Southwest Power Pool

CAWG MEETING
April 25 & 26, 2007
Sheraton Hotel
Oklahoma City, OK

AGENDA

Wednesday April 25, 2007 – 3:00 pm – 5:00 pm

1.	Introductions	3:00 - 3:10 pm
2.	The Wind Coalition's Perspectives on Cost allocation And Transmission Service in SPP Discussions lead by Richard Walker Sustainable Energy Strategies, Inc.	3:10 –4:10
3.	Economic Portfolio Follow-up Discussions lead by Keith Tynes & Charles Cates	4:10 – 5:00

Thursday April 26, 2007 8:00 am – 12:00 pm

4.	Introductions	8:00– 8:10 am
5.	Allocations of Benefits from Transmission Upgrades to Zones Allocation of Changes to Inter-Zonal Congestion Charges Discussion lead by Mike Proctor	8:10 – 9:15
6.	15 minute break	9:15 – 9:30
7.	Allocations of Benefits from Transmission Upgrades to Zones Allocation of Changes to Intra-Zonal Congestion Charges Discussion lead by Mike Proctor	9:30 – 11:30
8.	Plans for next meetings Discussion lead by Mike Proctor	11:30 – 12:00

The Wind Coalition's Perspectives On Transmission Services and Cost Allocation In The Southwest Power Pool Region

April 25, 2007

By: Rick Walker
Sustainable Energy Strategies, Inc.
On behalf of The Wind Coalition

The Wind Coalition

Wind Energy Development in the SPP

- ***Information about The Wind Coalition.***
- ***Current and proposed wind development in the SPP.***
- ***How national political and environmental issues will affect the demand for wind energy***
- ***Issues with current transmission cost allocation protocols***
- ***Issues with current aggregate study process***
- ***Transmission services that can facilitate wind development***

The Wind Coalition

Information About The Wind Coalition

- *The Wind Coalition is a non-profit association formed to encourage the development of the vast wind energy resources of the south central United States.*
- *The Wind Coalition is active in ERCOT and the SPP.*
- *Members include wind developers, wind turbine manufacturers, tower manufacturers, and consumer & industry interest groups.*

AES SeaWest	*Airtricity*
American Wind Energy Association	*Babcock & Brown*
BP Alternative Energy	*Clipper Windpower*
D.H. Blattner	*Environmental Defense Fund*
Eurus	*Gamesa Energy*
GE Wind Energy	*Great Plains Windpower*
Horizon Wind Energy	*PPM Energy*
Public Citizen – Texas Office	*Renewable Energy Systems*
Shell Wind Energy	*Siemens Wind Energy*
Trinity Structural Towers	*Vestas*
Texas Renewable Energy Industries Association	

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Federal Legislative & Regulatory Overview

- *The U.S. Senate included RPS provisions in the 2005 version of the Energy Bill that they passed (prior to the Conference Committee) calling for 10% of electricity to come from renewable energy by 2020.*
- *The Senate has passed a similar bill twice since 2002*
- *Today, a 20% RPS is currently proposed in the House and a 15% RPS is expected to be proposed in the Senate.*
- *A 20% national RPS could equate to approximately 180,000 MW of renewable energy by 2020, with much of this in the Eastern U.S. electric grid that the SPP is part of.*

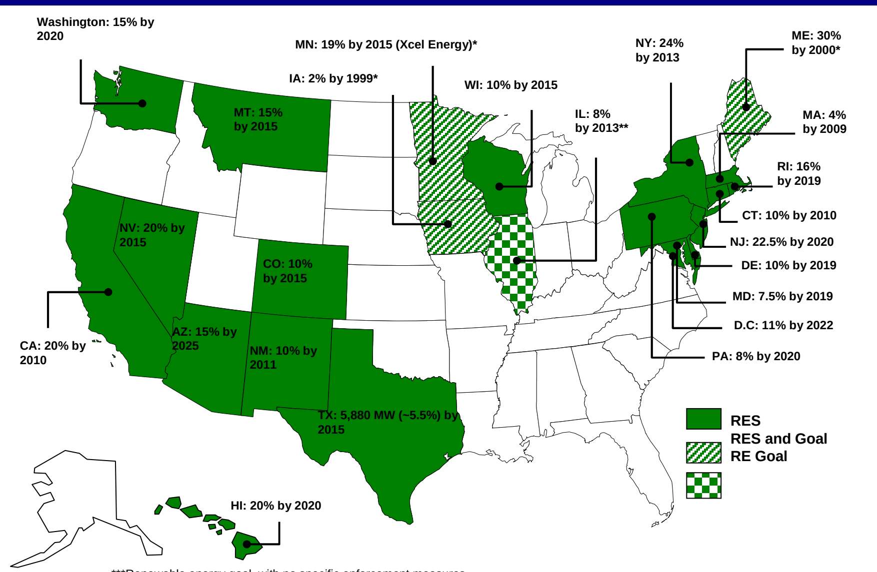
The Wind Coalition

State Regulatory & Legislative Overview

- *21 States and the District of Columbia currently have RPS's or other types of renewable energy mandates, plus two others have state goals.*
- *Approximately 50,000 MW renewable energy resources would be required by 2020 to meet these goals.*
- *15 of these states including part of Texas are in the Eastern U.S. electric grid that the SPP is part of.*
- *RPS requirements in those 15 states will require about 30,000 MW of renewable generation by 2020.*
- *Since wind generation in the SPP region has some of the lowest busbar costs in the country, much of the demand in the Eastern U.S. electric grid could be generated in the SPP, provided transmission were available and wheeling prices were not prohibitive.*

