THE COAL INSTITUTE

45th Annual Summer Trade Seminar

Surviving the Perfect Storm

The Future of Coal

July 17 - 19, 2016



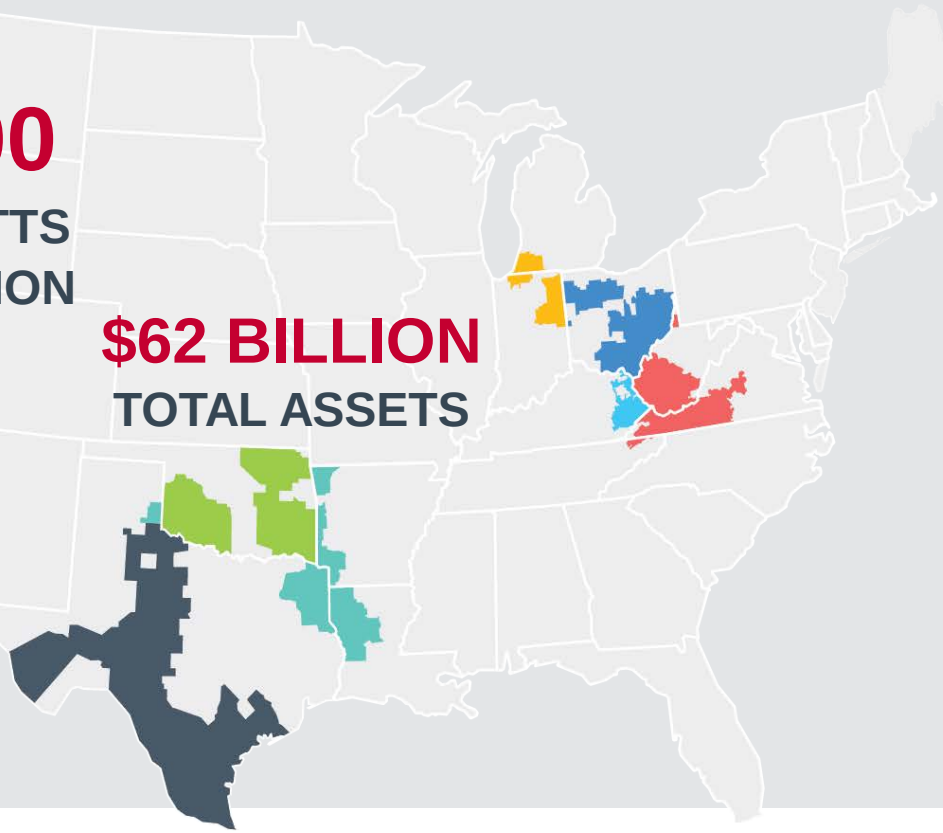

AEP AMERICAN ELECTRIC POWER

AEP Serves 5.4 Million Customers in 11 States

40,000
TRANSMISSION LINE MILES

31,000
MEGAWATTS GENERATION

$62 BILLION
TOTAL ASSETS



- AEP Ohio
- AEP Texas
- Appalachian Power
- Indiana Michigan Power
- Kentucky Power
- Public Service Company of Oklahoma
- Southwestern Electric Power Company

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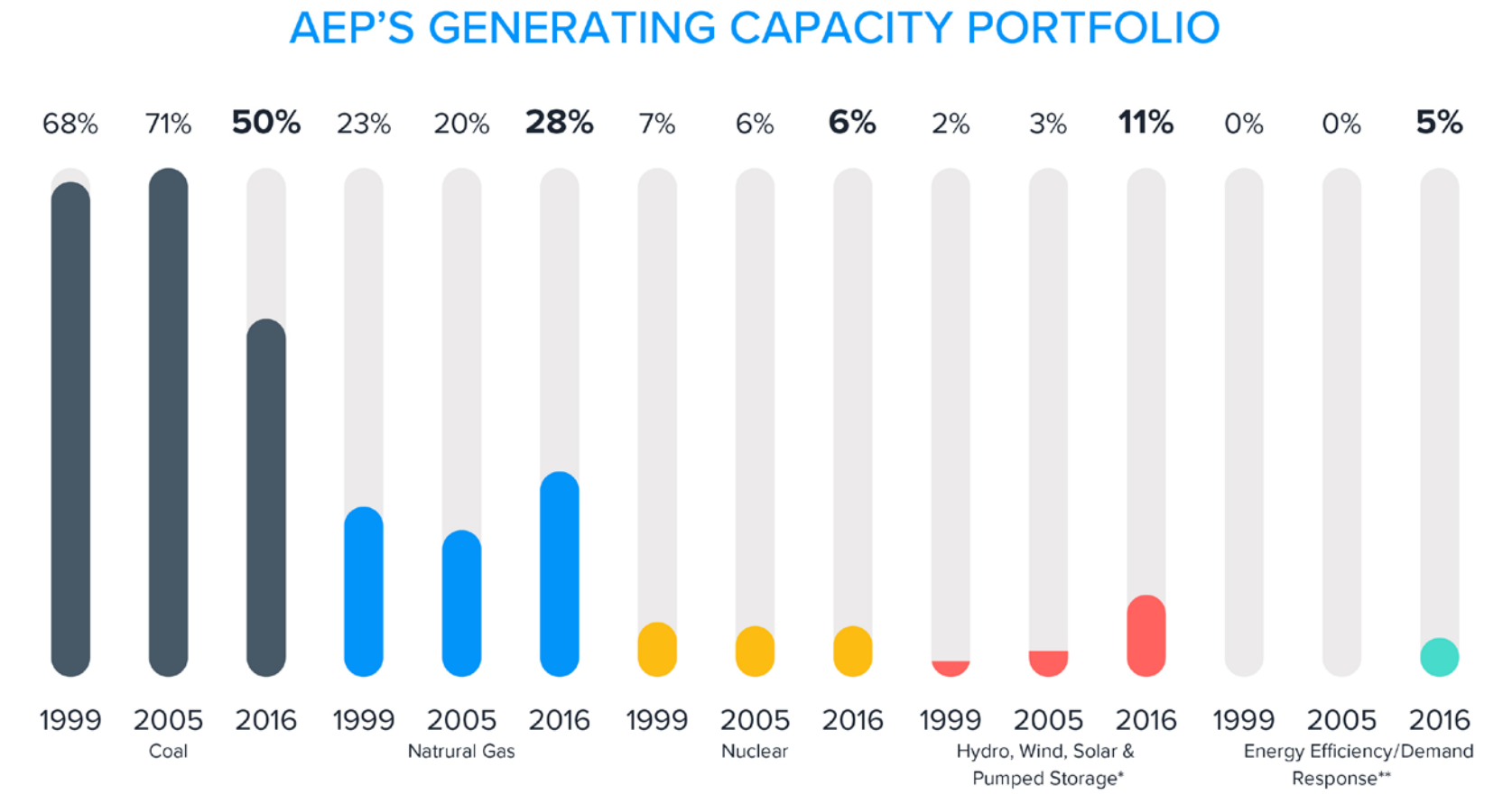
Fleet Transition: Diversifying the Portfolio

