Demand-Side Ancillary Services

PRLWG

October 21, 2005

Alternatives

1. Use the Current System (RTS)
   - 3-part bid (start-up, minimum generation, and incremental energy) is used to represent a supplier's costs.
   - Currently RTS assumes that all RT costs of providing reserves can be represented in the normal 3-part bid → no RT availability bid.

2. Modify RTS to provide additional bidding flexibility to demand-side reserve providers
   - Permit demand-side reserve suppliers to specify a RT availability bid to cover costs of supplying reserve that cannot be recovered through the normal RT 3-part bid.
   - Discussions to date with some potential demand-side reserve suppliers suggests that no additional bidding flexibility is necessary.

3. Create an out-of-market 30-minute reserve product modeled on Special Case Resources

Eligibility - Spinning Reserve

- NERC approval
- Synchronized to the network
- Two MW minimum
- Full response required within 10 minutes
  - Must be able to respond to activation order issued by the ISO
- Must be able to perform for at least 30 minutes
- Metering
  - Load MW telemetry (as today)
  - Response MW telemetry (non-zero when supplying service)
- Periodic test to verify capability to provide service

Eligibility - 10-Minute Nonsynchronized Reserve

- Two MW minimum
- Full response required within 10 minutes
  - Must be able to respond to activation order issued by the ISO
- Must be able to perform for at least 30 minutes
- Metering
  - Load MW telemetry (as today)
  - Response MW telemetry (non-zero when supplying service)
- Periodic test to verify capability to provide service

Eligibility - 30-Minute Reserve

- Two MW minimum
- Full response required within 30 minutes
  - Must be able to respond to activation orders issued by the ISO
- Must be able to perform for at least one hour*
- Metering
  - Load MW telemetry (as today)
  - Response MW telemetry (non-zero when supplying service)
- Periodic test to verify capability to provide service

*Minimum duration of performance has not (yet) been established for 30-minute reserve suppliers

Estimated Upper Bound on Annual Revenue

Per MW of Reserve (based on March 1 – September 27, 2005 actual)

- DA - West of Central-East
  - 10-minute spinning reserve $42,500
  - 10-minute nonsynchronized reserve $6,300
  - 30-minute reserve $2,800
- DA - East of Central-East
  - 10-minute spinning reserve $55,000
  - 10-minute nonsynchronized reserve $12,500
  - 30-minute reserve $3,000

Estimated Upper Bound on Annual Revenue

Per MW of Reserve (based on March 1 – September 27, 2005 actual)

- RT - West of Central-East
  - 10-minute spinning reserve $24,000
  - 10-minute nonsynchronized reserve $8,000
  - 30-minute reserve $2,700
- RT - East of Central-East
  - 10-minute spinning reserve $58,000
  - 10-minute nonsynchronized reserve $35,000
  - 30-minute reserve $4,000

Scheduling of Reserve

- Reserve and energy are co-optimized → minimizes as-bid production cost for the load served
  - The most expensive energy suppliers tend to be held in reserve

- Reserve clearing price reflects
  - Marginal lost opportunity cost
  - Reserve demand curves
  - Availability bid (day-ahead only)

- In real-time and only when activated, RTD/CAM calls on energy providers to respond to a reserve pick-up. The “least cost” energy providers are selected
  - The resource called upon to respond to a reserve pick-up may or may not have a RT reserve award.
  - RT reserve clearing price (which is a result of the energy/reserve co-optimization) will be zero if this happens – so it doesn’t matter.

Example

Supplier A
Marginal Cost of next MW = $70.00
RT reserve schedule = 10 MW

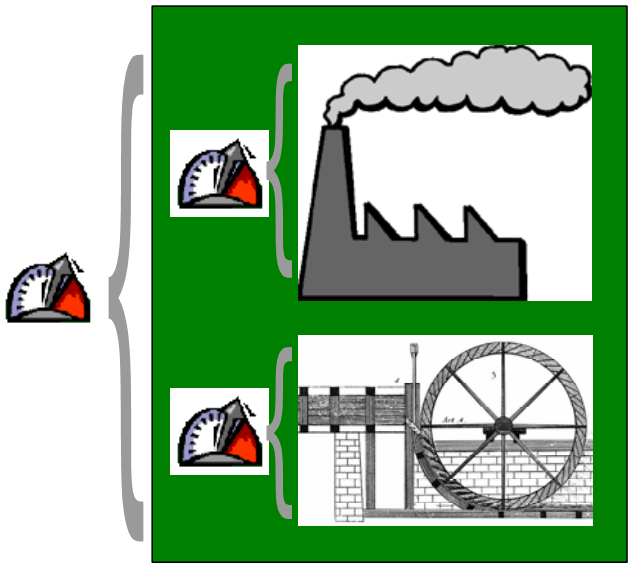
Supplier B
Marginal Cost of next MW = $60.00
RT reserve schedule = 0 MW

Suppose LMP = $50.00
Reserve clearing price = $0.00

RTD/CAM will require additional energy from Supplier B in the event of a reserve pick-up. Supplier A would have been more expensive than supplier B.