The Wind Coalition

State Renewable Energy Standards



***Renewable energy goal, with no specific enforcement measures.

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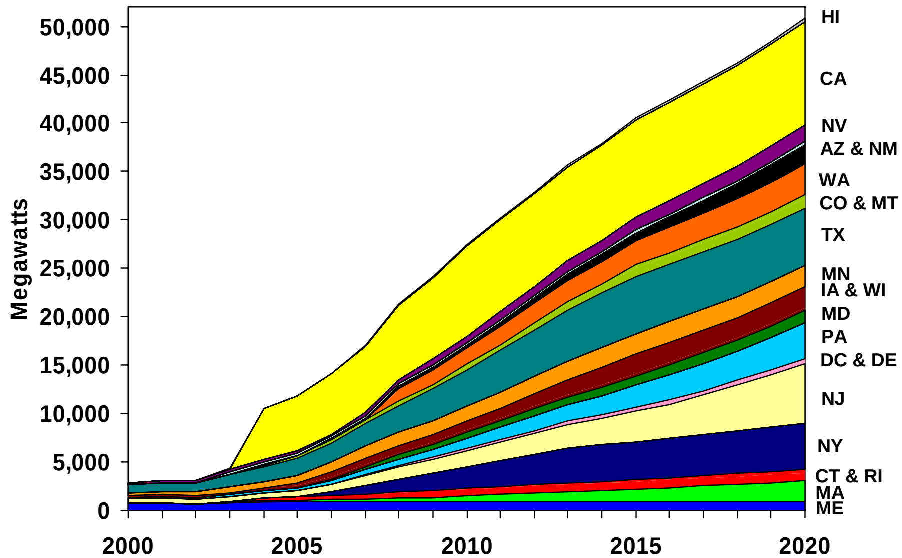
Renewables Needed to Meet State Standards



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Wind Energy Development in the SPP

EXISTING AND PROPOSED WIND ENERGY PROJECTS

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Wind Energy Purchases in SPP

• OG&E from Woodward, OK	51 MW
• OG&E from Centennial, OK	120 MW
• OMPA from Woodward, OK	51 MW
• AEP/PSO from Weatherford, OK	147 MW
• AEP/PSO from Blue Canyon II, OK	151 MW
• WFEC from Blue Canyon I, OK	74 MW
• Aquila from Montezuma, KS	112 MW
• KCP&L from Spearville, KS	100 MW
• Empire District from Elk River, KS	150 MW
• SPS from Quay County, NM	80 MW
• SPS/Xcel from San Juan Mesa, NM	120 MW
• SPS from White Deer, TX	80 MW
• SPS/Xcel from Wildorado, TX	160 MW
• SPS/Xcel from John Deere, TX	160 MW
• Miscellaneous	7 MW
• Total	1,563 MW
• Associated Electric / Mo. Projects	150 MW

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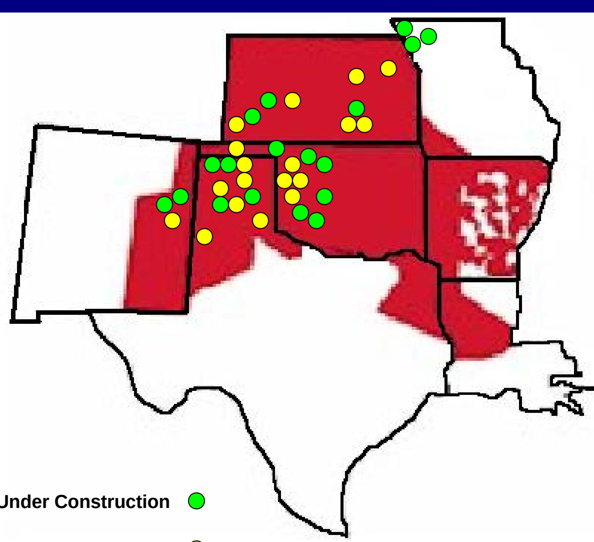
Wind Project Locations in the SPP



Existing or Under Construction ●

Signed IA's ○

More transmission in Western SPP grid or it may approach the limit of wind power it can support as soon as this year.

