Wind PPA discussion with iCAP Working Group

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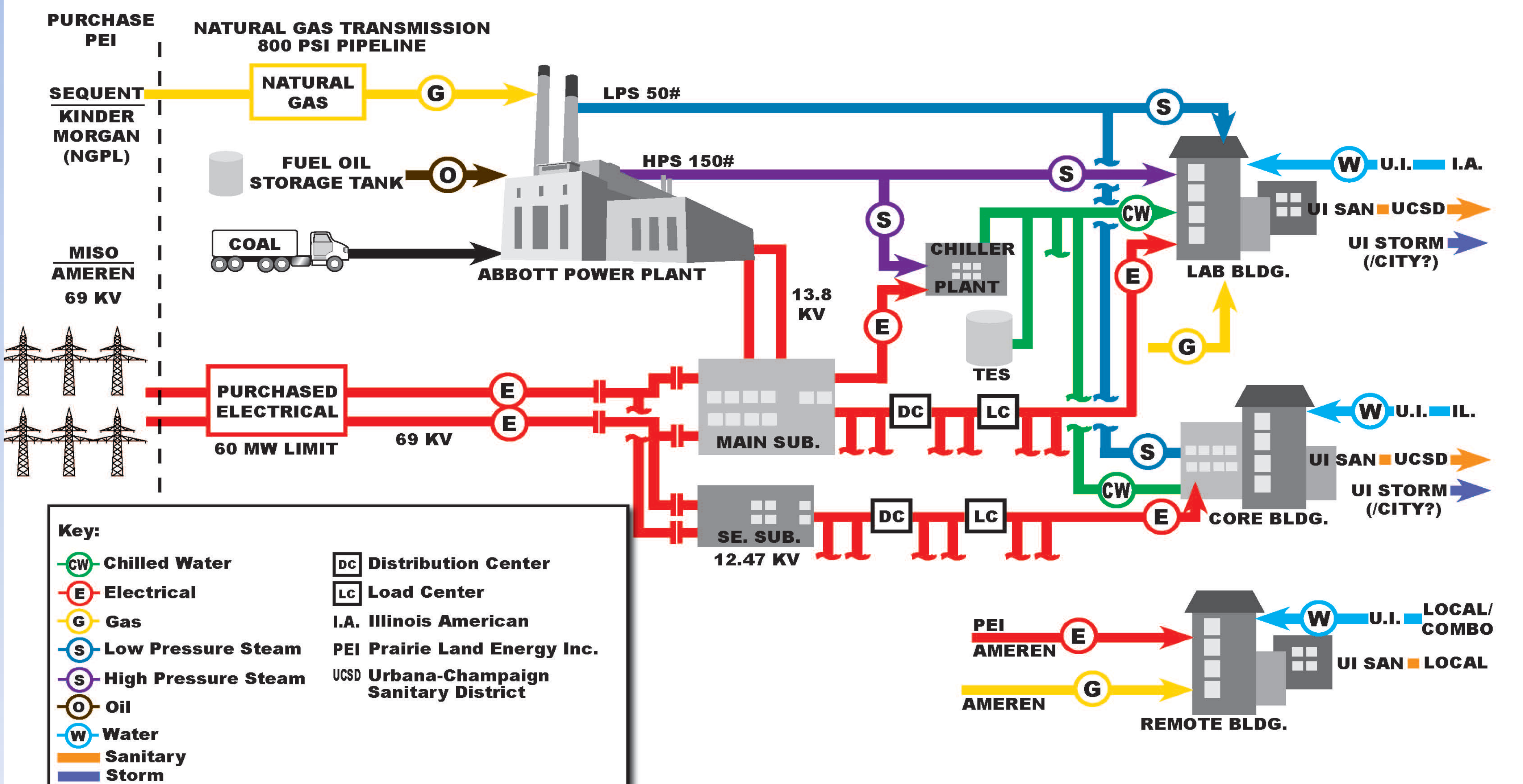
University of Illinois at Urbana-Champaign
October 30, 2014, 3pm
Example Data from working files- Not Final

ILLINOIS UTILITIES



Abbott Power Plant - CHP

- Steam Generation
  - 3 Gas/Oil Boilers –(Replacing)
    - 2 w/ low NOx Burners
    - 175k (A 140k) @ 325 PSI ea.
  - 3 Solid Fuel (Coal) Boilers
    - B&W w/ Spreader Stoker
    - 150k / 200k @ 875 PSI
    - Scrubber Total 350k #/hr
  - 2 HRSG / DB (on GTs)
    - Gas / Oil – Combined Cycle
    - 80k / 40k #/hr = Total 120k x 2
- Electric Generation
  - Steam Turbine Generators
    - 5 @ 325# (1 unavailable)
      - 1 Backpressure
      - Total of 4 = 12 MW
    - 5 @ 850 #
      - 1 Backpressure
      - Total of 5 = 47 MW
  - Combustion Turbines
    - Nat Gas / Oil
    - Total of 2 = 25 MW

Utility Enterprise Budget / Rates

Rate Components

- Fuel and purchased utility costs
- Chemicals
- Cost to distribute to the buildings
- Administrative labor costs
- Operations labor costs
- Maintenance costs
- Major repair/replacement costs
- Debt service
- Pre-FY09 Deficit (revised to annual payment)

Rate Development

Budget Rate – Prior to Fiscal Year start

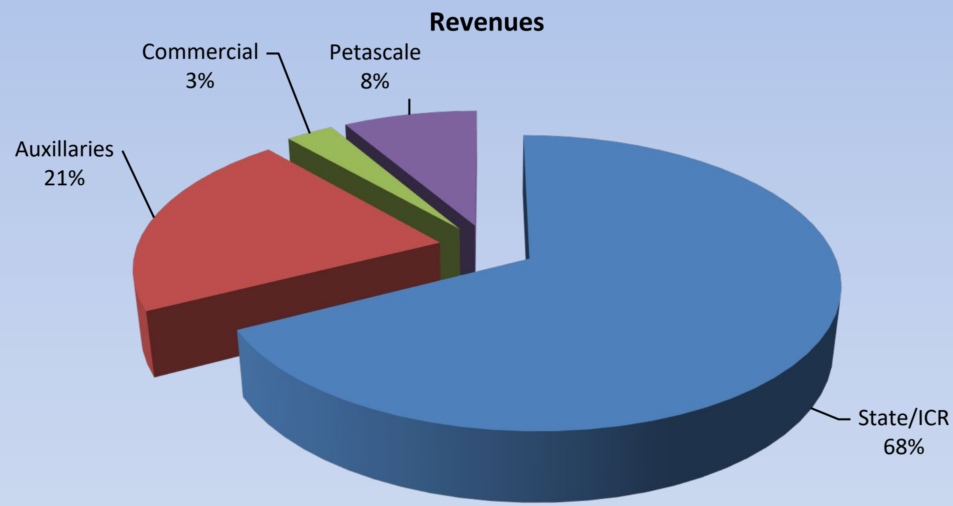
- Estimate consumption by commodity
- Market information to estimate prices
- Compare purchase/generate/fuel source
- Include fixed costs(debt, labor, capital, operations, deficit)
- Previous years over / under adj.