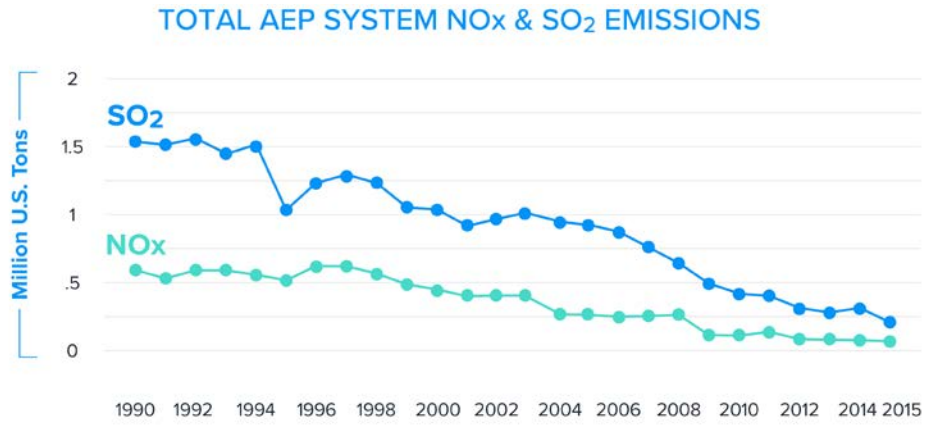


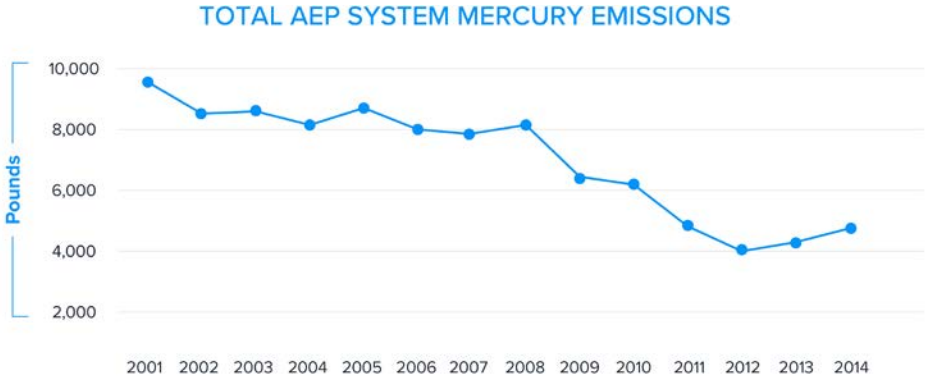
1999 includes combined AEP and Central and South West generation assets

* Includes Purchase Power Agreements

** Does not represent a physical asset but avoided capacity

Fleet Transition: Diversifying the Portfolio





2015 Mercury emissions data not yet available

Emissions down significantly over that last 25 years.

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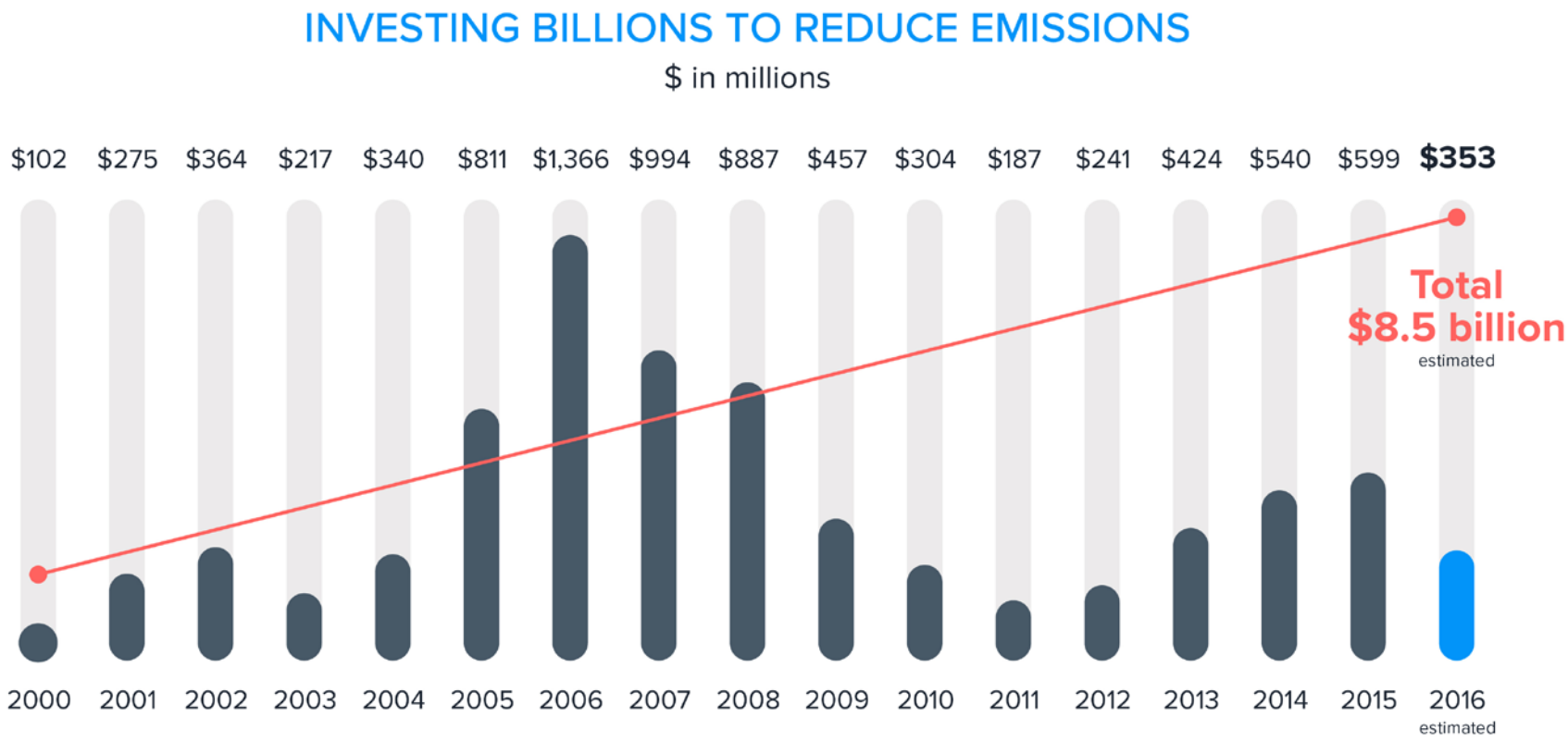
Fleet Transition: Diversifying the Portfolio



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AEP Regulated Coal Procurement 2015 Information

Purchase 39.0 million tons

51% PRB
16% CAPP
25% NAPP
7% ILB

Cook Coal Terminal
18 million ton capacity

Coal Transportation
4456 Railcars
11 Towboats
460 barges

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The Perfect Storm

The Future of Coal

AEP Regulated Coal Procurement					
Managed Tons Purchased per Year					
Year	**Total Tons Burned**	**%PRB**	**%NAPP**	**%CAPP**	**%ILB**
2014	47,000,000	51.5%	21.0%	21.5%	6.0%
2015	37,500,000	51.0%	24.5%	18.0%	6.5%
2016	30,900,000	46.5%	29.5%	18.0%	6.0%
2017-18	32,200,000	40.0%	33.5%	19.0%	7.5%

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Why the reduction in coal burn?

Coal Plant Retirements to comply with MATS regulations

"Have you got an Environmental Impact Statement for that castle, son?"

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Why the reduction in coal burn?
Environmental Retrofits & Retirements

Operating Company	Plant	MW	Refuel or Retire	Year
APCO	Glen Lyn 5	95	Retire	2015
	Glen Lyn 6	240	Retire	2015
	Clinch River 1	235	Retire	2015
	Clinch River 2	242	Refuel	2015
	Clinch River 3	242	Refuel	2015
	Sporn 1	150	Retire	2015
	Sporn 2	150	Retire	2015
	Sporn 3	150	Retire	2015
	Sporn 4	150	Retire	2015
	Kanawha River 1	200	Retire	2015
	Kanawha River 2	200	Retire	2015
I&M	Tanners Creek 1	145	Retire	2015
	Tanners Creek 2	145	Retire	2015
	Tanners Creek 3	205	Retire	2015
	Tanners Creek 4	500	Retire	2015
KYPCO	Big Sandy 1	278	Refuel	2015
	Big Sandy 2	800	Retire	2015
SWEPCO	Welsh 2	528	Retire	2016
PSO	Northeastern 4	470	Retire	2016
Total Coal Capacity - Retired or Refueled			5,125	MW

Remaining Managed Coal Fired Generation = 14,114 MW

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Why the reduction in coal burn?