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Wind Energy Development in the SPP

WIND ENERGY DEVELOPMENT POTENTIAL OF THE SPP

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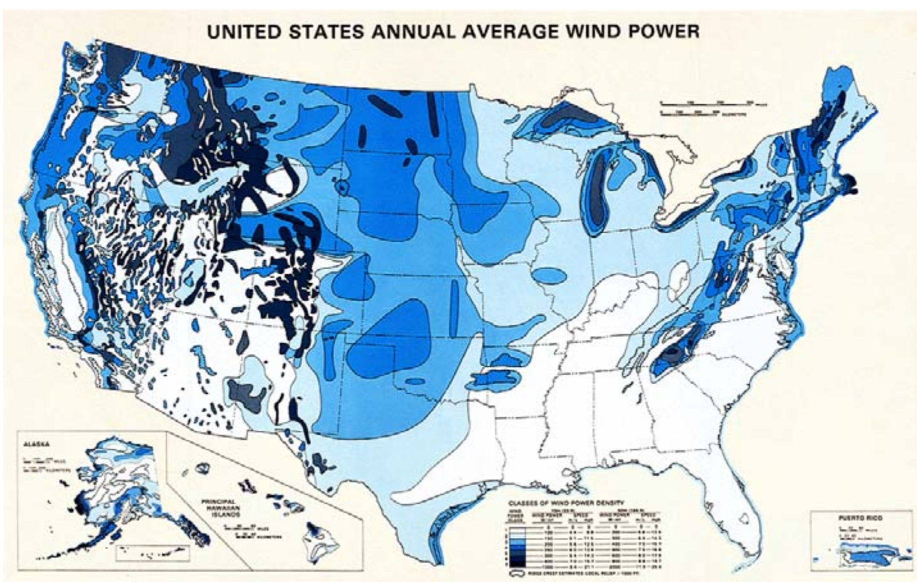
Future Wind Development Potential in the SPP



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Potential Wind Projects in SPP

Current SPP interconnection queue of projects not in operation includes 11,457 MW of wind projects and 8,376 MW of fossil-fueled projects.

	Existing or w/ PPA	Requests In Queue
Texas Panhandle	404 MW	4,120 MW
Oklahoma	595 MW	1,654 MW
New Mexico	200 MW	410 MW
Missouri	0 MW	700 MW
Kansas	364 MW	4,572 MW
Total	1,563 MW	11,457 MW

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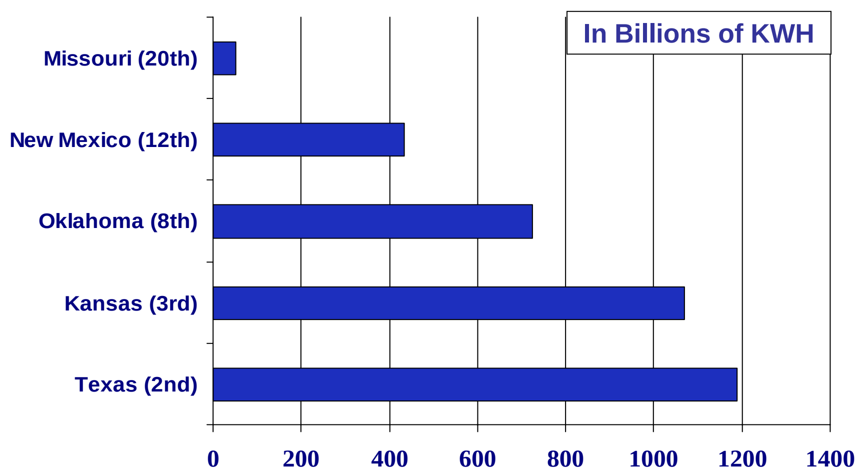
Estimated Annual Wind Energy Potential in SPP States



Source: An Assessment of the Available Windy Land Area and Wind Energy Potential in the Contiguous United States, Pacific Northwest Laboratory, August 1991. PNL-7789

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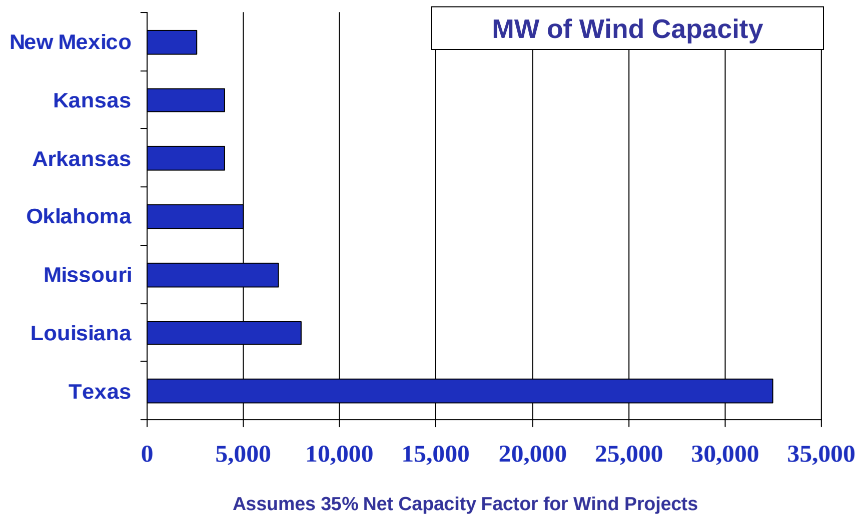
Estimated Wind Capacity Needed to Meet 10% of Electricity Usage in 2050



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Benefits of Adding Economic Transmission Projects

- *Improved transmission reduces constraints and facilitates efficient delivery of most economic resources, reducing cost to end user.*
- *Projects needed for future reliability reasons constructed prior to critical need, resulting in improved current reliability*
- *Improves choices of municipal & cooperative utilities who depend on transmission for access to the most economic energy choices*
- *Facilitates development of region's wind resources – a local resource, not imported – in many areas desperate for economic development*
- *Long-term price stability*
  - *Increased wind in portfolio with long-term pricing*
  - *Reduction of congested flowgates*
  - *Reduced demand on natural gas = lower prices and less volatility*
- *Environmental benefits of wind and most efficient generators.*
- *Positions utilities in the region well in event of national RPS, carbon caps, carbon taxes or other emissions trading markets.*

