

FTR and Congestion Discussion

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Task Force
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Monitoring Analytics

Congestion Discussion

- **Congestion is congestion related load charges net of congestion related generation charges.**

- $$\sum_{i=1}^n L_i * CLMP_i - \sum_{j=1}^m G_j * CLMP_j = \text{Congestion}$$

Congestion Discussion

- **Day Ahead Congestion is congestion related load charges net of congestion related generation charges in the day ahead market.**

- $$\sum_{i=1}^n DAL_i * DACLMP_i - \sum_{j=1}^m DAG_j * DACLMP_j =$$

DA Congestion

Congestion Discussion

- **Balancing congestion is the sum of congestion related deviation charges (changes in MW positions times real time CLMP).**

$$\sum_{i=1}^n (RTL_i - DAL_i) * RTCLMP_i - \sum_{j=1}^m (RTG_j - DAG_j) * RTCLMP_j$$

Congestion Discussion

- **Total congestion is total congestion related charges minus total congestion related credits.**
- **Total Congestion = Total Day Ahead Congestion + Total Balancing Congestion.**
- **Note: Balancing Congestion only affects total congestion if day ahead transmission model is different than the real time transmission model.**



DA Ahead Congestion

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500

- **Gen at A (100 MW) and D (50 MW), Load at A (50 MW) and D (100 MW).**
- **50 MW of transfer capability modeled between A and D.**
- **DA CLMP at Bus A is \$50 and DA CLMP at Bus D is \$100.**
- **\$50 x 50 MW of transfer = Over collection= \$2,500**
- **Total Day Ahead Congestion is Total Load Charges – Generation Credits = \$2,500**

DA Congestion

- **What if transfer capability was reduced between A and D, but load stayed the same?**



DA Ahead Congestion

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	90	50	\$4,500	\$2,500	(\$2,000)
D	\$100	60	100	\$6,000	\$10,000	\$4,000
Total		150	150	\$10,500	\$12,500	\$2,000

- **Gen at A (90 MW) and D (60 MW), Load at A (50 MW) and D (100 MW).**
- **40 MW of transfer capability modeled between A and D.**
- **DA CLMP at Bus A is \$50 and DA CLMP at Bus D is \$100.**
- **$\$50 \times 40 \text{ MW} = \text{Overcollection} = \$2,000$**
- **Total Day Ahead Congestion is Total Load Charges – Generation Credits = \$2,000**

DA Congestion

- **What if transfer capability was reduced between A and D, load stayed the same but CLMP changed (because the generation levels changed)?**



DA Ahead Congestion

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
D	\$125	60	100	\$7,500	\$12,500	\$5,000
Total		150	150	\$9,750	\$13,750	\$4,000

- **Gen at A (90 MW) and D (60 MW), Load at A (50 MW) and D (100 MW).**
- **40 MW of transfer capability modeled between A and D.**
- **DA CLMP at Bus A is \$25 and DA CLMP at Bus D is \$125.**
- **$\$100 \times 40 \text{ MW} = \text{Overcollection} = \$4,000$**
- **Total Day Ahead Congestion is Total Load Charges – Generation Credits = \$4,000**

Real Time versus Balancing Congestion

- Original state (50 MW transfer capability), with DA = RT positions and CLMP

No Deviations

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$50	0	0	\$0	\$0	\$0
D	\$100	0	0	\$0	\$0	\$0
Total Deviation		0	0	\$0	\$0	\$0
Total DA + Balancing						\$2,500

Real Time versus Balancing Congestion

- DA has 50 MW transfer, RT 40 MW Transfer, CLMP the same (flat gen offers)

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	90	50	\$4,500	\$2,500	(\$2,000)
D	\$100	60	100	\$6,000	\$10,000	\$4,000
Total		150	150	\$10,500	\$12,500	\$2,000
Bus	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$50	-10	0	(\$500)	\$0	\$500
D	\$100	10	0	\$1,000	\$0	(\$1,000)
Total Deviation		0	0	\$500	\$0	(\$500)
Total DA + Balancing						\$2,000