Natural Gas Prices

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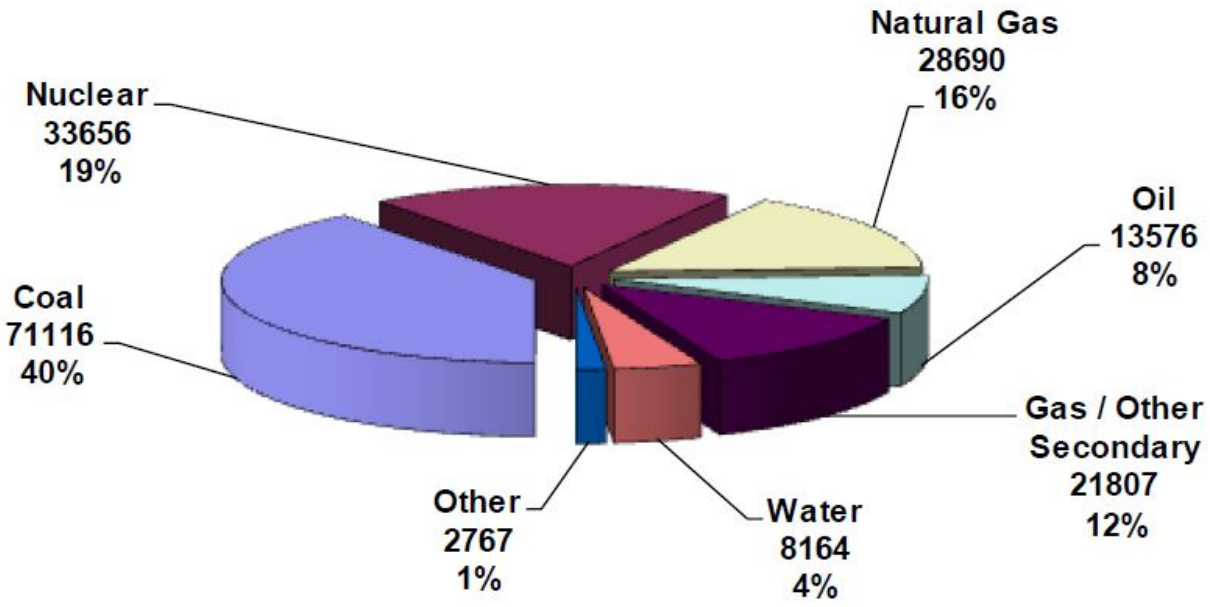
PJM 2014 Generation Capacity By Fuel Type

PJM RTO

(MidAtlantic, AP, ComEd, AEP, Dayton, Duquesne, Dominion, ATSI, DukeOK & EKPC Regions)

Capacity By Fuel Type -- 179,775 MW installed generation capacity



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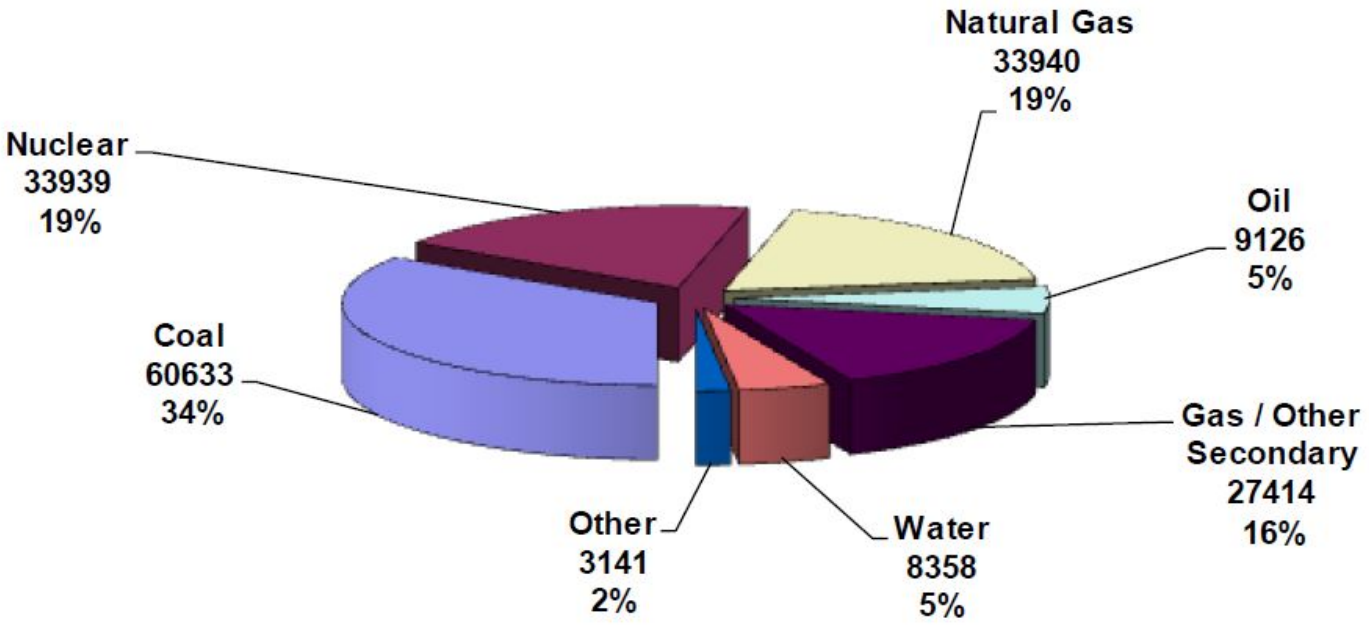
PJM 2016 Generation Capacity By Fuel Type

PJM RTO

(MidAtlantic, AP, ComEd, AEP, Dayton, Duquesne, Dominion, ATSI, DukeOK & EKPC Regions)

Capacity By Fuel Type -- 176,551 MW installed generation capacity



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Why the reduction in Coal Burn?
Types of Generation in PJM

Types of Generation

1. **Real Base load – nuclear, hydro**
2. **Non-dispatchable – wind, solar**
3. **Dispatchable base load – coal, CC natural gas**
4. **Peaking – natural gas CT's, oil**

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Why the reduction in Coal Burn?
APCo Example – Mountaineer and Amos

Amos Plant – 2900 MW

Mountaineer Plant – 1300 MW

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The Perfect Storm
The Future of Coal

Coal Burn at Appalachian Power		
Mountaineer and Amos plants		
Quarter	Tons Burned	Gas $/MMBtu
Q1, 2015	2,911,634	$2.79
Q2, 2015	2,307,826	$2.67
Q3, 2015	2,259,393	$2.72
Q4, 2015	1,275,787	$2.09
Q1, 2016	2,067,486	$1.93
Q2, 2016	2,222,947	$2.08