The Wind Coalition

Recent Quotes from FERC About Cost Allocation

- *Commissioner Kelly in MISO cost allocation order, ER06-18-004: "My personal feeling, based primarily on the fact that transmission facilities are the medium that permits adequate competition in generation, was that a higher level of socialization was probably desirable because of the public interest in healthy competition in generation. In other words, it is better to spend a little more on transmission if it will spawn larger savings in generation…society will be best served by building enough transmission to ensure adequate competition in generation."*

- *Commissioner Wellinghoff in MISO cost allocation order, ER06-18-004: "It is important to recognize that the development of transmission facilities may benefit a wide range of customers, and that many types of benefits may warrant consideration in evaluating a project's impact. Where a project has widespread benefits, it is appropriate for costs associated with that project to be allocated broadly, as well."*

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Favorable Trends or Concepts Considered in SPP

- *Implementation of energy imbalance market and move towards full LMP market*
- *Regional resource planning that considers the combined cost of generation and transmission*
- *Base-funding treatment for a portfolio of economic transmission projects*
- *Real-time transmission conductor rating*
- *Potential use of redispatch protocols allowing interconnection while line upgrades being made*
- *Growing support for construction of Kansas/Panhandle or "X-Plan"*
- *Support of SPP Board Members and Strategic Planning Committee for more favorable treatment of economic transmission projects*

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Impediments to Economic Transmission Projects in the SPP

- *Substantial disagreement on assumptions used to estimate benefits and costs*
- *Very little assurance of cost recovery offered via Attachment Z*
- *High potential for free-rider effect*
- *Working through SPP Committee structure can be long, drawn out process*
- *Aggregate study process cycle difficult for generation developers to adapt to and expensive to participate in*

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Impediments to Wind Growth in the SPP

- *SPP stakeholder process heavily weighted toward traditional utilities - no renewable energy companies, environmental advocates or ratepayer advocates have a vote*
- *Diversity of state objectives*
- *Primary emphasis on reliability and transmission costs, with only secondary emphasis on overall energy price, and very little on environmental or economic development issues*
- *Transmission planning process often takes years to go from identified need to actual construction*
- *Wind capacity accreditation value – one of the lowest in the country, if not the lowest.*
- *No conditional firm service tariff available in SPP.*

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Impediments to Wind Growth in the SPP

- *Problems with existing aggregate study process*
  - *Long process generally incompatible with wind development business cycle (contract negotiations, turbine procurement, PTC cycles)*
  - *Forces identification of customer and point of delivery several years in advance*
  - *Expensive to participate in*
  - *Used by too many parties for screening the all-in cost of new generation*
  - *Results somewhat meaningless and potentially misleading until the last stages*

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What Can Facilitate Wind Development in SPP?

- *Base funding for a portfolio of economic transmission projects providing benefits across the SPP region.*
- *Cost recovery assurance for builders/owners of a strong, EHV transmission network.*
- Regional resource planning that considers the combined cost of generation and transmission
- *Full implementation of LMP market with day ahead settlement and real time settlement*
- *Transmission planning reflecting the 40 to 50 year life of these assets and the long-lead time required for routing, permitting, ROW acquisition, and construction.*

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What Can Facilitate Wind Development in SPP?

- *Timely transmission additions & upgrades necessary to support large-scale wind development in SPP region.*
- *Speedy approval of a conditional firm service tariff with at specified cap on curtailment levels for at least five-years.*
- *Wind integration study for SPP region to prove that cost of large scale wind integration is small compared to large benefits of low cost, stable price, regional economic development and environmental friendliness.*
- *Wind capacity accreditation values consistent with other regions of the country.*

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Summary

- *Wind energy is the most rapidly growing type of generation resource in the SPP.*
- *The SPP region has some of the greatest and most abundant wind resources in the United States.*
- *The current cost recovery protocols for economic transmission projects in the SPP has resulted in construction of very few projects.*
- *Lack of transmission capacity and uncertain cost recovery for transmission additions are the largest barriers to future wind development in the region.*
- *The wind industry supports the concept of base funding for a portfolio of economic transmission projects.*
- *Assurance of cost recovery for transmission owners is necessary for construction of a reliable and efficient transmission grid.*

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Allocations of Benefits from Transmission Upgrades to Zones

CAWG

April 25-26, 2007

Cost Allocation Principle

- No matter what the specific form of the cost allocation adopted by SPP,

  Costs allocated to any zone (entity) should not exceed the benefits that entity is expected to receive.
- In order to implement the above cost allocation principle, the SPP must have an agreed to method for calculating expected benefits for zones (entities).

