



Three Pivotal Supplier (TPS) Test

5/24/2006 WebEx Training



Major offer capping rule change due to TPS

Prior to the implementation of the real-time TPS test:

A unit is subject to offer capping with respect to a transmission constraint if the raise-help power distribution factor (“dfax”) of the unit is higher than the operational threshold.

After the implementation of the real-time TPS test:

If a generation supplier passes the TPS test in real-time for a transmission constraint, the offer capping of the units affiliated with the generation supplier will be suspended for that constraint.



Pass/Fail Check of TPS Test

$$\frac{\text{Total _ Effective _ Supply} - (\text{Supply1} + \text{Supply2} + \text{Supply3})}{\text{Relief _ Demand}} > 1.00$$

Total Effective Supply: total available relief MW from all dispatchable units

Relief Demand: incremental MW needed to relieve the binding constraint

Supply 1 and Supply 2: available relief MW from all dispatchable units of two largest owners

Supply 3: available relief MW from all dispatchable units of the test owner

**Supply 3 Passes the TPS test if the test score is greater than 1.
Otherwise, Supply 1, 2 and 3 all Fail the TPS test.**



CONSTRAINT - TRANSFER INTERFACE: BED-BLA

System Marginal Price (SMP) = 60.03

Cost-based Constraint Shadow Price = -303.07

Number of Individual Suppliers = 16

Total Number of generating units with > 3% dfax = 290

Unit Effective Price (UEP) is 150% of the Constraint Shadow Price times the unit dfax. For an individual unit X,

$$\text{UEP} = \text{SMP} + (1.5 * \text{Constraint Shadow Price} * \text{unit dfax})$$

$$\text{UEP} = 60.03 + (1.5 * (-303.07) * (-0.2154))$$

$$\text{UEP} = 157.95$$

Unit Effective MW (UEMW) is the MW offer at UEP (restricted by the bid-in ramp). For unit X, UEMW is

237.8MW at \$157.95



TPS Example 1 – Cont'd

Unit Effective Supply (UES) is the amount of relief that the unit can provide when the unit is dispatched to UEMW. For unit X, the initial SE MW is 170.4

$$\text{UES} = (\text{UEMW} - \text{SE_MW}) * \text{unit dfax}$$

$$\text{UES} = (237.8 - 170.4) * (-0.21542)$$

$$\text{UES} = 14.51 \text{ MW}$$

Total Effective Supply (TES) is the sum of UES for all 290 units:

TES for this constraint is 170.76 MW

The Effective Supply for each supplier is also calculated.



TPS Example 1 – Cont'd

Constraint Relief Demand (RD) is the incremental MW needed to relieve the binding constraint. For BED-BLA interface constraint,

$$\text{RD} = \text{SE Constraint Flow} - (\text{Constraint limit} * \text{target control \%})$$

$$\text{RD} = 2548.39 - (2576 * 0.95)$$

$$\text{RD} = 101.19 \text{ MW}$$



Pass/Fail Check of TPS Test

$$\frac{\text{Total Effective Supply} - (\text{Supply1} + \text{Supply2} + \text{Supply3})}{\text{Relief Demand}} > 1.00$$

Total Effective Supply: total available relief MW from all dispatchable units

Relief Demand: incremental MW needed to relieve the binding constraint

Supply 1 and Supply 2: available relief MW from all dispatchable units of two largest owners

Supply 3: available relief MW from all dispatchable units of the test owner

**Supply 3 Passes the TPS test if the test score is greater than 1.
Otherwise, Supply 1, 2 and 3 all Fail the TPS test.**



TPS Example 1 – Cont'd

Sample Test Score Calculation for Supplier C:

<u>Supplier</u>	<u>Effective Supply</u>
A	40.52 (Top supplier)
B	35.73 (2 nd supplier)
C	20.68

Total Effective Supply (TES) for all 16 supplier = 170.76 MW
Constraint Demand Relief (DR) = 101.19 MW

TPS Score for Supplier C :

$$\begin{aligned} & [\text{TES} - (\text{Supplier_A} + \text{Supplier_B} + \text{Supplier_C})] / \text{DR} \\ & = [170.76 - (40.52 + 35.73 + 20.68)] / 101.19 \\ & = \mathbf{0.73} \end{aligned}$$



TPS Example 1 Test Results

<u>Supplier</u>	<u>Effective MW</u>
A	40.52
B	35.73
C	20.68
D	20.51
E	20.14
F	13.05
G	7.47
H	2.72
I	2.57
J	1.87
K	0.11
L	0.52
M	0.40
N	0.36
O	0.28
P	0.11

Test Score

no score

no score

0.73

0.73

0.74

0.81

0.86

0.91

0.91

0.92

0.93

0.93

0.93

0.93

0.93

0.93

Top 2 Suppliers do not pass since at least 1 other supplier do not pass

None of the suppliers passes since none of them has score greater than 1.00



TPS Example 2

CONSTRAINT - KAMMER2 TRANSFORMER

System Marginal Price (SMP) = 62.75

Cost-based Constraint Shadow Price = -163.13

Number of Individual Suppliers = 19

Total Number of generating units with > 3% dfax = 373

Total Effective Supply (TES) is the sum of (UES) for all 373 units:

TES = 480.41 MW

The Effective Supply for each supplier is also calculated.

Constraint Relief Demand (RD):

RD = SE Constraint Flow –

(Constraint limit * target control %)

RD = 1532.38 – (1530 * 0.90) = 155.38 MW



TPS Example 2 Test Results

Supplier

Effective MW

Test Score

A	224.42
B	84.63
C	29.8
D	21.74
E	21.08
F	20.04
G	19.6
H	15.85
I	15.45
J	13.29
K	13.29
L	3.73
M	0.98
N	0.59
O	0.53
P	0.51
Q	0.15
R	0.06
S	0.05

no score
no score

0.91
0.96
0.97
0.97
0.98
0.99
0.99

1.02
1.02
1.08
1.10
1.10
1.10
1.10
1.10
1.10
1.10

Top 2 Suppliers do not pass since at least 1 other supplier do not pass

Suppliers C to I do not pass

Suppliers J to S pass because their score are greater than 1.00