



# ATC Customer Benefit Metric

Marty Smith  
ATC Economic Planning

April 5, 2012

Helping to **keep the lights on,**  
businesses running and communities strong®





# Background

- ATC has used the Customer Benefit (CB) Metric for several years to quantify the economic benefits to ATC customers
- ATC presented results for each specific component of the CB Metric at the previous Stakeholder meeting held on January 30<sup>th</sup>
- Stakeholders requested that ATC provide more detail on calculation of the CB Metric at a future stakeholder meeting



# Additional Economic Impacts Captured

- The CB Metric explicitly takes into account
  - The degree of cost-based versus market based generation in Wisconsin;
  - The level of FTR coverage for ATC-internal generation;
  - The level of FTR coverage for imports into the ATC service area;
  - The extent to which a project may make additional FTRs available to LSEs into the ATC service area; and
  - The difference between marginal losses, loss refunds, and the PROMOD modeling of energy losses.

# Financial Settlement Calculation

## Settlements Format for CB Metric

- Load Pays local Locational Marginal Price (LMP)
- Generator Revenues Received at local Gen LMP
- + Cost of Utility Generation (Production Cost\*)
- FTR Revenue to the Utility
- Loss Refund Revenues for over-collection
- = Impact to Ratepayers

\* Not settled through the MISO market

# CB Metric Calculation of Financial Settlement

- The financial settlement including emissions cost can be calculated from PROMOD data as follows:

Cost to Serve ATC Load

= Supply + Congestion and Loss + Emissions Costs

- The result of this calculation provides the total cost to serve ATC customer load in the MISO market
- This equation is equivalent to the financial settlement but is built up from the supply cost using data available from PROMOD.

# CB Metric Components

## Customer Benefit Metric Components:

- **Supply Cost**
  1. Net Production Cost excluding IPPs within ATC
  2. IPP Purchase Cost to Utilities
  3. Import Cost
  4. Export Revenue
- **Congestion Cost**
  5. Congestion Cost
  6. Revenue from Existing External FTRs
  7. ATC Internal FTR Value
- **Loss Cost**
  8. Marginal Loss Cost
  9. Loss Refund on Internal Transactions and Imports
  10. "Credit" for Losses Already Captured in Production Cost
  11. Cost of Load Change due to Losses
- **Emission Costs**
  12. Cost due to Emissions



# Cost of Supply Calculation

- The first 4 components of the CB Metric combine to make up the cost of generation supply

## Supply Cost

1. Net Production Cost excluding IPPs within ATC
2. IPP Purchase Cost to Utilities
3. Import Cost
4. Export Revenue



# Net Production Cost excluding IPPs within ATC

- Generation revenue paid to Independent Power Producers (IPPs) is not an offset to utility customer cost
- Similarly, IPP production cost is not a utility customer cost
- IPP production cost is removed from the Net Production Cost
- The cost of needed IPP generation to the ATC utilities is later accounted for as a purchase cost
- The ATC Net Production Cost is calculated as:

Net Production Cost =

Total ATC Utility Production Cost – IPP Production Cost

- This calculation only adjusts for IPP generation costs identified within the ATC footprint
- All calculations are performed using hourly data





# IPP Purchase Cost to Utilities

- The cost of IPP generation within the ATC footprint is treated as a market-based purchase from merchant generators
- Historically, the Fox Energy Center and Point Beach have been treated as IPP purchases
- The production cost from these generators is removed in the Net Production Cost calculation and included as a purchase at the market price of energy

$$\text{IPP Purchase Cost} = \text{IPP Gen MWh} * \text{Gen LMP}$$

- This value is equivalent to what the generator would receive as market-based revenue



# Import Cost

- The cost of imports is estimated using the market price at external hubs
- A composite external hub price is calculated using a weighted average of the Illinois and the Minnesota hubs
- Historically, ATC has used a 2/3 Illinois and 1/3 Minnesota hub weighting for the composite hub price
- The hourly import volume (MWh) is determined from the interchange amount

$$\text{Import Cost} = \text{Import MWh} * \text{Composite LMP}$$



# Export Revenue

- The revenue from exports is estimated using the weighted average generator LMP for the WUMS zone multiplied by the export volume
- The hourly export volume (MWh) is determined from the interchange amount

$$\text{Export Revenue} = \text{Export MWh} * \text{Average Generator LMP}$$



# Congestion Components

- Components 5-7 of the CB Metric combine account for congestion costs net of the congestion hedged through FTRs

