



Distributed Energy Resource Aggregations

James Pigeon

*Senior Market Design Specialist
New York Independent System Operator*

MIWG

*February 28, 2017
Krey Corporate Center – Rensselaer, NY*

Purpose of Today's Meeting

- ◆ **Begin reviewing the details of aggregations which is the first of the DER Roadmap concepts**
- ◆ **Review aggregation examples**

Roadmap Concepts

- ◆ NYISO will review each of the concepts listed below in upcoming presentations
 - *Final concept proposals will be presented to stakeholders as such*
- ◆ Once these concepts have been finalized the NYISO will present a complete dispatchable DER proposal that encompasses all of the concepts
 - *Aggregations*
 - *Measurement and Verification*
 - *Operational Requirements and Resource Obligations*
 - Real-Time
 - Day-Ahead
 - *Eligibility Criteria and Performance Obligations*
 - *Simultaneous participation in wholesale markets and retail programs*

DER

- ◆ **DER is a resource or set of resources -- *typically located on an end-use customer's premises and operated for the purpose of supplying customer electric load* -- that seeks to provide NYISO wholesale market services**
- ◆ **Similar to Behind-the-Meter Net Generation Resources, the NYISO will consider DER to be dispatch-only because they are expected to be already serving a load**

Aggregations

- ◆ A DER aggregator will be called the DER Coordinator Entity (DCE)
- ◆ All DCE Aggregations (DCEA) will be at the Transmission Node Level
- ◆ DCEAs must be a minimum of 0.1MW and can be sized in increments of 0.1MW
- ◆ DCEAs can be:
 - *One or more DER*
 - *Homogeneous or heterogeneous*
 - The NYISO is evaluating options for aggregations of Intermittent Power Resources
 - The NYISO remains technology neutral

