



Northwest Power and Conservation Council NW Power Markets Symposium Products & Transactions

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Geographic Coverage

Morgan Stanley Commodities is an international group, with employees having a diverse range of nationalities (~40)



One of the top global commodity traders with an experienced team of professionals

- Trading as a principal since 1982
- Over 400 professionals worldwide
- Offices throughout the world providing 24-hour, global coverage of all markets

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Morgan Stanley – People and Experience:

- Morgan Stanley Capital Group Inc. (MSCG) is the principal entity through which Morgan Stanley conducts its North American commodities trading activities, with over 25 years of experience in physical and financial commodities.
- MSCG has significant know-how in commodities hedging and risk management and currently trades power, natural gas, emissions, crude oil, refined petroleum products, coal, freight, metals, renewable fuels and agricultural commodities.
- MSCG owns 6 power plants in North America and Europe.
- Long history of providing solutions to electric cooperatives, including purchases / sales, scheduling services, and full requirements load following. Key relationships include: Deseret Power Electric Cooperative, Greystone Power, Northeastern Rural Electric Membership, Georgia Electric Cooperative, and the Walton Electric Membership.
- Commodities offices in Westchester, NY and Vancouver, BC with 15 transactional staff in Vancouver, including a 24-hour real-time electricity trading desk for load / resource balancing and scheduling, pre-schedule and real-time power and gas trading, transmission and asset optimization, and structured term transactions with a physical, asset-based emphasis
- Manages output of 400 MW of wind in Montana through 2023 and serves load in Montana
- MSCG has also acquired 300 MW of scheduling rights on the new Montana / Alberta Transmission Line (MATL) through 2023, plus long-term firm transmission rights from Northwestern with roll-over rights
- Optimizes and schedules 200 MW hydroelectric generation on Columbia River, including energy, capacity, and pond storage
- Manages output of 290 MW of wind generation in Columbia River region
- 10+ year, 700 MW load following and thermal and hydroelectric asset optimization for Utah G&T, including load forecasting and hourly load service
- Numerous REC and low-carbon transactions in PNW to optimize and manage hydroelectric, biomass and wind output.

Northwest Power and Conservation Council – NW Power Markets Symposium

MEGAWATT DAILY'S POWER SALES ANALYSIS | JANUARY 30, 2012

MEGAWATT DAILY'S POWER SALES ANALYSIS | JANUARY 30, 2012

Most Active Delivery Points * (cont)

Ranked by MWh Volume
Q3 2011

COMPANY & DELIVERY POINT	MWh VOLUME	DELIVERY POINT MARKET SHARE	TRANSACTION VALUE (\$)	TRANSACTION VALUE MARKET SHARE	AVERAGE VALUE \$/MWH
CONSTELLATION ENERGY COMMODITIES & AFFILIATES	40,512	7.65%	2,091,028	7.75%	51.62
INTEGRYS ENERGY SERVICES & AFFILIATES	20,000	3.77%	1,451,437	5.38%	72.57
NEXTERA ENERGY RESOURCES	18,432	3.48%	1,047,859	3.89%	56.85
CMS ENERGY RESOURCE MANAGEMENT & AFFILIATES	3,200	0.60%	172,360	0.64%	53.86
TOTALS FOR DELIVERY POINT	529,851		26,965,563		
MID-COLUMBIA					
TRANSALTA ENERGY MARKETING	5,189,706	15.98%	199,698,590	18.66%	38.48
IBERDROLA RENEWABLES AFFILIATES	3,603,726	11.10%	97,877,430	9.15%	27.16
JPMORGAN CHASE BANK AFFILIATES	2,577,736	7.94%	88,601,373	8.28%	34.37
MORGAN STANLEY CAPITAL GROUP	2,476,526	7.63%	84,928,540	7.94%	34.29
CITIGROUP ENERGY	2,302,619	7.09%	68,425,115	6.39%	29.72
SHELL ENERGY NORTH AMERICA US	2,114,342	6.51%	71,018,209	6.64%	33.59
POWEREX	1,983,160	6.11%	58,153,704	5.43%	29.32
CALPINE AFFILIATES	1,295,792	3.99%	38,891,891	3.62%	29.86
PUGET SOUND ENERGY	1,156,758	3.56%	30,636,820	2.86%	26.49
MACQUARIE ENERGY	1,079,541	3.32%	30,054,385	2.81%	27.84
PPL ENERGYPLUS & AFFILIATES	1,063,299	3.27%	49,647,417	4.64%	46.69
BARCLAYS BANK	1,050,435	3.23%	43,847,123	4.10%	41.74
CREDIT SUISSE ENERGY	742,000	2.28%	37,203,296	3.48%	50.14
AVISTA	721,449	2.22%	17,593,680	1.64%	24.39
PACIFICORP	672,516	2.07%	15,908,632	1.49%	23.66
CONSTELLATION ENERGY COMMODITIES & AFFILIATES	562,911	1.73%	15,371,787	1.44%	27.31
BP ENERGY	452,735	1.39%	15,786,307	1.48%	34.87
CARGILL POWER MARKETS	440,486	1.36%	13,257,690	1.24%	30.10
EDF TRADING NORTH AMERICA	440,444	1.36%	15,197,687	1.42%	34.51
DB ENERGY TRADING	349,154	1.08%	10,124,448	0.95%	29.00
HINSON POWER	309,120	0.95%	9,402,714	0.88%	30.42
PORTLAND GENERAL ELECTRIC	277,888	0.86%	8,119,774	0.76%	29.22
NEXTERA ENERGY RESOURCES	243,716	0.75%	7,283,501	0.68%	29.89
NASDAQ OMX COMMODITIES CLEARING	197,400	0.61%	5,903,740	0.55%	29.91
NORTHWESTERN ENERGY	180,000	0.55%	4,275,212	0.40%	23.75
IDAHO POWER	155,794	0.48%	4,349,198	0.41%	27.92
MERRILL LYNCH COMMODITIES	118,366	0.36%	3,420,515	0.32%	28.89
J ARON	110,800	0.34%	5,925,580	0.55%	53.48
EXELON GENERATION AFFILIATES	98,000	0.30%	3,120,710	0.29%	31.84
ALCOA POWER	95,080	0.29%	2,599,294	0.24%	27.34
RAINBOW ENERGY MARKETING	90,128	0.28%	2,715,638	0.25%	30.13
CONOCOPHILLIPS	73,200	0.23%	2,763,300	0.26%	37.75
NOBLE AMERICAS	72,855	0.22%	1,883,447	0.18%	25.85
BNP PARIBAS ENERGY TRADING	55,200	0.17%	2,469,300	0.23%	44.73
SOUTHERN CALIFORNIA EDISON	51,600	0.16%	1,726,784	0.16%	33.46
BLACK HILLS POWER	48,000	0.15%	1,356,920	0.13%	28.27
LOUIS DREYFUS ENERGY	12,000	0.04%	405,140	0.04%	33.76
TENASKA AFFILIATES	5,200	0.02%	173,940	0.02%	33.45
PACIFIC SUMMIT ENERGY	2,629	0.01%	84,085	0.01%	31.98
BROOKFIELD POWER	1,800	0.00%	50,700	0.00%	31.69
TOTALS FOR DELIVERY POINT	32,473,931		1,070,053,614		