Anticipated Fuel for Hedge Process

- "Must Run" Nat Gas
- Electric Block Purchase

Operational Purchase – Gas / Elec (RTP)

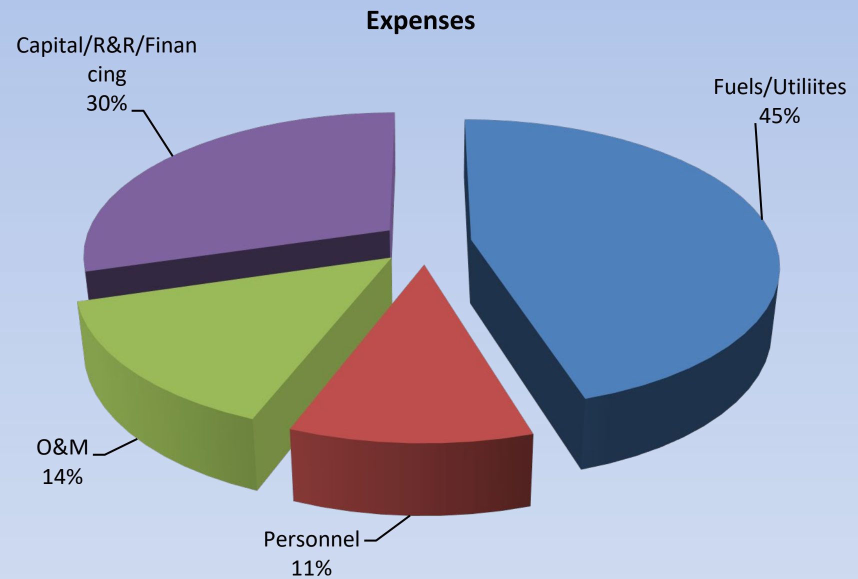
Sources of funds (revenues)



State/ICR	Auxiliaries	Commercial	Petascale	Total Operations
$55,104	$17,280	$2,455	$6,880	$81,719
67.4%	21.2%	3.0%	8.4%	100.0%

Source: 2015 Budget and Rate Case – Excludes funding for deficit reduction.

Uses of funds (expenses)



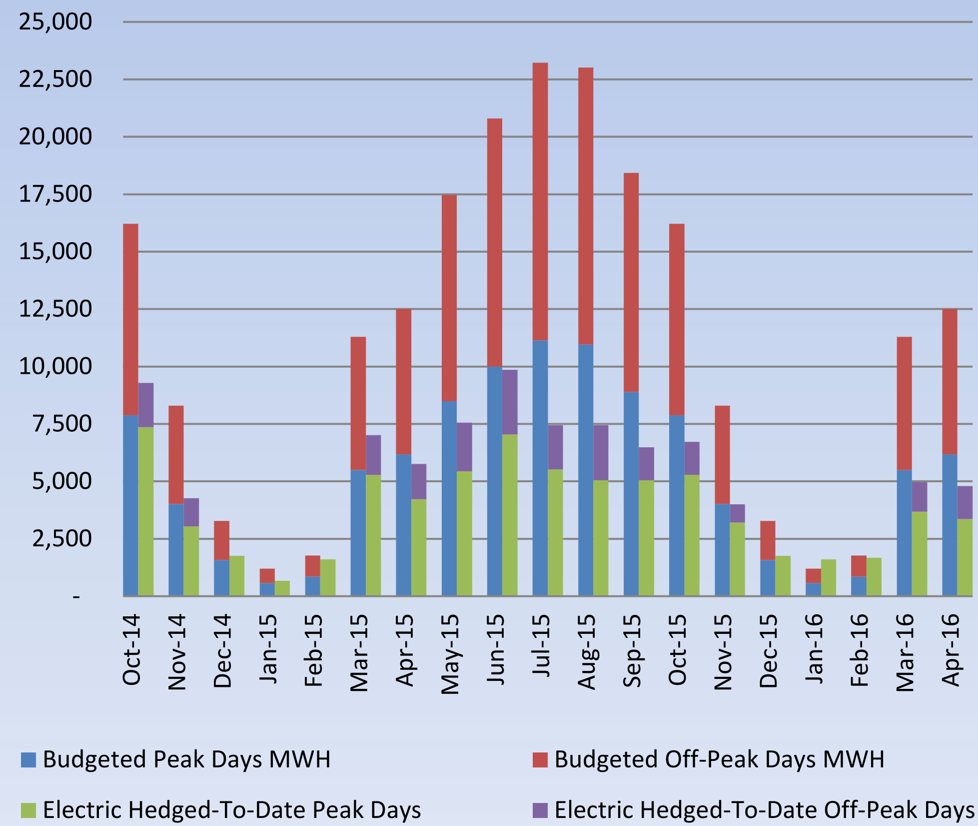
Fuels	Personnel	O&M	Cap/RR/Debt	Total Operations
$36,992	$8,663	$11,851	$24,213	$81,719
44.8%	10.5%	14.4%	30.3%	100.0%