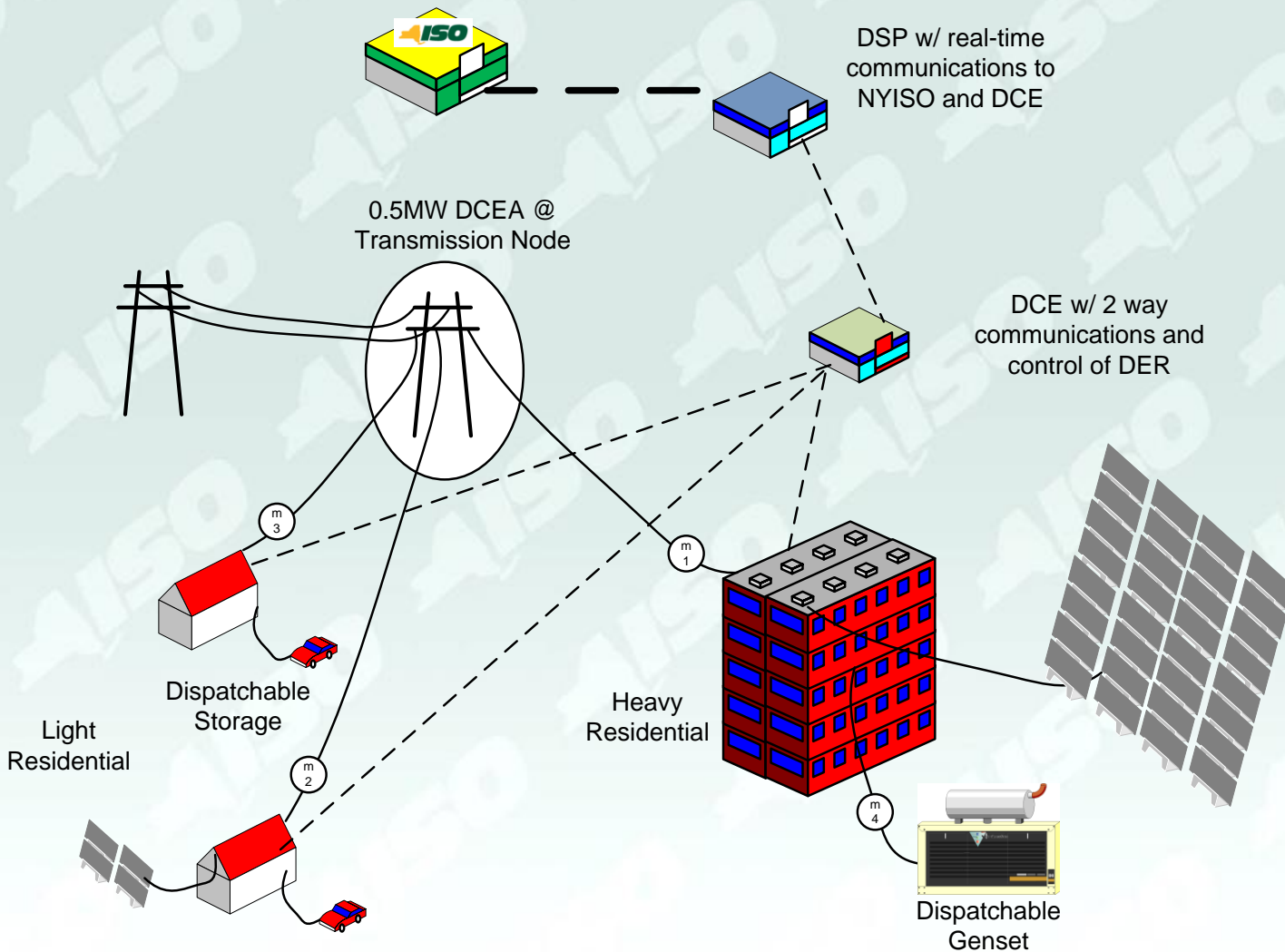
Small DCEAs

- ◆ **To accommodate smaller DCEAs, NYISO will aggregate DCEAs less than 1 MW in size into a “super aggregation” (SA) for scheduling purposes**
- ◆ **DCEAs less than 1 MW can offer only energy and capacity**
 - ***Ineligible to offer Operating Reserves or Regulation Service***
 - **For scheduling Operating Reserves or Regulation, SCED trades-off between that portion of a resource which provides energy versus Operating Reserves or Regulation**
 - **Since NYISO will “super-aggregate” DCEAs less than 1 MW with other DCEAs and create a super aggregated bid stack, this trade-off is challenging when disaggregating schedules to individual DCEA**

Large DCEAs

- ◆ **DCEAs greater than or equal to 1 MW in size can offer energy, ancillary services and capacity**
 - *If a DCEA is 1MW or larger in size, qualifies, and elects to offer ancillary services, it will be modeled as a single resource*
 - *If a DCEA is 1MW or larger in size and does not qualify or elect to offer ancillary services, it will be aggregated with other DCEAs into the SA*

