Energy Storage and Distributed Energy Resource ("ESDER") Initiative

Demand Response Baselines Working Group

August 27, 2015

ESDER Stakeholder process schedule

Step	Date	Event
Revised Straw Proposal	September 17	Post revised straw proposal
	September 29	Stakeholder web conference
	October 9	Stakeholder comments due
Draft Final Proposal	November 5	Post draft final proposal
	November 12	Stakeholder web conference
	November 20	Stakeholder comments due
Board approval	December 17-18	ISO Board meeting

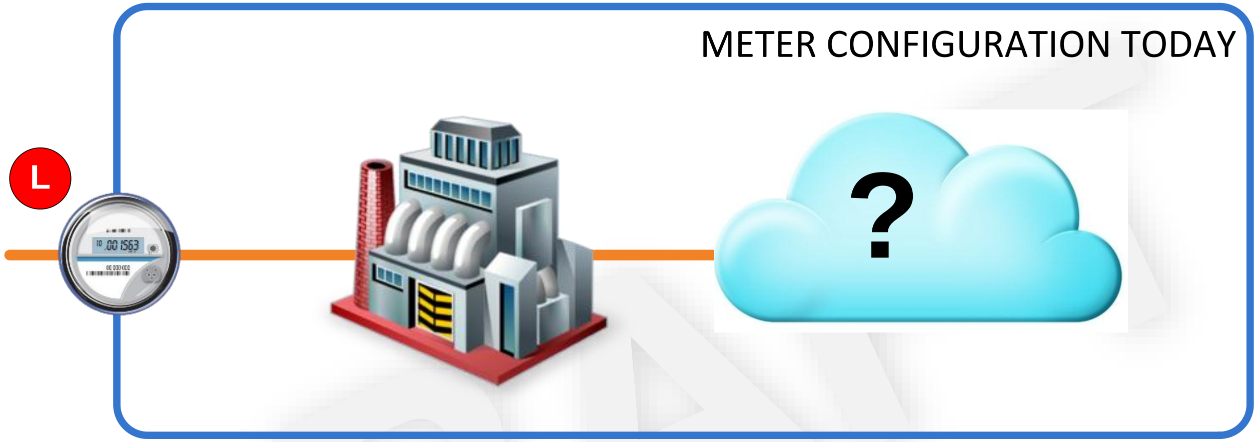
Today's Objective

CAISO is seeking Working Group feedback on proposals for:

- Metering Generator Output ("MGO")
- Type-II Baselines (Statistical Sampling)

Metering Generator Output ("MGO")

Current Landscape



Meter Generator Output

MGO is “a performance evaluation methodology, used when a generation asset is located behind the Demand Resource’s revenue meter, in which the Demand Reduction Value is based on the output of the generation asset”.

– NAESB Business Practices for Wholesale Demand Response

The performance of the PDR resource is therefore the unaltered meter value on the generator during the demand response call and may be implemented mathematically as Baseline = 0.

Performance Evaluation Method vs. Baseline

- There are five Performance Evaluation Methods defined by NAESB members:
  1. Maximum Base Load (MBL)
  2. Meter Before / Meter After (MB/MA)
  3. Baseline Type-I
  4. Baseline Type-II
  5. Metering Generator Output (MGO)
- All are Performance Evaluation Models.
- Only Baseline Type-I and Baseline Type-II have "Baselines"