Source: 2015 Budget and Rate Case – Excludes Deficit Reduction

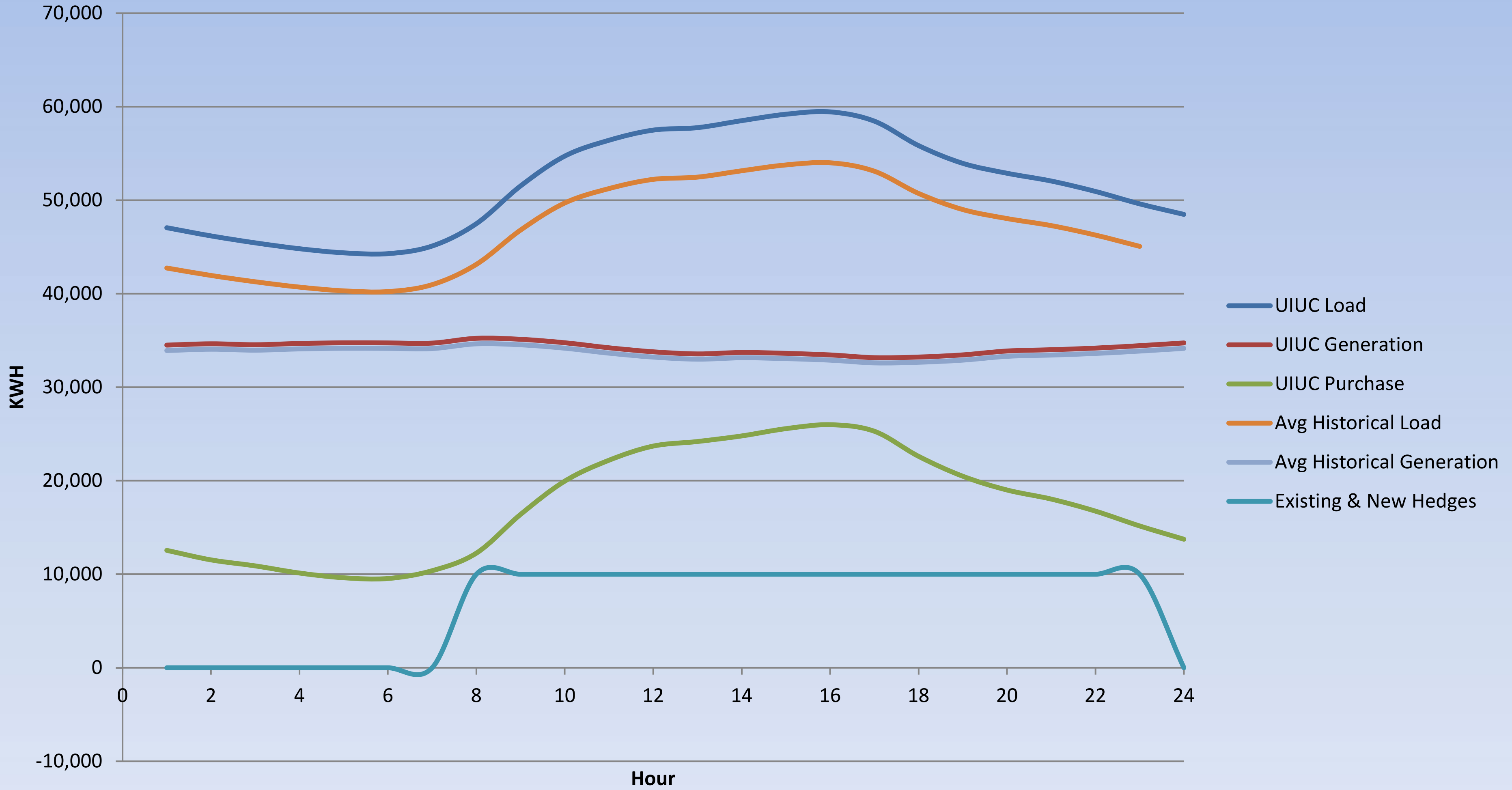
How we currently purchase electricity

- Electrical Hedge Purchase
  - Peak 16 Hours Only
  - Mostly Peak (work) Days
  - Some Off-Peak Days
    - Weekends
    - Holidays
- Block Purchases
  - January 2015 Example Peak
    - 5 x 16 Hours @ 2 MW
    - 21 Peak Days
    - 672 MWh purchase