Q3 2011 RTO/NERC Region Top Companies by MWh Volume (cont)

RTO/NERC REGION COMPANY	MWH VOLUME	RTO/NERC REGION VOLUME MARKET SHARE	TRANSACTION VALUE (\$)	AVERAGE VALUE \$/MWH *
COBB ELECTRIC MEMBERSHIP	1,118,518	1.46%	64,200,447	57.40
ENTEGRA POWER GROUP	1,055,353	1.38%	42,642,422	40.41
WESTAR ENERGY	819,476	1.07%	30,806,578	37.59
SOUTHEAST POWERGEN	809,770	1.06%	7,303,374	9.02
SEEC Total	76,501,906		2,488,628,334	
SPP				
XCEL ENERGY SERVICES	3,374,720	14.69%	111,950,237	33.00
WESTAR ENERGY	3,132,189	13.64%	100,921,256	32.22
GOLDEN SPREAD ELECTRIC	2,264,609	9.88%	125,264,342	55.31
AMERICAN ELECTRIC POWER SERVICE	2,142,601	9.33%	79,832,276	37.26
CALPINE AFFILIATES	1,726,770	7.52%	63,537,860	36.80
KANSAS CITY POWER & LIGHT	1,471,124	6.41%	54,750,031	37.22
EXELON GENERATION AFFILIATES	937,265	4.08%	41,424,139	44.20
OKLAHOMA GAS & ELECTRIC	849,096	3.70%	30,054,771	35.40
CLECO POWER	822,779	3.58%	25,538,908	31.04
J-POWER USA GENERATION	809,517	3.52%	1,449,035	1.79
KELSON HOLDINGS	686,349	2.99%	18,474,400	26.92
NEXTERA ENERGY RESOURCES	548,164	2.39%	17,908,907	32.67
TENASKA AFFILIATES	453,697	1.98%	21,652,258	47.72
NRG POWER MARKETING & AFFILIATES	370,808	1.61%	18,002,937	43.18
DENVER CITY ENERGY ASSOCIATES	365,097	1.59%	17,639,641	48.31
EDISON MISSION GROUP	338,136	1.47%	11,893,032	35.17
GS ELECTRIC GENERATING	322,803	1.41%	17,035,387	52.77
AMEREN OPERATING COMPANIES	296,470	1.29%	9,841,429	33.20
HORIZON WIND ENERGY	284,479	1.24%	10,721,527	37.69
MERRILL LYNCH COMMODITIES	194,609	0.85%	8,545,736	43.91
SPP Total	22,966,517		852,006,830	
WECC				
MORGAN STANLEY CAPITAL GROUP	13,398,917	8.48%	502,169,532	37.48
CALPINE AFFILIATES	11,813,026	7.48%	349,903,498	29.62
SHELL ENERGY NORTH AMERICA US	11,237,262	7.12%	498,011,962	44.14
TRANSALTA ENERGY MARKETING	8,371,610	5.30%	296,717,322	35.44
IBERDROLA RENEWABLES AFFILIATES	8,026,230	5.08%	284,920,170	35.50
POWEREX	6,856,402	4.34%	223,287,271	32.57
SEMPRA GENERATION	6,840,119	4.33%	248,652,146	36.35
JPMORGAN CHASE BANK AFFILIATES	6,632,835	4.20%	261,463,579	42.43
CITIGROUP ENERGY	6,182,117	3.91%	238,975,858	38.66
PACIFICORP	5,538,738	3.51%	172,297,153	31.11
J ARON	4,953,594	3.14%	284,076,587	57.35
PPL ENERGYPLUS & AFFILIATES	4,844,612	3.07%	232,178,874	47.92
BARCLAYS BANK	3,796,539	2.41%	181,206,939	47.70
PACIFIC SUMMIT ENERGY	2,966,485	1.88%	153,261,501	51.67
CONSTELLATION ENERGY COMMODITIES & AFFILIATES	2,527,160	1.60%	92,456,585	36.59
MACQUARIE ENERGY	2,372,399	1.50%	77,070,838	32.49
EDF TRADING NORTH AMERICA	2,344,887	1.48%	85,091,707	36.29
NEXTERA ENERGY RESOURCES	2,221,887	1.41%	65,411,033	29.44
CARGILL POWER MARKETS	2,169,846	1.37%	84,616,866	39.09
XCEL ENERGY SERVICES	1,990,461	1.26%	77,273,838	38.82
NBSO Total	141,698		9,708,080	
TOTAL ALL REGIONS	1,088,678,527		42,477,180,854	40.99