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Coal Vs Natural Gas

Comparison of Generation Cost between Coal and Natural Gas

Coal plants equipped with Srubbers, SCR's and ACI

		Delivered Coal Price costs					Plant Costs - Coal Handling, O&M and Emissions				
Plant Type	Fuel Type	Coal Price	Transport	$/MMBtu	Heat Rate	$/MWhr	Handling	Chemicals	O&M	Emissions	Total $/MWhr
Coal Plants		$/ton									
Super-critical	CAPP barge	$44.00	$6.00	$2.08	10,200	$21.25	$1.25	$0.95	$1.75	$0.05	$25.25
	NAPP	$33.05	$6.00	$1.63	10,200	$16.60	$1.25	$1.75	$1.75	$0.10	$21.45
	PRB	$11.00	$25.00	$2.05	10,200	$20.86	$1.00	$0.25	$1.00	$0.02	$23.13
Ultra-Super	PRB	$11.00	$25.00	$2.05	8,200	$16.77	$1.00	$0.25	$0.75	$0.01	$18.78
Natural Gas		$/MMBtu									
Combined Cycle		$2.50	$0.00	$2.50	7,500	$18.75	$0.00	$0.00	$0.25	$0.00	$19.00
Refuel - Steam		$2.50	$0.00	$2.50	10,000	$25.00	$0.00	$0.00	$0.15	$0.00	$25.15
Combustion Turbine		$2.50	$0.00	$2.50	11,500	$28.75	$0.00	$0.00	$0.50	$0.00	$29.25

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Profitable Coal Vs Natural Gas

Comparison of Generation Cost between Coal and Natural Gas

Coal plants equipped with Srubbers, SCR's and ACI

		Delivered Coal Price costs					Plant Costs - Coal Handling, O&M and Emissions				
Plant Type	Fuel Type	Coal Price	Transport	$/MMBtu	Heat Rate	$/MWhr	Handling	Chemicals	O&M	Emissions	Total $/MWhr
Coal Plants		$/ton									
Super-critical	CAPP barge	$55.00	$6.00	$2.54	10,200	$25.93	$1.25	$0.95	$1.75	$0.05	$29.93
	NAPP	$40.00	$6.00	$1.92	10,200	$19.55	$1.25	$1.75	$1.75	$0.10	$24.40
	PRB	$12.50	$25.00	$2.13	10,200	$21.73	$1.00	$0.25	$1.00	$0.02	$24.00
Ultra-Super	PRB	$12.50	$25.00	$2.13	8,200	$17.47	$1.00	$0.25	$0.75	$0.01	$19.48
Natural Gas		$/MMBtu									
Combined Cycle		$3.50	$0.00	$3.50	7,500	$26.25	$0.00	$0.00	$0.25	$0.00	$26.50
Refuel - Steam		$3.50	$0.00	$3.50	10,000	$35.00	$0.00	$0.00	$0.15	$0.00	$35.15
Combustion Turbine		$3.50	$0.00	$3.50	11,500	$40.25	$0.00	$0.00	$0.50	$0.00	$40.75

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Why the reduction in coal burn?

Renewables

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PJM Top Ten summer & winter peak days

Top 10 Summer Peak Day

Rank	Date	Load MWh
1	7/21/2011	158,043
2	7/18/2013	157,509
3	7/19/2013	156,077
4	7/17/2012	154,339
5	7/17/2013	154,044
6	7/18/2012	152,758
7	7/6/2012	151,966
8	7/16/2013	151,421
9	7/22/2011	151,366
10	7/15/2013	150,315

Top 10 Winter Peak Days

Rank	Date	Load MWh
1	2/20/2015	143,086
2	1/7/2014	140,510
3	2/19/2015	140,344
4	1/28/2014	137,336
5	1/24/2014	136,982
6	1/30/2014	136,215
7	1/8/2015	136,185
8	1/29/2014	136,020
9	1/7/2015	135,649
10	1/22/2014	135,061

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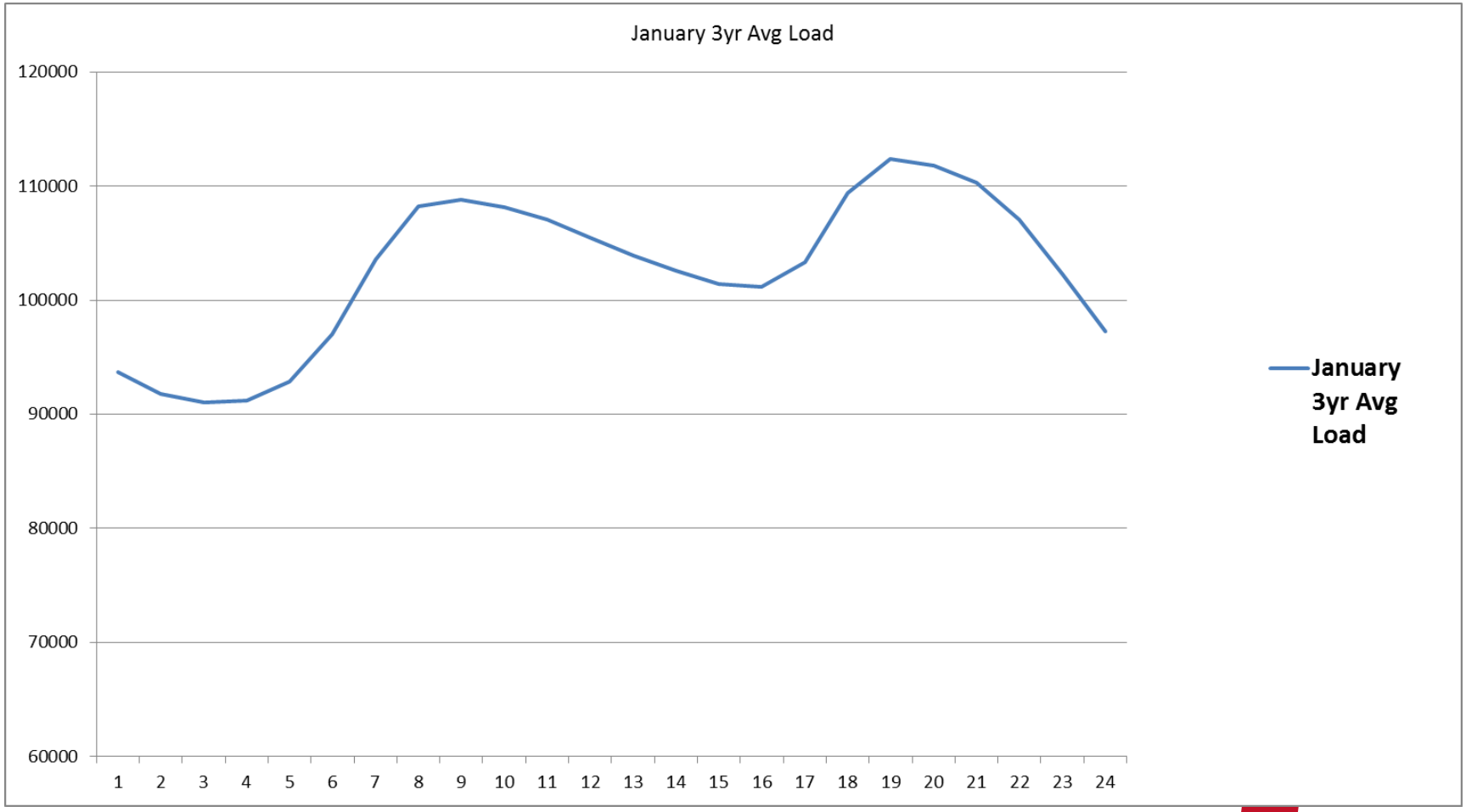
PJM Average January Hourly Load Profile