Example 1 – 0.5MW DCEA

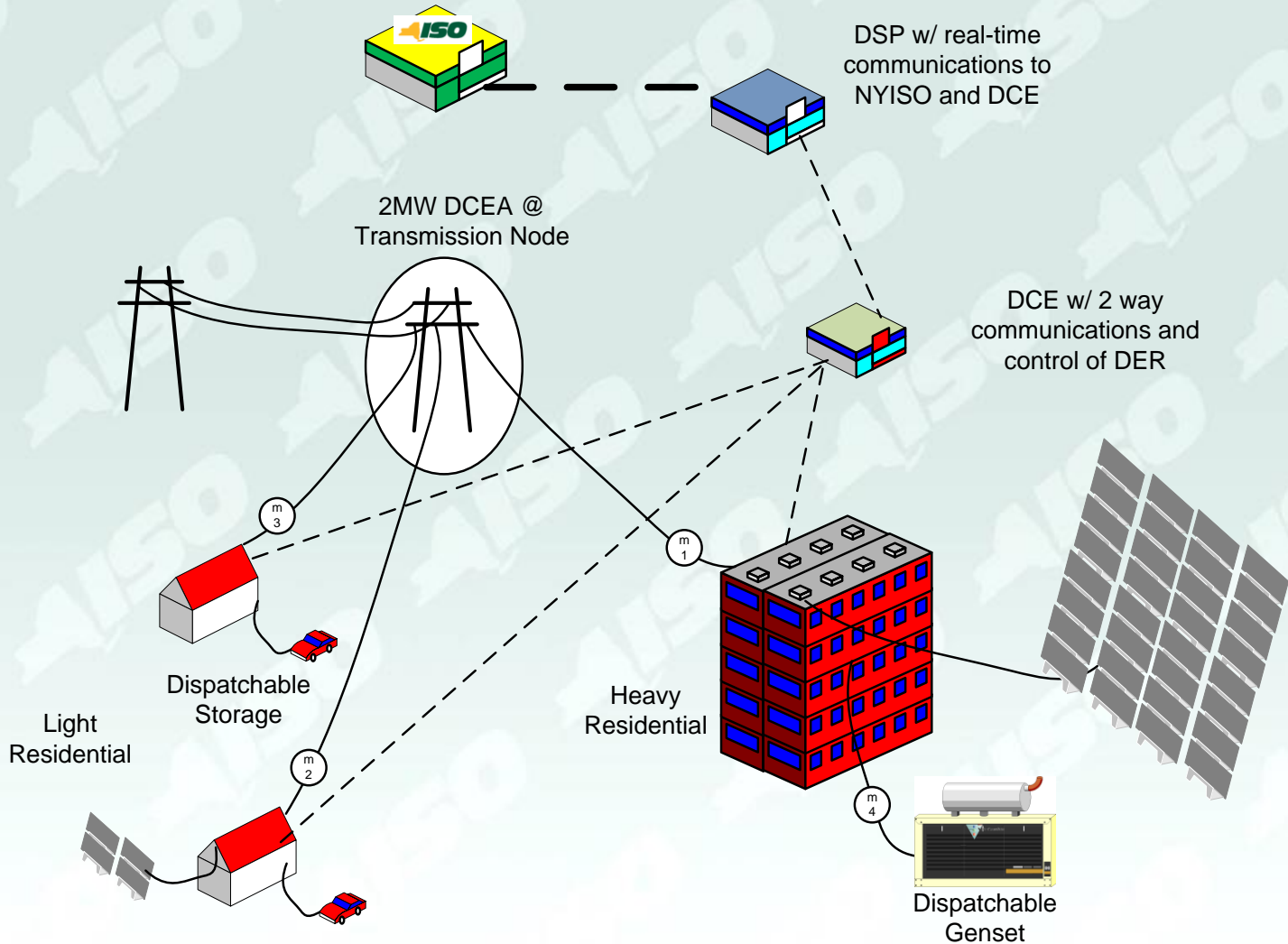


Example 1 (cont.)

DCEA:

- ◆ Can only offer energy in 0.1MW increments up to UOL of 0.5MW
- ◆ Will be dispatched (no RTC commitment) for energy only
- ◆ DAM offer for every hour of the day
 - *0-0.3MW @ \$25*
 - *>0.3-0.5MW @ \$45*
- ◆ Receives a DAM schedule for:
 - *HB18 – 0.5MW @ \$50*
 - *HB19 – 0.3MW @ \$25 (setting price @ node)*

Example 2 – 2MW DCEA



Example 2 (cont.)

DCEA:

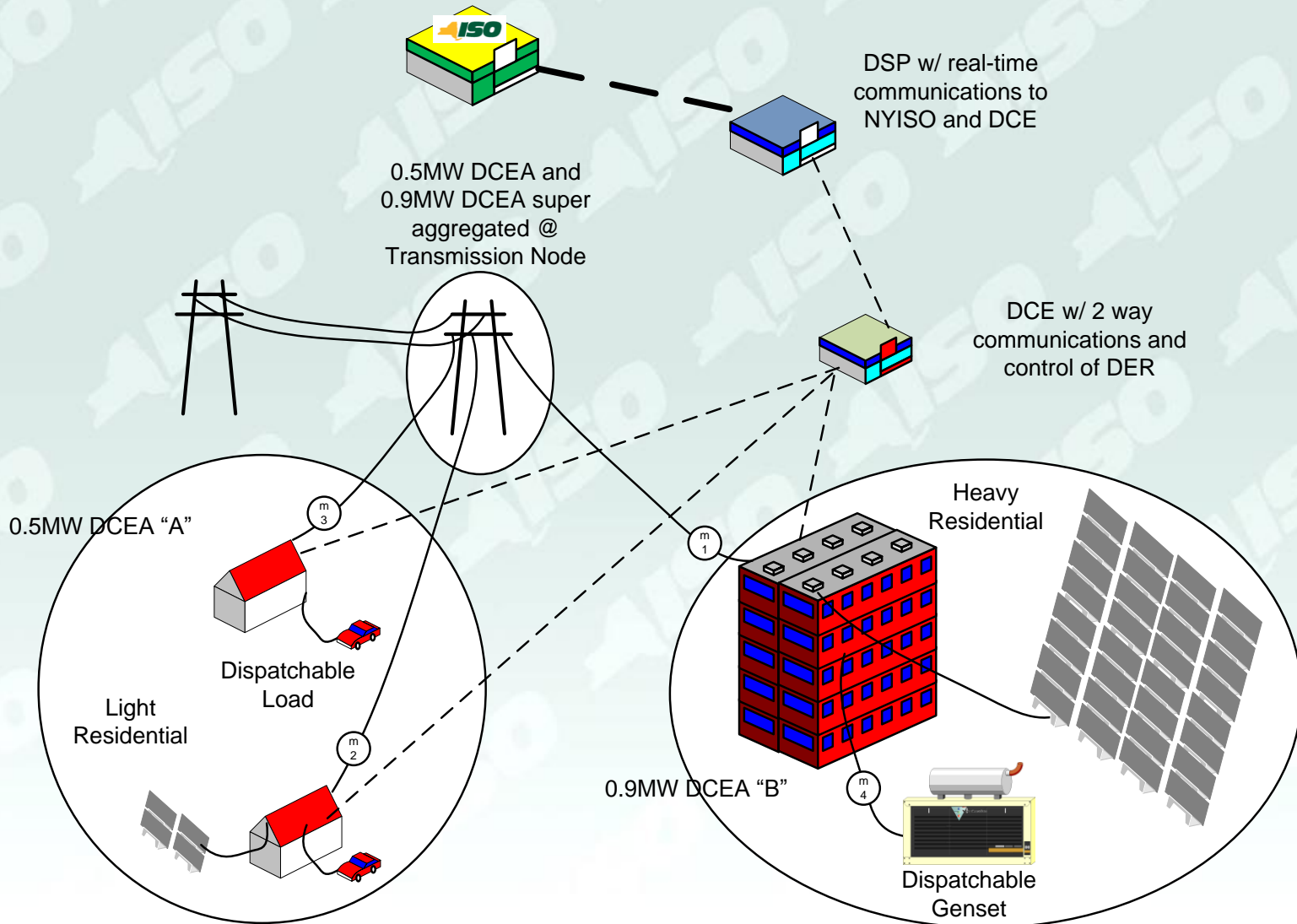
- ◆ If qualified it is eligible to offer energy, reserves and regulation
- ◆ Will only be dispatched (no RTC commitment)
- ◆ DAM offer for every hour of the day
 - *0-0.9MW @ \$25*
 - *>0.9-2.0MW @ \$45*
- ◆ Receives a DAM schedule for:
 - *HB18 – 2.0MW @ \$50*
 - *HB19 – 0.9MW @ \$25 (setting price @ node)*

Example 2 (cont.)

DCEA:

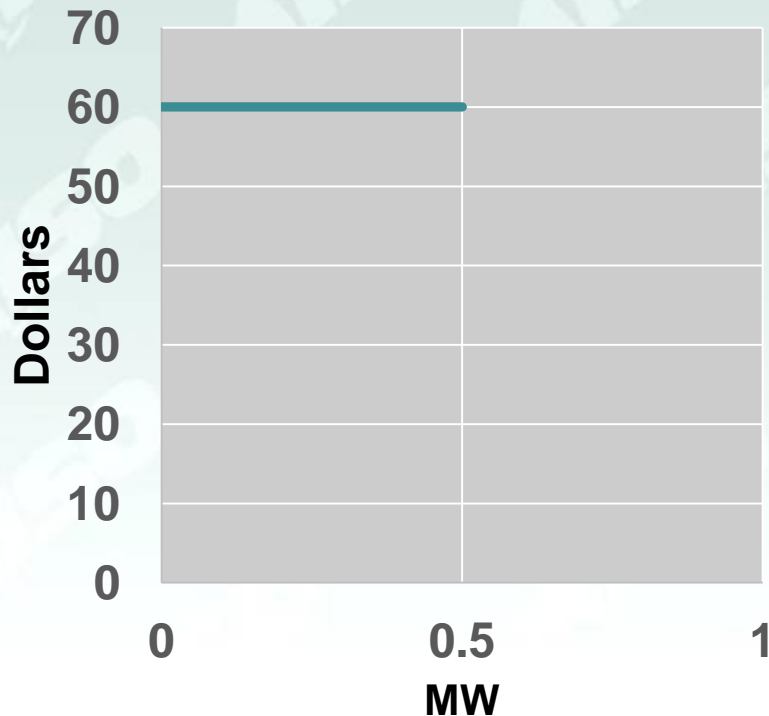
- ◆ In RT receives additional schedules for:
 - *HB17 – 2.0MW @ \$60*
 - *HB20 – 0.9MW @ \$25 (setting price @ node)*