Actual reserve payment to Supplier A: $0.00
Forgone reserve payment to Supplier B: $0.00

Direct ISO Customer



NetMW	measured (analogous to Subzone Load)
ResponseMW	measured
DemandMW	calculated (NetMW + ResponseMW)

Demand MW

RT Energy Settlement

No change, nothing new

- DemandMW: demand MW (calculated)
- NetMW: net load MW telemetry
- ResponseMW: response MW telemetry
- LMP: real-time energy price

- Payment (by load) for energy consumed by the load

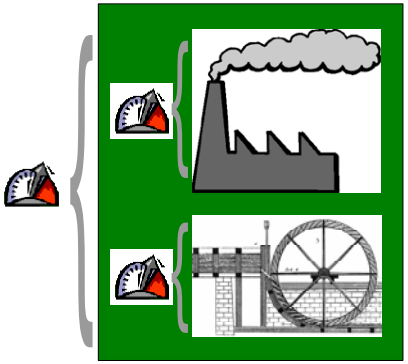
  DemandMW = (NetMW + ResponseMW)
  Payment = DemandMW x LMP

- Payment (to supplier) for energy provided by the demand-side reserve supplier when asked to respond

  Payment = ResponseMW x [higher of (LMP, Supplier's Energy Bid)]

  That is, supplier is eligible for a RT bid production cost guarantee (also covers startup & minimum generation costs)

Example



Industrial Site

Normal consumption	***100 MW***
On-site generation (load reduction)	***10 MW***
Start-up	***$1,000***
Mingen	***10 MW***
Mingen cost	***$5,000/hr***
Marginal energy cost	***$500/MWh***

Industrial site is called upon during a reserve pick-up to provide 10 MW of generation (load reduction) and complies.

LMP is constant at $200.00
One-hour run time

Demand MW

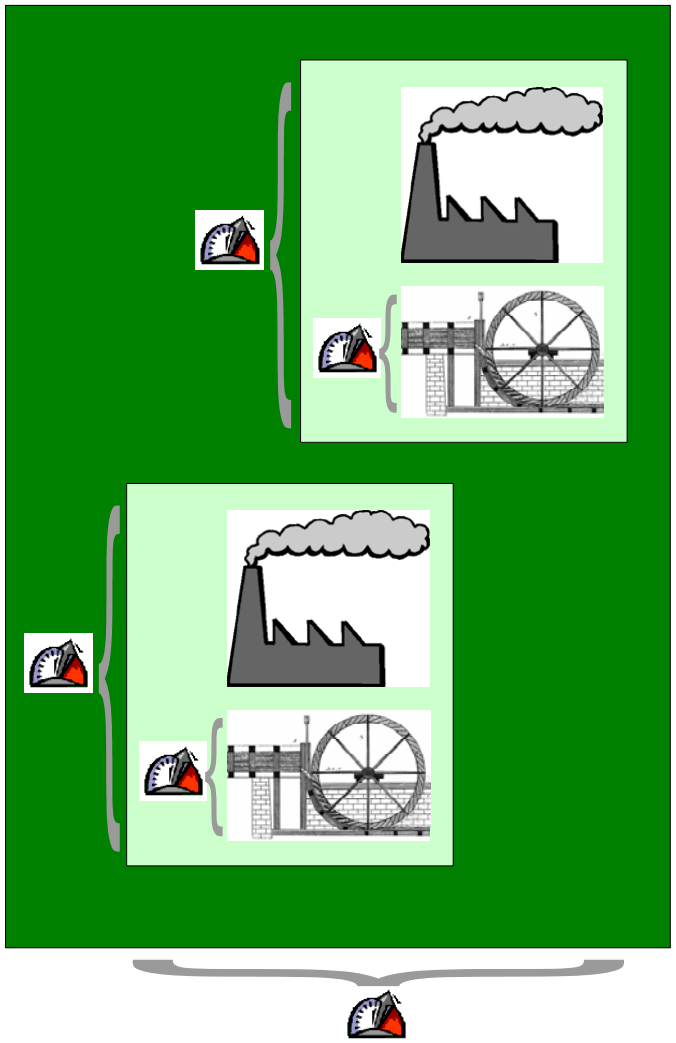
NetMW: 90
ResponseMW: 10
DemandMW: (90+10) = 100