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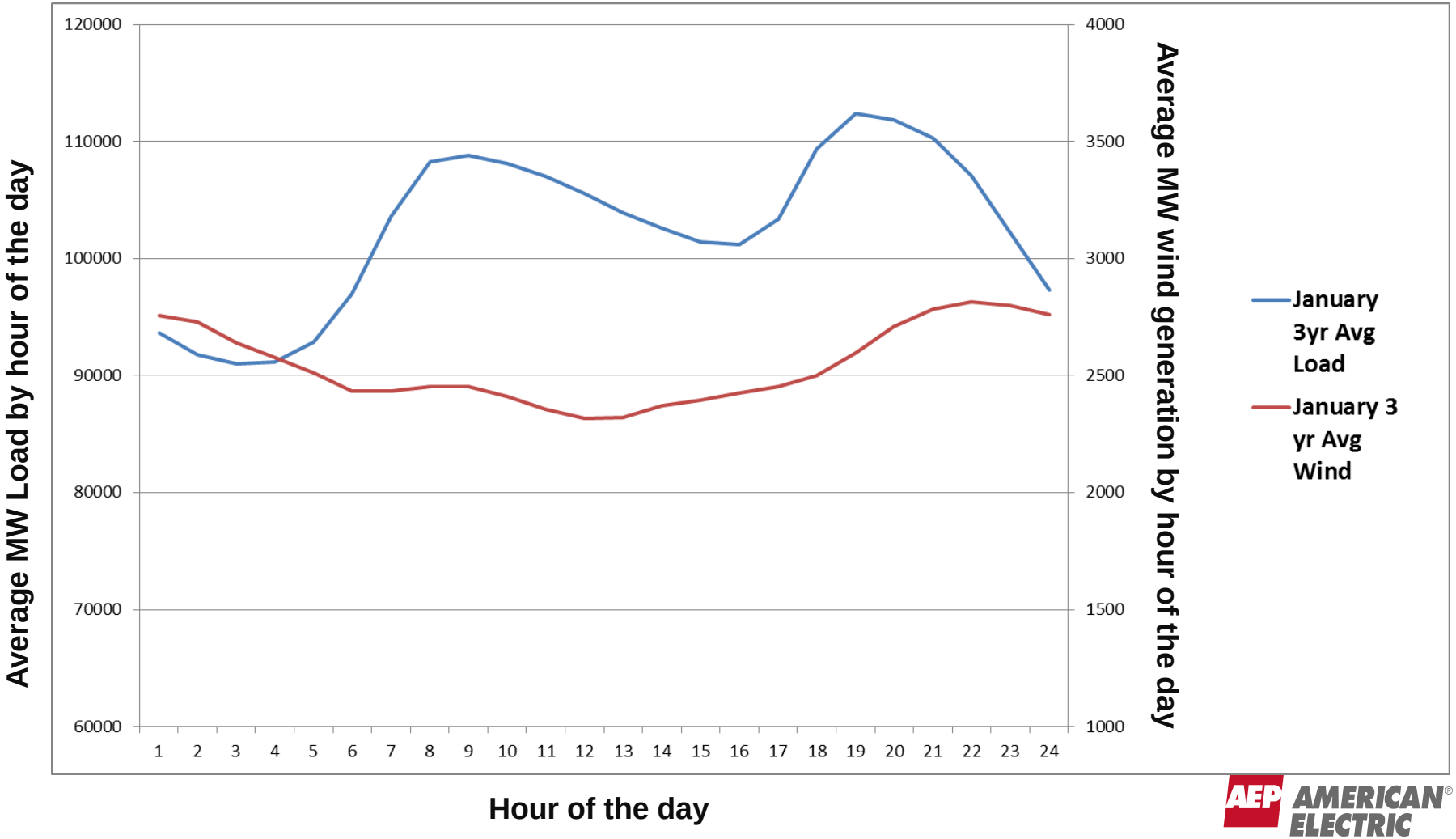
PJM Average January Hourly Load Profile
Vs
PJM Average July Wind Generation



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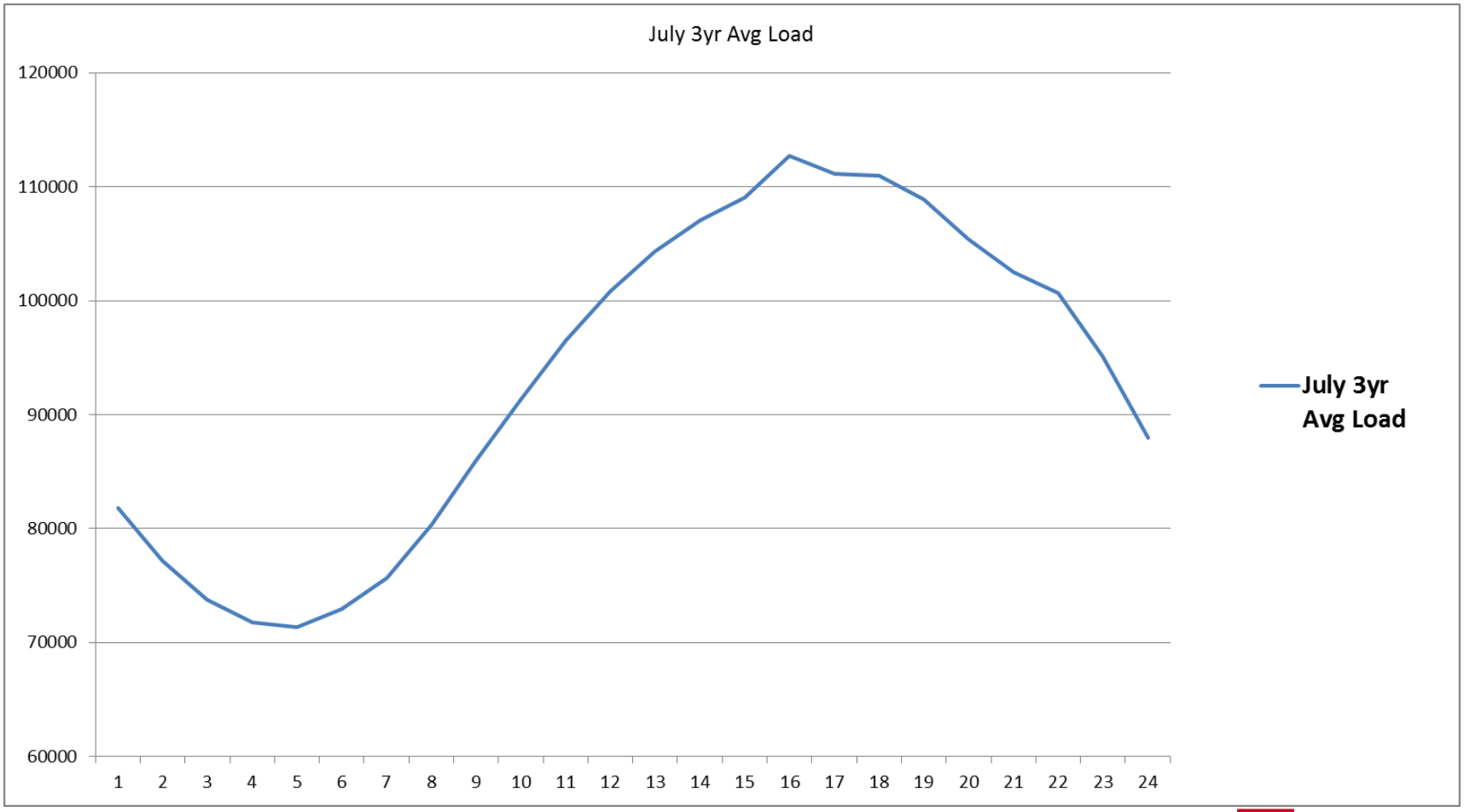
PJM Average July Hourly Load Profile



