ATC Planning
Stakeholder Meeting

2009 Market Congestion Summary

Presented by Tom Dagenais
ATC Economic Planning
Feb. 22, 2010

AMERICAN TRANSMISSION COMPANY®

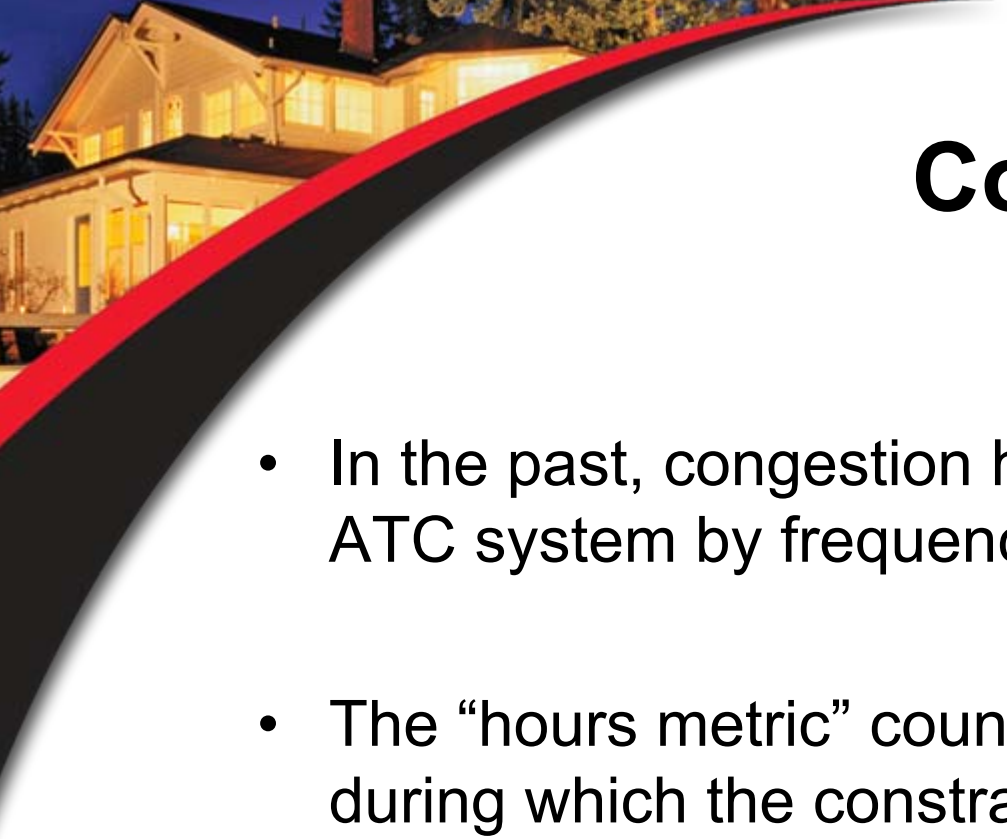
Overview

1. System Congestion Measures
   - Frequency (hours)
   - CSI (severity)
2. ATC 2009 Congestion Success Stories
3. ATC Remaining Congestion Issues
4. Potential Solutions to ATC Congestion

Part 1

Measuring System Congestion

AMERICAN TRANSMISSION COMPANY



Congestion Metrics

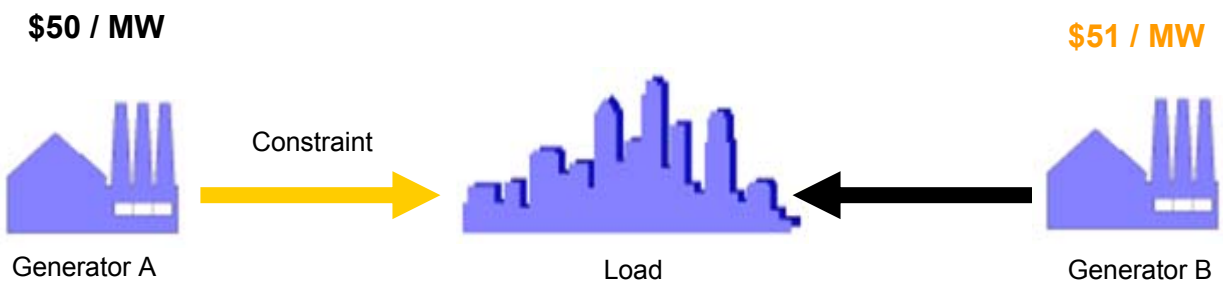
- In the past, congestion has been measured on the ATC system by frequency of constraints.
- The “hours metric” counted the number of hours during which the constraint occurred.
- This measurement didn’t provide a true assessment of the impacts our actions have on constraints in the MISO market.

Hours Metric Shortcomings

- Does not capture financial impacts of constraints

  Unit redispatch options vary by location and through time

Example 1: Minor constraint example



To relieve constraint:

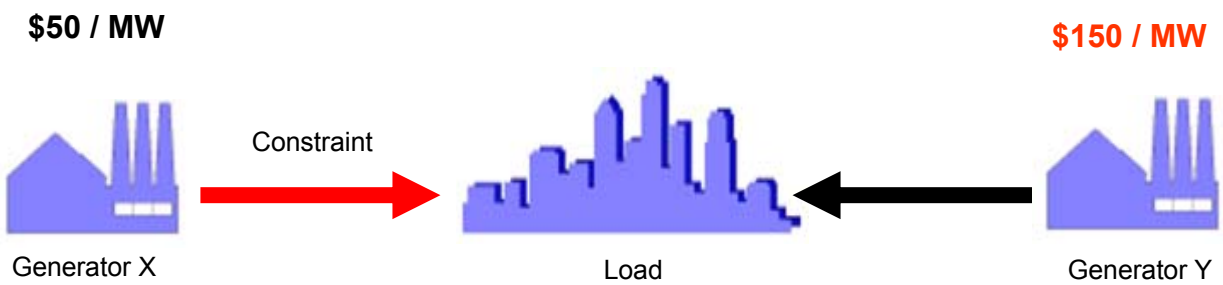
- Reduce output at the relatively cheap Generator A ($50 per MW)
- Increase output at the more expensive Generator B ($51 per MW)
- Power becomes slightly more expensive at the load

Hours Metric Shortcomings

- Does not capture financial impacts of constraints

  Unit redispatch options vary by location and through time

Example 2: Major constraint example

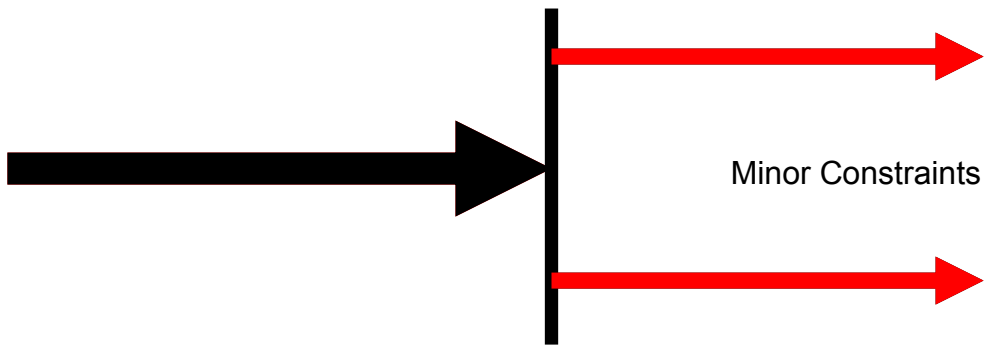


To relieve constraint:

