DA A/S Settlement Reference Guide

Assumptions

Take into consideration as a basis for this hypothetical example the following:

- Asset's RT LMP is the same as RT Hub LMP.
- Asset capability must be at least 250 MW
- Asset has a 2 MW/minute ramp rate
- Asset is marginal unit for EIR
- RT Reserve pricing is $0 in first example (price is moot in remaining examples)

DA Energy

Scenario 01	Scenario 02	Scenario 03	Scenario 04
Cleared DA MW: 150 X DA LMP: $40 = Credits: $6,000			

DA A/S

1 Strike Price: $50 | 2 Offered MW: 100 | 3 Offer Price: $10

		Scenario 01	Scenario 02	Scenario 03	Scenario 04
4	Percentiles of Predicted RT LMP @ HUB: 10th	$30	$20	$10	$25
	25th	$35	$30	$30	$30
	75th	$45	$55	$70	$60
	90th	$50	$65	$110	$95
5	Expected Close-out Cost	$0.70	$5	$35	$15

A.

		TMNSR	TMSR	TMOR	EIR
7	Cleared MW	0	20	40	40
8	Price	X N/A (9)	X $20	X $15	X $10
10	Product Credits	$0	$400	$600	$400

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FER Price	$10
Cleared DA MW	X 150
FER Credits	$1,500

B.

		Scenario 01	Scenario 02	Scenario 03	Scenario 04
12	RT LMP @ Hub	$40	$60	$90	$90
13	Close-out Charge: TMNSR	$0	$0	$0	$0
	TMSR	$0	($200)	($800)	($800)
	TMOR	$0	($400)	($1,600)	($1,600)
	EIR	$0	($400)	($1,600)	($1,600)

RT Energy

	Scenario 01	Scenario 02	Scenario 03	Scenario 04
RQM	100	250	250	0
Deviation	(50)	100	100	(150)
RT LMP	$40	$60	$90	$90
Credits	($2,000)	$6,000	$9,000	($13,500)

Total Credits

	Scenario 01	Scenario 02	Scenario 03	Scenario 04
DA Energy	$6,000	$6,000	$6,000	$6,000
RT Energy	($2,000)	$6,000	$9,000	($13,500)
DA A/S	$2,900	$1,900	($1,100)	($1,100)
Total	$6,900	$13,900	$13,900	($8,600)

Glossary

1. **Strike price:** The strike price calculator predicts a distribution of RT Hub LMPs and then calculates the mean RT Hub LMP and applies a $10/ MW adder. For the purpose of our example, the published strike price is $50.

2. **Offered MW:** Participants will offer one overall quantity of megawatts for each hourly offer. The market clearing engine will account for the unit's capability when awarding obligations.

3. **Offer Price:** For our hypothetical example, the participant has offered all four products at $10. A participant may submit a different price for each product to reflect different costs it may incur to provide it. Participants who submit hourly offers will enter four monetary values for each of the four day-ahead ancillary products.

4. **Percentiles of RT LMP:** The 10th, 25th, 75th, and 90th percentiles of the predicted distribution of RT Hub LMPs are not used in any downstream settlement calculations, but rather used to communicate the range, or uncertainty, of the distribution. Notice how each scenario has the same strike price but the further apart the 10th and 90th percentile are, the more uncertain the distribution, and the higher the published expected close-out.

5. **Expected Close-out Cost:** The expected close-out cost gives a probability-weighted expected cost to close a DA A/S position in $/MWh. Similar to the percentiles, this value is not used in settlement calculations, but estimates the close-out based on the distribution of RT Hub LMPs. The actual close-out charge will be determined after the market day. Different hypothetical distributions yield different expected close-outs - how do these compare with the actual close-out charge below?

6. **DA A/S Products:** There are two requirements that day-ahead ancillary service products need to satisfy. FRS or flexible response services include TMNSR, TMSR, and TMOR. They are the system operating reserve requirements used to cover a contingency. And EIR or energy imbalance reserve helps close any gap between physical supply that clears in the day-ahead market and the forecasted load.

7. **Cleared MW:** Through co-optimization, the market clearing engine will consider the system requirements as well as an asset's limitations. This ensures the optimal combination of energy and ancillary services needed to satisfy energy demand and system operating requirements throughout the operating day at least cost to consumers.

8. **Clearing Price:** Envision day-ahead ancillary service supply offers stacking from lowest to highest value in a "supply" column, and forecasted demand in a "demand" column. Where supply meets demand determines the clearing price for each product.

9. **N/A:** All DA A/S products will have a clearing price. This is N/A for the purposes of our example to reinforce that this resource did not clear any TMNSR.

10. **Product Credits:** The product credits are calculated by multiplying the cleared MW times the price.

11. **Forecast Energy Requirement:** The market clearing engine adds the day-ahead cleared exports to the forecasted load to determine the second requirement that EIR megawatts satisfy, which is the forecast energy requirement. You'll notice that the EIR price **is** the FER price.

12. **RT Hub LMP:** Day-ahead ancillary services uses a call option settlement mechanism using a real time load obligation cost allocator, which means the ISO conducts the settlement after real time. Notice the differences in the actual RT Hub LMP in the first three scenarios. The third and fourth scenario have the same RT Hub LMP, but different settlement outcomes - can you tell why that is?

13. **Close-out Charge:** Participants who received a day-ahead ancillary service award may also receive a close-out charge, in addition to receiving a credit. A close-out charge is triggered when the RT Hub LMP is higher than the strike price. If the RT Hub LMP was lower than the strike price, the close-out charge will be zero. Close-out charges are calculated for each of the day-ahead ancillary service products. The close-out charge is calculated as (product) award * MAX [(Hub RT LMP - Strike price), 0]

Acronym Legend:

- **DA:** day ahead
- **DA LMP:** Day-ahead Locational Marginal Price
- **DA A/S:** Day-Ahead Ancillary Services
- **EIR:** energy imbalance reserve
- **FRS:** flexible response services
- **FER:** forecast energy requirement
- **MW:** megawatts
- **RQM:** revenue quality metering
- **RT LMP:** Real-time Locational Marginal Price
- **TMNSR:** 10-minute non-spinning reserve
- **TMSR:** 10-minute spinning reserve
- **TMOR:** 30-minute operating reserve

These hypothetical scenarios are fabricated to be plausible, but not necessarily realistic to system conditions.