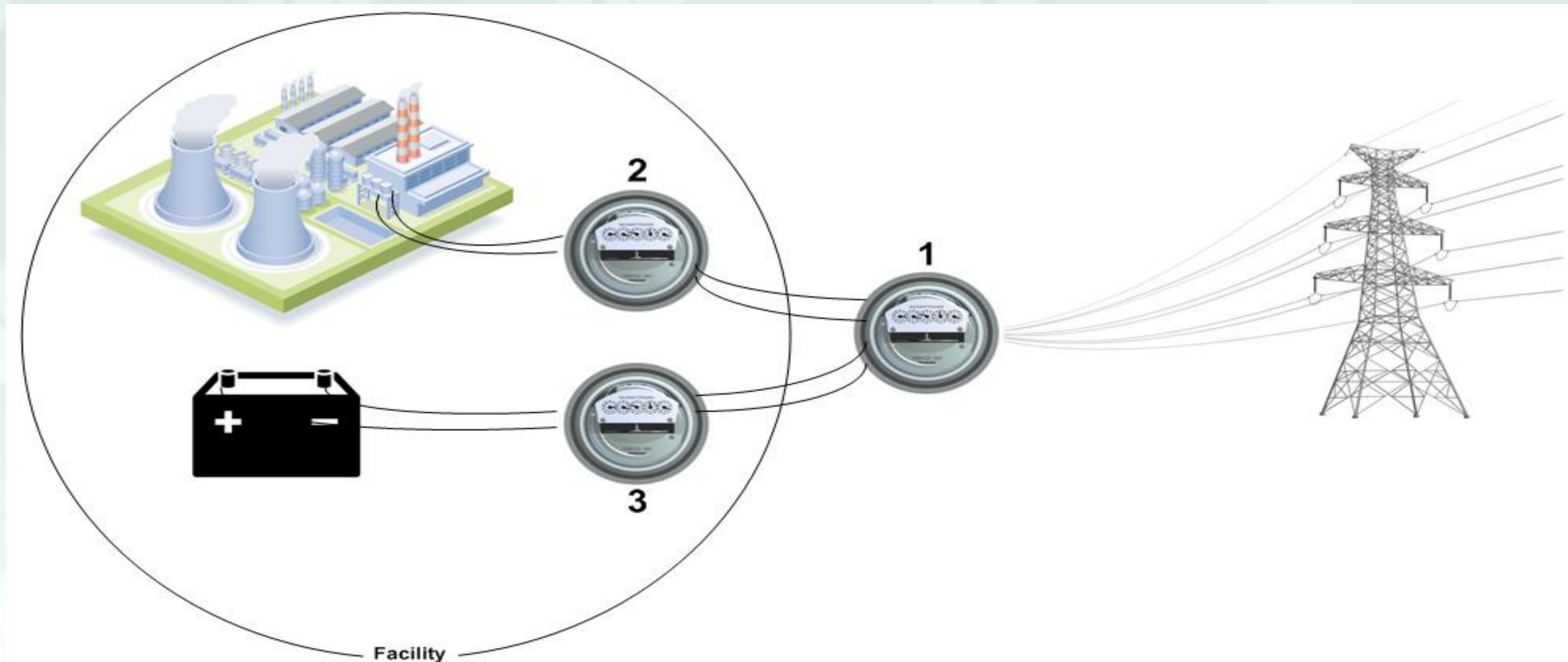
Energy Storage resource plus non-intermittent generation (Single Resource)

- As a single resource (one meter) where storage is used to enhance the capabilities of the Generator
 - *Capacity and/or Energy and/or Ancillary Services*