- Reduce output at the relatively cheap Generator X ($50 per MW)
- Increase output at the more expensive Generator Y ($150 per MW)
- Power becomes much more expensive at the load

Hours Metric Shortcomings

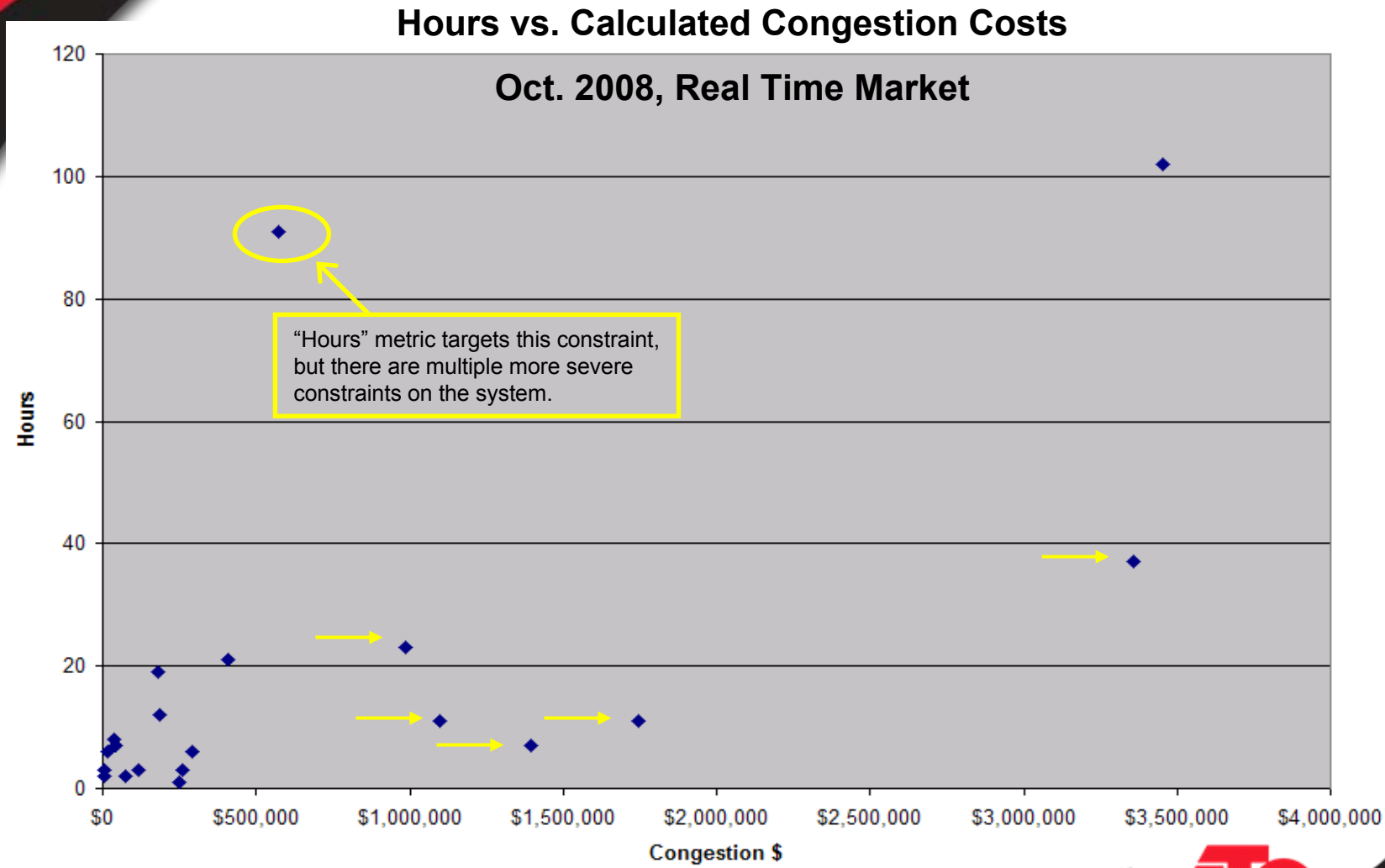
- Eliminating constraints may *increase* hours
  - Multiple downstream constraints may occur



System is improved, but hours metric increases!

AMERICAN TRANSMISSION COMPANY

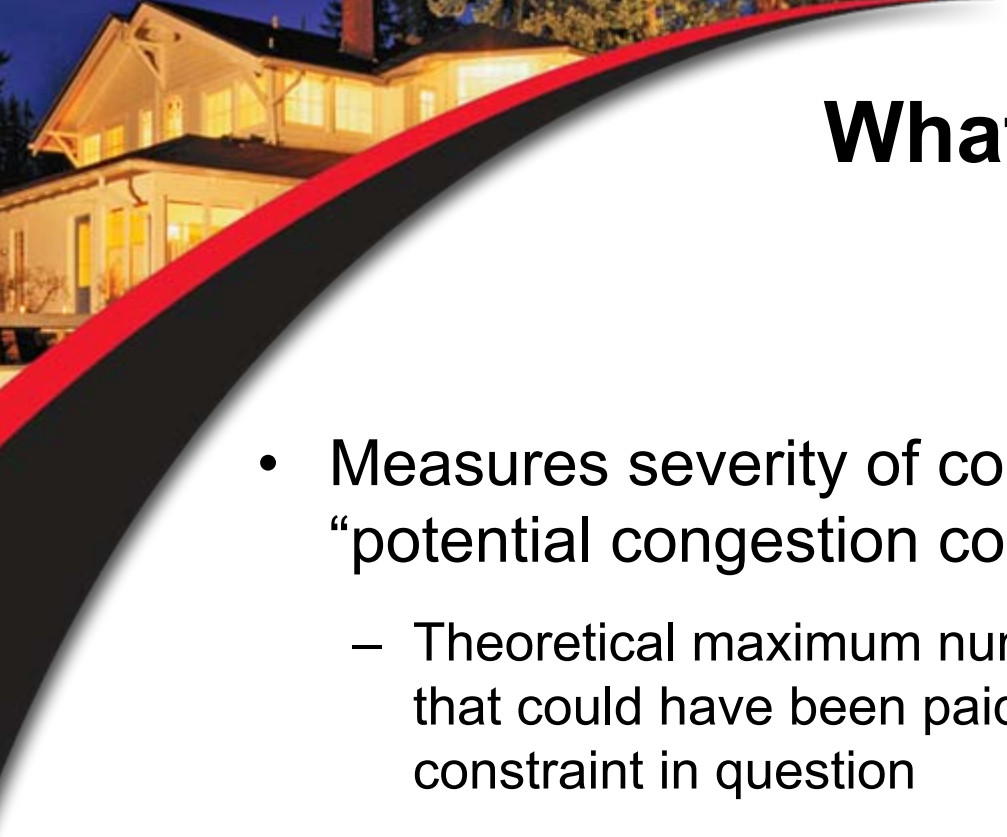
Frequency ≠ Financial Impact



Congestion Severity Index

- ATC has developed this measurement for tracking market constraints.