* Low average values may result from tolling or exchange agreements

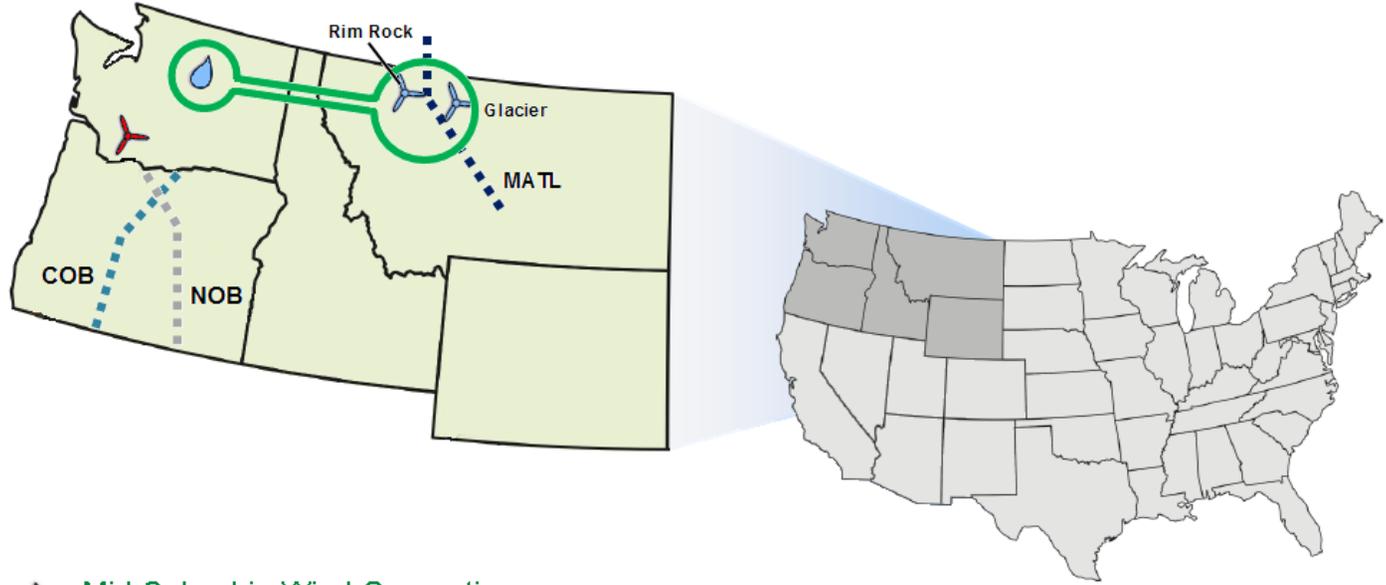
** ERCOT data is not comprehensive and is based on filings where data is available

Source: Federal Energy Regulatory Commission and Platts



Select MSCG Power Assets

Pacific Northwest Power Assets



-  Mid Columbia Wind Generation
-  Montana Wind Generation
-  Hydro Generation (Slice Contracts)
-  Montana-Alberta Tie-Line (MATL)
-  Power Watch Balancing Authority

REGIONAL ELECTRIC POWER MARKET
 WECC – Western Electricity Coordinating Council

Source: Morgan Stanley Commodities

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Products & Transactions

- PNW Market Conditions and Participants
- Regional 'Seams'
 - Liquidity, Operational, and Regulatory effects
 - Bilateral versus exchange traded products
 - Pancaked transmission and scheduling requirements
- Regional Transmission Developments
 - Montana-Alberta Tie-Line (MATL)
 - Juan de Fuca Cable Project
- RPS and Carbon products
 - Low-carbon, specified resources
 - ACS designation
 - RPS and Carbon interaction
 - Regional dispatch changes



Pacific Northwest Power Market

- One of the most active trading hubs within the WECC region (and other NERC regions)
- Term, pre-schedule, real-time (hourly), intra-hour, and ancillary markets
 - **Greatest transparency and liquidity in pre-schedule and hourly markets**
 - **A bilateral trading hub, not an exchange, ISO, or pool**
 - **For example, the pre-schedule market at Mid-C looks like this:**
 - 25 to 35 active participants (50 to 75 enabled)
 - 200 to 500 trades per day (for approx. \$2 to \$4 billion / year)
 - Daily volume of approx. 5,000 to 15,000 MW, depending upon season and activity (of approx. 60,000 – 100,000 MW across WECC)(approx. 10-15% of WECC market)
 - Typically 16-hour ‘Heavy Load Hour’ or 8-hour ‘Light Load Hour’ blocks trade, but can trade individual or custom strips of hours
 - All pre-schedules need to balance loads / resources by balancing authority, but the hourly market re-opens the shape and price by hour
 - Transmission purchases and e-tagging completed to effect flows
 - Price and volume transparency through mandatory FERC reporting, and index price reporting by Dow Jones and Powerdex – for both daily (in HLH and LLH blocks) and hourly prices
- Summary: a liquid, active market, but for **energy only, not capacity**



Wholesale Electricity Market Participants

- Portfolio requirements, with flexible resources due to standard block sizes (25 MW)
- Credit requirements for transactions greater than 1-day
- Real-time load / resource balancing expertise and 24 x 7 scheduling coverage to manage unit outages, transmission congestion, and varying market conditions
- Master enabling agreements: WSPP Contract, EEI, ISDA with Power Annex

Challenging Market Conditions

- Reduced participants and liquidity, particularly for long-term transactions
- Cyclical (seasonal and annual)
- Storage-constrained
- Highly regulated and politicized
- Capital-intensive
- Complex market fundamentals due to: industrial loads, fuel switching, regional 'seams', macro economic impacts, and the influence of weather (heating and cooling degree days, seasonal and hourly wind and water resource variations)
- Without storage, and in the absence of a capacity market wholesale energy market is priced indirectly in response to daily and hourly capacity surpluses / shortfalls. Paired with transmission constraints, variable fuel costs, carbon / RPS legislation, and fundamentals above, this leads to volatile power prices



Products & Transactions

- PNW Market Conditions and Participants

- Regional 'Seams'

- Liquidity, Operational, and Regulatory effects
- Bilateral versus exchange traded products
- Pancaked transmission and scheduling requirements