## Net Congestion Cost to Utility

5. Congestion Cost
6. Revenue from Existing External FTRs
7. ATC Internal FTR Value

# Congestion Cost

- ATC congestion cost is categorized as either internal (generation to load) or import congestion
- The internal congestion cost is:

$$\text{Internal Congestion} = (\text{Load-Imports}) * (\text{MCC}_{load} - \text{MCC}_{gen})$$

- Where the Marginal Congestion Cost (MCC) values are the weighted average values for WUMS (ATC)

- The import congestion cost is:

Import Congestion

$$= \text{Imports} * (\text{MCC}_{load} - [2 * \text{MCC}_{IL} + \text{MCC}_{MN}]/3)$$

- Where MCC of the Illinois and Minnesota hubs are weighted the same as for the import cost calculation [composite LMP]



# Revenue from Existing External FTRs

- The revenue from existing FTRs is calculated as:

Value of Existing FTRs

$$= \text{Existing FTRs (MW)} * (\text{MCC}_{\text{load}} - \text{MCC}_{\text{outsidegen}})$$

- Historically, this calculation assumes the following quantity of FTRs between ATC load (WUMS) and external generation resources
  - For example, 104 MW between Boswell 4 and ATC Load
- Depending on congestion patterns, FTRs can cost utilities money. If so, it is assumed that utilities would not select these FTRs (in the long run)



# Revenue from Incremental External FTRs (Project Case) 1

- Incremental valuable FTRs from external resources may be made available if a project increases import capability as quantified by the First Contingency Incremental Transfer Capability (FCITC) into ATC (WUMS)
- The quantity of FTRs made available is based on the average FCITC Increase into WUMS after the Project based on (Summer On Peak) Transfer Studies
- Assumes that ATC customers would have full FTR coverage for likely and potential future “outside” network resources
- Assumes ATC utilities would request additional FTRs from external resources only if the FTR has a positive value
- Additional potential FTRs for external resources associated with the FCITC increase after the project were apportioned based on the ratio of each generator's capacity to the total amount of "outside" generation



# Revenue from Incremental External FTRs (Project Case) 2

- The revenue from incremental external FTRs in the project case is then calculated as

Incremental FTR Value

$$= \text{Prorated FCITC} * (\text{MCC}_{\text{load}} - \text{MCC}_{\text{outsidegen}})$$

- Where the total FCITC is prorated based on the ratio of each generator's capacity to the total amount of "outside" generation
- No incremental value is included if the total incremental value is negative



# ATC Internal FTR Value

- ATC assumes that 85% of internal congestion costs from generation to load are hedged from internal FTRs
- This assumption is based on customer responses
- The internal FTR value is calculated as

Internal FTR Revenue

= Hedged % (85%) \* Internal Congestion Costs

- Where Internal Congestion = (Load-Imports) \* (MCC<sub>load</sub> - MCC<sub>gen</sub>)



# Loss Related Components

- Components 8-11 of the CB Metric combine to account for loss related cost impacts

## Net Loss Cost to Utility

8. Marginal Loss Cost
9. Loss Refund on Internal Transactions and Imports
10. “Credit” for Losses Already Captured in Production Cost
11. Cost of Load Change due to Losses

# Marginal Loss Cost

- ATC marginal loss cost is categorized as either internal (generation to load) or import losses

- The internal loss cost is:

$$\text{Internal Losses} = (\text{Load-Imports}) * (\text{MLC}_{load} - \text{MLC}_{gen})$$

- Where the MLC values are the weighted average values for WUMS (ATC)

- The import loss cost is:

Import Losses

$$= \text{Imports} * (\text{MLC}_{load} - [2 * \text{MLC}_{IL} + \text{MLC}_{MN}]/3)$$

- Where MLC of the Illinois and Minnesota hubs are weighted the same as for the import cost calculation [composite LMP]