- The Congestion Severity Index takes into account both the amount of time a constraint is “bound” as well as the potential financial impacts (shadow price and MW flow) of the constraint during those times.



What is the Congestion Severity Index?

- Measures severity of constraints through the "potential congestion cost"
  - Theoretical maximum number of dollars (in millions) that could have been paid into the market due to the constraint in question
  - Approximation that puts a bound on the maximum amount of money that could be saved if the constraint did not exist

Congestion Severity Index

How are “potential congestion costs” calculated?

Based on market fact for congestion costs at a node:

MW load at node * MCC[1] at node = Congestion Dollars

Approximation of this calculation for a transmission element:

$\sum_{\text{All Hours}}$ [Rating[2] * Shadow Price] = Congestion Severity Index

[1] MCC = Marginal Congestion Component of LMP

[2] Rating ≈ Line flow for a constrained element

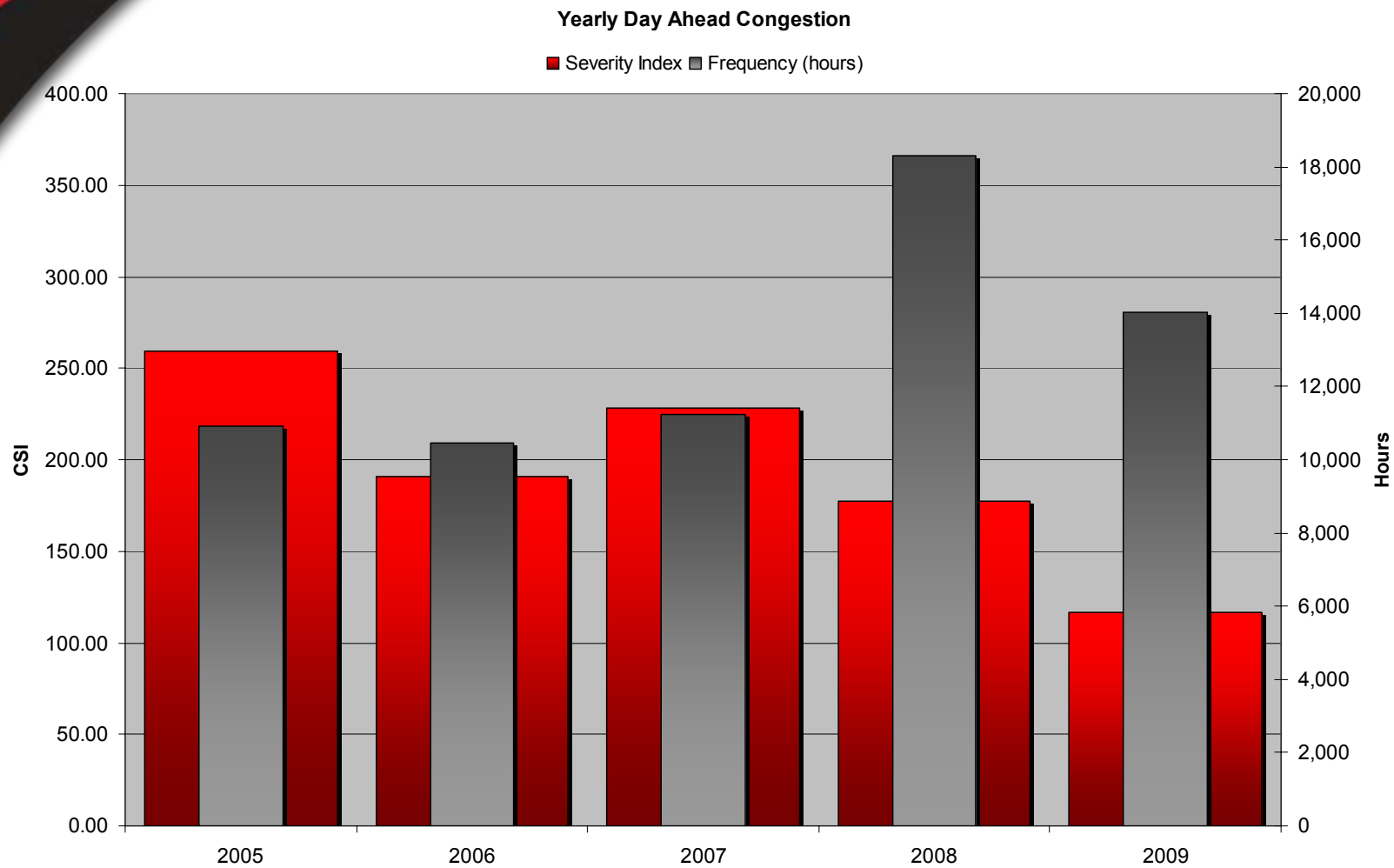
Congestion Severity Index History

	DA Severity Index	RT Severity Index
2005*	259.54	320.54
2006	190.50	223.08
2007	228.08	234.48
2008	177.13	179.87
2009	116.52	108.45

* No data before 4/1/05 (commencement of market operations)

