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Operations Impact of Scheduled Non-Physical Load

EXECUTIVE SUMMARY

In the ERCOT Region, QSEs must submit schedules balanced between Resources and Obligations. Energy scheduled on the Resource side of a balanced schedule reflects energy to be produced by Resources represented by the QSE or energy purchased from other QSEs. Energy scheduled on the Obligation side may reflect energy to be consumed by loads (including losses) that the QSE represents, any energy sales to other QSEs, as well as an additional amount scheduled to balance the total energy scheduled as Obligations to the amount scheduled from Resources. This additional amount of scheduled Obligation may not represent physical load.

This white paper explores any potential impacts such a scheduled Obligation may have on ERCOT's operation. Several scheduling scenarios for Resources and Obligations are discussed to evaluate this issue. On the scheduled Resource side, two scenarios are analyzed:

(1) The Resource schedule is for energy from the QSE's own portfolio; or
(2) The Resource schedule is for energy purchased through bilateral contracts.

On the scheduled Obligation side, three scenarios are analyzed:

(1) The Obligation schedule does not represent physical load;
(2) The Obligation schedule represents energy sold to another QSE through bilateral contracts; or
(3) The Obligation schedule represents energy sold into the Balancing Energy Services (BES) market.

By comparing different combinations of the above Resource and Obligations scheduling scenarios as well as their settlement results, this paper will show that, when a QSE schedules an Obligation that does not represent physical Load, the QSE will either get paid for the energy at the MCPE of the zone in which it generates the energy or purchases it from another QSE. None of the scheduling scenarios discussed in this paper will negatively impact ERCOT's market operations or grid operations.

PROTOCOL LANGUAGE

Sections 4.3.2 of the Protocols describe the components of Balanced Schedules as follows:

(1) Energy to be produced by Resources the QSE represents, by Congestion Zone;

(2) Energy to be consumed by Loads the QSE represents (including T&D Losses) by Congestion Zone;

(3) ERCOT allocated Ancillary Services Obligations for the QSE;

(4) Any energy and Ancillary Services scheduled to or from other QSEs or ERCOT (e.g. Inter-QSE Trades);

(5) Any Balancing Energy scheduled through the ERCOT Scheduling Process; and

(6) Any Self-Arranged Ancillary Services.

When relaxed Balanced Schedules are allowed by ERCOT, pursuant to Section 4.3.5, Requirement for Balanced Schedules, the requirement for subpart (2) above shall be relaxed and QSEs shall be allowed to schedule energy for Load that is equivalent to the amount of scheduled energy for Resources as specified in subpart (1) and (5) above.

QUESTIONS

(1) How would a QSE schedule energy from Resources in its portfolio when it does not represent physical Load?
(2) What will the QSE get paid for scheduling Obligations that do not represent physical Load?
(3) Will payments be different depending on how the QSE schedules this Obligation?

CURRENT PRACTICES

ERCOT has reviewed the different practices used by QSEs scheduling Resources when the QSE does not represent physical Load. The following examples illustrate the practices observed.

Scenario 1

QSE A has a Resource of 1000MW (either from its own portfolio or purchased from another QSE) but does not represent any physical Load.

Part I: The Resource is in the QSE's portfolio

If the Resource is in the QSE's own portfolio, QSE A basically may schedule the 1000MW in one of the following three ways.

Option 1:
(1) Scheduled Resource = 1000MW;
(2) Scheduled Obligation = 1000MW.

Generation Resource is in Zone *i* and Load is in Zone *j*; *i* and *j* can be the same; *k* is the zonal CSC constraint.

In the Operating Interval, QSE A's actual generation is 1000MW and its actual Load is 0MW.

Settlement for QSE A:

Resource Imbalance: $-1*(\text{Actual Gen}_i - \text{Scheduled Gen}_i)*\text{MCPE}_i$
$= -1*(1000 - 1000)*\text{MCPE}_i$
$= \$0$

Load Imbalance: $(\text{Actual Load} - \text{Scheduled Load}_j)*\text{MCPE}_j$
$= (0-1000)*\text{MCPE}_j$
$=-1000*\text{MCPE}_j$

CSC Charge: $\sum((\text{Scheduled Gen}_i * SF_{i,k} - \text{Scheduled Obligation}_j * SF_{j,k}) * \text{Shadow Price}_k)$
Where SF = Shift Factor
$=\sum((1000 * SF_{i,k} - 1000 * SF_{j,k}) * \text{Shadow Price}_k)$
$=1000* (\text{MCPE}_j - \text{MCPE}_i)$