2

∆ Adjusted Production Costs

- At the November 1, 2006 CAWG meeting materials were presented on the use of ∆ Adjusted Production Costs as the basic measure to be used for benefits:

∆ Adjusted Production Costs

– ∆ Variable Production Costs

+ ∆ Revenues from Sales

– ∆ Expenses from Purchases

3

Part A
Allocations of ∆s In
Inter-Zonal Congestion Charges

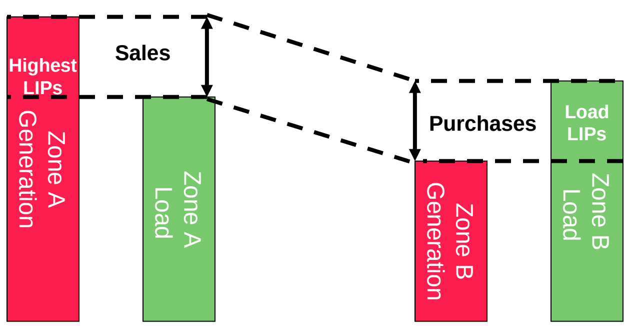
Δ Inter-Zonal Congestion Costs

Examples considered at the November 1 CAWG meeting explained that the Δ Adjusted Production Costs metric also includes a component that measures the Δ Inter-Zonal Congestion Costs.

Issue: SPP does not keep the inter-zonal congestion charge revenues, but instead distributes these back to the market participants.

5

Inter-Zonal Trades



Load is scheduled, and as long as reported load equals scheduled load there is no intra-zonal congestion.

LIPs = Locational Imbalance Prices

Sales are made from the dispatched generation with the highest LIPs, and purchases are made at the load LIP.

Inter-Zonal Congestion occurs anytime the Sales Prices and the Purchase Prices (LIPs) differ.

6

Comparison 2 Revisited
Inter-Zonal Congestion Charges

No Exports, No Imports With Residual Congestion

		Before Upgrade				After Upgrade				Change from Upgrade				Savings	
Zone A		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$	-$11,900	
	Generation	2,500	Cost	$25.00	$62,500	3,000	Cost	$26.00	$78,000	500	Cost	$1.00	$15,500		
	Sales	-600	LMP	**$30.00**	-$18,000	-1,100	LMP	**$35.00**	-$38,500	-500	LMP	$5.00	-$20,500		
	Load	1,900	Adj PC $		$44,500	1,900	Adj PC $		$39,500	**Adj PC Savings**			**-$5,000**		**42.02%**
Zone B		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$		
	Generation	1,500	Cost	$35.00	$52,500	1,000	Cost	$30.00	$30,000	-500	Cost	-$5.00	-$22,500		
	Purchases	600	LMP	**$40.00**	$24,000	1,100	LMP	**$36.00**	$39,600	500	LMP	-$4.00	$15,600		
	Load	2,100	Adj PC $		$76,500	2,100	Adj PC $		$69,600	**Adj PC Savings**			**-$6,900**		**57.98%**
Variable Production Costs		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$	-$11,900	
	Zone A	2,500	Cost	$25.00	$62,500	3,000	Cost	$26.00	$78,000	500	Cost	$1.00	$15,500		
	Zone B	1,500	Cost	$35.00	$52,500	1,000	Cost	$30.00	$30,000	-500	Cost	-$5.00	-$22,500		
	Total	4,000	Total PC $		$115,000	4,000	Total PC $		$108,000	**Total PC Savings**			**-$7,000**		
Inter-zonal Congestion Charges		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$		
	Purchases	600	LMP	**$40.00**	$24,000	1,100	LMP	**$36.00**	$39,600	500	LMP	-$4.00	$15,600		
	Sales	-600	LMP	**$30.00**	-$18,000	-1,100	LMP	**$35.00**	-$38,500	-500	LMP	$5.00	-$20,500		
	Charges	600	⇒	**$10.00**	**$6,000**	1,100	⇒	**$1.00**	**$1,100**	**Congestion Savings**			**-$4,900**		

Notice that $4,900 of savings is in reduced inter-zonal congestion charges. However, SPP does not keep the revenues from these charges. They are distributed back to market participants via the SPP tariff.

7

SPP Tariff Allocation of Energy Imbalance Service Charge/Credit

(b) For each hour, a Market Participant shall have an Energy Imbalance Service Uplift Obligation at each Settlement Location that is equal to the sum of:

(i) the absolute value of that Market Participant's **actual net generation** at that Settlement Location;

(ii) the absolute value of that Market Participant's **Reported Load** at that Settlement Location;

(iii) the absolute value of that Market Participant's bilateral transaction **purchases external to the SPP Region** at that Settlement Location; and

(iv) the absolute value of that Market Participant's bilateral transaction **sales external to the SPP Region** at that Settlement Location.