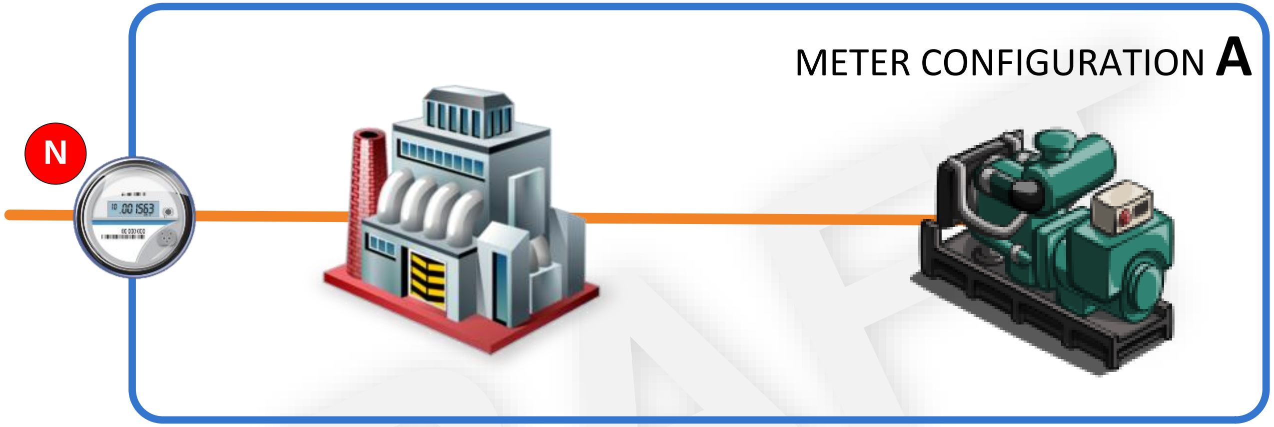
PDR Rule Refresher

1. A single meter cannot be shared between two PDRs

2. Each PDR Registration has (or can have) its own performance evaluation method

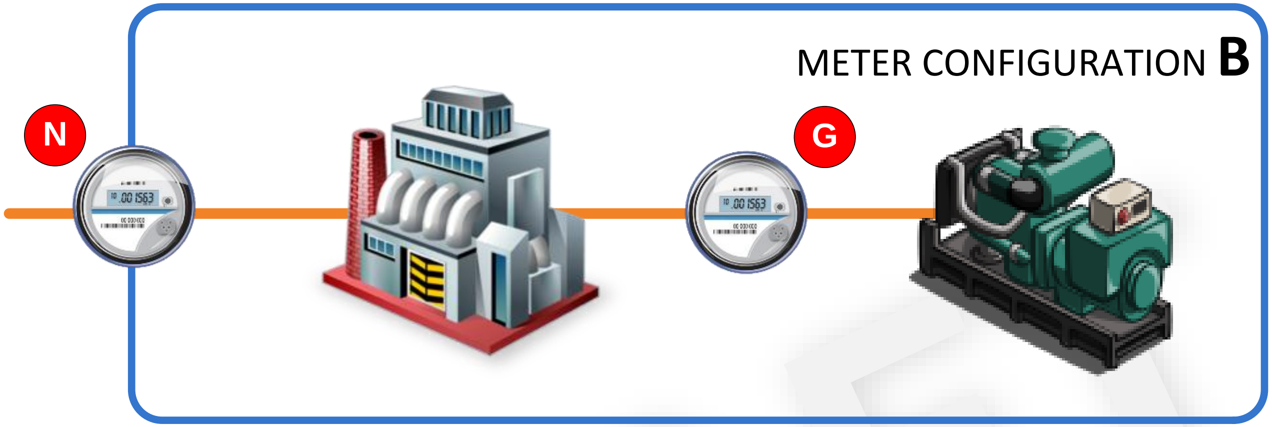
3. A PDR cannot “export” energy to the grid

Meter Configuration A



- A PDR may opt to keep the status-quo and continue with this configuration, however, the baseline will be less accurate than other methods.

Meter Configuration B



- In this scenario, the PDR would be a single Resource with two attached Registrations/Locations
- Load Registration = standard Performance Evaluation Method (using N-G as a "virtual" meter)
- Generation Registration = MGO method (using G as a physical meter).
- For example, if N = 8 MWh and G = -2 MWH, the virtual load meter L = N-G = 8 – (-2) MWh = 10 MWh. *Assuming a sign convention where Load = +, Generation = -*