The total payment to QSE A will be:

Resource Imbalance + Load Imbalance + CSC Charge
= 0 - 1000*$MCPE_j$ + 1000* ($MCPE_j$ – $MCPE_i$)
=-1000*$MCPE_i$

In other words, by scheduling 1000MW of Obligation that does not represent physical Load, QSE A actually sells the 1000MW into Balancing Energy Service (BES). No matter which Zone QSE A schedules the Load in, the QSE is always paid at the Market Clearing Price of Energy (MCPE) of the Zone in which the Generation Resource is located.

Option 2:
QSE A has 1000MW of scheduled generation in Zone i and sells 1000 MW of energy to QSE B in Zone j through a bilateral contract; *k* is the zonal CSC constraint.

In the Operating Interval, QSE A's actual generation is 1000MW and actual Load is 0. Scheduled QSE A Load is zero since the 1000 MW Obligation Scheduled is for a bilateral trade to QSE B.

Settlement for QSE A:

Resource Imbalance:	-1*(Actual Gen – Scheduled Gen)*$MCPE_i$ = -1*(1000 – 1000)*$MCPE_i$ = $0
Load Imbalance:	(Actual Load – Scheduled Load)*$MCPE_j$ =(0-0)*$MCPE_j$ =$0
CSC Charge:	$\sum$((Scheduled Gen_i * $SF_{i,k}$ – Scheduled $Obligation_j$ * $SF_{j,k}$) * Shadow $Price_k$) = $\sum$((1000 * $SF_{i,k}$ - 1000 * $SF_{j,k}$) * Shadow $Price_k$) =1000* ($MCPE_j$ – $MCPE_i$)

Settlement between QSE A and QSE B:
QSE B's payment to QSE A: 1000*contract_energy_price
In other words, QSE A sells the 1000MW to QSE B and is paid at their agreed contract price.

The total payment to QSE A will be:
Resource Imbalance + Load Imbalance + CSC Charge + Payment from QSE B
= 0 + 0 + 1000* ($MCPE_j$ – $MCPE_i$) - 1000*contract_energy_price
= 1000 * ($MCPE_j$ – $MCPE_i$) -1000 * contract_energy_price

As a result, QSE A receives the contract price from QSE B, plus or minus any Zonal Congestion Charge incurred as a result of its schedule.

Option 3:
QSE A bids 1000MW into the BES market, at a bid price low enough to be a price taker. ERCOT deploys the 1000MW as part of BES; *k* is the zonal CSC constraint.

In the Operating Interval, QSE A's actual generation is 1000MW and actual Load is 0.

Settlement between ERCOT and QSE A:

Resource Imbalance:	-1*(Actual Gen_i – Scheduled Gen_i)*$MCPE_i$ = -1*(1000 –0)*$MCPE_i$ = -$1000*$MCPE_i$
Load Imbalance:	(Actual $Load_i$ – Scheduled $Load_i$)*$MCPE_i$ =(0-0)*$MCPE_i$ =$0
CSC Charge:	$0

Resource Imbalance + Load Imbalance + CSC Charge
= 0 - 1000*$MCPE_j$ + 0
=-1000*$MCPE_i$

In other words, QSE A sells the 1000MW into BES and receives the MCPE of the Zone in which the Generation Resource is located.

In summary, no matter how QSE A schedules the 1000MW, the QSE is, in effect, paid at the MCPE of the Zone in which the Generation Resource is located or, in scenario 2, at the contract price from QSE B where QSE A sells the energy through a bilateral contract.

Part II: Energy Resource Is Energy Purchased through a Bilateral Contract

If the scheduled Resource is energy purchased from another QSE through a bilateral contract in Zone i, QSE A may schedule the 1000MW in one of the following two ways.

Option 1:

(1) Scheduled Resource from QSE B = 1000MW in Zone i
(2) Scheduled Obligation = 1000MW.

Scheduled Obligation is in Zone *j*; *k* is zonal CSC constraint.

In the Operating Interval, QSE A's actual generation is 0 and its actual Load is 0 MW.