Generation Deviations

Less Gen Credit

More Gen Credit

Total generation credits go up by \$500

No change in load charges

Over collection falls by \$500, to \$2000

-\$500 balancing congestion

Real Time versus Balancing Congestion

- DA has 50 MW transfer, RT 40 MW Transfer, CLMP change (gen curves)

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
D	\$125	60	100	\$7,500	\$12,500	\$5,000
Total		150	150	\$9,750	\$13,750	\$4,000
Bus	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$25	-10	0	(\$250)	\$0	\$250
D	\$125	10	0	\$1,250	\$0	(\$1,250)
Total Deviation		0	0	\$1,000	\$0	(\$1,000)
Total DA + Balancing						\$1,500

Generation Deviations

Less Gen Credit

More Gen Credit

Total generation credits go up by \$1,000

No change in load charges

Over collection falls by \$1,000, to \$1,500

-\$1000 balancing congestion

Real Time versus Balancing Congestion

- DA has 50 MW transfer, RT 40 MW Transfer, CLMP change (gen curves), load changes

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
D	\$125	70	110	\$8,750	\$13,750	\$5,000
Total		160	160	\$11,000	\$15,000	\$4,000
Bus	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$25	-10	0	(\$250)	\$0	\$250
D	\$125	20	10	\$2,500	\$1,250	(\$1,250)
Total Deviation		10	10	\$2,250	\$1,250	(\$1,000)
Total DA + Balancing						\$1,500

Generation Deviations

Less Gen Credit

More Gen Credit

Total generation credits go up by \$2,250

Change in load charges

Over collection falls by \$1,000, to \$1,500

-\$1000 balancing congestion

Real Time versus Balancing Congestion

- Everything changes, but transfer capability is the same DA and RT (50 MW, same model!)

Bus	DA CLMP	DA MW GEN 1	DA MW GEN 2	DA MW Load	Gen 1 Credit	Gen 2 Credit	Load Charges	Total Congestion
A	\$50	100	0	50	\$5,000	\$0	\$2,500	(\$2,500)
D	\$100	50	0	100	\$5,000	\$0	\$10,000	\$5,000
Total		150	0	150	\$10,000	\$0	\$12,500	\$2,500 ←
Bus	RT CLMP	RT MW GEN 1	RT MW GEN 2	RT MW Load	Gen 1 Credit	Gen 2 Credit	Load Charges	Total Congestion
A	\$55	50	55	55	\$2,750	\$3,025	\$3,025	(\$2,750)
D	\$125	50	10	110	\$6,250	\$1,250	\$13,750	\$6,250
Total		100	65	165	\$9,000	\$4,275	\$16,775	\$3,500
Bus	RT CLMP	GEN 1 DEV	GEN 2 DEV	Load Dev	Gen 1 Credit	Gen 2 Credit	Load Charges	Bal. Congestion
A	\$55	-50	55	5	(\$2,750)	\$3,025	\$275	\$0
D	\$125	0	10	10	\$0	\$1,250	\$1,250	\$0
Total Deviation		-50	65	15	(\$2,750)	\$4,275	\$1,525	\$0
Total DA + Balancing								\$2,500 ←

No modeling differences, no balancing.