- Regional Transmission Developments

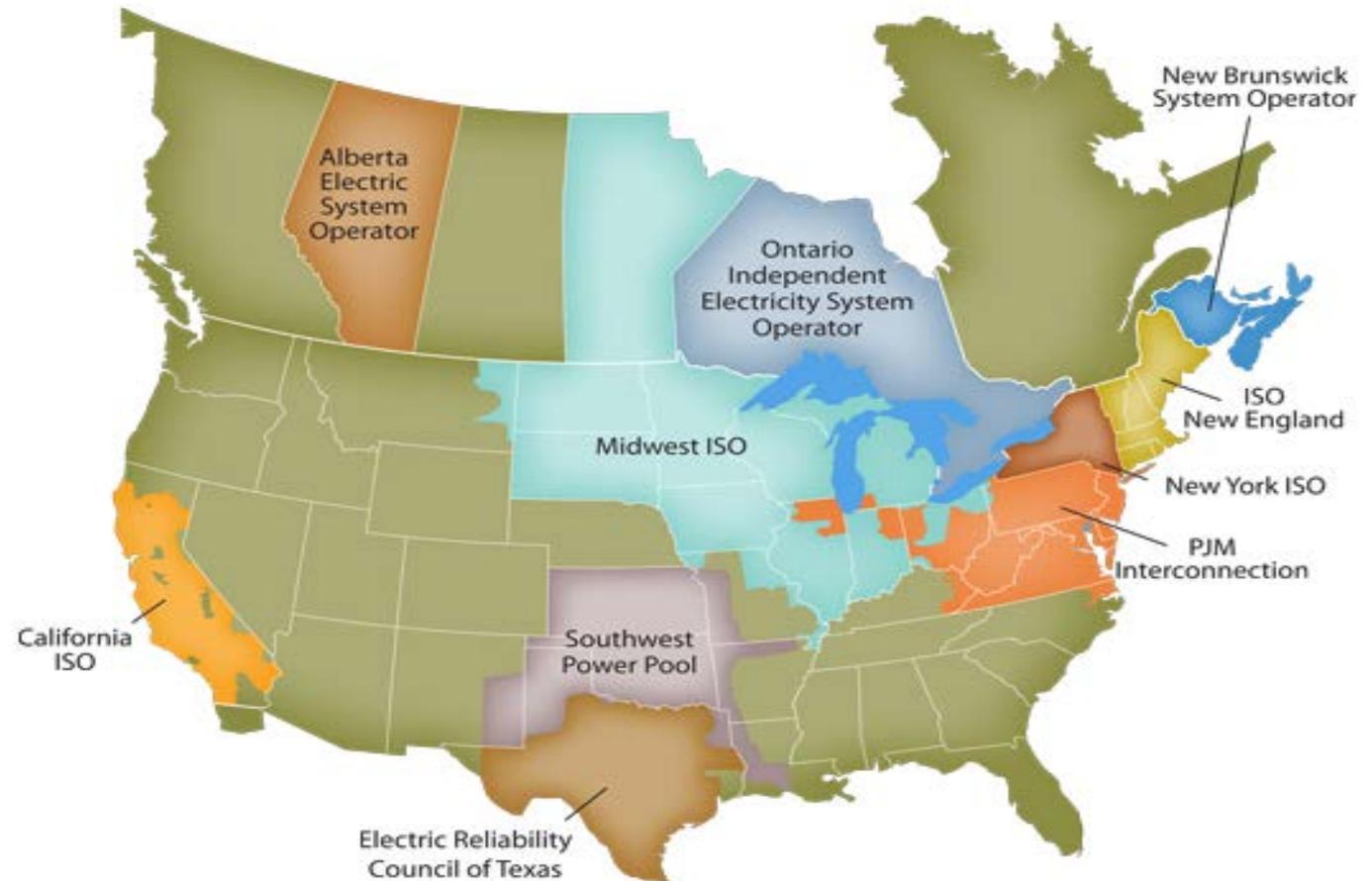
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North American Independent System Operators