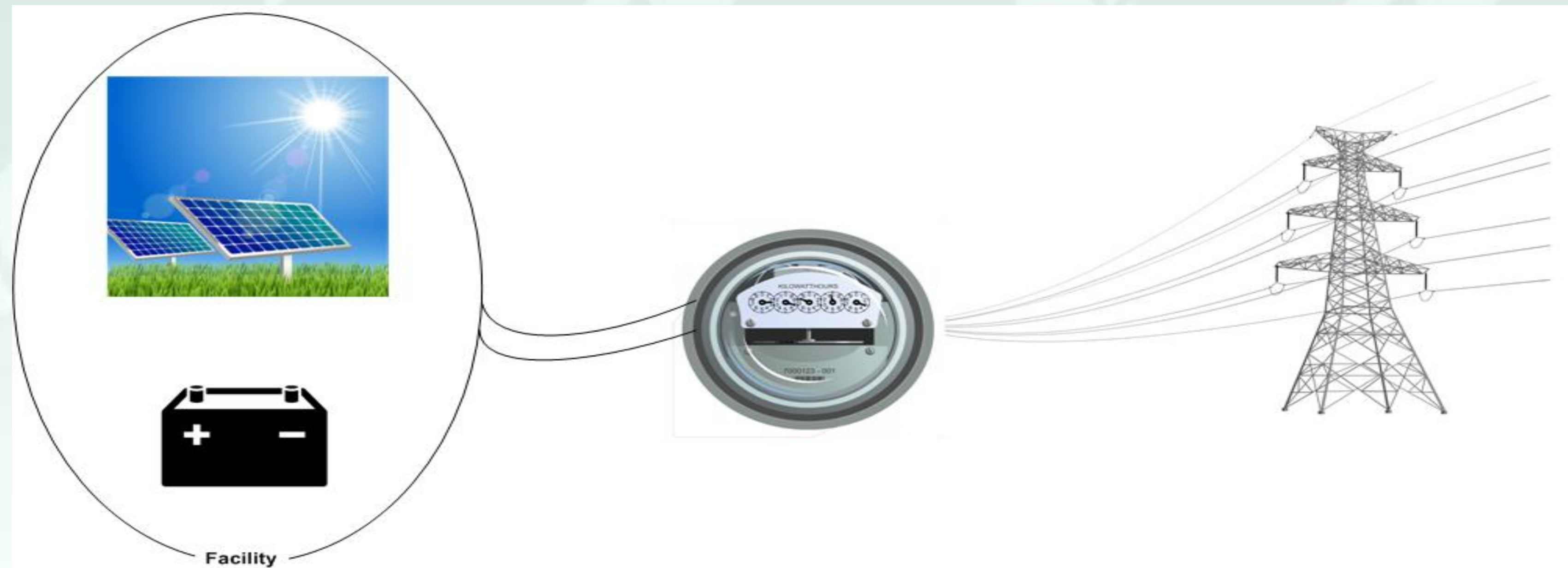
Energy Storage resource plus non-intermittent generation (Multiple Resources)

- As separate resources at the same facility (multiple meters)
 - *Capacity and/or Energy and/or Ancillary Services*



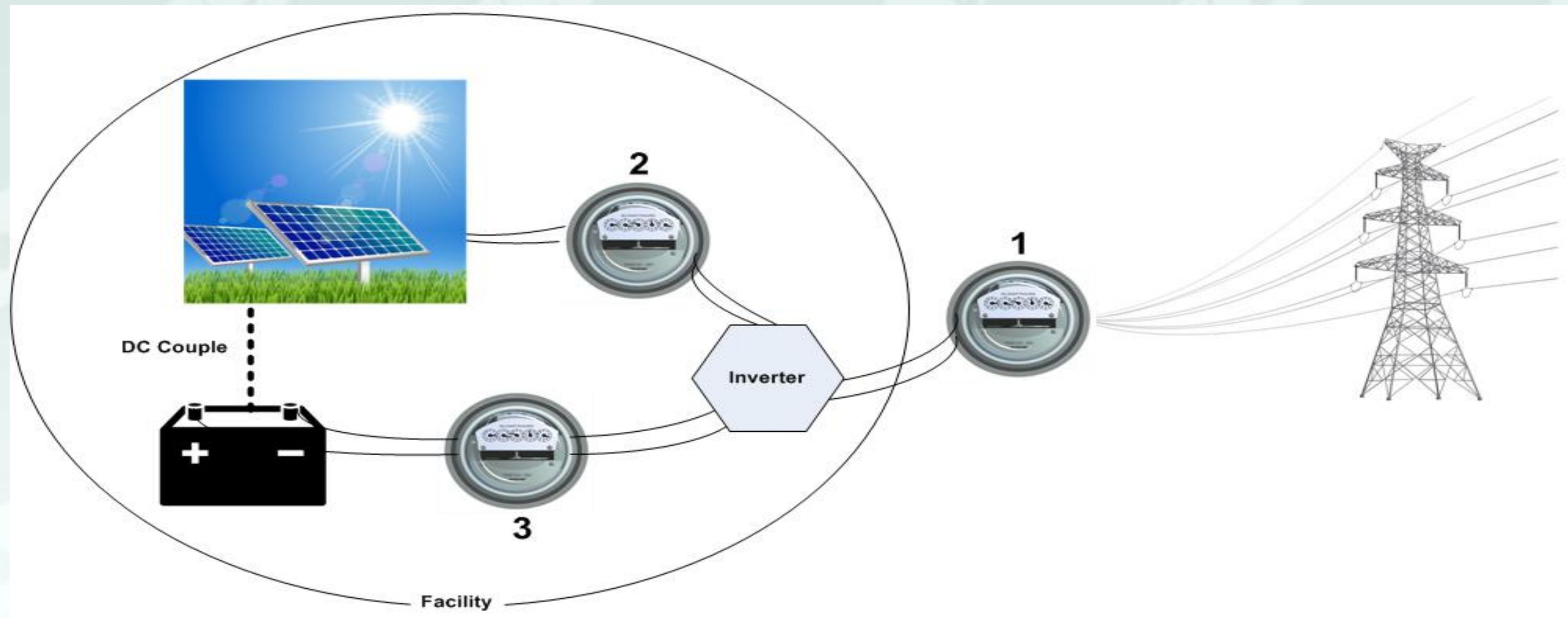
Energy Storage resource plus intermittent generation (Single Resource)