Net MW

Response MW

Payment (by industrial site) for energy consumed	***100 MWh x $200.00/MWh = $20,000.00***
Payment (to industrial site) for energy produced as a result of the reserve pick-up	***10 MWh x $200.00/MWh = $2,000.00***
Cost (to industrial site) of providing energy as a result of the reserve pick-up	***$1,000.00 + (10 MWh x $200.00) = $3,000.00***
Guarantee payment (to industrial site)	***$3,000.00 - $2,000.00 = $1,000***
Net payment (by industrial site)	***$20,000.00 - $3,000.00 = $17,000.00***

Indirect ISO Customer



- Retail energy purchased by the demand-side resource is not normally visible to the ISO. However, metering of retail purchases may be required to verify performance.
- NetMW (energy purchased from the ISO) is zero.
- An equivalent DemandMW for each demand-side resource is ResponseMW

RT Energy Settlement

No LSE involvement

- DMW: demand MW (calculated)
- NMW: net load MW = zero
- RMW: response MW telemetry
- LMP: real-time energy price

- Payment to ISO (by each demand-side resource) for energy consumed by its load

  DMW = (0 + RMW)
  Payment = (DMW x LMP) = (RMW x LMP)

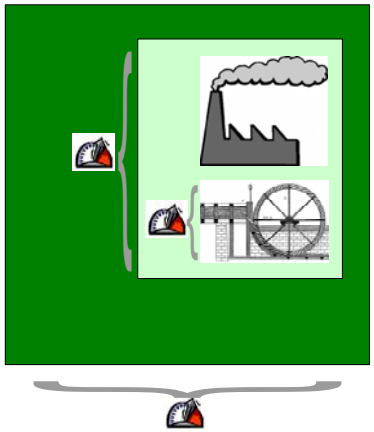
- Payment by ISO (to each demand-side resource) for energy provided by the demand-side reserve supplier when asked to respond

  Payment = RMW x [higher of (LMP, Supplier's Energy Bid)]

  That is, supplier is eligible for a RT bid production cost guarantee (also covers startup & minimum generation costs)

- Agreement between LSE and demand-side resource is unknown to the ISO. Presumably demand-side resource benefits from reduction in retail energy purchase (from LSE).

Example



Industrial Site

Normal consumption	***100 MW***
On-site generation (load reduction)	***10 MW***
Start-up	***$1,000***
Mingen	***10 MW***
Mingen cost	***$2,000/hr***
Marginal energy cost	***$200/MWh***

Industrial site is called upon during a reserve pick-up to provide 10 MW of generation (load reduction) and complies.

LMP is constant at $200.00
One-hour run time

NetMW: 0
ResponseMW: 10
DemandMW: (0+10) = 10

Payment (by industrial site) for energy consumed	***10 MWh x $200.00/MWh = $2,000.00***
Payment (to industrial site) for energy produced as a result of the reserve pick-up	***10 MWh x $200.00/MWh = $2,000.00***
Cost (to industrial site) of providing energy as a result of the reserve pick-up	***$1,000.00 + (10 MWh x $200.00) = $3,000.00***
Guarantee payment (to industrial site)	***$3,000.00 - $2,000.00 = $1,000***
Net payment (to industrial site)	***$2,000.00 - $2,000.00 + $1,000 = $1,000.00***

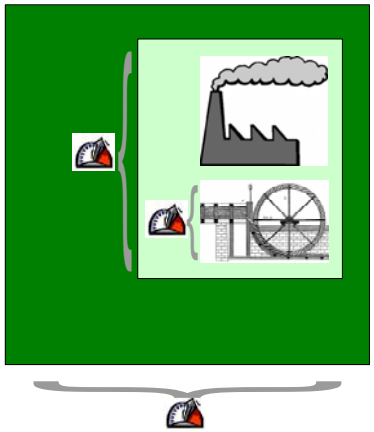
Net MW

Response MW

LSE

Subzone MW

Example (cont.)



Industrial Site

Normal consumption	***100 MW***
On-site generation (load reduction)	***10 MW***
Start-up	***$1,000***
Mingen	***10 MW***
Mingen cost	***$2,000/hr***
Marginal energy cost	***$200/MWh***

Payment (by LSE) for energy consumed	***90 MWh x $200.00/MWh = $18,000.00***
Payment (by industrial site to LSE) for energy consumed	***Unknown***
	$18,000.00 assuming energy @ $200.00/MWh, then

Net MW

Response MW

LSE

Subzone MW

Response Verification

- Expect to see a decrease in NMW upon activation
- Expect that the decrease in NMW and the increase in RMW will be (approximately) equal
- Details are yet to be worked out
- Sanctions for non-performance are yet to be worked out.