Example 3 – 2 DCEAs - 1.4MW SA

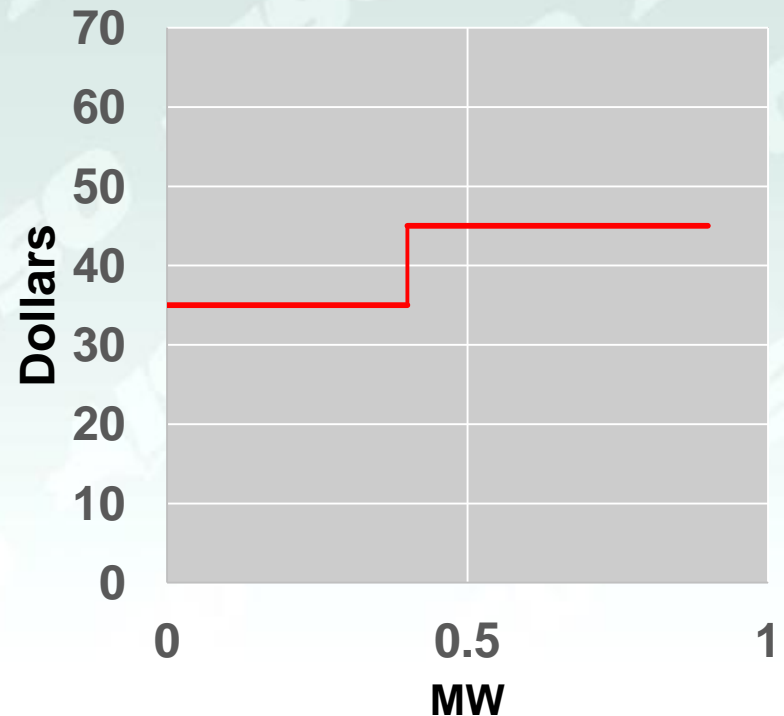


Example 3 (cont.)