- As a single resource (one meter) where the storage “firms up” the intermittent generation (e.g., solar and/or wind paired with storage)
 - *Capacity and/or Energy and/or Ancillary Services*
 - *Market Participants have expressed an interest in pursuing an option where the combined resource retains, at least in part, the generator’s intermittent status*



Energy Storage resource plus intermittent generation (Multiple Resources)

- As separate resources at the same facility (multiple meters)
 - *Capacity and/or Energy and/or Ancillary Services*
 - *May facilitate DC coupling, while seeking to retain intermittent status for Generator*



Other Feedback Received

- **Mobile Storage**
- **Fuel Constrained Bidding**
- **Runtime Performance (Capacity) Model**
- **Runtime Aggregations**
- **Fast Response Product**
- **Over/Under Bid**

- **Mobile Storage**

- *A concept of mobile storage or long term outage for reasons other than a maintenance outage*
- *Scenarios noted by Market Participants for consideration*
 - *Scenario 1 – Storage moves between points on the transmission grid staying in the wholesale market*
 - *Scenario 2 – Storage moves between transmission and distribution grids but stays in the wholesale market*
 - *Scenario 3 – Storage moves between transmission and distribution grid and enters in and out of wholesale market*

- **Fuel Constrained Bidding**

- *Explore the expansion of the concept to include the optimization of grid connected energy storage resources*

- **Runtime Performance (Capacity) Model**
 - *Allow for more resources to participate in the capacity market by providing pay for performance/capability incentives for “limited runtime” resources*
 - *Consider the creation of multiple minimum runtime duration classifications for ELRs with corresponding payment structures for each classification*
- **Aggregations to allow for more resource participation in the capacity market**
 - *Allow resources with runtime durations less than the minimum requirements for participation in the capacity market to be aggregated to meet the minimum requirements*

- **Fast Response Product**
 - ***Consider and research the need for a “fast response” product to help alleviate intermittent RTD price spikes***
 - *This may be as simple as leveraging current product/service availability and providing bids for a unit reflecting a very fast response rate; or*
 - *Something more complex that involves the creation of a new product/service that exists in between AGC (6 seconds) and RTD (5 minutes)*
- **New bid structure allowing for intra-hour changes in storage resource status based on specified price points (“over/under bid”)**
 - ***Consider a new type of simultaneous bid that allows for generation if price is more than X or charging if price is less than Y***
 - *The bid would also allow for injection (discharging) and withdrawal (charging) inside of an hour*

Next Steps

- **The NYISO is requesting feedback on which items should be evaluated for 2018 and beyond projects**
 - *In addition to feedback provided at today's meeting, please provide any additional feedback by no later than August 19, 2016*
- **August – September 2016**
 - *NYISO will develop an initial proposal based on the feedback received*
 - *NYISO is evaluating which suggestions fit into current scopes of 2017 projects*
 - *Currently targeting to present an initial proposal at MIWG by the end of September 2016*

Questions/Feedback

Please contact

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The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefit to consumers by:

- *Maintaining and enhancing regional reliability*
- *Operating open, fair and competitive wholesale electricity markets*
- *Planning the power system for the future*
- *Providing factual information to policy makers, stakeholders and investors in the power system*

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