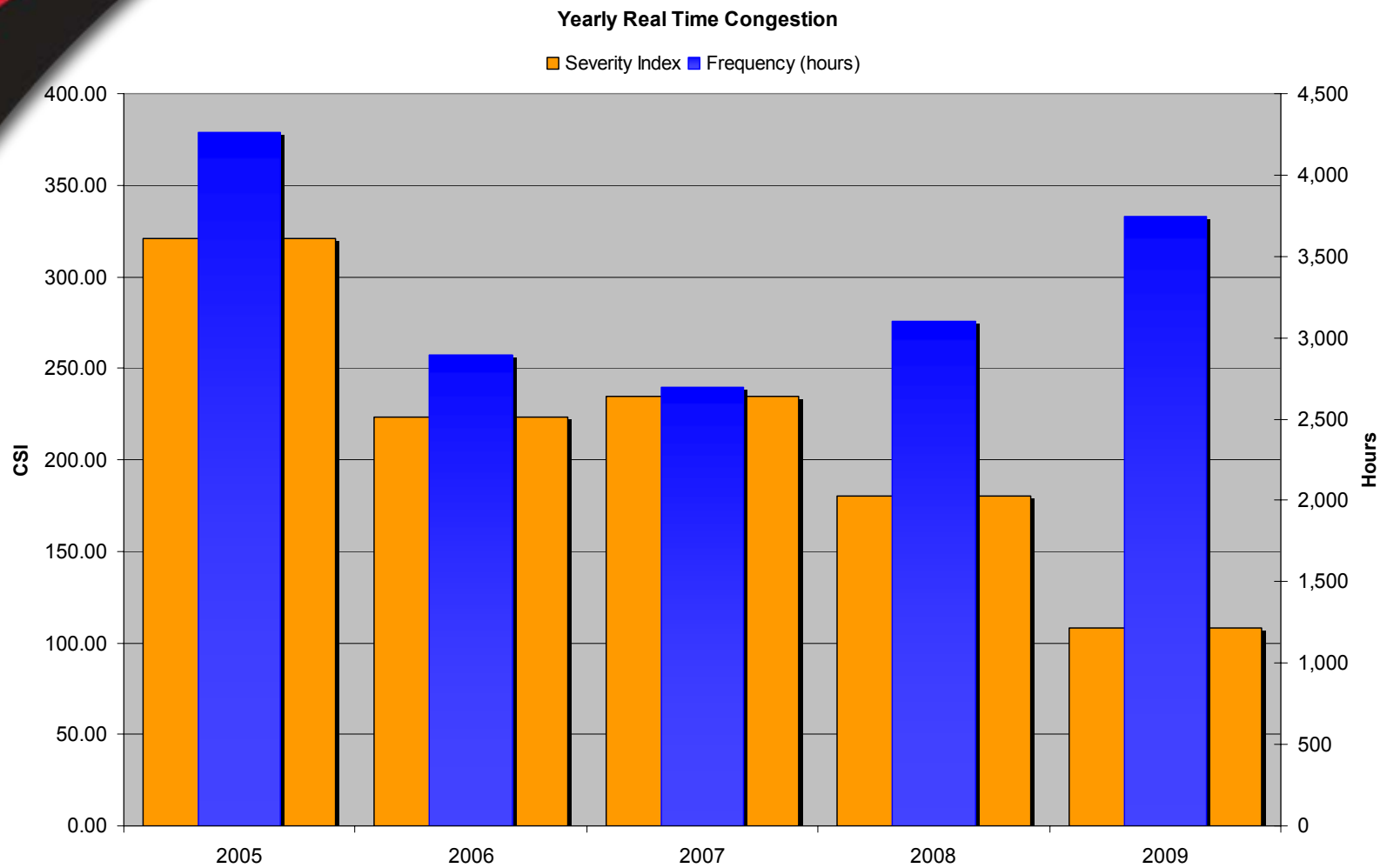
Annual CSI vs. Hours

ATC Footprint: Day Ahead Market

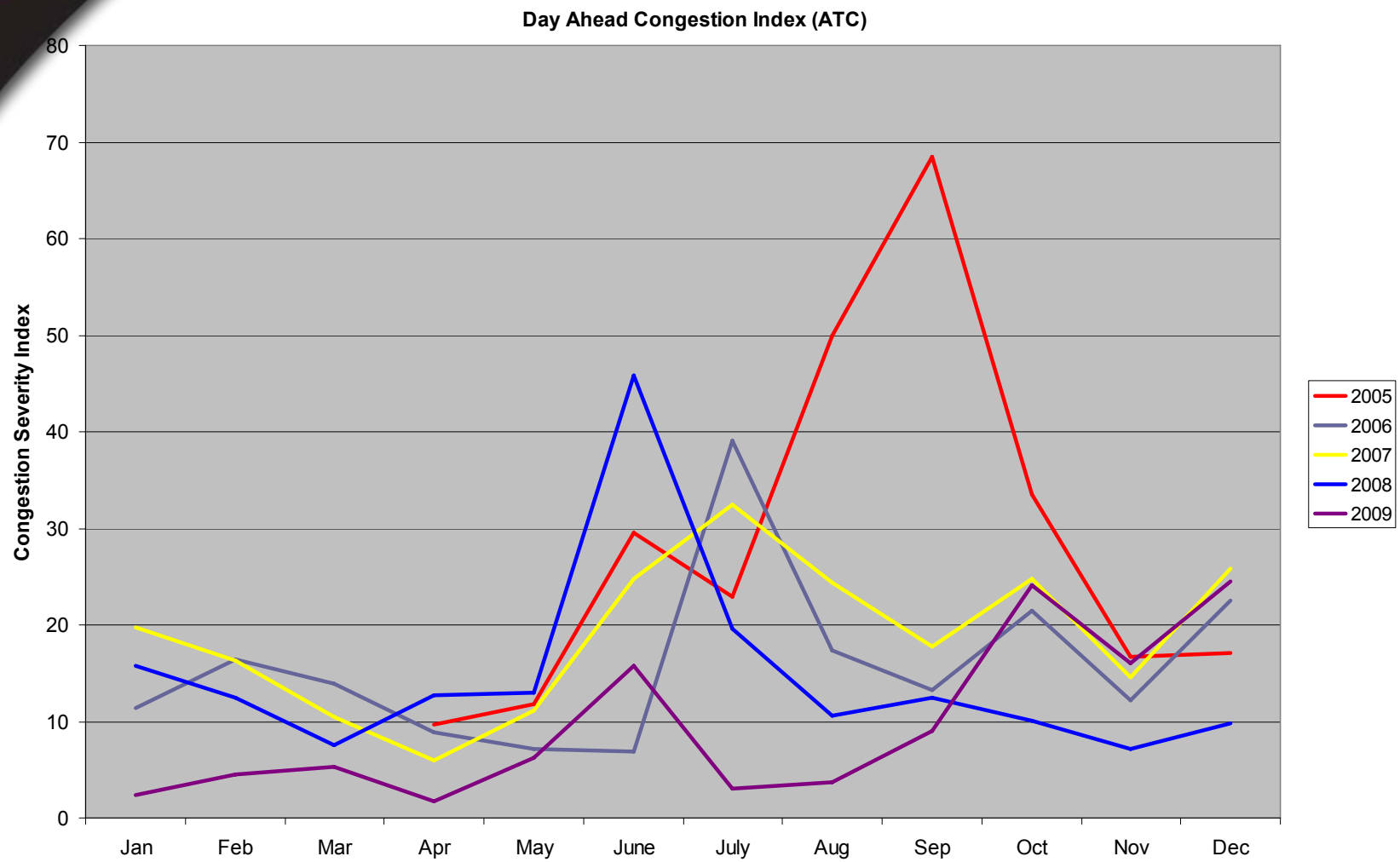


Annual CSI vs. Hours

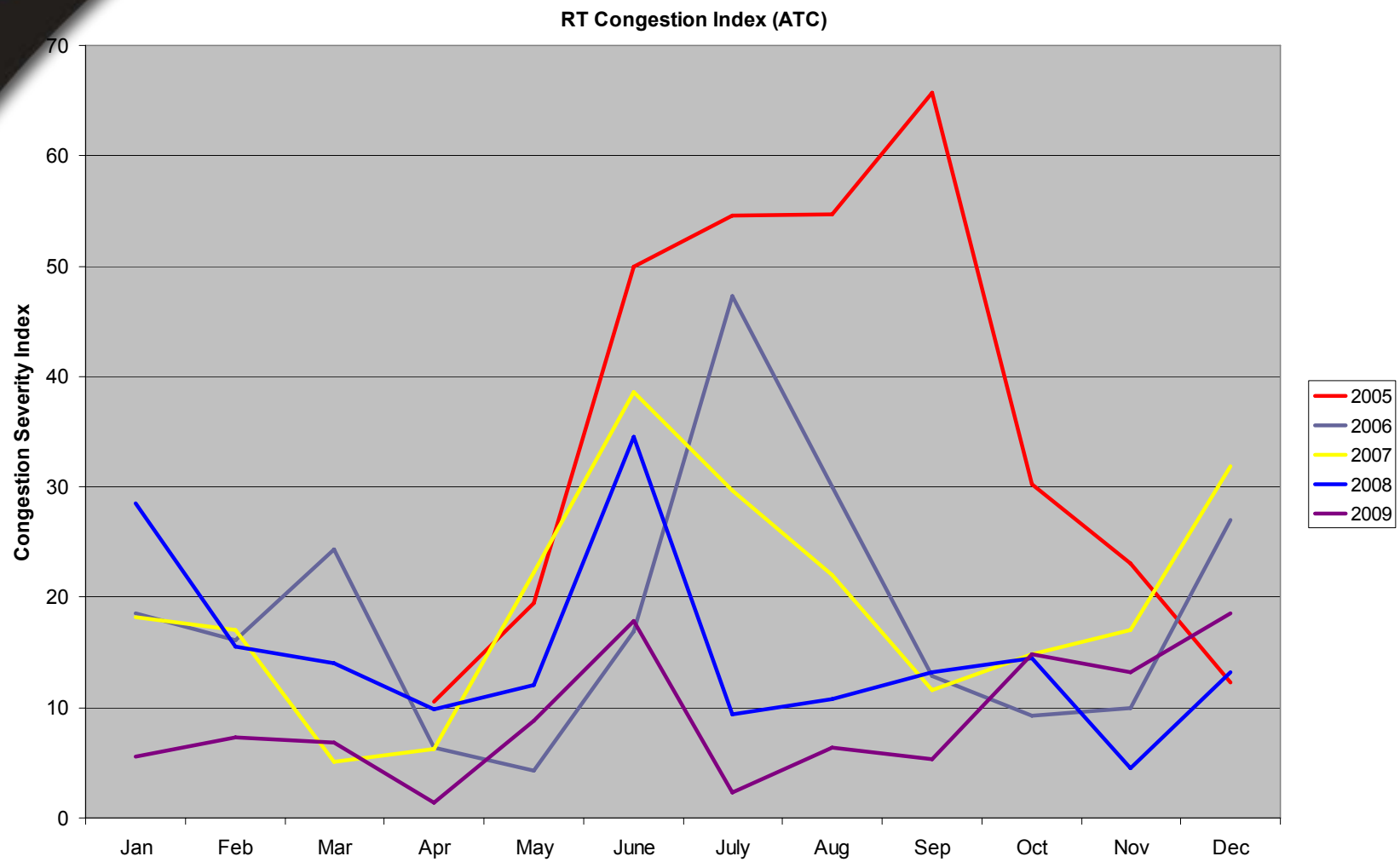
ATC Footprint: Real Time Market



Day Ahead CSI By Month



Real Time CSI By Month

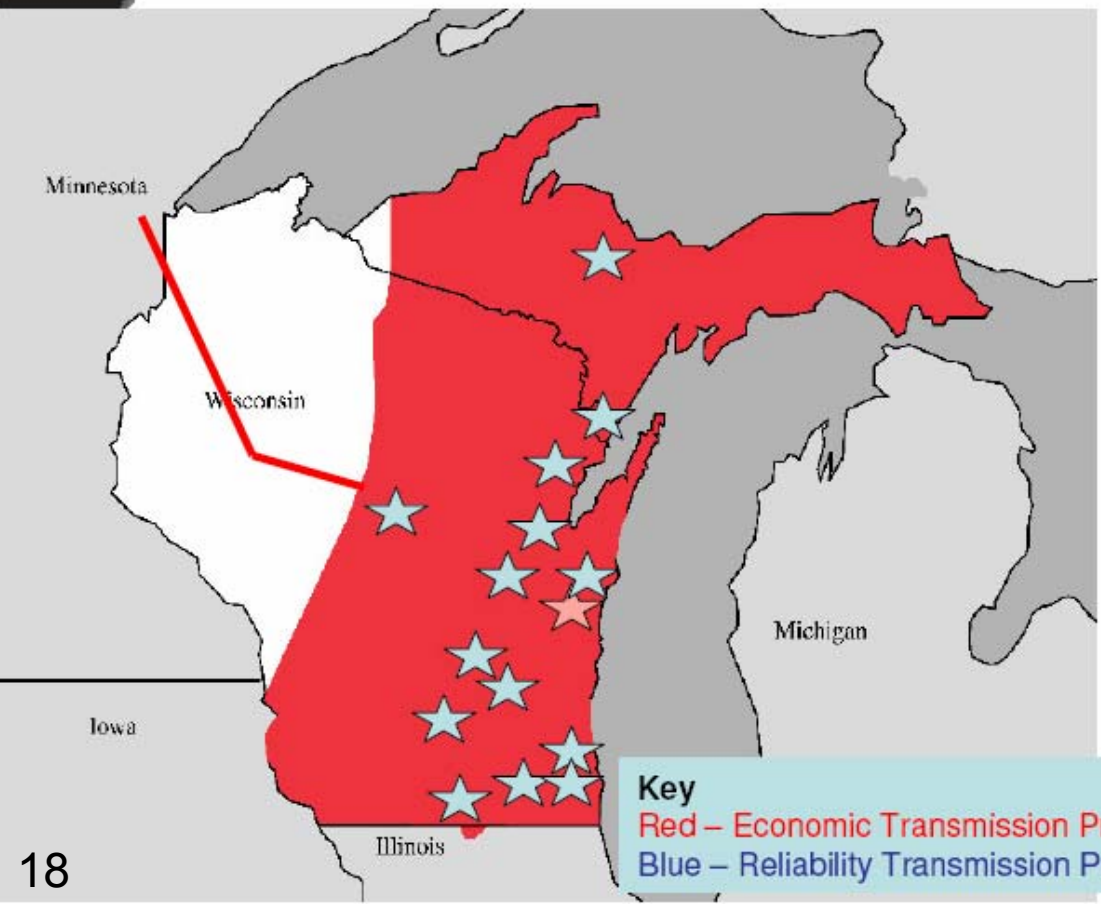


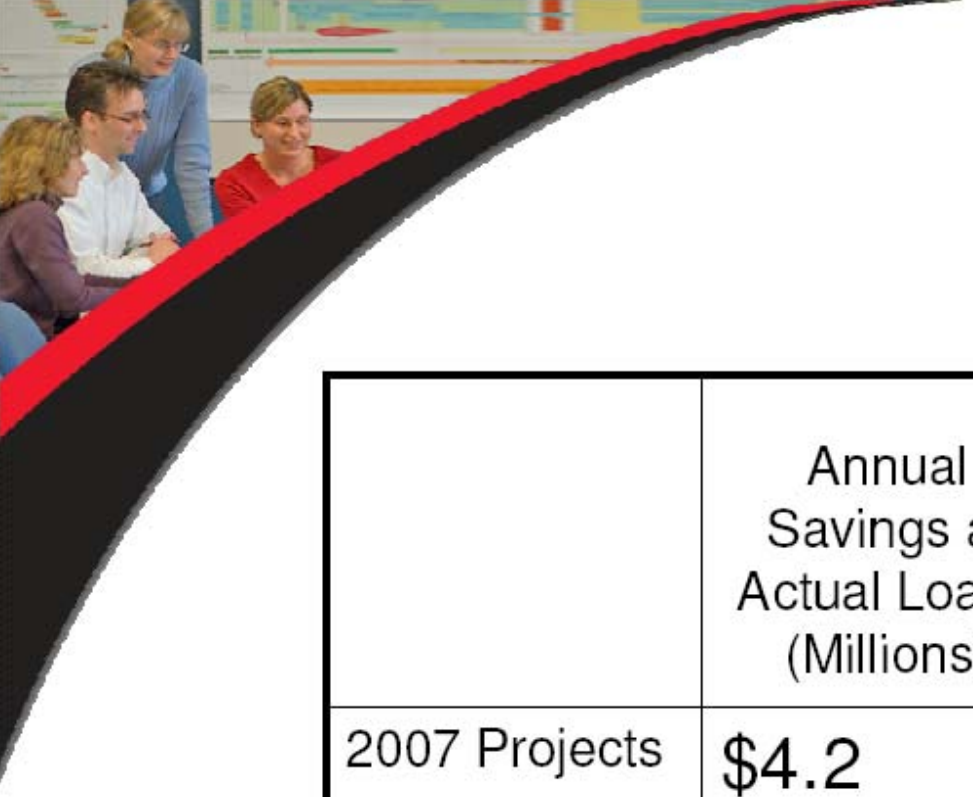
Part 2

2009 Success Stories

In-Service Projects Net Ratepayer Benefit

- Projects were required for Reliability or justified by Economic Benefits
- Projects provided $24.0 Million in 2009 due to reduced energy costs and losses
- Forecasting ongoing savings at the 2009 level, approximately 103% of project costs are offset