8

Congestion Revenue Allocation For the No Import/Export Case

Inter-zonal Congestion Revenues Allocated on Sum of Generation Plus Load

		Before Upgrades				After Upgrades				Change from Upgrade				Savings	
		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$		
Zone A	Generation	2,500	Cost	$25.00	$62,500	3,000	Cost	$26.00	$78,000	500	Cost	$1.00	$15,500		
	Sales	-600	LMP	**$30.00**	-$18,000	-1,100	LMP	**$35.00**	-$38,500	-500	LMP	$5.00	-$20,500		
	Load	1,900	Adj PC $		$44,500	1,900	Adj PC $		$39,500	**Adj PC Savings**			-$5,000		
	Congestion $	**4,400**	**55%**		**-$3,300**	**4,900**	**61%**		**-$674**	**Δ Congestion Revnues**			$2,626		
	Net	Adj PC $ - Congestion $			$41,200	Adj PC $ - Congestion $			$38,826	**Net Savings**			**-$2,374**	-$7,000	**33.91%**
Zone B		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$		
	Generation	1,500	Cost	$35.00	$52,500	1,000	Cost	$30.00	$30,000	-500	Cost	-$5.00	-$22,500		
	Purchases	600	LMP	**$40.00**	$24,000	1,100	LMP	**$36.00**	$39,600	500	LMP	-$4.00	$15,600		
	Load	2,100	Adj PC $		$76,500	2,100	Adj PC $		$69,600	**Adj PC Savings**			-$6,900		
	Congestion $	**3,600**	**45%**		**-$2,700**	**3,100**	**39%**		**-$426**	**Δ Congestion Revnues**			$2,274		
	Net	Adj PC $ - Congestion $			$73,800	Adj PC $ - Congestion $			$69,174	**Net Savings**			**-$4,626**		**66.09%**
Variable Production Costs		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$		
	Zone A	2,500	Cost	$25.00	$62,500	3,000	Cost	$26.00	$78,000	500	Cost	$1.00	$15,500		
	Zone B	1,500	Cost	$35.00	$52,500	1,000	Cost	$30.00	$30,000	-500	Cost	-$5.00	-$22,500		
	Total	4,000	Total PC $		$115,000	4,000	Total PC $		$108,000	**Total PC Savings**			-$7,000		
Inter-zonal Congestion Charges		MW	Cost/Price		$	MW	Cost/Price		$	MW	Cost/Price		$	-$7,000	
	Purchases	600	LMP	**$40.00**	$24,000	1,100	LMP	**$36.00**	$39,600	500	LMP	-$4.00	$15,600		
	Sales	-600	LMP	**$30.00**	-$18,000	-1,100	LMP	**$35.00**	-$38,500	-500	LMP	$5.00	-$20,500		
	Charges		⇓		$6,000		⇓		$1,100	**Congestion Savings**			-$4,900		
	Revenues	600	⇒	**$10.00**	**-$6,000**	1,100	⇒	**$1.00**	**-$1,100**	**Δ Congestion Revnues**			$4,900		
	Net				$0				$0	**Net Savings**			$0		

9

Conclusions on Inter-Zonal Congestion

- Adjusted Production Costs (APCs) calculations require a ranking of generation by LIPs.
- Since a ranking of generation by LIPs is required to calculate APCs, it should be straight forward to calculate Inter-Zonal Congestion Costs and allocate these costs to the zones via the SPP tariff.
- ❖ **Ask SPP to come back to CAWG to report on the ability of the model to calculate revenue from sales and expenses for purchases**
  - This requires the ranking of generation LIPs within a zone to determine the LIPs of the generators used to make sales.

10

Part B
Allocations of Δs In
Inter-Zonal Congestion Charges

Intra-Zonal Congestion

- At the November 1 CAWG meeting it was noted that SPP's metrics include a

  "Load Impact Sensitivity Equation" metric =

  (Δ Load LIP)*(X%)
- It was also noted that this is meant to correct any congestion a market participant has in delivery of own generation to own load (i.e., intra-zonal congestion), not congestion between market participants (i.e., inter-zonal congestion).

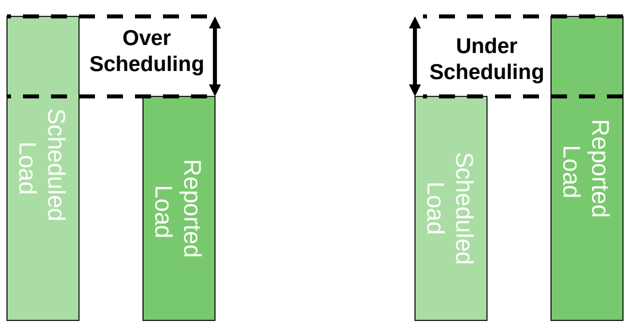
12

Intra-Zonal Congestion Charges (Under/Over Scheduling Charges)

- In SPP every LSE must submit a balanced schedule day-ahead.
- These schedules are accepted if they are simultaneously feasible. If not, then the SPP calls a TLR on these schedules.
- In concept, scheduled load is not subject to congestion charges. However, if reported (actual) load differs from scheduled load by more than 4%, the difference is subject to an intra-zonal congestion charge (called under or over scheduling charge in SPP tariff).

13

Over and Under Scheduling Load



There are two sources for over and under scheduling of load.