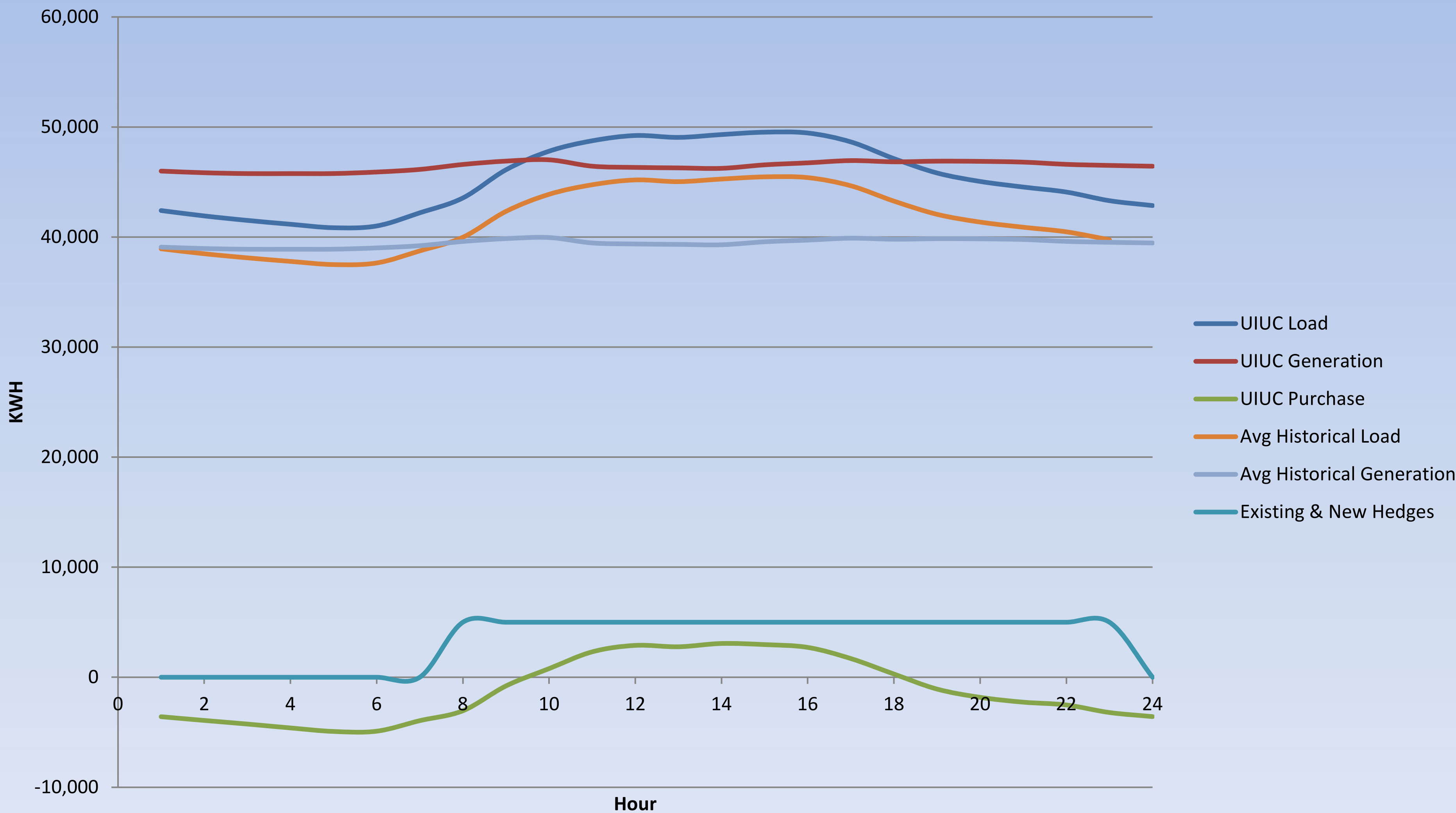
Total Electric Hedge Positions



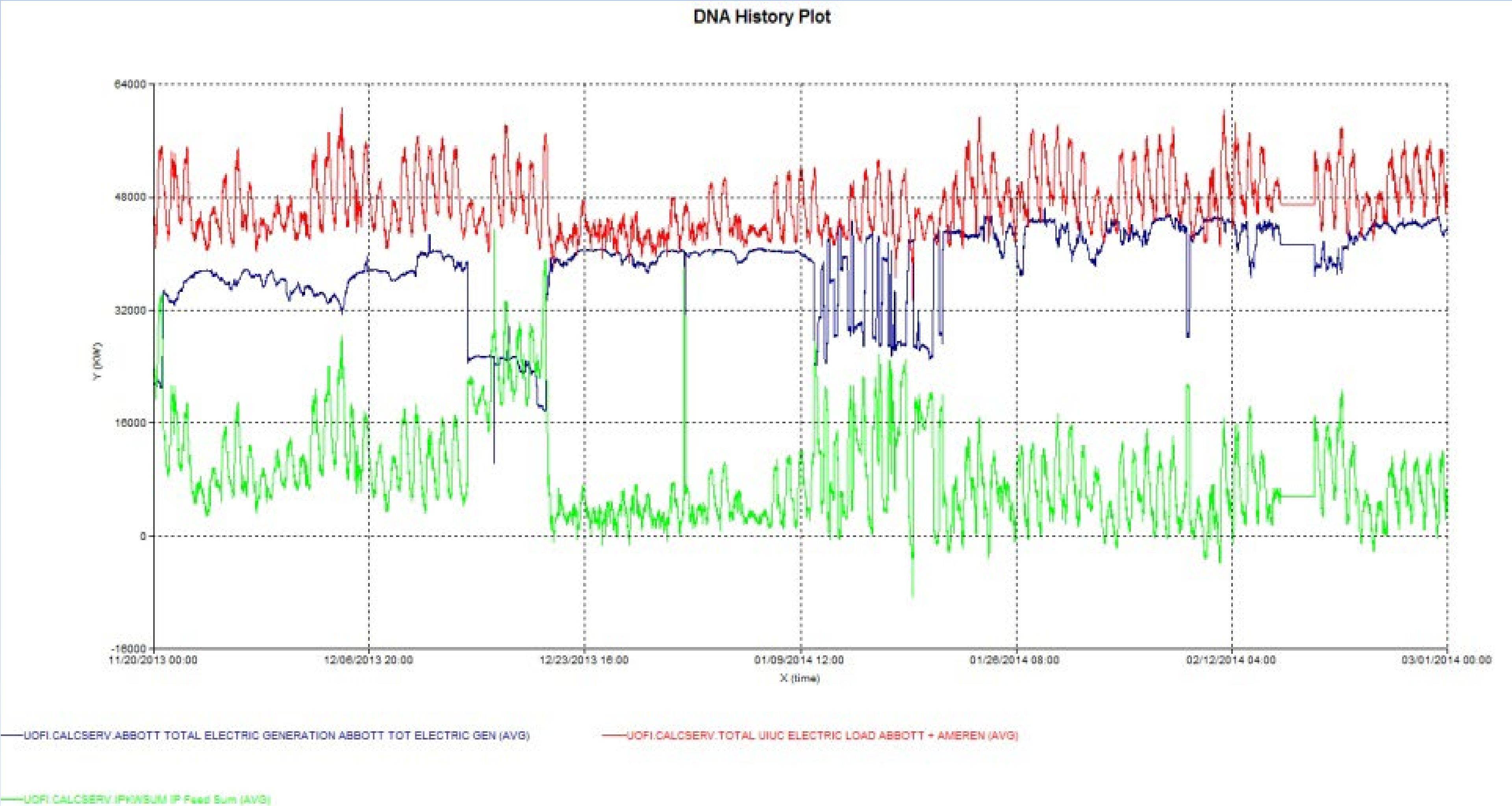
April Peak Electric Forecasts and Comparisons



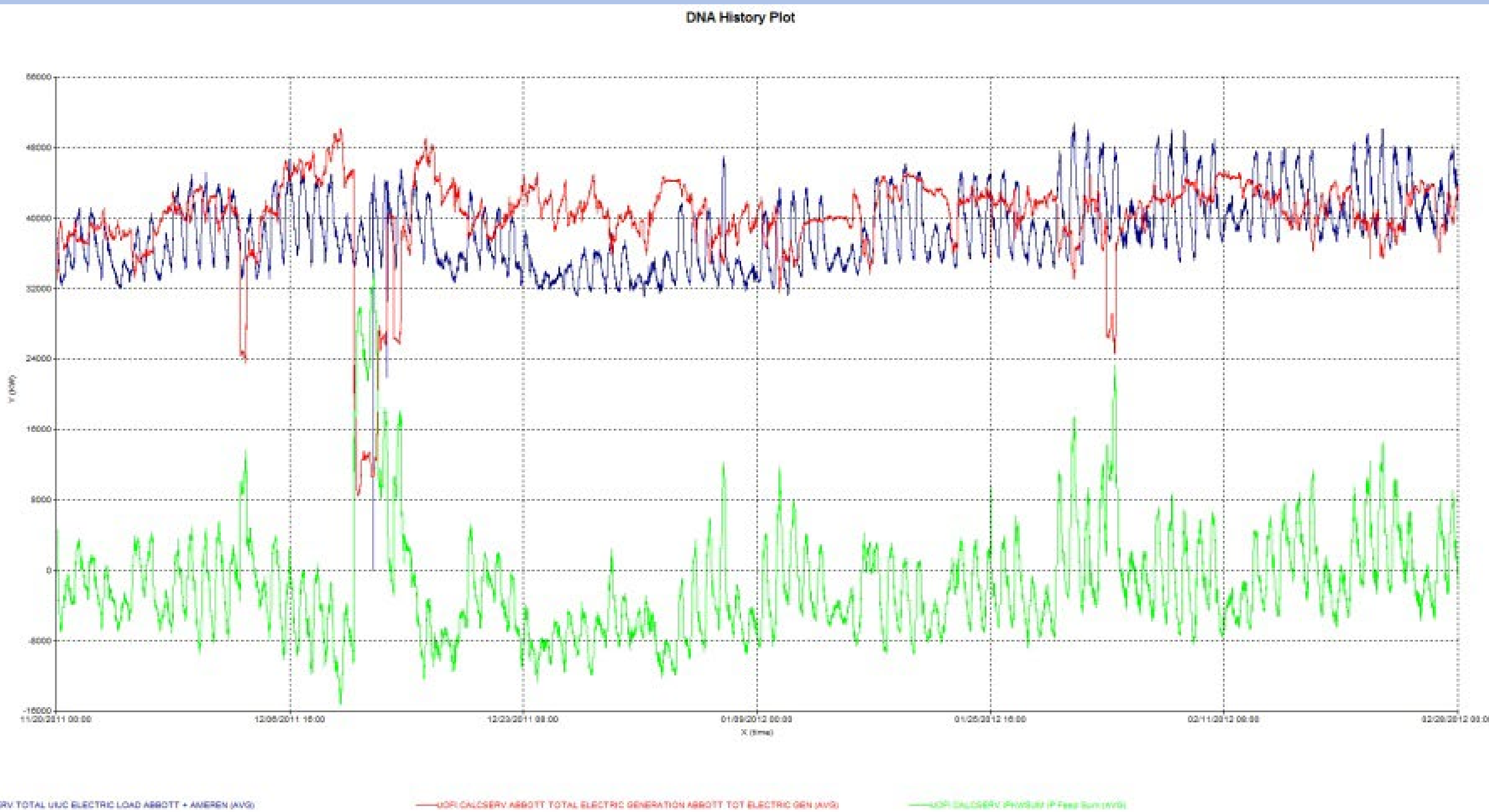
December Peak Electric Forecasts and Comparisons