Configuration B Options

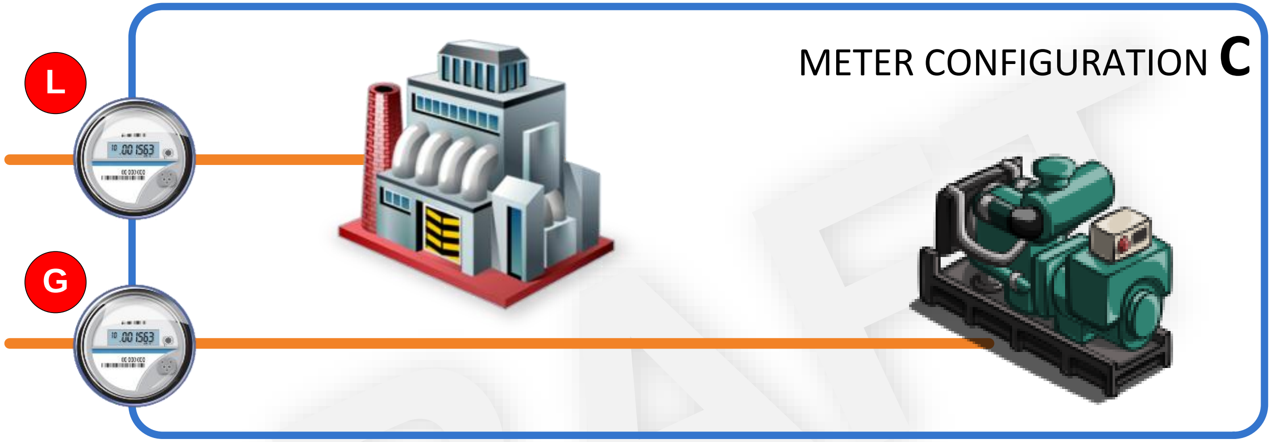
- The PDR also may decide which reduction methods (i.e., use cases) are entered into the Market:
  - Load Reduction Only
  - Generation Offset Only
  - Net Facility (both Load Reduction and Generation Offset at the same time)

- In all cases: There must be a single PDR associated to a single Demand Response Provider (DRP)

Summary (A & B)

	Meter Configuration A	Meter Configuration **B**		
		Net Facility	**Load Only**	**Gen Only**
Demand Response Providers	Single DRP	Single DRP	Single DRP	Single DRP
Resources	Single PDR	Single PDR	Single PDR	Single PDR
Registrations	Net Facility	1) Load 2) Generation	Load	Generation
Locations (SANs)	Net Facility	1) Load 2) Generation	Load	Generation
Performance Evaluation Model	Baseline (N)	Baseline (N-G) + MGO (G)	Baseline (N-G)	MGO (G)
Export Check	All Intervals N ≥ 0	All Intervals N ≥ 0	All Intervals N ≥ 0	All Intervals N ≥ 0

Meter Configuration C



- Mathematically identical to Meter Configuration B (N-G replaced L)
- Required if separate participants are independently managing the load and generation
- If load and gen not combined in the same PDR, the generation source alone cannot be considered a PDR; it must be considered a Non-Generator Resource (NGR) or a Participating Generator (PG)

Summary (Configuration C)

	Meter Configuration **C**	
	Load Only	**Gen Only**
Demand Response Providers	Single DRP ***MAY BE DIFFERENT FROM GEN OWNER***	Must Register For Non-Generator resource (NGR) or Participating Generator (PG)
Resources	Single PDR	
Registrations	Load	
Locations (SANs)	Load	
Performance Evaluation Model	Type-I Baseline (L)	

Other issues/questions

- "Frequent" Generation
  - The NAESB business practices for wholesale demand response were written for "infrequent loads", such as a backup generator; a good "rule-of-thumb" is generation subject to RICE-NESHAP* rules.
  - Distributed generation and storage solutions may be modeled in the same fashion, however issues will arise especially related to determining baselines for associated loads.
- Should information about performance in interval(s) prior to being dispatched be available to ascertain when no net benefit to the grid occurred?
  - Current CAISO proposal requires meter data only for the hours the resource received an award in the market.
  - Wholesale vs Retail policy on multi-use.

** "The National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines ("RICE NESHAP") limits emissions of toxic air pollutants from stationary reciprocating internal combustion engines…The RICE NESHAP applies to stationary reciprocating internal combustion engines. Stationary engines are commonly used to generate electricity and to power pumps and compressors, and also in emergencies to produce electricity and pump water for flood and fire control. All sizes of stationary engines are covered by the rule."*

--http://www.epa.gov/ttn/atw/icengines/docs/EPARegionalRICEcontacts.pdf

Type-II Baselines
(Statistical Sampling)

ISO Tariff Section 10.1.7

Provision of Statistically Derived Meter Data

"… in cases where interval metering is not available for the entire population of underlying service accounts for the Reliability Demand Response Resource or Proxy Demand Resource."

CAISO plans to clarify the definition of interval data in the proposal to mean at least 15 minute interval data.

