Utility Metering and Billing Capabilities for DER Market Participation

- Background: The Joint Utilities have been working with DPS, NYISO and other stakeholders on options for DER to directly participate in NYISO markets
  - Provides for better market outcomes and ability to capture ancillary service revenues
- FERC 2222 includes DER use cases which are not compatible with existing utility metering and billing systems.
- This presentation outlines the current and near term capabilities and suggests a potential staged implementation.

JU Metering and Billing Capabilities and Potential Day 1 Functionality

OPTION 1 can be accommodated Day 1: Dedicated service line for DER in a parallel metering configuration.

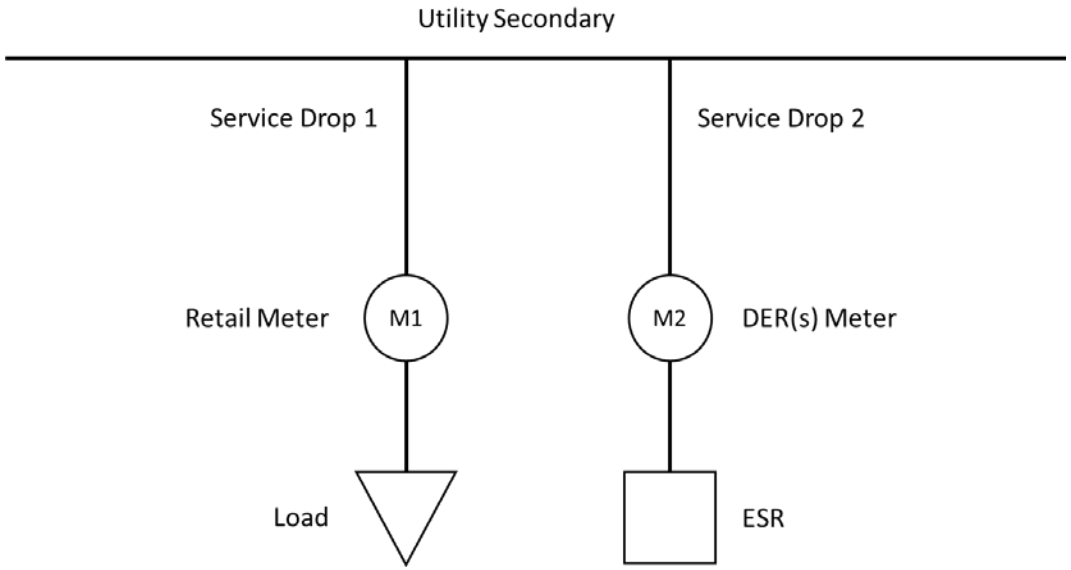
OPTION 2 can be accommodated Day 1: Only net exports are recognized and addressed, similar to VDER.

OPTION 3 is full implementation, a future state: Would require utility billing systems to apply different billing determinants to supply and delivery charges; potential future state.

OPTION 3(a) modifies Option 3 to accommodate some near-term functionality: the JU propose an accounting workaround (that would require a NYISO tariff change) based on a similar concept the NYISO already uses for ESR Energy withdrawals.

Day 1 Option 1: Dedicated Service Drops

Second Service Drop



This configuration may impose costs on the customer.

Day 1 Option 2:

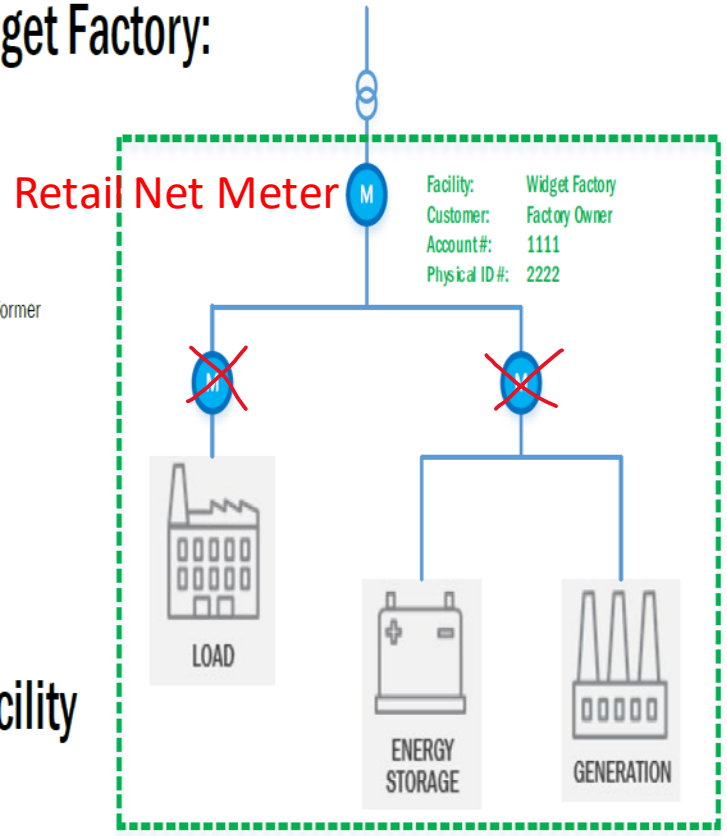
Only Recognize the Net Exports into the Grid

*Does not fully comply with FERC 2222 because it doesn't report to the NYISO generation self-consumed by customer; does enable some DER participation without imposing additional costs.

Anything self-consumed by the customer (as in VDER) offsets retail charges and not compensated by the NYISO.

Single DER Facility

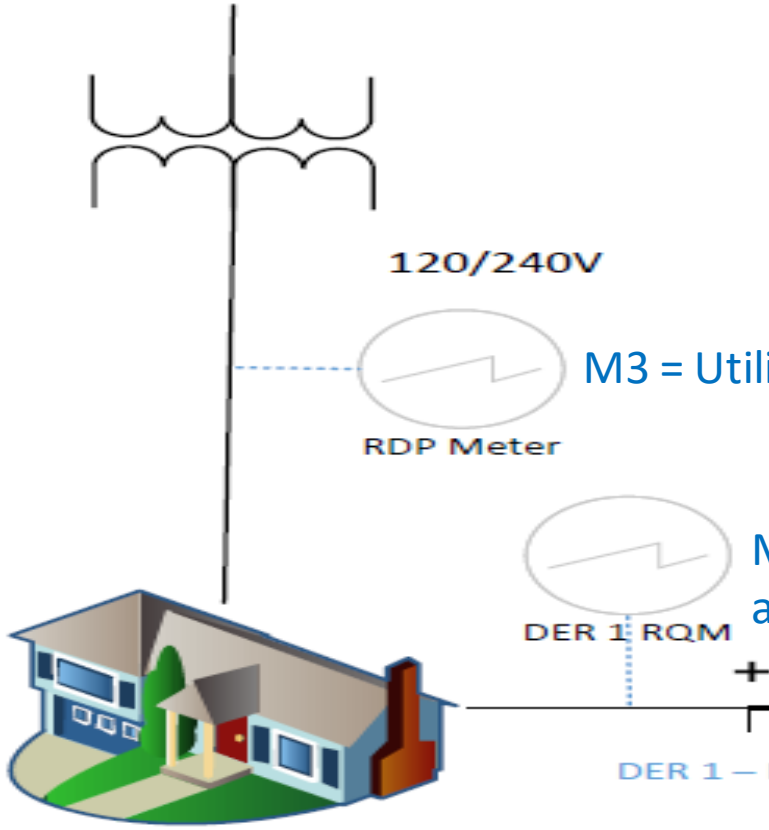
- **Facility overview – Widget Factory:**
  - One customer: Widget Factory Owner
  - Offering:
    - Injection/withdrawal with battery
    - Injection with generator
    - Curtailment with load
  - Metering Points:
    - Net Meter on low side of Step Up Transformer
- **Pertinent IDs:**
  - Account #: 1111
  - Physical ID #: 2222
- **The configuration participates as one Facility**
  - One Customer, one facility