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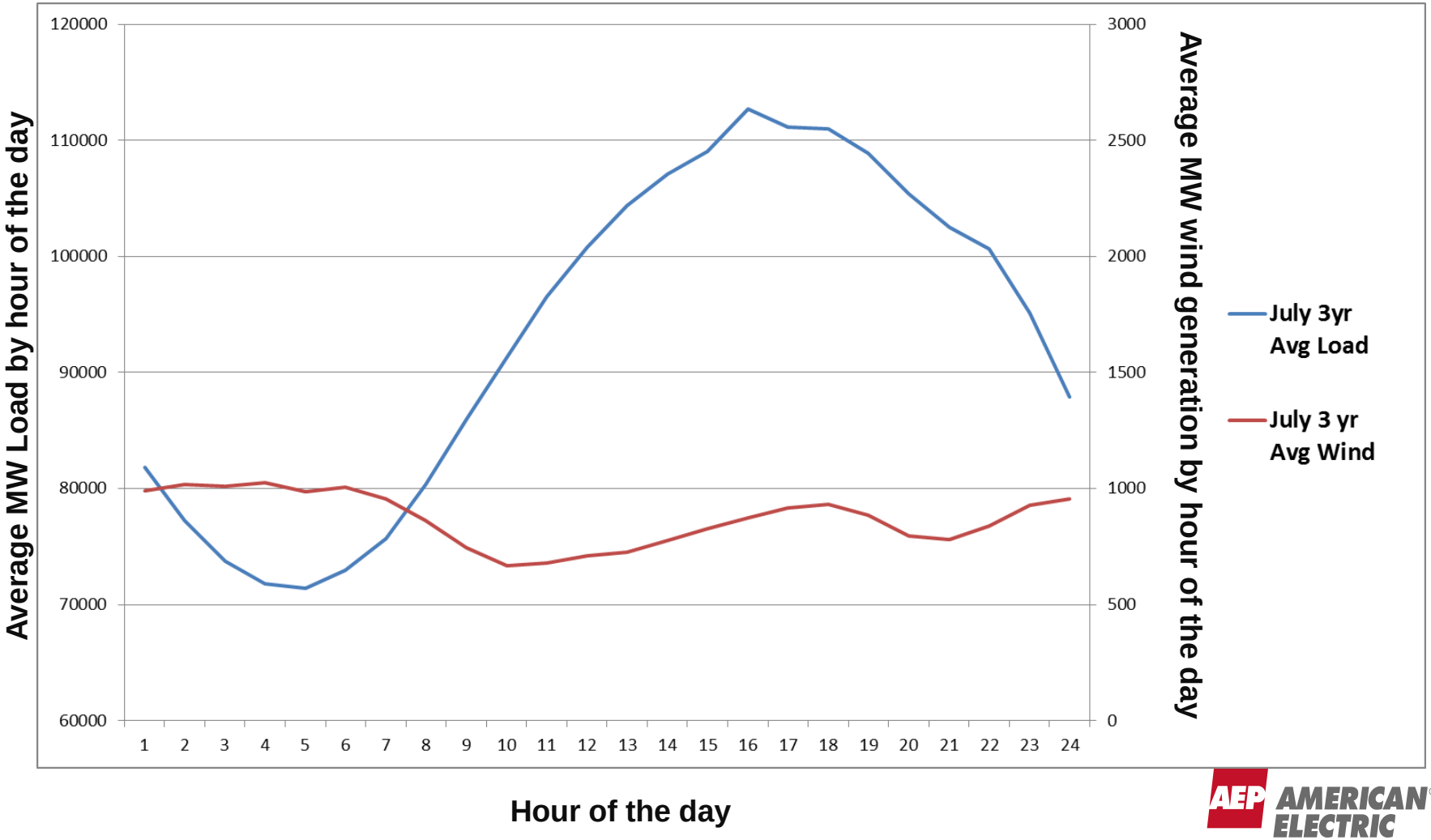
PJM Average July Hourly Load Profile
Vs
PJM Average July Wind Generation



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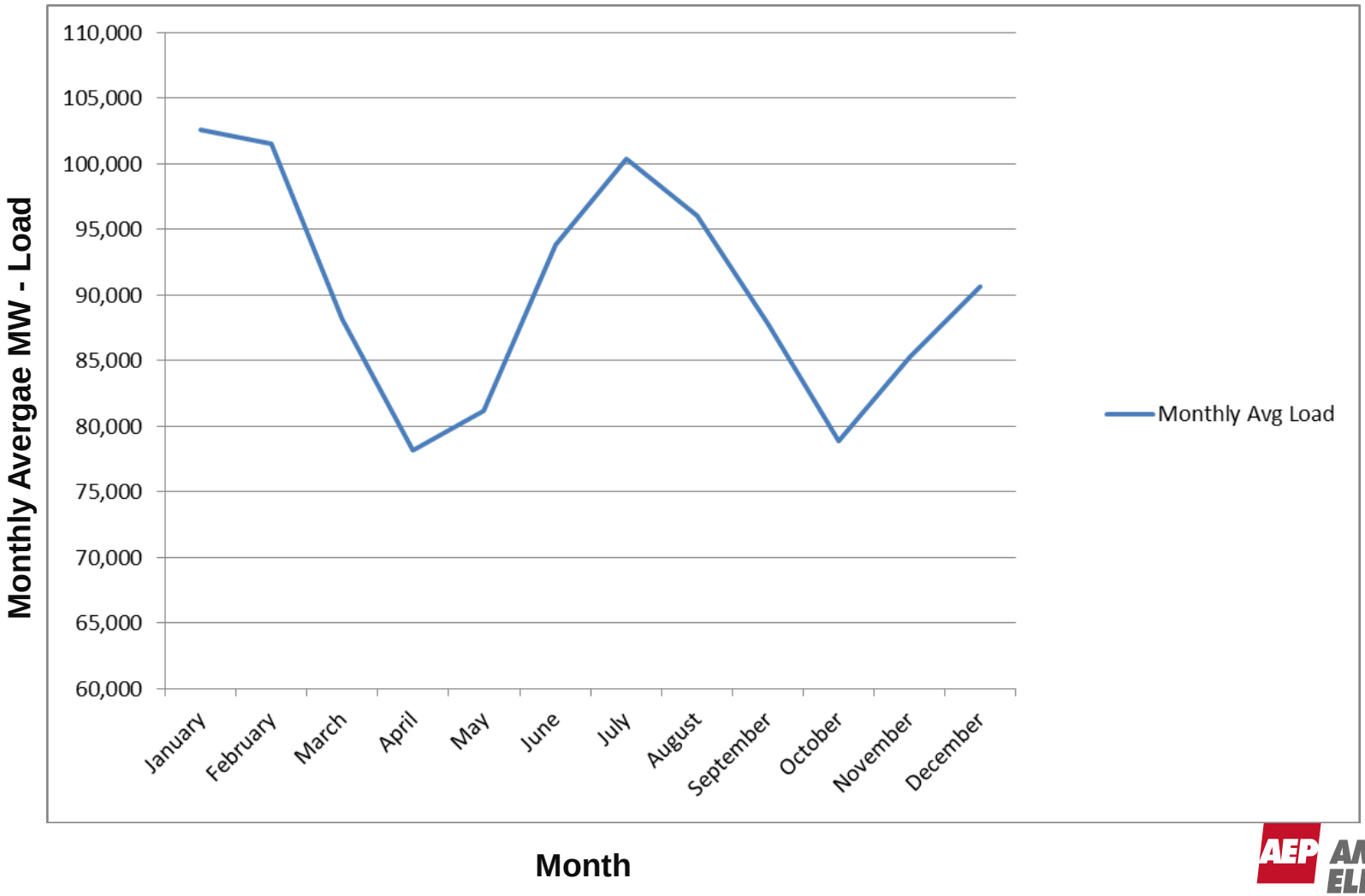
PJM Average Monthly Load Profile