Winter ‘14 Electrical Load/Gen/Purchase



Winter '12 Electrical Load/Gen/Purchase



Purchased Electricity Continued

- Operational Purchases
  - Optimize Operations
    - Asset Availability
    - Market Prices
  - Day Ahead Purchase
    - Electrical (optional)
    - Nat Gas Nomination
  - Daily Balancing
    - Electrical RTP
    - Balance with 1,500 Swing

Real-Time Pricing Report

Market Date: 02/18/2013
Peak Hour: HE 20 (EST)
Minimum Hour: HE 04 (EST)
Publish Date: 02/19/2013

Pricing Results

	Demand	Supply	Total
Energy Cleared (MWh)	1,428,979.0	1,322,837.0	2,751,816.0
Dollars Cleared	$33,187,648.01	$27,340,019.00	$60,527,666.96

LMP Prices ($ per MW)

	MISO System	Illinois Hub	Michigan Hub	Minnesota Hub	Indiana Hub
Hour 01	34.35	(5.92)	145.47	18.71	22.78
Hour 02	19.43	19.42	58.34	10.19	19.71
Hour 03	15.06	17.57	24.59	10.04	22.37
Hour 04	15.30	13.49	26.05	10.24	23.76
Hour 05	18.22	21.41	26.06	15.91	23.22
Hour 06	19.16	7.74	23.03	18.52	24.63
Hour 07	21.07	18.38	24.31	22.43	30.57
Hour 08	37.19	(5.19)	47.99	23.67	58.60
Hour 09	22.71	13.97	26.51	23.02	31.45
Hour 10	19.61	(71.73)	24.58	22.12	33.43
Hour 11	21.14	(7.71)	26.10	23.05	28.71
Hour 12	19.02	4.84	24.28	22.59	25.78
Hour 13	18.98	6.53	23.85	21.99	25.02
Hour 14	20.03	21.30	24.47	22.38	23.53
Hour 15	18.95	21.38	24.02	23.55	23.57
Hour 16	19.22	19.21	24.19	22.37	25.39
Hour 17	19.45	22.61	24.72	20.84	22.90
Hour 18	20.67	26.19	29.09	19.17	26.77
Hour 19	29.07	(5.56)	42.30	24.69	46.73
Hour 20	21.12	8.56	26.18	22.74	26.25
Hour 21	20.38	(4.42)	24.99	22.23	27.42
Hour 22	20.11	23.00	24.25	22.01	22.36
Hour 23	19.54	27.32	23.14	21.31	23.13
Hour 24	18.82	21.64	22.73	20.28	25.99

Around the Clock

Low	(492.15)	(71.73)	22.73	10.04	19.71
Average	21.19	8.92	32.97	20.17	27.67
High	451.00	27.32	145.47	24.69	58.60

On-Peak (between 0600 and 2200 EST Monday through Friday, excluding holidays)

Low	(492.15)	(71.73)	23.85	19.17	22.36
Average	21.79	5.71	27.61	22.43	29.91
High	451.00	26.19	47.99	24.69	58.60

Off-Peak (between 2201 and 0559 EST Monday through Friday, all hours for weekends and holidays)

Low	(272.78)	(5.92)	22.73	10.04	19.71
Average	19.99	15.33	43.68	15.65	23.20
High	296.21	27.32	145.47	21.31	25.99

Purchased Elec Misc Charges

FY 14	Ameren Distribution		Ameren Transmission		MISO Schedule Charges		MISO Ancillary Charges		PEI Overhead		ESG (Electronic Data)		DS4 Volumes	Total FY14 Adders	
Month	DS4 Total	$/MWH	Transmission Total	$/MWH	MISO Schedule Total	$/MWH	MISO Ancillary Charges Total	$/MWH	PEI Overhead Total	$/MWH	ESG Total	$/MWH	DS4 MWH	Adder Cost Total	$/MWH
July 2013	$ 163,666	$ 8.49	$ 103,862	$ 5.39	$ 30,694	$ 1.59	$ 15,325	$ 0.80	$ 19,275	$ 1.00	$ 1,098	$ 0.06	19,275	$ 333,920	$ 17.32
August 2013	$ 160,160	$ 7.77	$ 105,641	$ 5.12	$ 62,783	$ 3.05	$ 14,463	$ 0.70	$ 20,618	$ 1.00	$ 1,110	$ 0.05	20,618	$ 364,775	$ 17.69
September 2013	$ 195,051	$ 9.20	$ 102,248	$ 4.82	$ 38,814	$ 1.83	$ 19,243	$ 0.91	$ 21,204	$ 1.00	$ 1,107	$ 0.05	21,204	$ 377,666	$ 17.81
October 2013	$ 169,479	$ 8.15	$ 105,306	$ 5.06	$ 35,773	$ 1.72	$ 17,090	$ 0.82	$ 20,797	$ 1.00	$ 1,102	$ 0.05	20,797	$ 349,546	$ 16.81
November 2013	$ 127,130	$10.54	$ 84,752	$ 7.03	$ 22,381	$ 1.86	$ 13,168	$ 1.09	$ 12,062	$ 1.00	$ 1,116	$ 0.09	12,062	$ 260,608	$ 21.61
December, 2013	$ 85,349	$10.37	$ 95,160	$11.56	$ 10,161	$ 1.23	$ 13,910	$ 1.69	$ 8,231	$ 1.00	$ 1,093	$ 0.13	8,231	$ 213,903	$ 25.99
January, 2014	$ 66,592	$11.22	$ 92,275	$15.54	$ 14,504	$ 2.44	$ 4,986	$ 0.84	$ 5,937	$ 1.00	$ 1,102	$ 0.19	5,937	$ 185,395	$ 31.23
February, 2014	$ 49,564	$11.59	$ 83,593	$19.55	$ 13,195	$ 3.09	$ 7,587	$ 1.77	$ 4,276	$ 1.00	$ 1,163	$ 0.27	4,276	$ 159,378	$ 37.27
March, 2014	$ 132,976	$11.26	$ 101,090	$ 8.56	$ 53,793	$ 4.55	$ 17,462	$ 1.48	$ 11,812	$ 1.00	$ 1,105	$ 0.09	11,812	$ 318,238	$ 26.94
April, 2014	$ 100,277	$ 8.90	$ 33,134	$ 2.94	$ 36,892	$ 3.27	$ 19,257	$ 1.71	$ 11,270	$ 1.00	$ 1,125	$ 0.10	11,270	$ 201,955	$ 17.92
May, 2014	$ 166,469	$ 8.81	$ 115,969	$ 6.14	$ 63,109	$ 3.34	$ 24,821	$ 1.31	$ 18,901	$ 1.00	$ 1,117	$ 0.06	18,901	$ 390,385	$ 20.65
June, 2014	$ 211,902	$ 7.31	$ 113,381	$ 3.91	$ 51,543	$ 1.78	$ 53,925	$ 1.86	$ 28,969	$ 1.00	$ 1,141	$ 0.04	28,969	$ 460,861	$ 15.91
Total/$/MWH Avereage	$ 1,628,614	$ 8.88	$1,136,411	$ 6.20	$ 433,643	$ 2.37	$ 221,235	$ 1.21	$ 183,350	$ 1.00	$ 13,377	$ 0.07	183,350	$3,616,631	$ 19.73
															$ -

Notes:

1) DS-4 volumes were used in the calculations

2) MISO Ancillary charges DO NOT include ARR or Distribution Loss Credits

3) Capacity (Resource Adequacy Amount) is included in the MISO Ancillary charges, charges increased from an average of $780 a month to $31,000 a month. The service period is from June 1 - May 31 for capacity charges.