ARR/FTR Product

- **Allocation of congestion rents collected:**
 - **Provides credit (congestion offset) for transmission access to less expensive generation.**
 - **Evolved from physical rights to transmission.**
 - **Should not provide more revenue than congestion collected.**
 - **Would be over payment to FTR holder**
 - **Target allocation a distribution metric for under and over allocation, not a guarantee of payout.**

Real Time versus Balancing Congestion

- **DA has 50 MW transfer, RT 40 MW Transfer, CLMP the same (flat gen offers)**

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
D	\$100	50	100	\$5,000	\$10,000	\$5,000
Total		150	150	\$10,000	\$12,500	\$2,500
Bus	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	90	50	\$4,500	\$2,500	(\$2,000)
D	\$100	60	100	\$6,000	\$10,000	\$4,000
Total		150	150	\$10,500	\$12,500	\$2,000
Bus	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$50	-10	0	(\$500)	\$0	\$500
D	\$100	10	0	\$1,000	\$0	(\$1,000)
Total Deviation		0	0	\$500	\$0	(\$500)
Total DA + Balancing						\$2,000

Total generation credits go up by \$500

-\$500 balancing congestion

Over collection falls by \$500, to \$2000

Real Time versus Balancing Congestion

- DA has 50 MW transfer, RT 40 MW Transfer, CLMP the same (flat gen offers)

		FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
DA	A to D	50	50	\$50	\$2,500	\$2,500
	Total				\$2,500	\$2,500

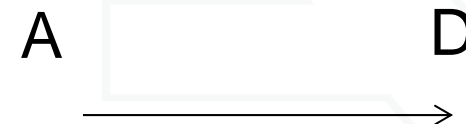
		FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
RT	A to D	50	40	\$50	\$2,500	\$2,000
	Total				\$2,500	\$2,000

		FTR MW	Deviation	CLMP Difference	Target Allocations	Balancing Congestion
Balancing	A to D	50	(10)	\$50	\$2,500	(\$500)
	Total				\$2,500	(\$500)
DA + Balancing	A to D					\$2,000

FTR	Target Allocation	Day Ahead Congestion	Balancing Congestion	Total Congestion	Funding
A to D	\$ 2,500.00	\$ 2,500.00	\$ (500.00)	\$ 2,000.00	\$ (500.00)



50 MW DA



40 MW RT

ARR/FTR Product

- **FTRs target allocation is \$2,500 but actual congestion is \$2,000.**
- **Indicates load was charged \$2,000 in congestion based on day ahead and real time (balancing) system conditions.**
- **\$2,000 is allocated to FTR holders.**
- **If load has to pay total of \$2,500 to FTR holders, load is forced to pay \$500 ($\$2,500 - \$2,000$) more in congestion that was actually incurred.**
- **Double charge for congestion incurred**

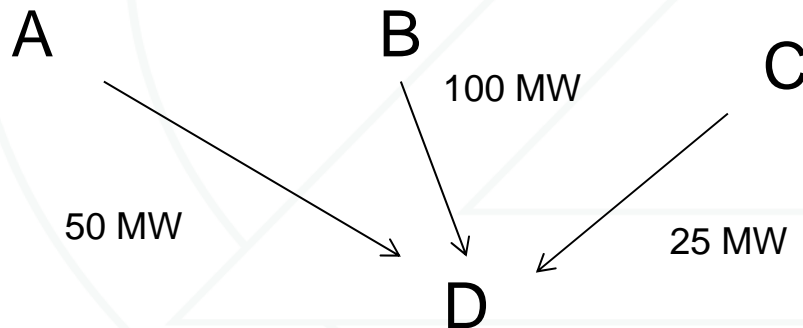


ARR/FTR Product

- **FTR pay out of \$2,000 offsets congestion completely.**
- **If FTR pay out is \$2,500, but actual congestion is \$2,000, FTR holders would be subsidized.**
- **Depending on allocation of the FTRs and the uplift charges, winners and losers, wealth transfers.**