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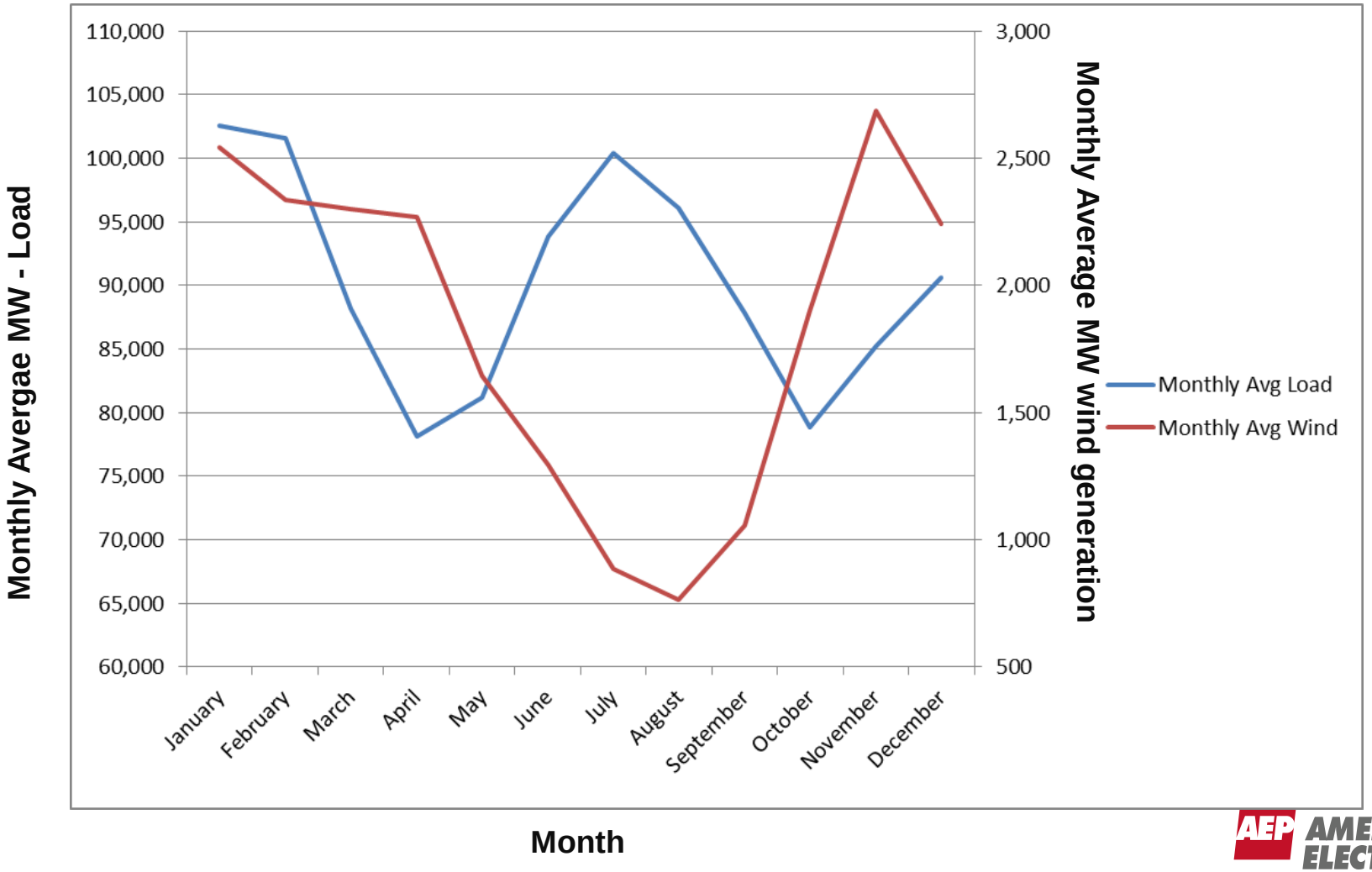
PJM Average Monthly Load Profile
Vs
PJM Average Monthly Wind Generation



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What if Coal Companies supplied coal like wind generation supplies MWhrs?

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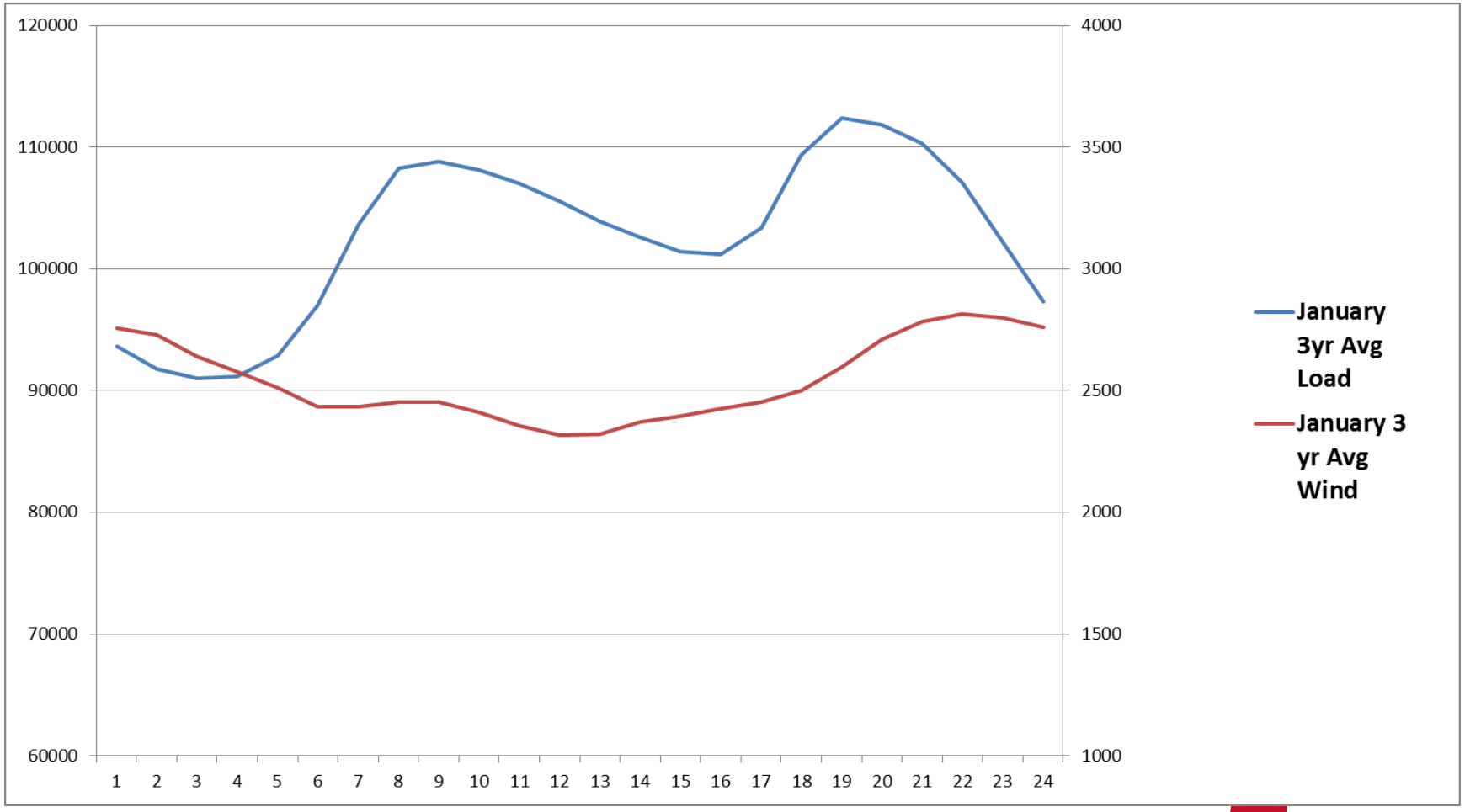