Renewable Energy Goals

- iCAP Goals
  - 5% by 2015
  - 17.5% by 2020
  - 25 % by 2025
- RFP for Power / RECs
- 2015 Est. 470,000 Mwh
- 2015 RECs
  - 20,000 Mwh
  - $1.35 (MISO Wind)
- MISO - EIA Data
  - 12.5 % Renewable
  - UIUC import 5.3 % RE
- Solar Farm PVs
  - Annual Starting Production ~ 7,863 MWH
- Solar Building PVs
  - ECE ~ 400 MWH – Potential Project
  - NCPD ~1,600MWH – Potential with ECE
  - BIF~ 86MWH – In service at % of design
- Anaerobic Digester / Other ?

Electricity projections for FY15

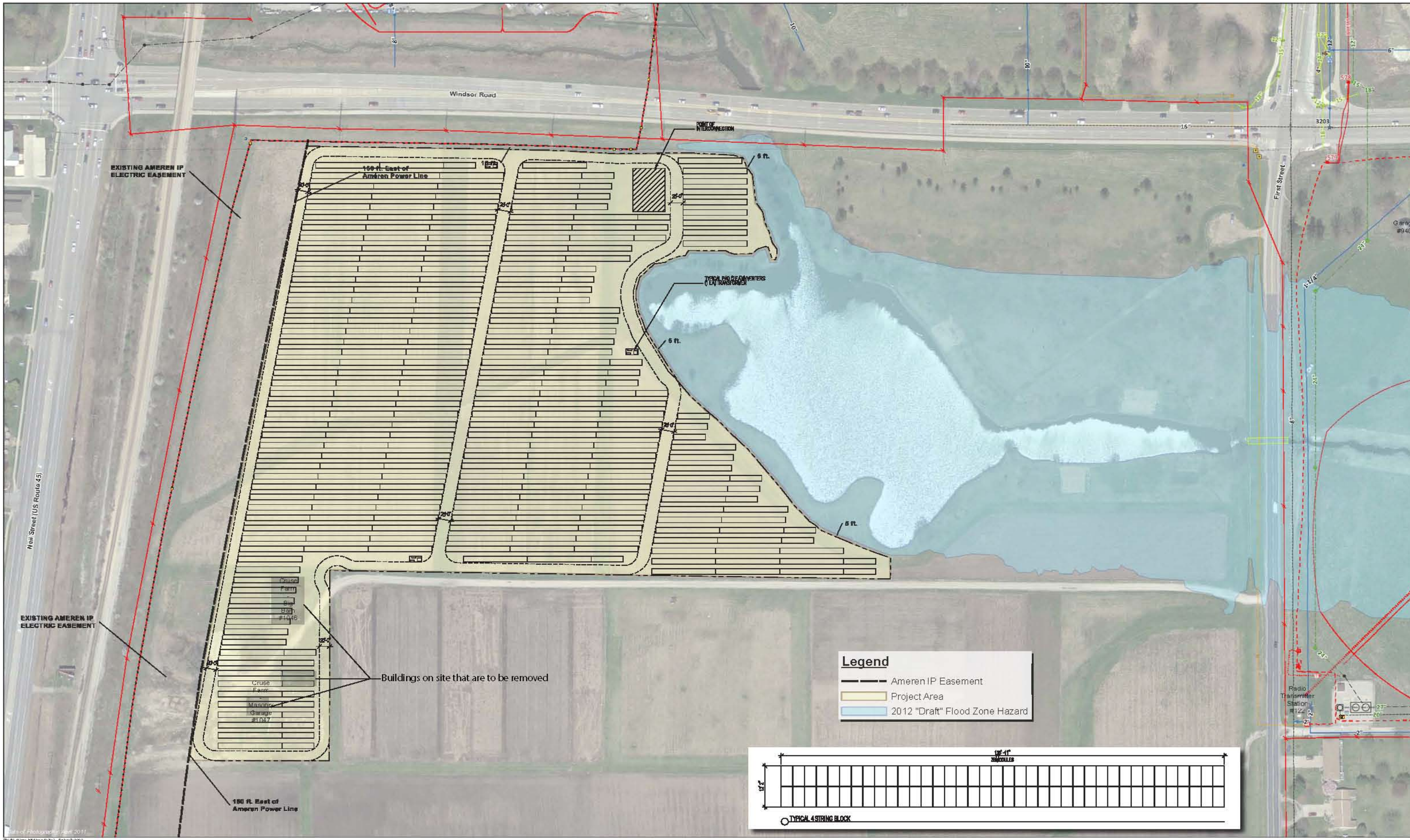
• Abbott Power Plant	308,965 MWh
• Purchased	+161,123 MWh
Total *	470,088 MWh
5%	23,500 MWh

- Wind PPA options 10,00 to 100,000 MWh?