Congestion/FTR Example: FTR MW = DA Model MW

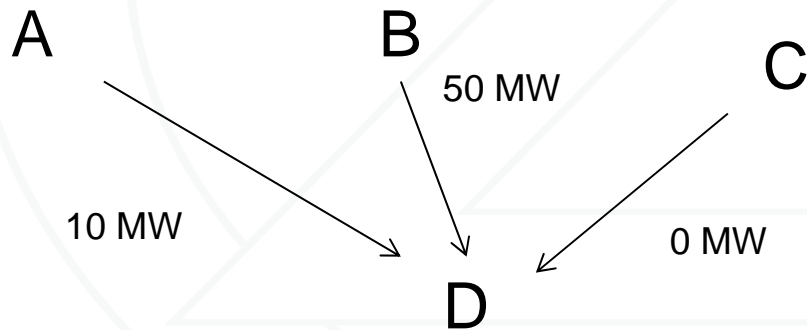
Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
B	\$55	100	0	\$5,500	\$0	(\$5,500)
C	\$75	100	75	\$7,500	\$5,625	(\$1,875)
D	\$100	50	225	\$5,000	\$22,500	\$17,500
Total		350	350	\$23,000	\$30,625	\$7,625



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	50	\$50	\$2,500	\$2,500
B to D	100	100	\$45	\$4,500	\$4,500
C to D	25	25	\$25	\$625	\$625
Total				\$7,625	\$7,625

Congestion/FTR Example: FTR MW > DA Model MW

	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	60	50	\$3,000	\$2,500	(\$500)
B	\$55	50	0	\$2,750	\$0	(\$2,750)
C	\$75	75	75	\$5,625	\$5,625	\$0
D	\$100	165	225	\$16,500	\$22,500	\$6,000
		350	350	\$27,875	\$30,625	\$2,750



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	10	\$50	\$2,500	\$500
B to D	100	50	\$45	\$4,500	\$2,250
C to D	25	-	\$25	\$625	\$0
Total				\$7,625	\$2,750

Congestion/FTR Example: DA vs RT Model Issue

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
B	\$55	100	0	\$5,500	\$0	(\$5,500)
C	\$75	100	75	\$7,500	\$5,625	(\$1,875)
D	\$100	50	225	\$5,000	\$22,500	\$17,500
Total		350	350	\$23,000	\$30,625	\$7,625
	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	60	50	\$3,000	\$2,500	(\$500)
B	\$55	50	0	\$2,750	\$0	(\$2,750)
C	\$75	75	75	\$5,625	\$5,625	\$0
D	\$100	165	225	\$16,500	\$22,500	\$6,000
Total		350	350	\$27,875	\$30,625	\$2,750
	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$50	-40	0	(\$2,000)	\$0	\$2,000
B	\$55	-50	0	(\$2,750)	\$0	\$2,750
C	\$75	-25	0	(\$1,875)	\$0	\$1,875
D	\$100	115	0	\$11,500	\$0	(\$11,500)
Deviation		0		\$4,875	\$0	(\$4,875)
Total DA + Balancing						\$2,750

Congestion/FTR Example

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	50	\$50	\$2,500	\$2,500
B to D	100	100	\$45	\$4,500	\$4,500
C to D	25	25	\$25	\$625	\$625
Total				\$7,625	\$7,625

Target Allocation	Day Ahead Congestion	Balancing Congestion	Total Congestion	Funding
\$ 7,625.00	\$ 7,625.00	(4,875)	\$2,750	(\$4,875)

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	10	\$50	\$2,500	\$500
B to D	100	50	\$45	\$4,500	\$2,250
C to D	25	-	\$25	\$625	\$0
Total				\$7,625	\$2,750

	FTR MW	Deviation	CLMP Difference	Target Allocations	Balancing Congestion
A to D	50	(40)	\$50	\$2,500	(\$2,000)
B to D	100	(50)	\$45	\$4,500	(\$2,250)
C to D	25	(25)	\$25	\$625	(\$625)
Total				\$7,625	(\$4,875)

ARR/FTR Product

- **FTRs target allocation is \$7,625 but actual congestion is \$2,750.**
- **Indicates load was charged \$2,750 in congestion based on day ahead and real time (balancing) system conditions.**
- **\$2,750 is allocated to FTR holders.**
- **If load has to pay total of \$7,625 to FTR holders, load is forced to pay \$4,875 ($\$7,625 - \$2,750$) more in congestion that was actually incurred.**
- **Double charge for congestion incurred**