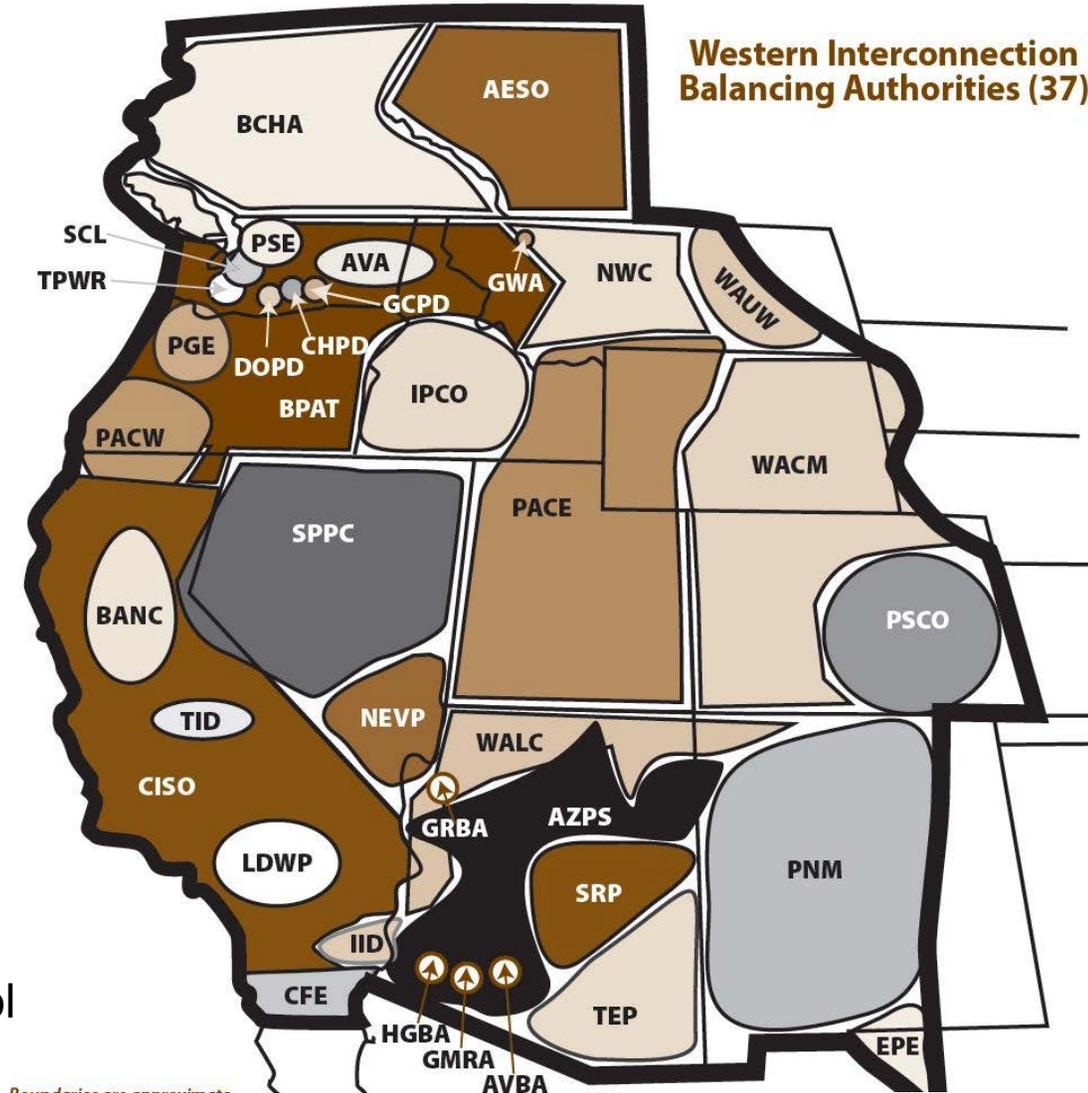


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Regional Balancing Authorities

- 2 Independent System Operators (ISO)
- 14 Investor Owned Utility (IOU) control areas
- 16 Government entity control areas
 - 4 municipalities
 - 4 federal agencies
 - 3 public utility districts
 - 2 foreign govts
 - 2 irrigation districts
 - 1 state political subdivision
- 5 Generation-only control areas



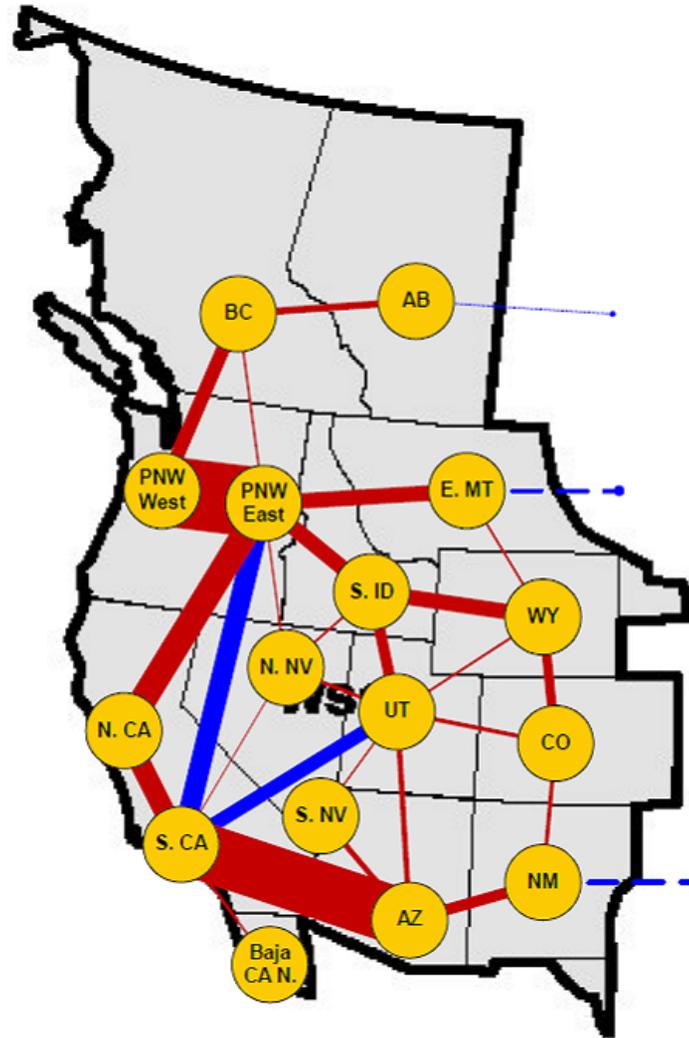
Western Interconnection Balancing Authorities (37)

Source: WECC

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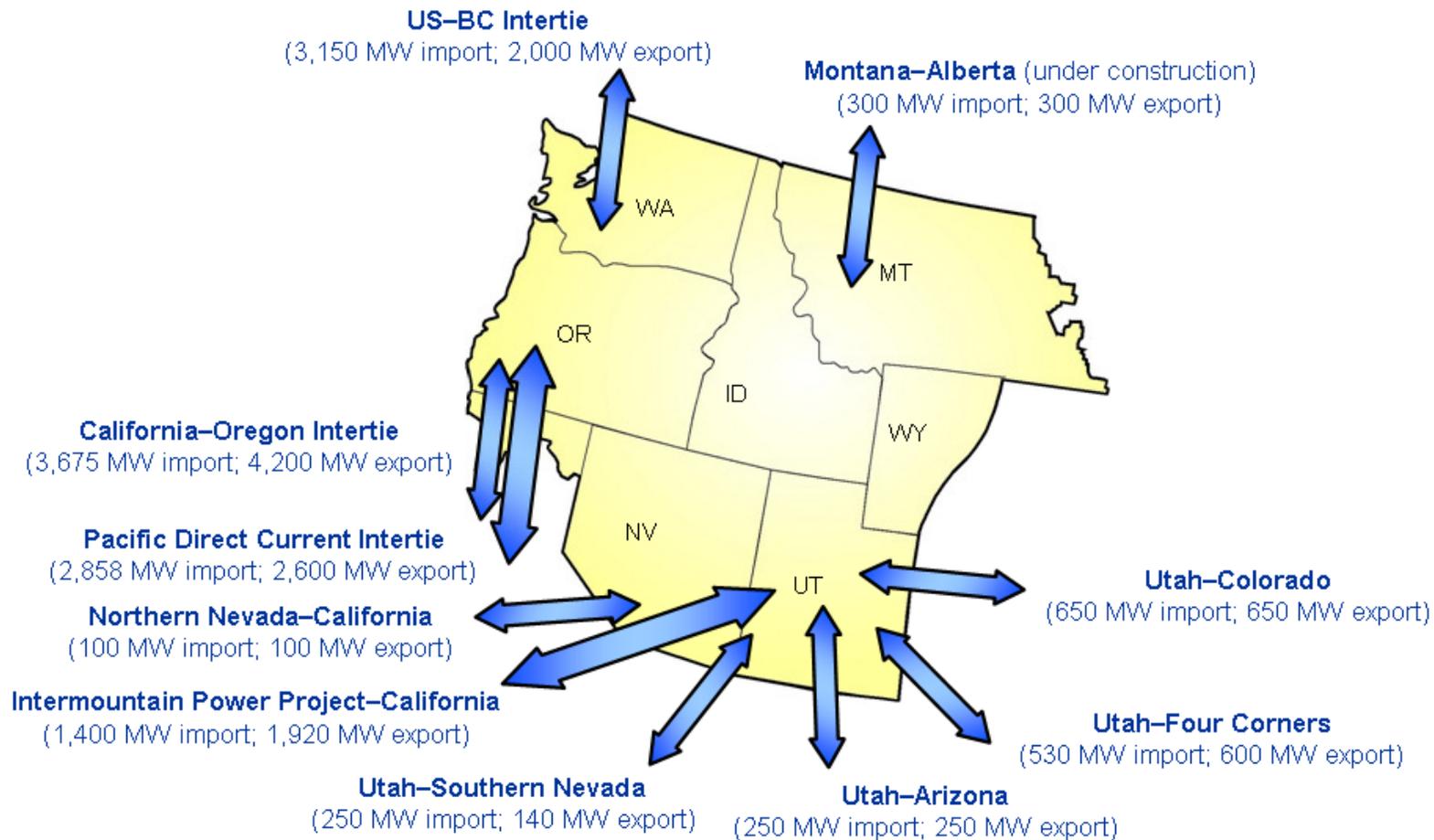
Schematic Electricity Flows