1. Load Forecast Error
2. TLR is called on Submitted Schedules

14

First Application of Over Scheduling Charge

Under Scheduling: Generation Exceeds Load Within the Zone

Generation Resource Ranked in Ascending LIP Order

Generators		
Unit	LIPs	MW
BL 1	$23	400
BL 2	$24	350
BL 3	$25	500
CY 1	$27	250
CY 2	$28	200
CT 1	$30	50
CT 2	$31	0

Load	Load MW	$/MWh
Scheduled	1,500	
Reported	1,600	
Under	**100**	
Load LIP		$35

Match Gen to Load: Reported Load

Gen	LIP	MW	$
BL 1	$23	400	$9,200
BL 2	$24	350	$8,400
BL 3	$25	500	$12,500
CY 1	$27	250	$6,750
CY 2	$28	100	$2,800
Total	$24.78	1,600	$39,650

Match Gen to Load: Under Scheduled Load

Gen	LIP	MW
CY 2	$28	100

Calculate Generation for Sales

Gen	LIP	MW	$
CY 1	$27	0	$0
CY 2	$28	100	$2,800
CT 1	$30	50	$1,500
Total	$28.67	150	$4,300

Calculate Under Scheduling Charges

Load LIP	$35
Gen LIP	$28
Difference	$7
Under MW	100
Under Scheduling Charges	$700

15

First Application of Under Scheduling Charge

Over Scheduling: Generation Exceeds Load Within the Zone

Generation Resource Ranked in Ascending LIP Order

Generators		
Unit	LIPs	MW
BL 1	$23	400
BL 2	$24	350
BL 3	$25	500
CY 1	$27	250
CY 2	$28	200
CT 1	$30	50
CT 2	$31	0

Load	Load MW	$/MWh
Scheduled	1500	
Reported	1250	
Over	**250**	
Load LIP		$35

Match Gen to Load: Scheduled Load

Gen	LIP	MW	$
BL 1	$23	400	$9,200
BL 2	$24	350	$8,400
BL 3	$25	500	$12,500
CY 1	$27	250	$6,750
Total	$24.57	1,500	$36,850

Match Gen to Load: Under Scheduled Load

Gen	LIP	MW
CY 1	$27	250

Calculate Generation for Sales

Gen	LIP	MW	$
CY 1	$27	250	$6,750
CY 2	$28	200	$5,600
CT 1	$30	50	$1,500
Total	$27.70	500	$13,850

Calculate Under Scheduling Charges

Load LIP	$35
Gen LIP	$27
Difference	$8
Under MW	250
Under Scheduling Charges	$2,000

16

Second Application of Over Scheduling Charge

Under Scheduling: Load Exceeds Generation Within the Zone

Generation Resource Ranked in Ascending LIP Order

Generators		
Unit	LIPs	MW
BL 1	$23	400
BL 2	$24	350
BL 3	$25	400
CY 1	$27	150
CY 2	$28	0
CT 1	$30	0
CT 2	$31	0

Load	Load MW	$/MWh
Scheduled	1500	
Reported	1,600	
Under	**100**	
Load LIP		$29

Match Gen to Load: Reported Load

Gen	LIP	MW	$
BL 1	$23	400	$9,200
BL 2	$24	350	$8,400
BL 3	$25	400	$10,000
CY 1	$27	150	$4,050
Total	$24.35	1,300	$31,650

Match Gen to Load: Under Scheduled Load

Gen	LIP	MW
NA	$0	0

Calculate Purchases

	LIP	MW	$
Reported Load		1,600	
Generation		1,300	
(Short)	$29	-300	-$8,700

Calculate Under Scheduling Charges

Load LIP	$29
Gen LIP	$0
Difference	$29
Under MW	0
Under Scheduling Charges	$0

17

Second Application of Under Scheduling Charge

Over Scheduling: Load Exceeds Generation Within the Zone

Generation Resource Ranked in Ascending LIP Order

Generators		
Unit	LIPs	MW
BL 1	$23	400
BL 2	$24	350
BL 3	$25	400
CY 1	$27	150
CY 2	$28	0
CT 1	$30	0
CT 2	$31	0

Load	Load MW	$/MWh
Scheduled	1500	
Reported	1250	
Over	**250**	
Load LIP		$29

Match Gen to Load: Scheduled Load

Gen	LIP	MW	$
BL 1	$23	400	$9,200
BL 2	$24	350	$8,400
BL 3	$25	400	$10,000
CY 1	$27	150	$4,050
Total	$24.35	1,300	$31,650

Match Gen to Load: Under Scheduled Load

Gen	LIP	MW
CY 1	$27	50

Calculate Purchases

	LIP	MW	$
Reported Load		1,250	
Generation		1,300	
(Short)	$29	50	$1,450

Calculate Under Scheduling Charges

Load LIP	$29
Gen LIP	$27
Difference	$2
Under MW	50
Under Scheduling Charges	$100

18

Key Components for Calculations

1. To calculate Adjusted Production Costs it is necessary to rank generation by LIPs to determine the Revenue for Sales.
2. In the model, there is no under or over scheduling. This implies that X% of load must be estimated as being related to intra-zonal congestion charges.
   a. Source is load forecasting error and TLRs.
   b. In cases where zones purchase imbalance energy to serve load, it appears that intra-zonal congestion charges are small or zero.
3. For zones that sell, the congestion charge rate is calculated as the LIPs for load minus the ranked LIPs for generators matched to meet X% of load.