# Loss Refund on Internal Transactions and Imports

- Marginal losses tend to be greater than the average losses on the transmission system
- Marginal loss costs are related to an incremental additional MW on the system and average twice the overall average loss cost on the system
- The loss refund is categorized as either internal, utility & IPP generation to Load, or import losses
- The loss refund is calculated as:

Loss Refund

=  $\frac{1}{2}$  of Internal Utility Marginal Loss Charges

+  $\frac{1}{2}$  of Utility Marginal Loss Charges on Imports

# “Credit” for Losses Already Captured in Production Cost

- Losses are part of the load modeled in PROMOD
- The Production Cost calculation includes the cost of supplying losses
- The cost of losses has been accounted for through the previous calculations of the marginal losses and the loss refund
- To avoid double counting, the production cost of losses is “credited” back, or removed from the cost
- The static loss % included in load forecast is used to credit back the production cost of the losses
- The static loss % is calculated from the base case as:  
**Static Loss %**  
**= Internal average loss cost / production cost**
- The credit for losses is calculated as:  
**Loss Credit**  
**= Adj. Prod. Cost \* Static Loss % in Load Forecast**



# Cost of Load Change due to Losses

- Physical losses are part of load modeled in PROMOD
- The same load is used in the base case and the project case for the PROMOD analysis
- If a project causes a change in losses, it effectively changes the load in the project case
- To account for this, the change in losses is valued at the project case LMP for each ATC utility zone
- If losses increase due to a project, this is an additional cost and if losses decrease it is a savings

Load Change Value

= Change in Losses MWh \* Project case LMP



# Cost due to Emissions

- The total pounds of emissions can be calculated in PROMOD
- The difference in emissions between the base case and project case can then be valued using an assumed cost of an emission allowance or tax (for example \$50 / ton for CO<sub>2</sub>)

Change in Cost due to emissions

= Change in emissions volume \* Cost of emission

# Putting it Together

- Perform PROMOD analysis on a base case scenario and then on the same scenario with the project included
- Difference analysis performed to determine project savings
- All future scenarios are then analyzed using ATC Customer Benefit (CB) Metric:

## ATC Customer Benefit

= Reduction in total cost due to including the project as calculated using the CB Metric

- ATC uses the strategic flexibility method where each future result is presented to provide the bounds for plausible futures.



# Example of an Import Project that Decreases Congestion

ATC Customer Benefit Change Description	ATC Benefit Impact (\$ - Year)	
<i>Higher Import Cost</i>	<b>(\$17,735,214)</b>	<b>Penalties</b>
<i>Decreased ATC Internal FTR Value</i>	<b>(\$5,006,370)</b>	
<i>Decreased Export Revenue</i>	<b>(\$2,699,523)</b>	
<i>Decreased Revenue from Existing External FTRs</i>	<b>(\$1,334,542)</b>	
<i>Net Increase in Marginal Loss Cost</i>	<b>(\$191,707)</b>	
<i>Increased "Credit" for Losses Already Captured in Production Cost</i>	<b>\$55,354</b>	<b>Benefits</b>
<i>Higher Loss Refund on Internal Transactions and Imports</i>	<b>\$95,854</b>	
<i>Decreased Cost of Load Change due to Losses</i>	<b>\$1,827,797</b>	
<i>Decreased Cost due to decreased CO<sub>2</sub> Emissions (CO<sub>2</sub> Tax)</i>	<b>\$4,553,880</b>	
<i>Congestion Cost Benefit</i>	<b>\$9,355,026</b>	
<i>Lower IPP Purchase Cost to Utilities</i>	<b>\$10,218,890</b>	
<i>Lower Net Production Cost excluding IPPs within ATC</i>	<b>\$12,317,268</b>	
<b>Total ATC Customer Benefit:</b>	<b>\$11,456,712</b>	

**(\$)** = Costs / Penalties

**\$** = Savings / Benefits

# Questions?

## ATC Economic Planning

- Dale Burmester
  - [dburmester@atcllc.com](mailto:dburmester@atcllc.com)
  - (608) 877-7109
- Marty Smith
  - [msmith@atcllc.com](mailto:msmith@atcllc.com)
  - (608) 877-7058