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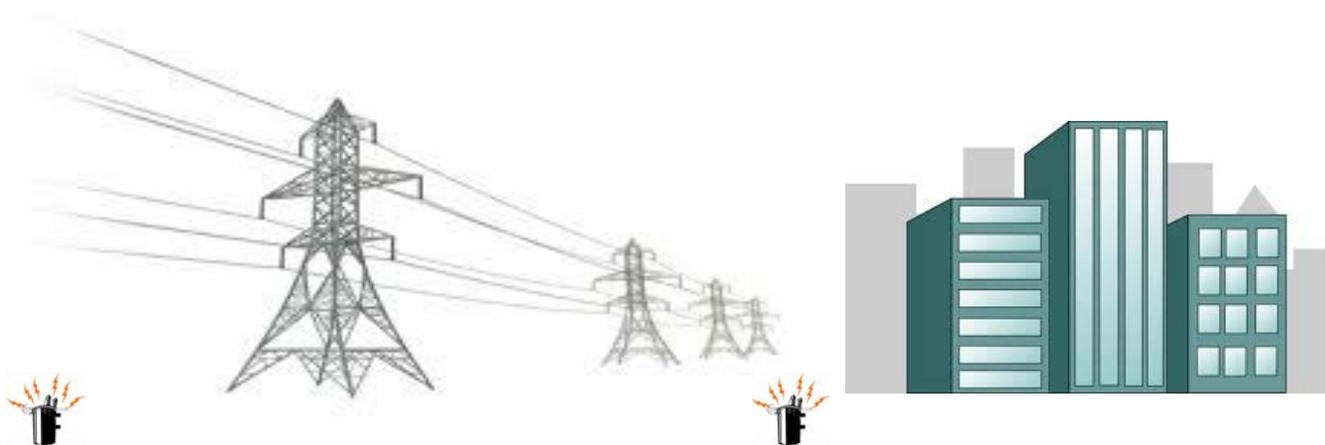
Regional Intertie Capacity



Sources: IHS CERA and WECC.
90908-14

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Rate Pancaking Across Multiple BA's



AESO
export
charge

~\$3.5 +

+ Losses

BC
Hydro
Wheel

\$6.4 +

6.2%

BPA
PNW
Wheel

\$4.3 +

1.9%

BPA SW
Wheel

\$4.3 +

3.0%

CAISO
congestion
& GMC

\$0.5 - ??

Total Tx
Costs

=\$19 +

=11.1%



Keys to Reducing Physical Seams

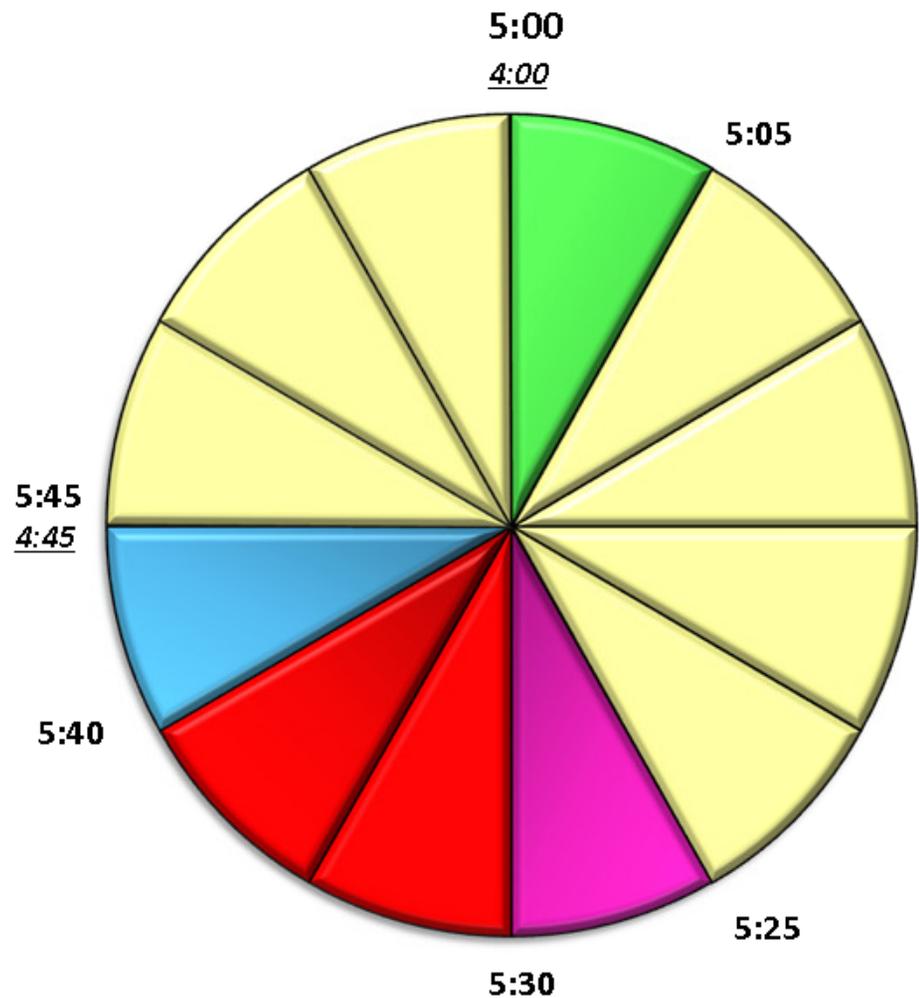
- Larger geographic scope for Balancing Authorities
- Faster energy markets - sub hourly
- Some efforts underway:
 - Intra – hour scheduling
 - Dynamic Scheduling (DSS)
 - ADI
 - ITAP (Intra hour transaction accelerator platform)
 - West Connect / Columbia Grid transmission pricing