19

For Benefit: Δ Intra-Zonal Congestion Charges

- For zones that are selling energy to the market in a given hour:

  Δ Intra-Zonal Congestion Charges

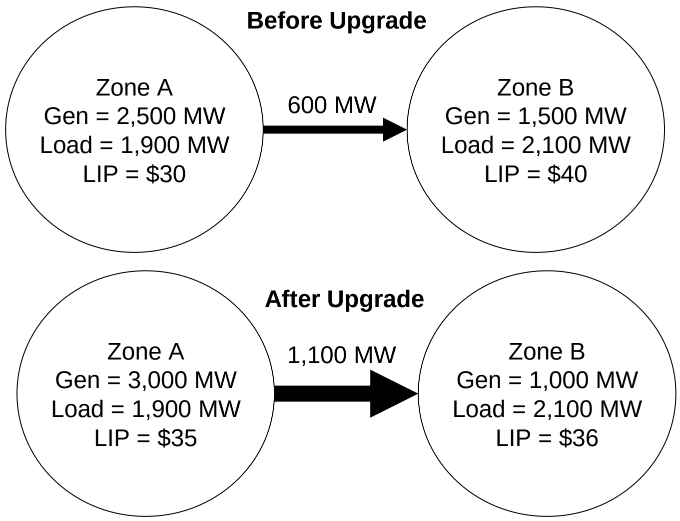
  $= \Delta(LIP_{Load} – LIP_{RMGen})*(X\%)*(Load)$
  where RMGen = Ranked and Matched Generation

- SPP uses the following to estimate benefit and applies it to all zones in all hours:

  $= \Delta(LIP_{Load})*(X\%)(Load)X\%)*(Load)$

20

Simple Example



Concern #1

- The SPP calculation is made for all zones irrespective of whether the zone is selling or purchasing within the hour.
- For purchasing zones, the LIPs from an upgrade that increases imports into the zone are likely to decrease, and generation within the zone is also likely to decrease resulting in even a lower likelihood of being charged any intra-zonal congestion.
- The SPP calculation will impute a benefit, when the purchasing zone is unlikely to experience any intra-zonal congestion charges.

SPP Calculation for Zone B

Suppose X% = 10%

(10%)* (2,100 MW) = 210 MW

Δ LIP^{A}_{Load} = $40 - $36 = $4/MW (a decrease)

Benefit = ($4/MW)*(210 MW) = $840

However:

1. The purchasing zone is unlikely to have any intra-zonal congestion charges.
2. If the LIP at the Generators is the same as the LIPs at the Load, then the net change is zero.

23

Concern # 2

- It is not unusual to see low Load LIPs in zones where low cost generation is constrained in
  - LIPs have to go down in order to reduce the generation dispatched because of the constraint.
- When upgrades release this generation to the market,
  - LIPs in the zone have to increase in order to increase the generation dispatched.
- It is unlikely that this increase in load LIPs results in increased congestion costs for the utility in the zone.
  - This is because the LIPs at both the load and the generators have to increase, and it is only where this difference gets larger that there is a detriment.

24

SPP Calculation for Zone A

Suppose X% = 10%

(10%)* (1,900 MW) = 190 MW

Δ LIP^{A}_{Load} = \$30 - \$35 = -\$5/MWh (an increase)

Detriment = (-\$5/MWh)*(190) = -\$950

However, if the LIP at the Generators are the same as the LIPs at the Load, then the net change is zero.

25

Conclusions on Intra-Zonal Congestion

1. Intra-Zonal Congestion is not a direct output from the models because it only relates to differences between scheduled and actual loads.
2. It is not clear that changes in intra-zonal congestion charges will account for any significant changes in benefits as purchasing zones will incur these charges and for selling zones, the difference between load and generation LIPs is not likely to be significant unless upgrades included reduce internal redispatch.
3. It may make sense to document upgrades that reduce internal redispatch and make separate benefit calculations for these upgrades. (Next 2 Slides)

26

Further Thoughts on Reductions To Intra-Zonal Congestion

- Local Benefits: For a selling (lower variable production cost) utility, a key component can be the reduction in internal (intra-zonal or within its own zone) congestion that prevents it from dispatching its own lower-cost generation to meet its native load.
- Regional Benefits: For a selling utility, a second key component can be the reduction in internal congestion that prevents it from being able to sell more to the market.

27

Calculating Benefits from Reducing Intra-Zonal Congestion

Does the following process (or similar) make sense?

1) Each LSE submits to SPP transmission constraints that require it to redispatch its generation. SPP would work with the LSEs to determine which transmission constraints result in internal redispatch.
2) Local Benefits: Have LSE run (SPP confirms) a study on the dispatch of internal generation to meet load to determine the internal redispatch costs resulting from these transmission constraints. Have SPP and LSE determine what upgrades would be needed to reduce or eliminate these redispatch costs, and calculate the redispatch costs savings for the LSE = Local Benefit = reduction in variable production costs.
3) Overall Benefits: Have SPP run a regional study to determine what the overall benefits are for upgrades that eliminate internal redispatch costs. For a project to be considered, overall benefits must equal or exceed the cost of the transmission upgrades.
4) Cost allocation: Separate between regional and local benefit via:
   Regional Benefits = Overall Benefits (3) – Local Benefits (2)
   Where :
   Local Benefits are directly assigned to the Zone; and
   Regional Benefits are allocated to Region.

28

Proposal for Benefits from Δ Intra-Zonal Congestion

- For upgrade projects designated as reducing intra-zonal congestion: benefits from Δ Intra-zonal congestion are calculated via previous slide or similar.
  - ❖ **Ask SPP to work on the precise details and come back to CAWG with a proposal.**
- For all other upgrade projects: benefits from Δ Intra-zonal congestion are calculated as zero.

29

Questions/Discussion

30