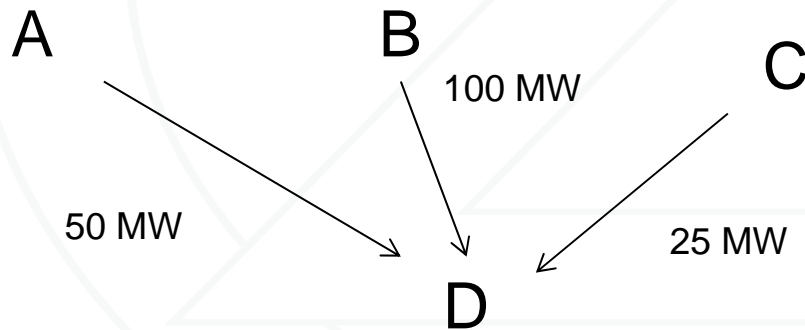
ARR/FTR Product

- **FTR pay out of \$2,750 offsets congestion completely.**
- **If FTR pay out is \$7,625, but actual congestion is \$2,750, FTR holders would be subsidized.**
- **Depending on allocation of the FTRs and the uplift charges, winners and losers, wealth transfers.**



Congestion/FTR Example # 2

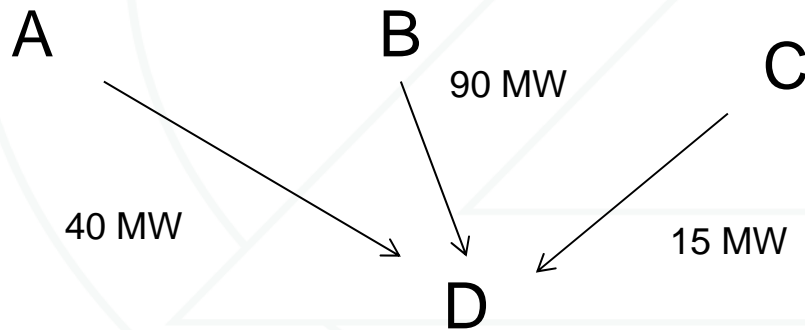
Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
B	\$55	100	0	\$5,500	\$0	(\$5,500)
C	\$75	100	75	\$7,500	\$5,625	(\$1,875)
D	\$100	50	225	\$5,000	\$22,500	\$17,500
Total		350	350	\$23,000	\$30,625	\$7,625



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	50	\$50	\$2,500	\$2,500
B to D	100	100	\$45	\$4,500	\$4,500
C to D	25	25	\$25	\$625	\$625
Total				\$7,625	\$7,625

Congestion/FTR Example

	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
B	\$35	90	0	\$3,150	\$0	(\$3,150)
C	\$65	90	75	\$5,850	\$4,875	(\$975)
D	\$125	80	225	\$10,000	\$28,125	\$18,125
Total		350	350	\$21,250	\$34,250	\$13,000



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	40	\$100	\$2,500	\$4,000
B to D	100	90	\$90	\$4,500	\$8,100
C to D	25	15	\$60	\$625	\$900
Total				\$7,625	\$13,000

Congestion/FTR Example

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$50	100	50	\$5,000	\$2,500	(\$2,500)
B	\$55	100	0	\$5,500	\$0	(\$5,500)
C	\$75	100	75	\$7,500	\$5,625	(\$1,875)
D	\$100	50	225	\$5,000	\$22,500	\$17,500
Total		350	350	\$23,000	\$30,625	\$7,625
	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
B	\$35	90	0	\$3,150	\$0	(\$3,150)
C	\$65	90	75	\$5,850	\$4,875	(\$975)
D	\$125	80	225	\$10,000	\$28,125	\$18,125
Total		350	350	\$21,250	\$34,250	\$13,000
	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$25	-10	0	(\$250)	\$0	\$250
B	\$35	-10	0	(\$350)	\$0	\$350
C	\$65	-10	0	(\$650)	\$0	\$650
D	\$125	30	0	\$3,750	\$0	(\$3,750)
Deviation		0		\$2,500	\$0	(\$2,500)
Total DA + Balancing						\$5,125