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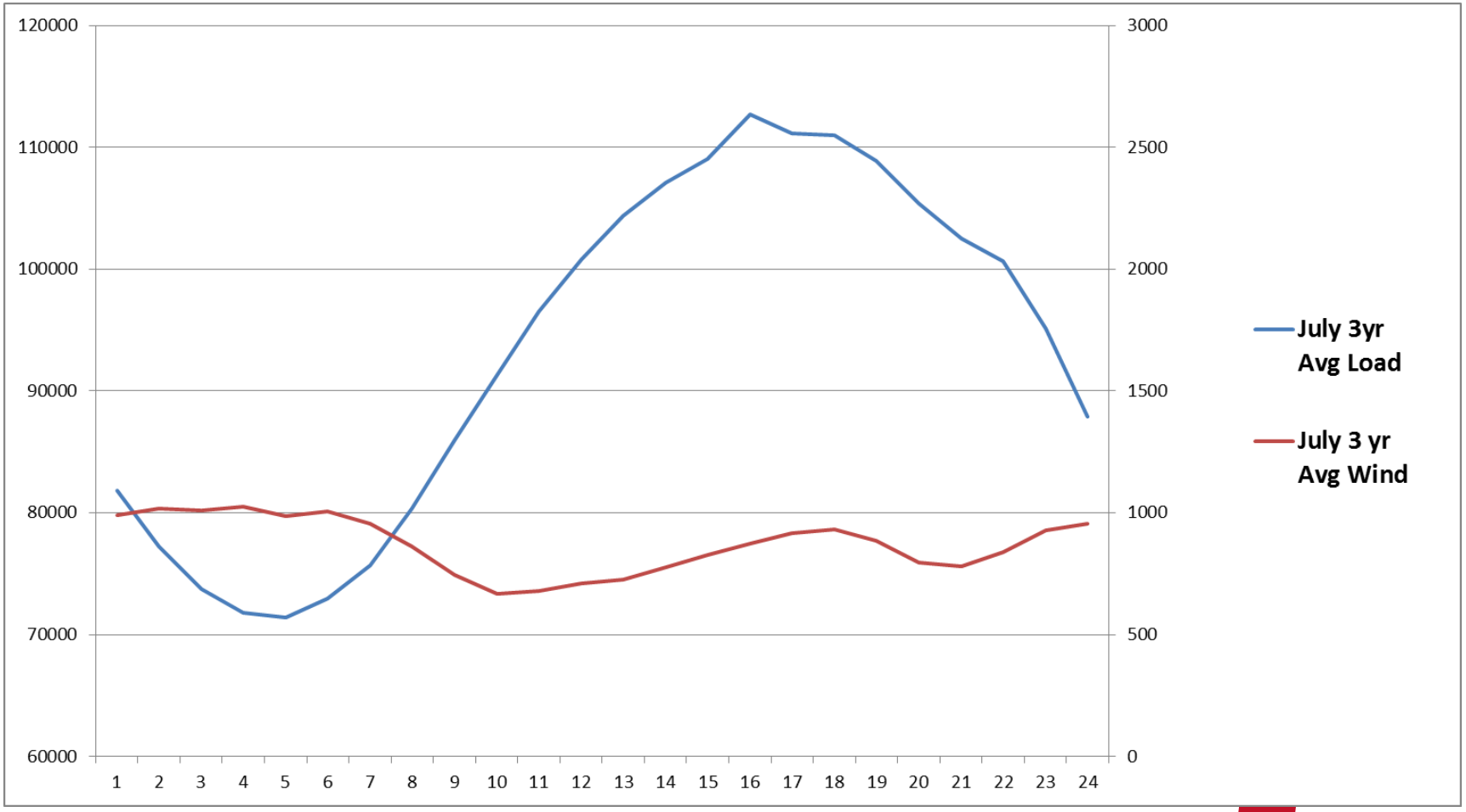

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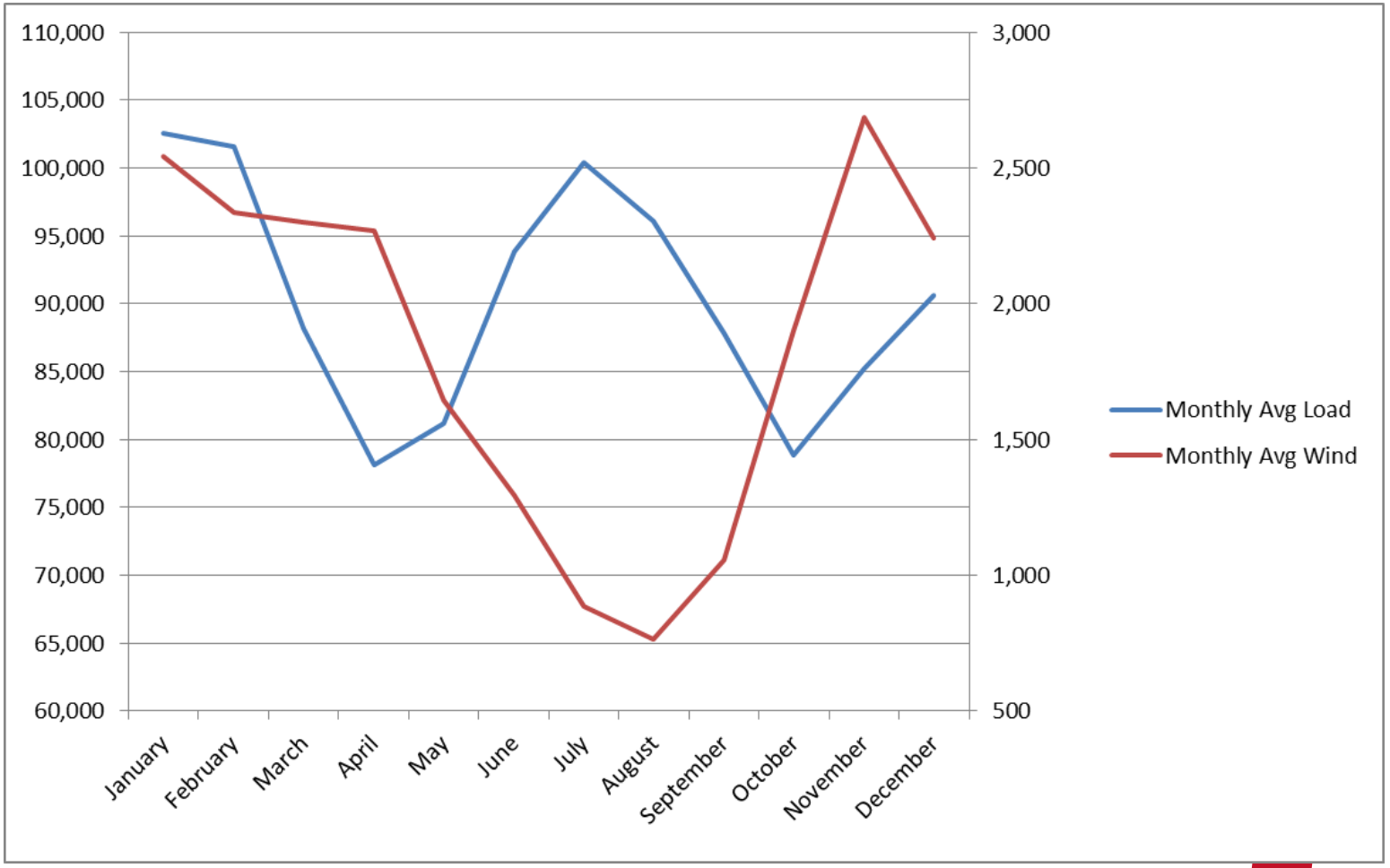

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The Future of Coal

What needs to happen for a turnaround in coal?

1. Natural Gas above $3.50/MMBtu
2. Renewable subsidies to go away
3. Clean Power Plan to get thrown out
4. To have Elvis, Michael Jackson and Big Foot all come out in support of base load coal fired generation.

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Questions?

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