Settlement between ERCOT and QSE A:

Resource Imbalance: -1*(Actual Gen_i – Scheduled Gen_i)*$MCPE_i$
= -1*(0 – 0)*$MCPE_i$
= $0

Load Imbalance: (Actual $Load_j$ – Scheduled $Load_j$)*$MCPE_j$
=(0-1000)*$MCPE_j$
=-$1000*$MCPE_j$

CSC Charge: $\sum$((Schedule $Resource_i$ * $SF_{i,k}$ - Scheduled $Obligation_j$ * $SF_{j,k}$)* Shadow $Price_k$)
= $\sum$((1000 * $SF_{i,k}$ - 1000 * $SF_{j,k}$) * Shadow $Price_k$)
=1000 ($MCPE_j$ – $MCPE_i$)

Resource Imbalance + Load Imbalance + CSC Charge
=-1000*$MCPE_j$ + 1000 * ($MCPE_j$ –$MCPE_i$)
=- 1000 * $MCPE_i$

Settlement between QSE A and QSE B:
QSE A's payment to QSE B: 1000*contract_energy_price

In other words, QSE A buys 1000MW from QSE B at the bilateral contract price. By scheduling the 1000MW of Obligation that does not represent physical Load (no matter which Zone QSE A schedules in), QSE A sells the 1000MW into BES at the MCPE in Zone i, where QSE A purchased from QSE B.

Option 2:
QSE A sells 1000 MW of energy in Zone j to QSE C through a bilateral contract.

(1) Scheduled Resource from QSE B = 1000MW in Zone i;
(2) Scheduled Obligation to QSE C = 1000MW in Zone j.

k is zonal CSC constraint.

In the Operating Interval, QSE A's actual generation is 0MW and its actual Load is 0MW.

Settlement between ERCOT and QSE A:

Resource Imbalance: -1*(Actual Gen – Scheduled Gen)*MCPE
= -1*(0 – 0)*MCPE
= $0

Load Imbalance: (Actual Load – Scheduled Load)*MCPE
=(0-0)*MCPE
=$0

CSC Charge: $\sum((\text{Scheduled Resource}_i * SF_{i,k} - \text{Scheduled Obligation}_j * SF_{j,k}) * \text{Shadow Price}_k)$
$= \sum((1000 * SF_{i,k} - 1000 * SF_{j,k}) * \text{Shadow Price}_k)$
$=1000* (MCPE_j – MCPE_i)$

The total settlement for QSE A is:
Resource Imbalance + Load Imbalance + CSC Charge + Settlement between QSEs A & B + Settlement between QSEs A & C
= 0 + 0 + $1000* (MCPE_j – MCPE_i)$ + Settlement between QSEs A & B + Settlement between QSEs A & C

In other words, QSE A purchases 1000MW from QSE B at their agreed upon contract price; QSE A then sells the 1000MW to QSE C and receives their agreed contract price. QSE A will be subjected to congestion charge if Zone i is not the same as Zone j.

In summary, if the QSE purchases 1000MW in Zone i from another QSE and does not have a physical Load, it can re-sell the 1000MW into BES or to another QSE. If the QSE schedules the sale as an Obligation that does not represent physical Load, it will receive the MCPE in Zone i, where it purchased energy from QSE B, regardless of the Zone in which the Obligation is scheduled. If the QSE sells the energy to another QSE, it will receive the agreed contract price and be subject to congestion charges if it sells the energy in another Zone.

CONCLUSION

Based on the above examples (Part I and II), this paper shows that there are no adverse impacts to ERCOT operations or settlements from QSEs scheduling Obligations that do not represent physical Load. If the QSE schedules energy from Resources in its portfolio, it receives the Market Clearing Price of Energy of the Zone in which the Resource is located. If the QSE schedules energy from a trade with another QSE, the QSE receives the Market Clearing Price of Energy of the Zone in which it purchased the energy.

WHAT IMPACT DOES THIS HAVE ON ERCOT?

When a QSE schedules an Obligation that does not represent physical Load, it does not impact ERCOT's market operations or grid operations because ERCOT uses QSEs' Resource schedules, not Obligation schedules, along with ERCOT's Load forecast in ERCOT's operation. ERCOT deploys Balancing Energy according to the difference between the total scheduled Resource and ERCOT's short-term Load forecast. Therefore, the accuracy of a QSEs' Resource schedules is very important to ERCOT operations, but the accuracy of QSEs' obligation schedules will not impact grid operations.

In summary, from ERCOT's standpoint, a QSE's Resource schedule, not its Obligation schedule, has an impact on ERCOT's market operations and grid operations.