Scheduling Timelines – An Example: Trading for Hour Ending 7

Trading for Hour Ending 7 (6:00-7:00)

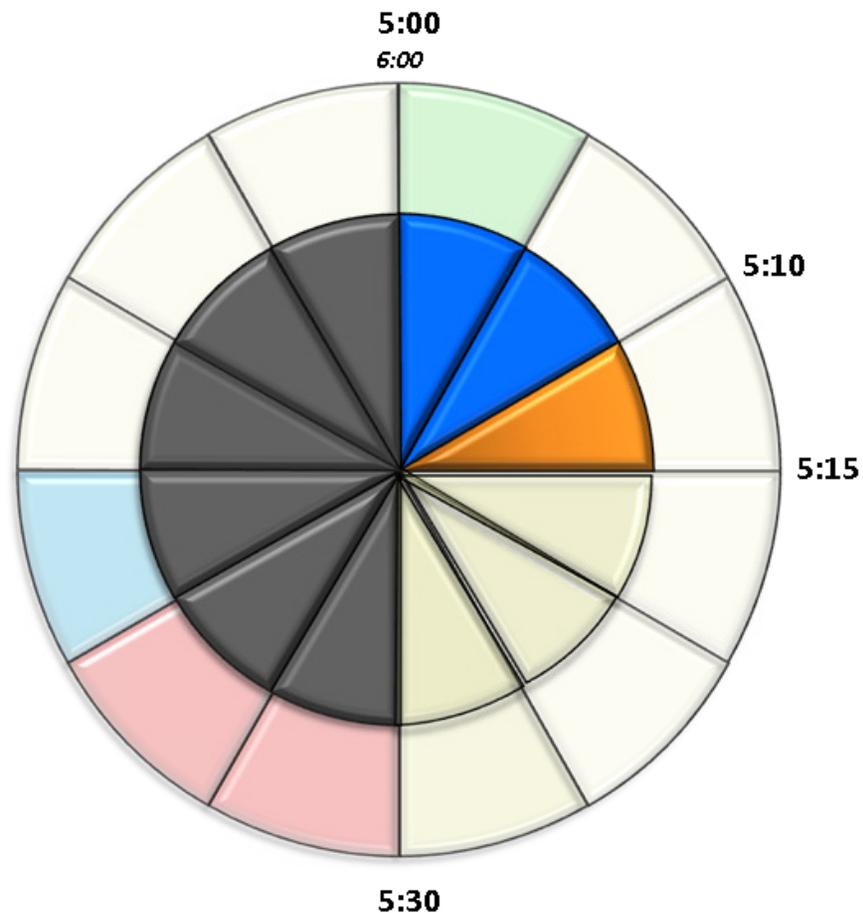
- **4:00 AESO Bid Deadline (T-2)**
- **4:45 CAISO Bid Deadline**
- **4:50 – 5:25 Bi-lateral Trading, forecast wind, reserve tx, prepare NERC E-Tags**
- **5:05 CAISO Awards Dispatched**
- **5:30 Hydro Slice E-Tag Deadline**
- **5:40 BPAT/Mid-C E-Tag Deadline**
- **6:00 – 7:00 Energy dispatched for HE7**





Scheduling Timelines – An Example: Trading for Hour Ending 7 & Intra-Hour for HE 6

- Plus Intra-Hour for HE6 (5:30 – 6:00)**
- **5:10 Intra-Hour Tx Deadline**
 - **5:15 Intra-Hour E-Tag Deadline**
 - **5:30 - 6:00 Intra-Hour Dispatch**





Products & Transactions

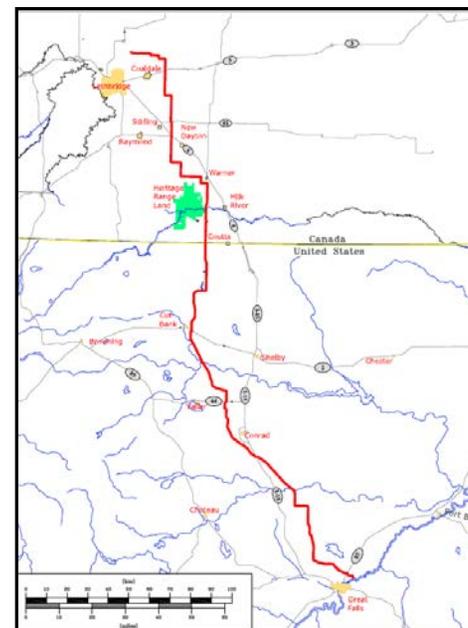
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Montana-Alberta Tie-Line (MATL) Project