Option 3 Sub-metering (not Day 1)

Requires Billing and Settlement Systems to handle Sub-metering

Customer Mina Miller signs up w/ an Aggregator and installs an ESR in a sub-metering configuration



M3 = Utility Net Meter (this is what utility Billing Systems use)

M1 = Utility must get this reading and then do a Reconstitution, i.e., a True-Up, and report the reconstituted M-Loads for Mina's LSE as reported to the NYISO

OPTION 3 background principle

Utility bill contains 2 basic charges – supply and delivery based on the same kWh billing determinants

- Mina Miller pays the LSE for the actual commodity - this is the **RETAIL SUPPLY CHARGE**. The supply rate is 9.033 cents/kWh in this example for energy, capacity and ancillary services. Mina Miller's consumption was 273 kWh for the month of November 2020. The 273 kWh is the supply billing determinant.
- The Utility charges Mina for delivery of electricity, which pays for the service of wires carrying the electrons – **UTILITY DELIVERY CHARGE**. The delivery rate in this example is 12.5604 cents. Mina Miller had 273 kWh delivered in month of November 2020. The 273 kWh is the delivery billing determinant.
- Option 3 would require a different billing determinant for supply based on the DER's transactions with the NYISO, which cannot be readily implemented by the utilities and would impact LSEs / customer contracts.

Name: MINA MILLER Account number: 99-9999-9999-9999-9 Page 2 of 2

Your electricity breakdown *Rate: EL1 Residential or Religious*

Electric Meter Detail - billing period from Nov 04, 2020 to Dec 08, 2020 (34 days)

Meter #	New Reading	Reading Type	Date	Prior Reading	Reading Type	Date	Reading Diff	Total Usage
008942589	10641	Actual	Dec 08, 20	10368	Actual	Nov 04, 20	273	273 kWh

Your Supply Charges

Supply **273** kWh @9.0330¢/kWh	$24.66
Merchant function charge	$1.03
GRT & other tax surcharges	$0.62
Total supply charges	**$26.31**

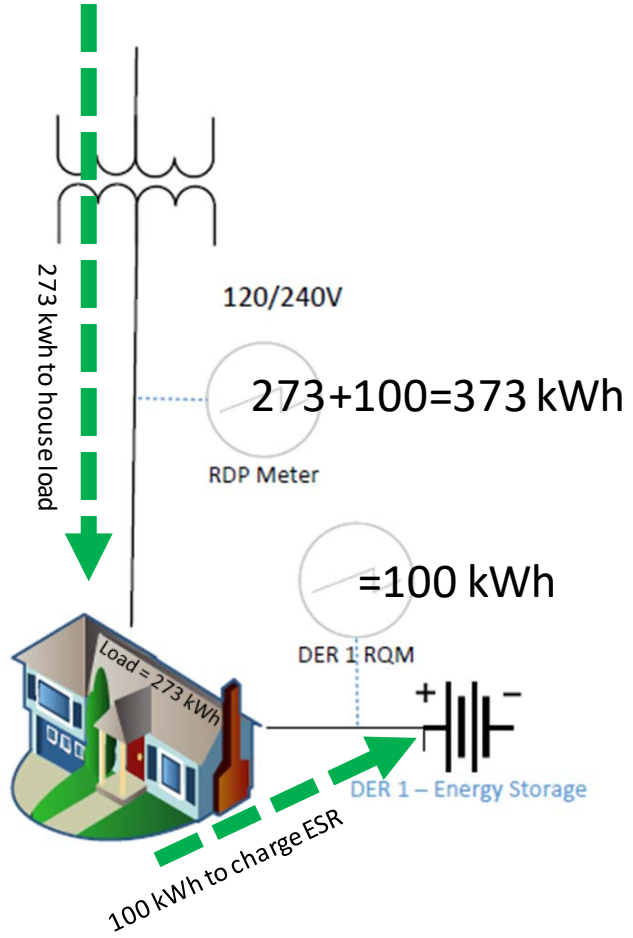
Your total electricity supply cost for this bill is 9.6¢ per kWh. You can compare this price with those offered by energy services companies (ESCOs). For a list of ESCOs, visit PowerYourWay.com or call 1-800-780-2884.