Congestion/FTR Example

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	50	\$50	\$2,500	\$2,500
B to D	100	100	\$45	\$4,500	\$4,500
C to D	25	25	\$25	\$625	\$625
Total				\$7,625	\$7,625

Target Allocation	Day Ahead Congestion	Balancing Congestion	Total Congestion	Funding
\$ 7,625.00	\$ 7,625.00	\$ (2,500.00)	\$ 5,125.00	\$ (2,500.00)

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	50	40	\$100	\$2,500	\$4,000
B to D	100	90	\$90	\$4,500	\$8,100
C to D	25	15	\$60	\$625	\$900
Total				\$7,625	\$13,000

	FTR MW	Deviation	CLMP Difference	Target Allocations	Balancing Congestion
A to D	50	(10)	\$100	\$2,500	(\$1,000)
B to D	100	(10)	\$90	\$4,500	(\$900)
C to D	25	(10)	\$60	\$625	(\$600)
Total				\$7,625	(\$2,500)

ARR/FTR Product

- **FTRs target allocation is \$7,625 but actual congestion is \$5,125.**
- **Indicates load was charged \$5,125 in congestion based on day ahead and real time (balancing) system conditions.**
- **\$5,125 is allocated to FTR holders.**
- **If load has to pay at total of \$7,625 to FTR holders, load is forced to pay \$2,500 ($\$7,625 - \$2,750$) more in congestion that was actually incurred.**
- **Double charge for congestion incurred**

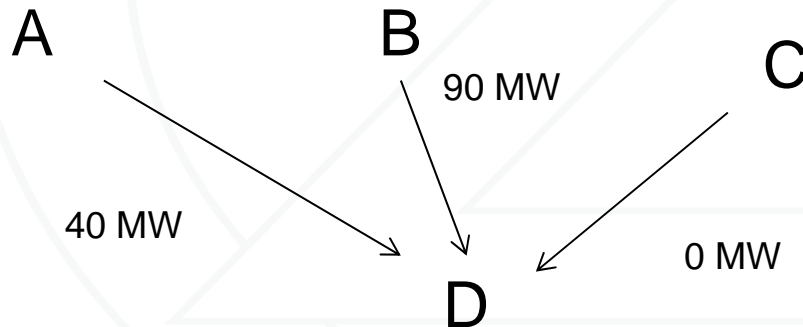
ARR/FTR Product

- **FTR pay out of \$5,125 offsets congestion completely.**
- **If FTR pay out is \$7,625, but actual congestion is \$5,125, FTR holders would be subsidized.**
- **Depending on allocation of the FTRs and the uplift charges, winners and losers, wealth transfers.**



Congestion/FTR Example # 3

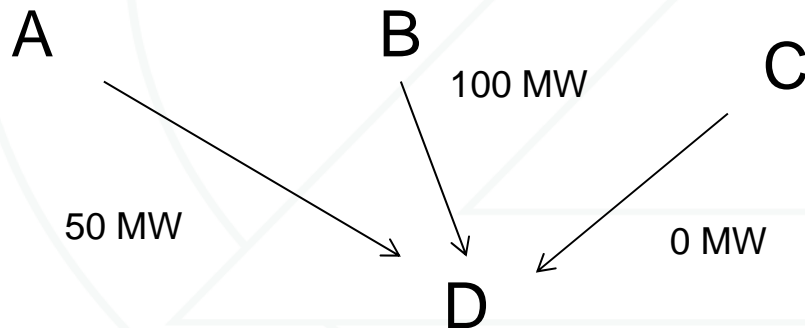
Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
B	\$35	90	0	\$3,150	\$0	(\$3,150)
C	\$75	75	75	\$5,625	\$5,625	\$0
D	\$100	70	200	\$7,000	\$20,000	\$13,000
Total		325	325	\$18,025	\$26,875	\$8,850