Virtual Metering

$$m_{VIRTUAL} = \frac{N}{n} \cdot \sum_{i=1}^{n} m_i$$

where: $N = Total\ Number\ of\ Locations\ Participating$

$n = Number\ of\ Metered\ Locations$

$m_i = SQMD\ for\ Location\ i$

$n \in N\ (Metered\ Locations\ are\ a\ subset\ of\ Locations\ Participating)$

Finite Populations

$$n' = \left(\frac{z}{e_{REL}}\right)^2 \cdot \left(\frac{1-p}{p}\right)$$

Where:

$e_{REL} = Relative\ Precision\ Level$

$z = Value\ based\ on\ Level\ Of\ Confidence$

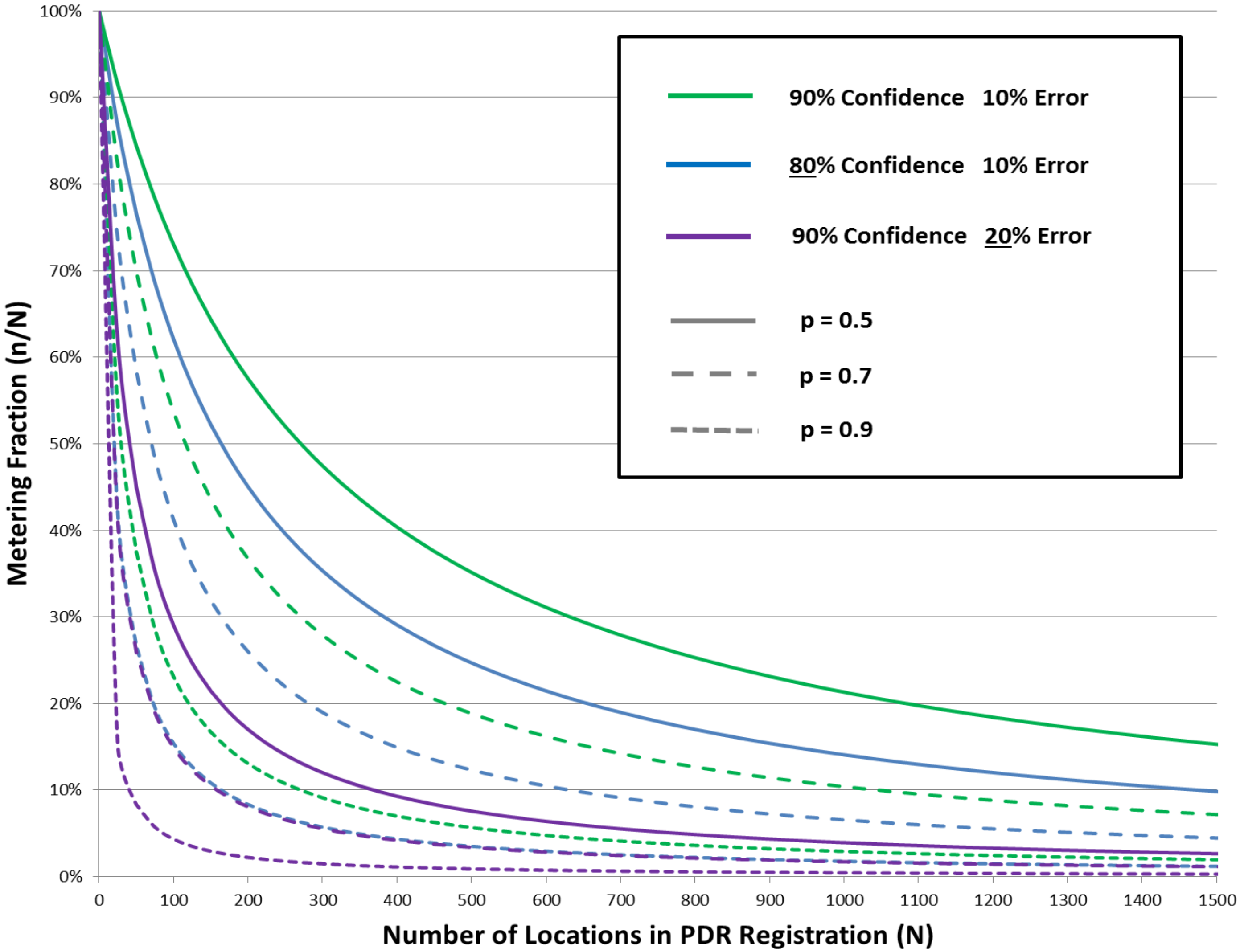
$p = True\ Population\ Proportion$