- ◆ DCEA “A” is 0.5MW
 - *DAM offer every hour*
 - 0-0.5MW @ \$60 for

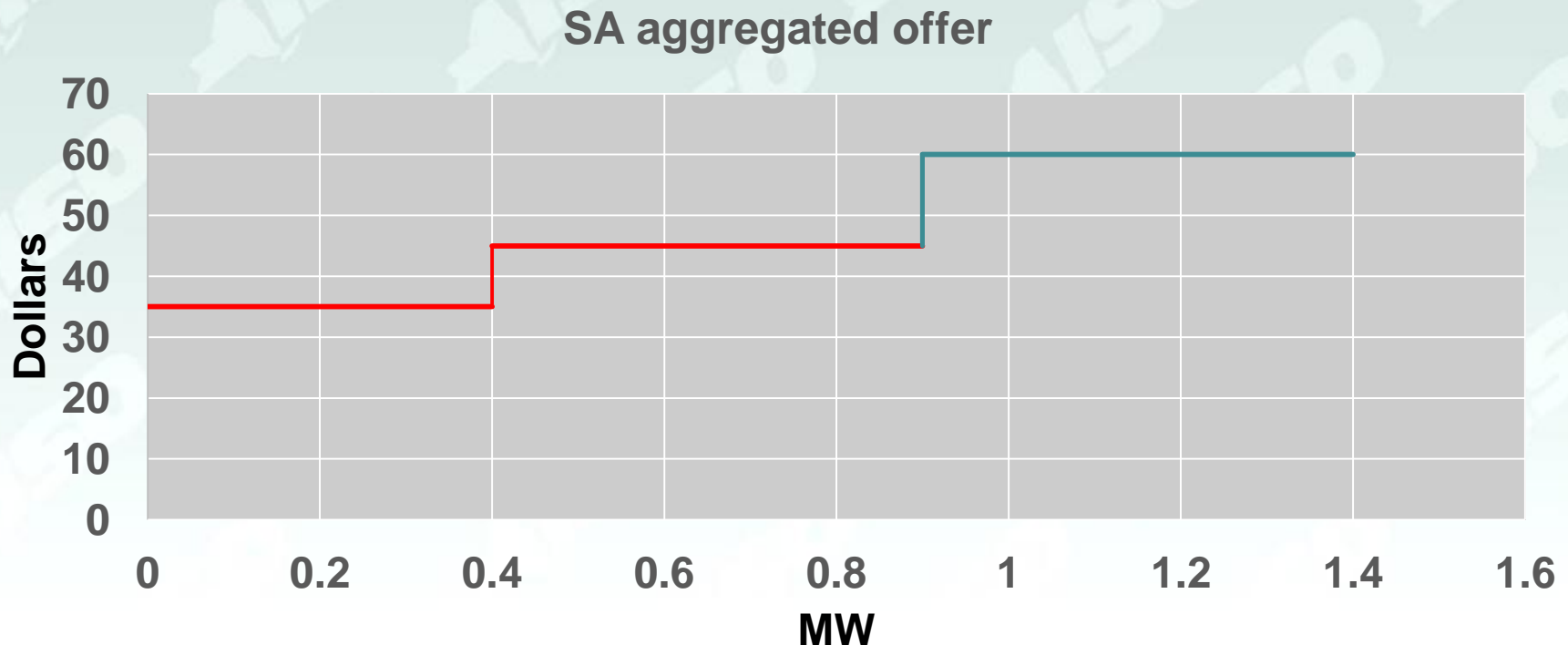


- ◆ DCEA “B” is 0.9MW
 - *DAM offer for every hour*
 - 0-0.4MW @ \$35
 - >0.4-0.9MW @ \$45



Example 3 (cont.)

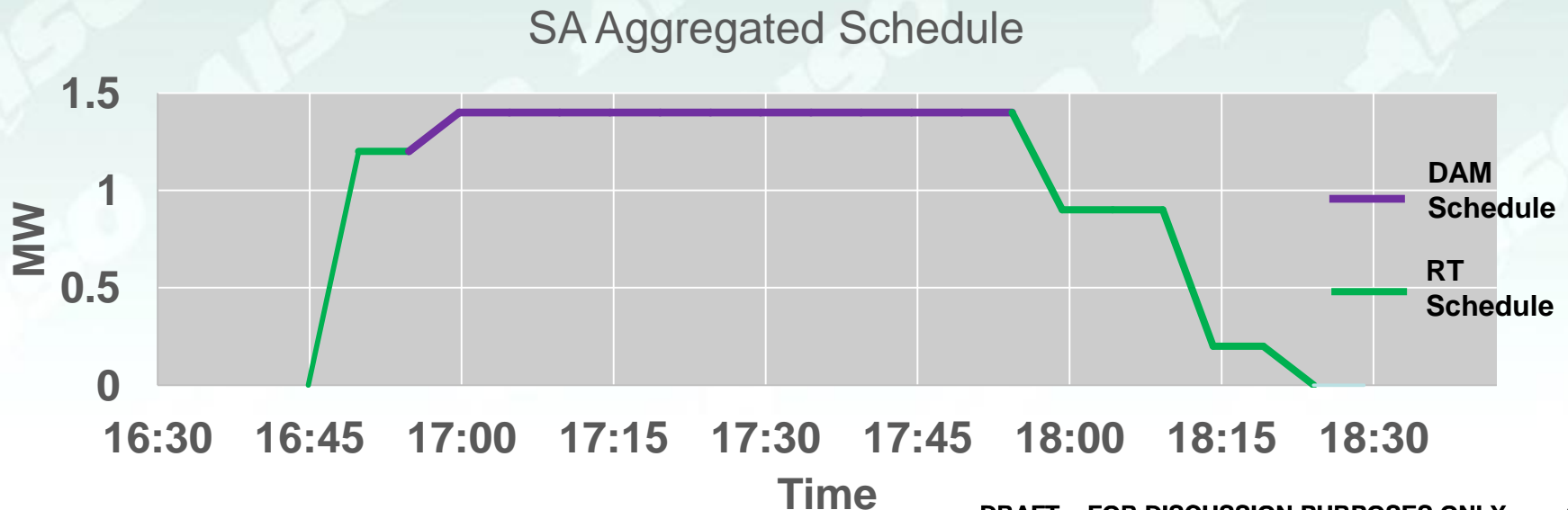
- ◆ Offers are combined to create a 3pt curve
 - *0-0.4MW @ \$35*
 - *>0.4-0.9MW @ \$45*
 - *>0.9-1.4MW @ \$60*



Example 3 (cont.)