Your Delivery Charges

Basic service charge	$18.77
Delivery 273 kWh @12.5604¢/kWh	$34.29
System Benefit Charge @0.5018¢/kWh	$1.37
GRT & other tax surcharges	$2.75
Total delivery charges	**$57.18**
Sales tax @4.5000%	$3.76
Total sales tax	**$3.76**
Your electricity total	**$87.25**

Option 3(a) is a modified version that can happen sooner

NYISO tariff remedy for the charging scenario imbalance

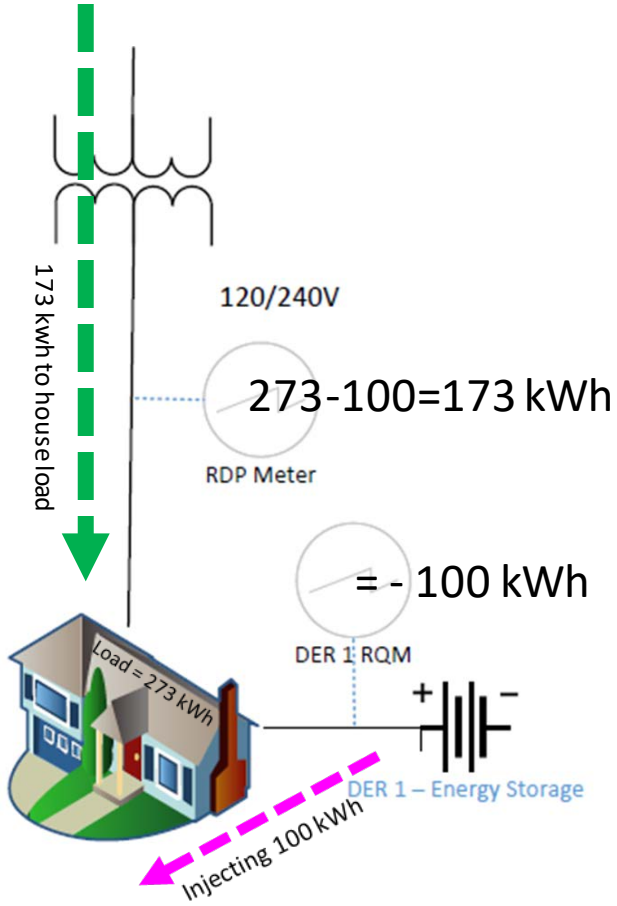


Asset Accounts:

NYISO	LSE	Mina & her Aggregator	
+ 273	- 273		LSE pays NYISO for 273 of supply
	+ 373	- 373	LSE bills Mina for 373
+ 100		- 100	NYISO bills Mina for 100
+ 373	+ 100	- 473	out of balance - Team Mina has paid for 100 kWh TWICE
	- 100	+ 100	**Per NYISO M.S.T. 7.2.8**
= + 373	= 0	= - 373	Now everything balances. 373 kWh sold and bought

*Footnote: this slide shows a simplified version of complex transactions (e.g., it shows LSE paying NYISO for 273 of reconstituted M-Load as the 1st transaction) and only shows transaction values in terms of total kWh compensation; NYISO's MST 7.2.8 addresses total volume but negates the ESR / DER's purchase or sale of energy from NYISO's 5-minute RT LBMP.

For Option 3(a)
JU recommend NYISO adopt a reciprocal remedy for injections



Asset Accounts:

NYISO	LSE	Mina & her Aggregator	
+ 273	- 273		LSE pays NYISO for 273 of supply
	+ 173	- 173	LSE bills Mina for only 173
- 100		+ 100	NYISO pays Mina for 100 @ LBMP
+ 173	- 100	- 73	out of balance - Team Mina received payment TWICE for 100 kWh
	+ 100	- 100	**Per NYISO M.S.T. 7.2.??????**
= + 173	= 0	= - 173	Now everything balances. 173 kWh sold and bought