$$\frac{n}{N} = \frac{n'}{N + n'}$$

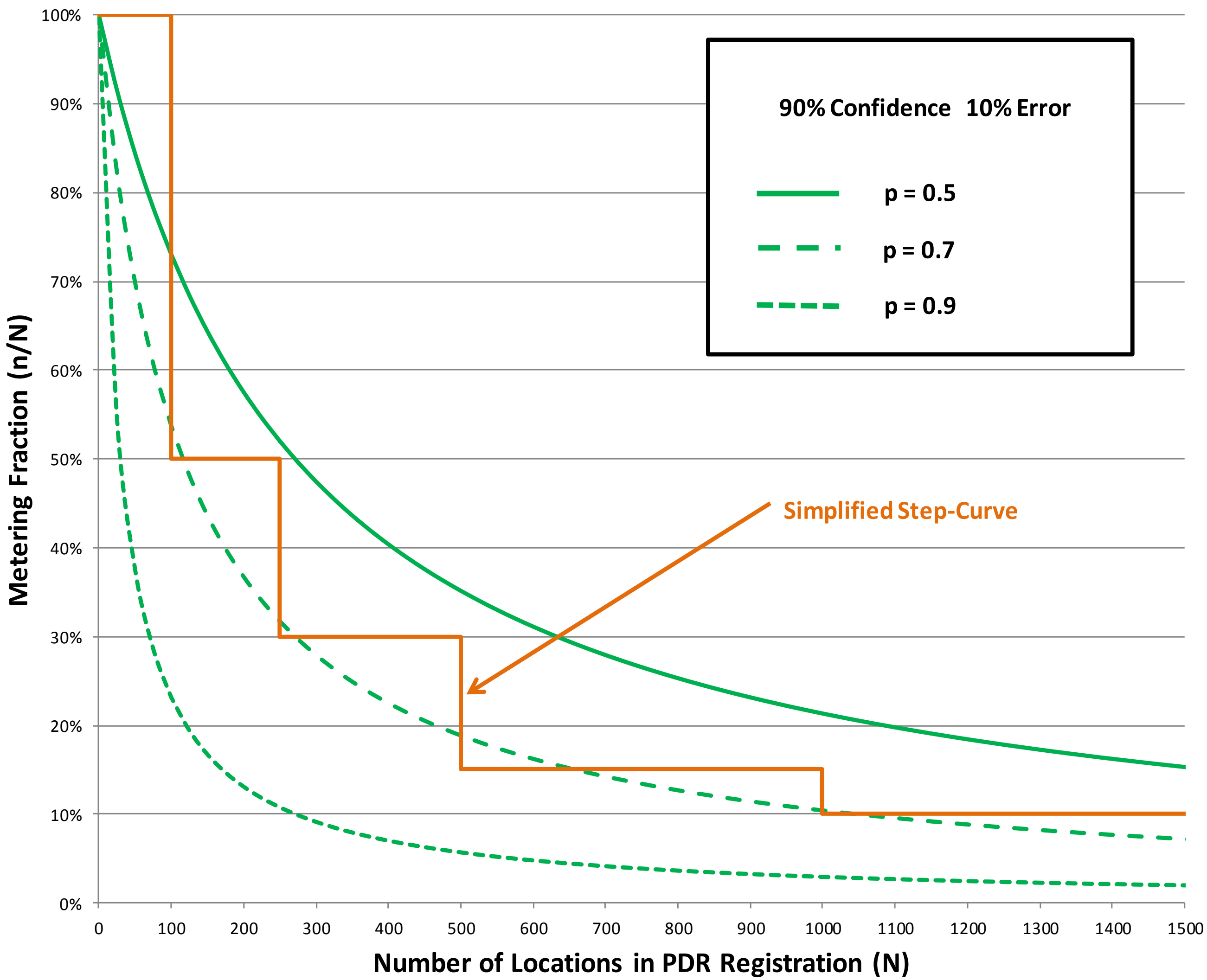
Typical Values

	Relative Precision Level	Level Of Confidence
PJM	10%	90% (z=1.645)
ISO New England	10%	80% (z=1.282)
NYISO	10%	90% (z=1.282)

Meter Fraction Ratios



CAISO Proposal: 90% Confidence 10% Error with simplified step curve



"Simple Fraction"

PDR Locations	Minimum Sample Fraction
1 - 100	100%
101 - 250	50%
251 - 500	30%
501 - 1000	15%
> 1000	10%

Next Steps

- Submit comments to initiativecomments@caiso.com by close of business September 3, 2015