  10 year PPA from FY16 to FY25

Requires us to buy as available rather than as needed

* Includes Line Losses and NPCF

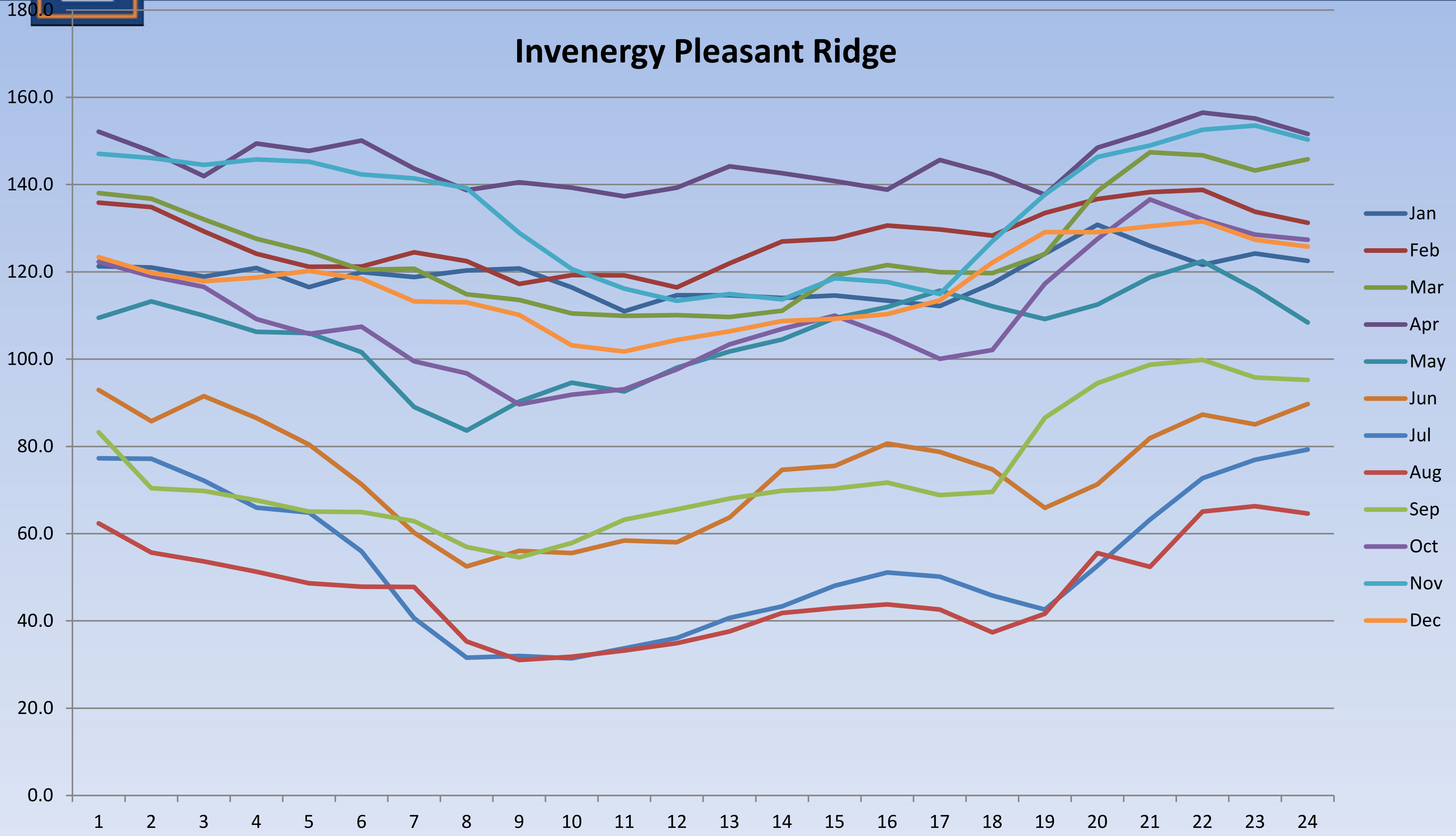


UTILITIES AND ENERGY SERVICES

0 40 80 160 240 320 Feet

FIGURE 4
SOLAR FARM PROJECT
University of Illinois, Urbana - Champaign Campus

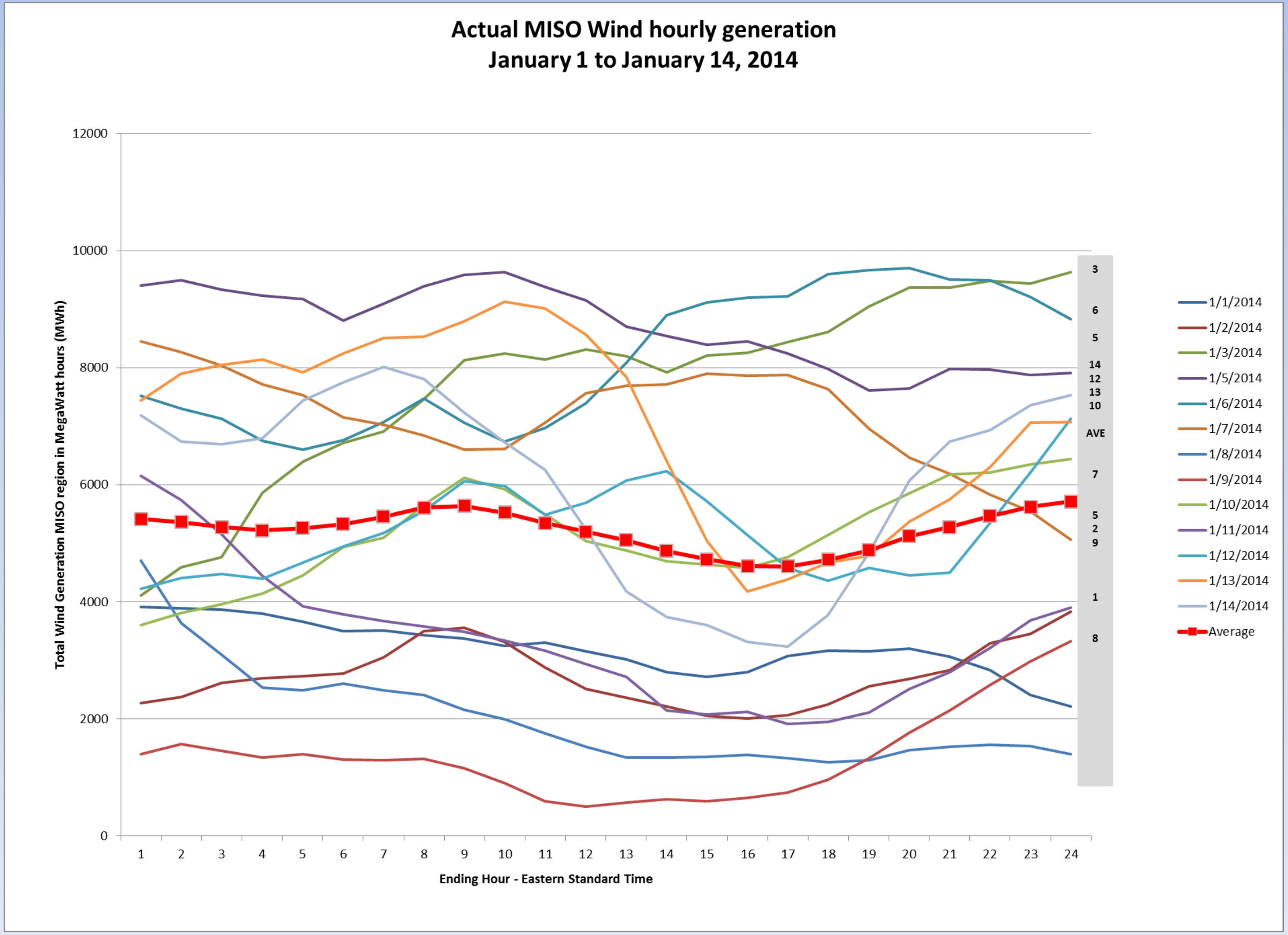
- PV – Solar Farm
  - PPA (10 yr.) w/ Land Lease
  - 7.5 Gwh / year (~ 2 %)


Invenergy Pleasant Ridge
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Wind PPA Issues