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	40	40	\$75	\$3,000	\$3,000
B to D	80	90	\$65	\$5,200	\$5,850
C to D	-	-	\$25	\$0	\$0
Total				\$8,200	\$8,850

Congestion/FTR Example

	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$30	100	50	\$3,000	\$1,500	(\$1,500)
B	\$40	100	0	\$4,000	\$0	(\$4,000)
C	\$75	100	100	\$7,500	\$7,500	\$0
D	\$90	50	200	\$4,500	\$18,000	\$13,500
Total		350	350	\$19,000	\$27,000	\$8,000



	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	40	50	\$60	\$3,000	\$3,000
B to D	80	100	\$50	\$5,200	\$5,000
C to D	-	-	\$15	\$0	\$0
Total				\$8,200	\$8,000

Congestion/FTR Example

Bus	DA CLMP	DA MW GEN	DA MW Load	Gen Credit	Load Charges	Total Congestion
A	\$25	90	50	\$2,250	\$1,250	(\$1,000)
B	\$35	90	0	\$3,150	\$0	(\$3,150)
C	\$75	75	75	\$5,625	\$5,625	\$0
D	\$100	70	200	\$7,000	\$20,000	\$13,000
Total		325	325	\$18,025	\$26,875	\$8,850
	RT CLMP	RT MW GEN	RT MW Load	Gen Credit	Load Charges	Total Congestion
A	\$30	100	50	\$3,000	\$1,500	(\$1,500)
B	\$40	100	0	\$4,000	\$0	(\$4,000)
C	\$75	100	100	\$7,500	\$7,500	\$0
D	\$90	50	200	\$4,500	\$18,000	\$13,500
Total		350	350	\$19,000	\$27,000	\$8,000
	RT CLMP	Gen DEV	Load Dev	Gen Credit	Load Charges	Bal. Congestion
A	\$30	10	0	\$300	\$0	(\$300)
B	\$40	10	0	\$400	\$0	(\$400)
C	\$75	25	25	\$1,875	\$1,875	\$0
D	\$90	-20	0	(\$1,800)	\$0	\$1,800
Deviation		25	25	\$775	\$1,875	\$1,100
Total DA + Balancing						\$9,950

Congestion/FTR Example

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	40	40	\$75	\$3,000	\$3,000
B to D	80	90	\$65	\$5,200	\$5,850
C to D	-	-	\$25	\$0	\$0
Total				\$8,200	\$8,850

Target Allocation	Day Ahead Congestion	Balancing Congestion	Total Congestion	Funding
\$ 8,200.00	\$ 8,850.00	\$ 1,100.00	\$ 9,950.00	\$ 1,750.00

	FTR MW	Flow	CLMP Difference	Target Allocations	Congestion
A to D	40	50	\$60	\$3,000	\$3,000
B to D	80	100	\$50	\$5,200	\$5,000
C to D	-	-	\$15	\$0	\$0
Total				\$8,200	\$8,000

	FTR MW	Deviation	CLMP Difference	Target Allocations	Balancing Congestion
A to D	40	10	\$60	\$3,000	\$600
B to D	80	10	\$50	\$5,200	\$500
C to D	-	-	\$15	\$0	\$0
Total				\$8,200	\$1,100

ARR/FTR Product

- **FTRs target allocation is \$8,200 but actual congestion is \$9,950.**
- **Indicates load was charged \$9,950 in congestion based on day ahead and real time (balancing) system conditions.**
- **\$8,850 is allocated to FTR holders (initially).**
- **FTRs paid \$1,750 less than congestion incurred.**
- **FTR paid surplus at end of year, load does not get surplus.**



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