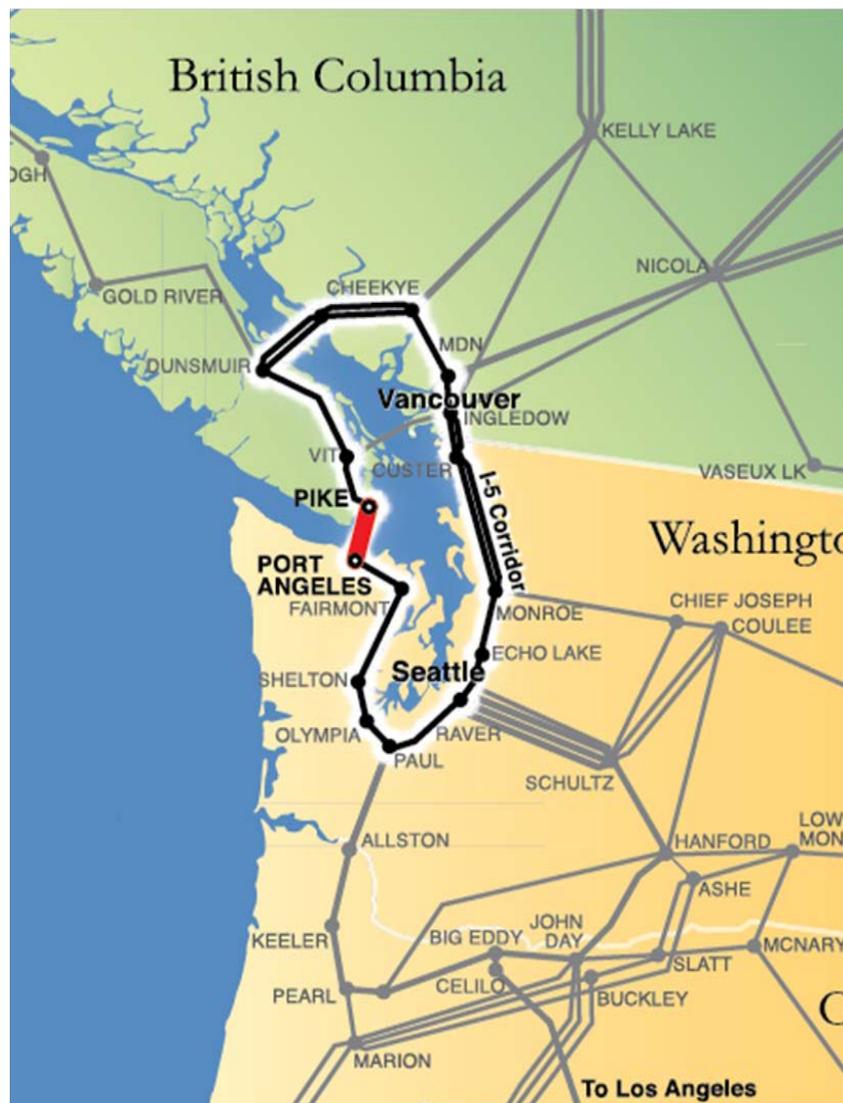
- 300 MW import-export, 214 mile AC transmission line between Great Falls, MT and Lethbridge, AB
- Intercepts approx. 400 MW installed wind generating capacity (Glacier 1 and 2, and Rim Rock facilities), developed by Naturener and managed within two NERC-certified Balancing Authority Areas by Constellation Energy Control & Dispatch (CECD)
- MSCG responsible for much of the integration requirements and all of the energy off-take, emphasizing need for regional liquidity, access to AS products, and open transmission access





Juan de Fuca Cable Project

- 550 MW High Voltage Direct Current (HVDC) transmission line to connect Greater Victoria area of Vancouver Island, BC with Olympic Peninsula, WA.
- Benefits to include enhanced system reliability, greater S->N intertie capacity to serve growing loads in BC and Alberta
- Supports integration of renewable resources



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Northwest Power and Conservation Council – NW Power Markets Symposium

Benefits of Regional Coordination and Market Function
Regional Wind Generation Correlation

<i>Q1</i>	<i>PRR BPA</i>	<i>PRR CAISO</i>	<i>PRR Alberta</i>
PRR BPA	1.000		
PRR CAISO	-0.014	1.000	
PRR Alberta	0.012	0.061	1.000

<i>Q2</i>	<i>PRR BPA</i>	<i>PRR CAISO</i>	<i>PRR Alberta</i>
PRR BPA	1.000		
PRR CAISO	0.099	1.000	
PRR Alberta	0.021	0.027	1.000

<i>Q3</i>	<i>PRR BPA</i>	<i>PRR CAISO</i>	<i>PRR Alberta</i>
PRR BPA	1.000		
PRR CAISO	0.259	1.000	
PRR Alberta	0.054	0.068	1.000

<i>Q4</i>	<i>PRR BPA</i>	<i>PRR CAISO</i>	<i>PRR Alberta</i>
PRR BPA	1.000		
PRR CAISO	-0.001	1.000	
PRR Alberta	0.050	-0.045	1.000

One year overall

	<i>PRR BPA</i>	<i>PRR CAISO</i>	<i>PRR Alberta</i>
PRR BPA	1.000		
PRR CAISO	0.104	1.000	
PRR Alberta	0.034	0.028	1.000

PRR = Power Ramp Rate = [Output Power (t+1) – Output Power (t)]. Using hourly intervals (2011 data).



RPS and Carbon Products and Their Interaction

- Altered generation stack due to carbon costs
- Inter-state / inter-regional cost advantages and resulting dispatch patterns
 - California – PNW – British Columbia
- Preferential bilateral transactions with sharing of benefits (avoided costs)
- Balancing of low-carbon resources and limited intertie transmission
- Not all low-carbon generation created equal:
 - e-tagging requirements
 - ACS versus Specified resources (shuffling vs. load-serving)
 - Capacity factors, dispatch, and transmission usage
- Written confirmation requirements
- ICE – traded standard blocks versus bilateral as-generated transactions
 - Market liquidity impacts
 - CARB regulation versus guidance
- WSPP contract modifications



Questions and Discussion