- Project costs = ~$492 million

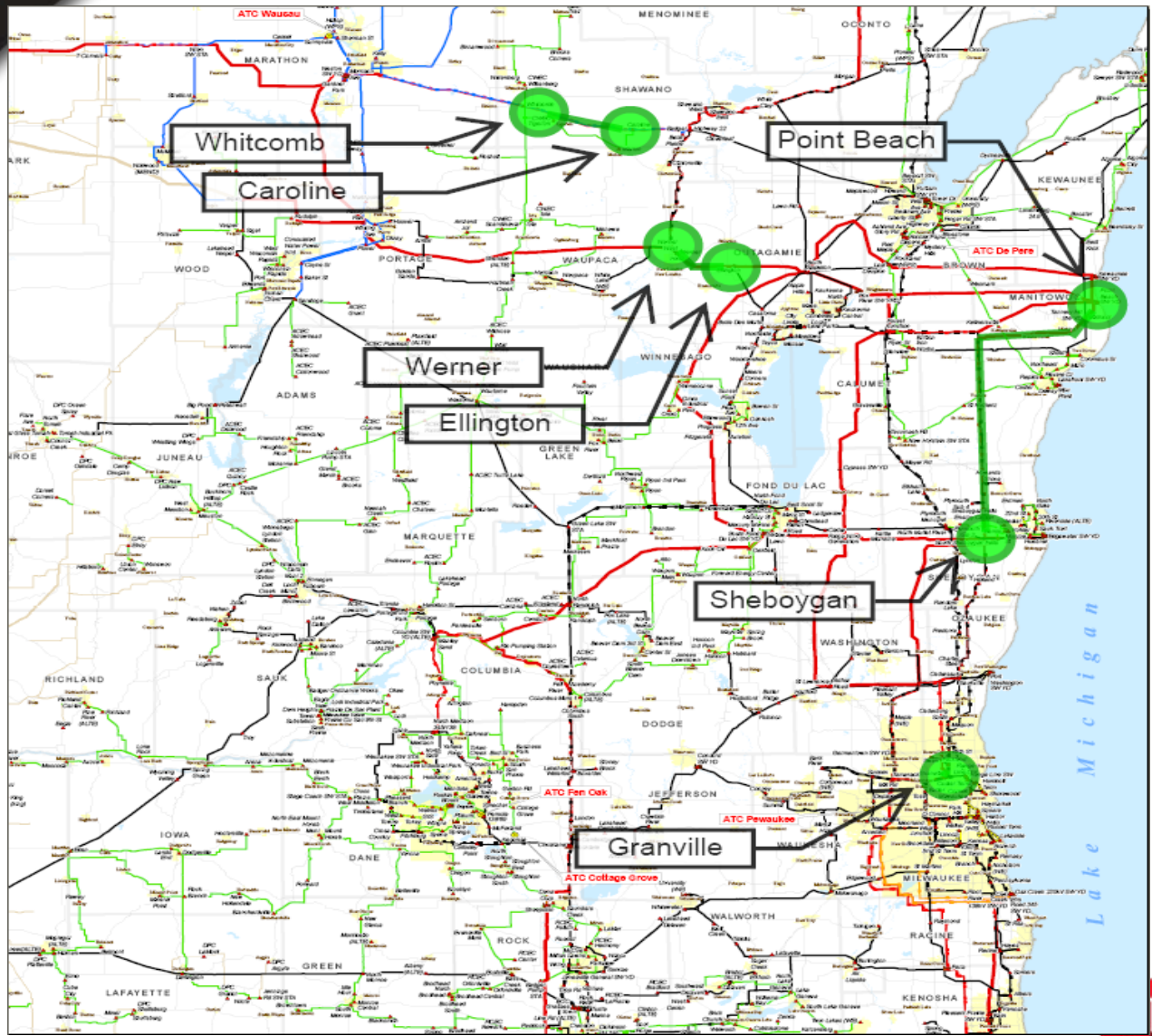




In-Service Projects
Net Ratepayer Benefit

	Annual Savings at Actual Loads (Millions)	% Offset of Project Costs (Actual Loads)	Annual Savings at Forecasted Loads (Millions)
2007 Projects	$4.2	80%	$12.3
2008 Projects	$14.4	40%	$16.2
2009 Projects	$24.0	103%	$28.1
Total	$42.6	-----	$56.6

2009 Market Success Stories



AMERICAN TRANSMISSION COMPANY

2009 Success Stories

Congestion Reduction: Whitcomb – Caroline

Rebuild of Whitcomb – Caroline 138-kV line as double-circuit

- Rebuild of line as double-circuit completed in March 2009.
- Construction of a new parallel 345-kV path from Gardner Park to Highway 22 substation completed in May 2009.
- Congestion for this line, which was typically summer month constrained, was completely eliminated in 2009.

2008 vs. 2009	DA Hours	DA Severity Index	RT Hours	RT Severity Index
Congestion Reduction*	915	8.04	407	11.06
Percentage Reduction from 2008	100%	100%	100%	100%

** Whitcomb – Caroline 138-kV constraints*

2009 Success Stories

Congestion Reduction: Werner – Hintz – Ellington

Completion of Werner West – Highway 22 - Morgan 345-kV line

- Construction of a new 345-kV path from Werner West to Highway 22 completed in May 2009.
- Construction of a new 345-kV path from Highway 22 to Morgan completed in September 2009.