- ◆ SA Receives DAM schedules for:
 - *HB17 – 1.4MW @ \$65*
- ◆ SA in RT receives additional schedules for:
 - *16:50, 16:55 – 1.2MW @ \$65*
 - *18:00, 18:05, 18:10 – 0.9MW @ \$45*
 - *18:15, 18:20 – 0.2 @ \$35*

****For this example it assumed that the DAM schedules are all economical and there were no RT changes**



Example 3 (cont.)

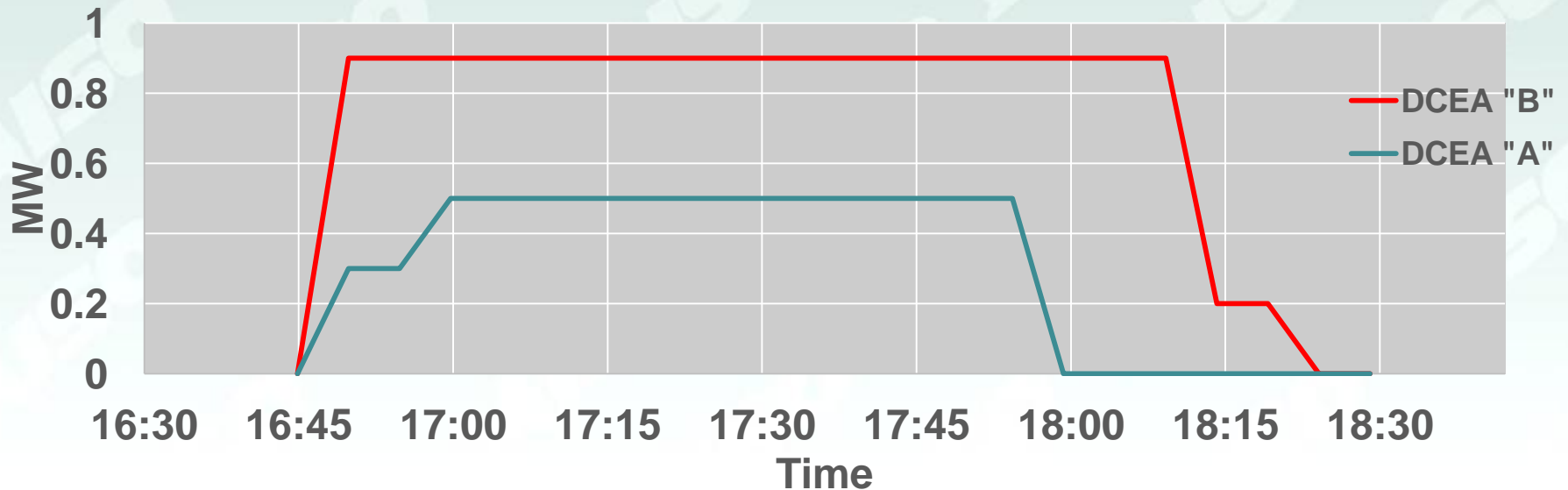
DCEA "A" Schedules

- ◆ Receives DAM schedules for:
 - *HB17 – 0.5MW @ \$65*
- ◆ In RT receives additional schedules for:
 - *16:50, 16:55 – 0.3MW @ \$65*

DCEA "B" Schedules

- ◆ Receives DAM schedules for:
 - *HB17 – 0.9MW @ \$65*
- ◆ In RT receives additional schedules for:
 - *16:50, 16:55 – 0.9MW @ \$65*
 - *18:00, 18:05, 18:10 – 0.9MW @ \$45*
 - *18:15, 18:20 – 0.2MW @ \$35*

Individual DCEA Schedules



Next Steps

- ◆ **NYISO and the utilities continue to discuss coordination and operational procedures for aggregation mapping to the transmission network**
- ◆ **DER Participation Model Attributes**
- ◆ **DCEA Registration, Termination, and Modification process**

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*

www.nyiso.com