- Wind Production Profile – Unpredictably Variable
  - Daily Peak Average Opposite UIUC Load Profile
  - Monthly Profile Doesn't Match UIUC Profile
- LMP Pricing - Basis Risk / Congestion
- Wind Farm PPA w/ Developer - LLC
- Minimum 10 Year Agreement
  - Financial Stability
  - Long Term UIUC Load Profile – NPCF / GSF / Conserve

Production variability



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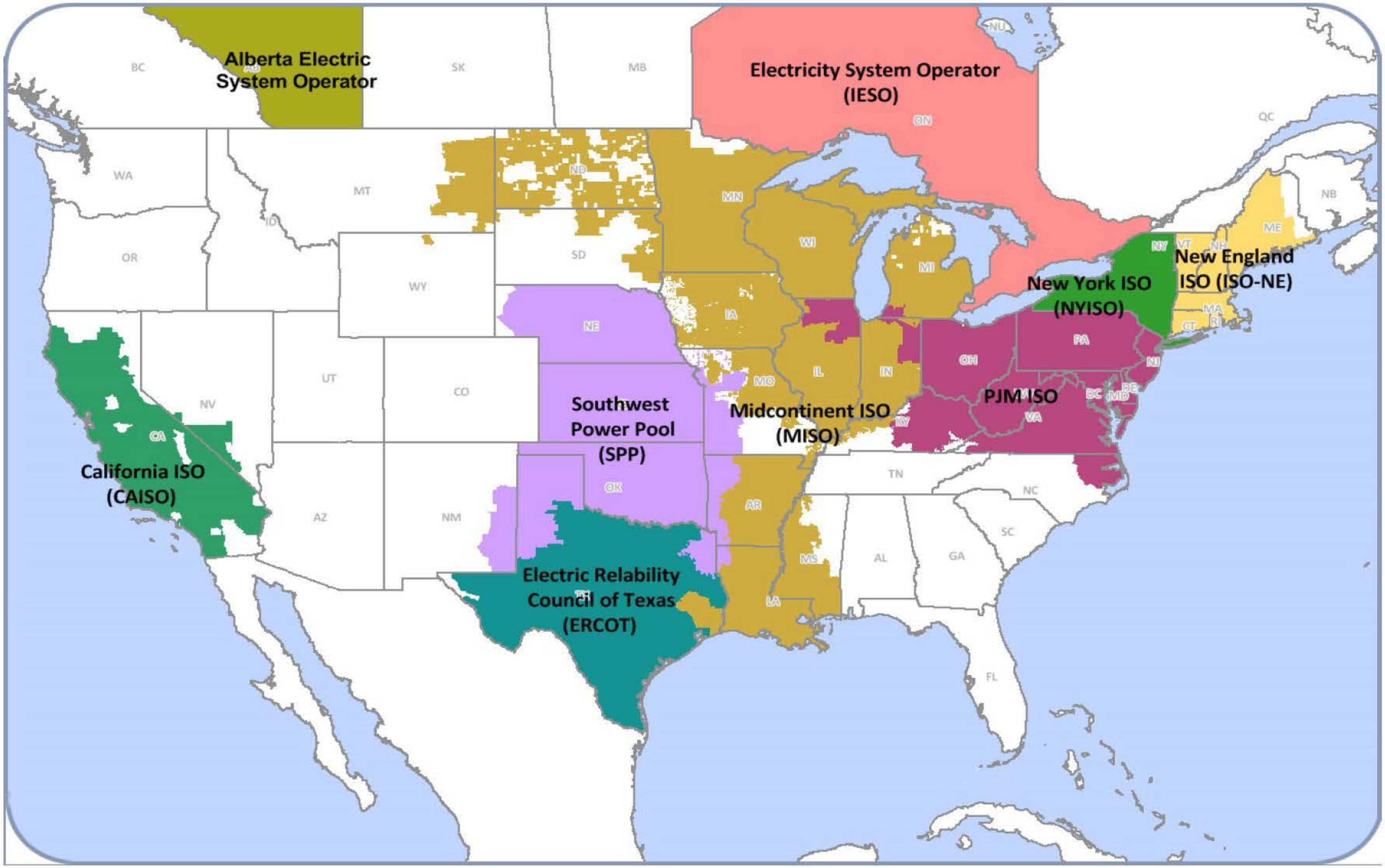
North American Regional Transmission Organizations



Source: Created in *Energy Velocity*

Updated: July 14, 2014

- [LMP Contour Map](://www.misoenergy.org/LMPContourMap/MISO_All.html)://www.misoenergy.org/LMPContourMap/MISO_All.html

Wind PPA Cost Evaluation

Wind RFI Pricing Matrix									
Company Name	Wind Farm Name	Location	Market	Bundled Quote AMIL.PEIC $/MWh	Unbundled Quote AMIL.PEIC $/MWH	Comp Market Price	Bundled Premium $/MWH	Unbundled Premium $/MWH	Comments
Acciona Energy North America	Tatanka	McIntosh County, ND; McPherson County, SD	MISO	$ 38.00	$ 35.00	$ 30.81	$ 7.19	$ 4.19	
Acciona Energy North America	EcoGrove	Stephenson Country, IL	PJM	$ 50.00	$ 30.00	$ 31.20	$ 18.80	$ (1.20)	Could Combine with MISO Wind RECs
EDF Renewable Energy	Kelly Creek	Northeastern, IL	PJM	$ 61.20	N/A	$ 30.81	$ 30.39	N/A	
Iberdrola Renewables	Providence Heights	Bureau County, IL	PJM	$ 43.50	N/A	$ 30.87	$ 12.63	N/A	
EDP Renewables North America	Rail Splitter	Tazewell County, IL; Logan County, IL	MISO	$ 44.00	N/A	$ 30.66	$ 13.34	N/A	
Invenergy	Pleasant Ridge	Livingston County, IL	PJM	$ 40.00	N/A	$ 30.81	$ 9.19	N/A	quote $39 to $40, annual escalator 2.25%
Invenergy	Bishop Hill Energy Center	Henry County, IL	MISO	$ 48.50	N/A	$ 30.61	$ 17.89	N/A	quote $46.50-$48.50, annual escalator 2.25%

Step	Description	Estimated Time (Weeks)	Target Date	Responsible Parties
1	Prepare and issue RFI to list of vendors previously provided by FM.	3	8/15/2014	UIUC, PEI, FM
2	Responses to RFI due to PEI.	2	8/29/2014	UIUC, PEI, FM
3	Review RFI responses.	9	10/31/2014	UIUC, PEI, FM
4	Issue RFP based on results of RFI.	3	11/21/2014	UIUC, PEI, FM
5	Responses to RFP due to PEI.	3	12/12/2014	UIUC, PEI, FM
6	Review RFP responses, including standard PPA's, credit worthiness, ownership structure and other terms.	6	1/23/2015	UIUC, PEI, FM
7	Notification of award.	1	1/30/2015	PEI
8	Negotiate and execute PPA with winning bidder.	13	4/30/2015	UIUC, PEI, FM
9	Delivery begins.		7/1/2015	