2008 vs. 2009	DA Hours	DA Severity Index	RT Hours	RT Severity Index
Congestion Reduction*	364	9.54	65	8.90
Percentage Reduction from 2008	89%	97%	92%	98%

** Werner – Hintz and Hintz - Ellington 138-kV constraints*

AMERICAN TRANSMISSION COMPANY

2009 Success Stories

Congestion Reduction: Point Beach – Sheboygan

Uprate of Point Beach – Sheboygan 345-kV line

- Temporary clearance improvements increased line rating by 56 MVA in May 2009.
- Permanent clearance improvement to be completed Q1 2010 to achieve an additional 551 MVA rating increase.
- Permanent rating increase will further eliminate congestion on this line and help to meet future system needs.

2008 vs. 2009	DA Hours	DA Severity Index	RT Hours	RT Severity Index
Congestion Reduction*	133	12.86	63	13.21
Percentage Reduction from 2008	26%	74%	47%	85%

** Point Beach – Sheboygan Energy Center constraints*

AMERICAN TRANSMISSION COMPANY

2009 Success Stories

Congestion Reduction: Granville Transformer

Milwaukee area upgrades

- New Kansas – Harbor 138 kV circuit (Dec 2008)
- Improvement of Lincoln – Norwich 138 kV circuit (Oct 2008)
- Replacement of Blue Mound 345/138 kV transformer (Jun 2008)

2008 vs. 2009	DA Hours	DA Severity Index	RT Hours	RT Severity Index
Congestion Reduction*	166	5.18	23	3.20
Percentage Reduction from 2008	100%	100%	100%	100%

** Granville 345/138 kV Transformer T1 constraints*

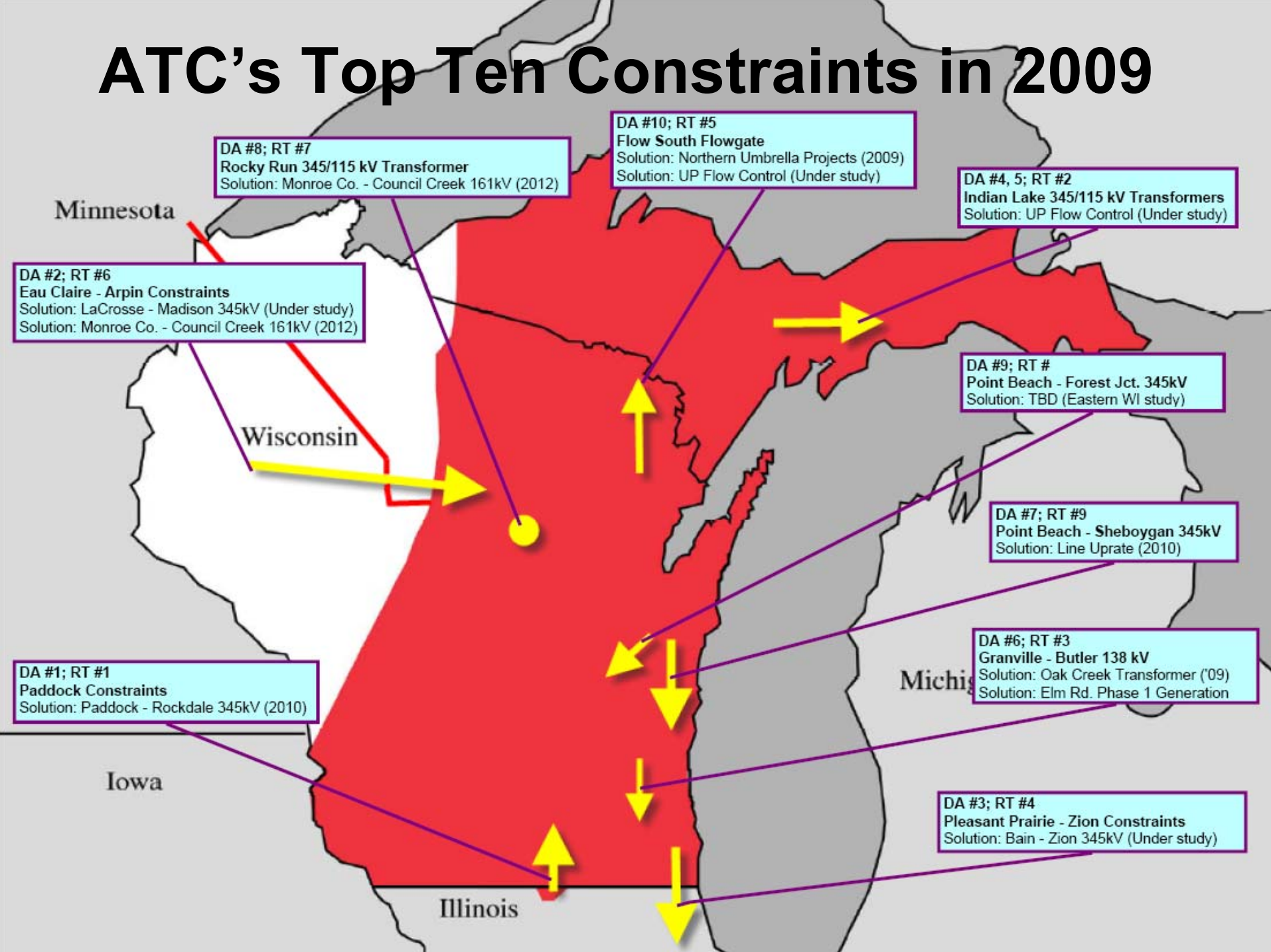
AMERICAN TRANSMISSION COMPANY

Part 3

ATC Congestion Issues

AMERICAN TRANSMISSION COMPANY®

ATC's Top Ten Constraints in 2009

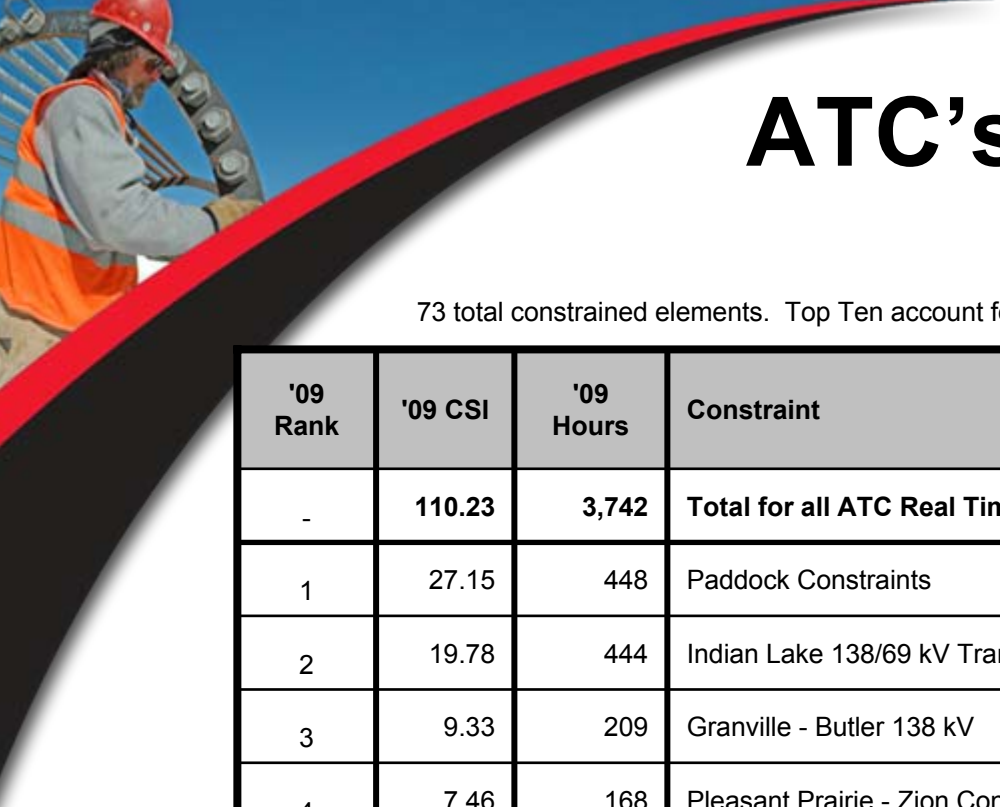


ATC's Top Ten ('09 DA)

2009 Day Ahead Market

127 total constrained elements. Top Ten account for 78% of total severity but just 43% of total hours.

'09 Rank	'09 CSI	'09 Hours	Constraint	'08 Rank	CSI Change '08 to '09
-	**116.39**	**14,025**	**Total for all ATC Day Ahead constraints in 2009**	-	-60.74
1	37.16	2,016	Paddock Constraints	1	-3.42
2	14.74	858	Eau Claire - Arpin Related Constraints	4	3.40
3	12.71	906	Pleasant Prairie - Zion Constraints	2	-7.71
4	7.34	829	Indian Lake 138/69 kV Transformer T2	59	7.19
5	6.73	896	Indian Lake 138/69 kV Transformer T1	57	6.57
6	6.58	313	Granville - Butler 138 kV	22	5.28
7	4.55	386	Point Beach - Sheboygan Energy Center 345 kV	3	-12.86
8	2.47	83	Rocky Run 345/115 kV Transformer T1	-	2.47
9	1.94	93	Point Beach - Forest Junction 345 kV	-	1.94
10	1.70	273	Flow South PTDF	18	-0.43



ATC's Top Ten ('09 RT)

2009 Real Time Market

73 total constrained elements. Top Ten account for 76% of total severity but just 46% of total hours.

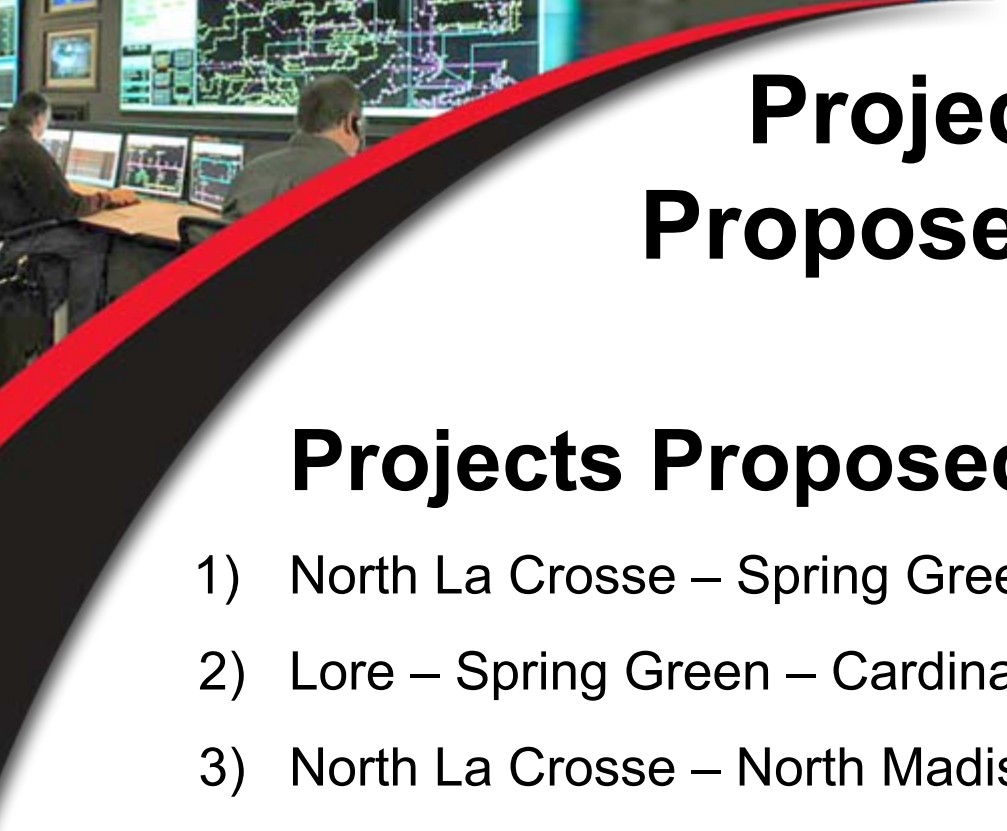
'09 Rank	'09 CSI	'09 Hours	Constraint	'08 Rank	CSI Change '08 to '09
-	**110.23**	**3,742**	**Total for all ATC Real Time constraints in 2009**	-	-69.64
1	27.15	448	Paddock Constraints	1	-21.34
2	19.78	444	Indian Lake 138/69 kV Transformer T2	34	19.17
3	9.33	209	Granville - Butler 138 kV	9	6.00
4	7.46	168	Pleasant Prairie - Zion Constraints	2	-13.10
5	6.29	77	Flow South	13	3.83
6	6.21	75	Eau Claire - Arpin Related Constraints	3	-8.04
7	3.32	69	Rocky Run 345/115 kV Transformer T1	60	3.20
8	2.48	166	Werner West - Werner 138 kV	47	2.27
9	2.37	70	Point Beach - Sheboygan Energy Center 345 kV	4	-13.21
10	1.89	103	Arpin - Sigel 138 kV	7	-2.19

ATC AMERICAN TRANSMISSION COMPANY

Part 4

Potential Solutions (projects to study)

AMERICAN TRANSMISSION COMPANY



Projects and Alternatives Proposed for 2010 Analysis

Projects Proposed for 2010 Analysis

1) North La Crosse – Spring Green – Cardinal Madison 345 kV Project
2) Lore – Spring Green – Cardinal 345 kV Project
3) North La Crosse – North Madison – Cardinal 345 kV Project
4) Option 2 + Option 3
5) Genoa – North Monroe 765 kV Project
6) Western Wisconsin Low Voltage Alternative
7) Bain – Zion Energy Center 345 kV Project
8) Other based on feedback?

Questions?

ATC Economic Planning

- Jamal Khudai
  - jkhudai@atcllc.com
- Tom Dagenais
  - tdagenais@atcllc.com
- Arash Ghodsian
  - aghodsian@atcllc.com
- Todd Tadych
  - ttadych@atcllc.com
- Erik Winsand
  - ewinsand@atcllc.com

AMERICAN TRANSMISSION COMPANY