

2006 Integrated Resource Plan

Capacity Expansion Module (CEM) Results



Pacific Power | Rocky Mountain Power | PacifiCorp Energy

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Introduction: Capacity Expansion Model Analysis

- Capacity Expansion Module (CEM)
 - ▶ Chooses a portfolio of resources from an array of resource options that minimizes, on a deterministic basis only, the Present Value Revenue Requirements (PVR) over the twenty year study horizon for a given future scenario.
 - ▶ Reminder that the CEM is intended as a screening tool to help guide the selection of resources for further analysis; it reflects high-level operational details, and, unlike the Planning and Risk Module, does not capture hourly chronological commitment and dispatch constraints.
- Future Scenarios
 - ▶ CEM is run over a variety of scenarios to determine how variables such as market prices and carbon dioxide adders may impact the overall least cost resource mix.
- Risk versus Scenarios
 - ▶ Stochastic risks, including the future effects of volatility and correlation, are not part of the CEM analysis.
- Optimized CEM Portfolios Guide Construction of Candidate Portfolios
 - ▶ Candidate portfolios will be designed for least-cost on an expected basis after full consideration of the stochastic risks.
 - ▶ Intend to start with an optimized portfolio using appropriate future scenarios, and revise to minimize risks as measured in the later stochastic analysis.

Scenario Review – Alternative Futures

Alternative Futures Scenarios

CAF #	Name	Coal Cost: CO2 Adder/Coal Commodity Price	Gas/Electric Price	Load Growth	Renewable Sales Percentage due to RPS	Renewable PTC Availability	DSM Potential
0	Business As Usual	None/Medium	Medium	Medium	Low	Yes	Medium
1	Low Cost Coal/High Cost Gas	None/Low	High	Medium	Medium	Yes	Medium
2	with Low Load Growth	None/Low	High	Low	Medium	Yes	Medium
3	with High Load Growth	None/Low	High	High	Medium	Yes	Medium
4	High Cost Coal/Low Cost Gas	High/High	Low	Medium	Medium	Yes	Medium
5	with Low Load Growth	High/High	Low	Low	Medium	Yes	Medium
6	with High Load Growth	High/High	Low	High	Medium	Yes	Medium
7	Favorable Wind Environment	High/Medium	High	Medium	High	Yes	Medium
8	Unfavorable Wind Environment	None/Medium	Low	Medium	Low	No	Medium
9	High DSM Potential	High/Medium	High	Medium	Medium	Yes	High
10	Low DSM Potential	None/Medium	Low	Medium	Medium	Yes	Low
11	Medium Load Growth	Medium/Medium	Medium	Medium	Medium	Yes	Medium
12	Low Load Growth	Medium/Medium	Medium	Low	Medium	Yes	Medium
13	High Load Growth	Medium/Medium	Medium	High	Medium	Yes	Medium
14	Low Cost Portfolio Bookend	None/Low	Low	Low	Medium	Yes	Medium
15	High Cost Portfolio Bookend	High/High	High	High	Medium	No	Medium

Variable Value Frequency Counts (Excluding "Business As Usual" Scenario)							
"High" Count	6/4	6	4	1	N/A	1	
"Medium" Count	3/8	3	7	13	N/A	13	
"Low" and "None" Count	6/4	6	4	1	N/A	1	
TOTALS	15/15	15	15	15	N/A	15	

Scenario Review – Variable Sensitivity

Variable Sensitivity Scenarios

SAS#	Name	Basis
1	Plan to 12% capacity reserve margin	Alternative Futures Scenario #11 ("Medium Load Growth")
2	Plan to 18% capacity reserve margin	Alternative Futures Scenario #11 ("Medium Load Growth")
3	CO2 adder implementation in 2016	Alternative Futures Scenario #11 ("Medium Load Growth")
4	Regional transmission project	Alternative Futures Scenario #11 ("Medium Load Growth")
5	CO2 adder impact on resource selection (test \$8, \$15, \$20, \$25, and \$40 per ton adders)	Alternative Futures Scenario #11 ("Medium Load Growth")
6	Low wind capital cost	Alternative Futures Scenario #11 ("Medium Load Growth")
7	High wind capital cost	Alternative Futures Scenario #11 ("Medium Load Growth")
8	Low coal price	Alternative Futures Scenario #11 ("Medium Load Growth")
9	High coal price	Alternative Futures Scenario #11 ("Medium Load Growth")
10	Low IGCC capital cost	Alternative Futures Scenario #11 ("Medium Load Growth")
11	High IGCC capital cost	Alternative Futures Scenario #11 ("Medium Load Growth")
12	Replace a baseload pulverized resource with carbon-capture-ready IGCC	Alternative Futures Scenario #11 ("Medium Load Growth")
13	Replace baseload resource with IGCC/single gasifier	Alternative Futures Scenario #11 ("Medium Load Growth")
14	Replace baseload resource with IGCC/sequestration	Alternative Futures Scenario #11 ("Medium Load Growth")
15	Plan to "average of super-peak" load	Alternative Futures Scenario #11 ("Medium Load Growth")
16	Replace Klamath hydro units with alternative resources	Preferred Portfolio

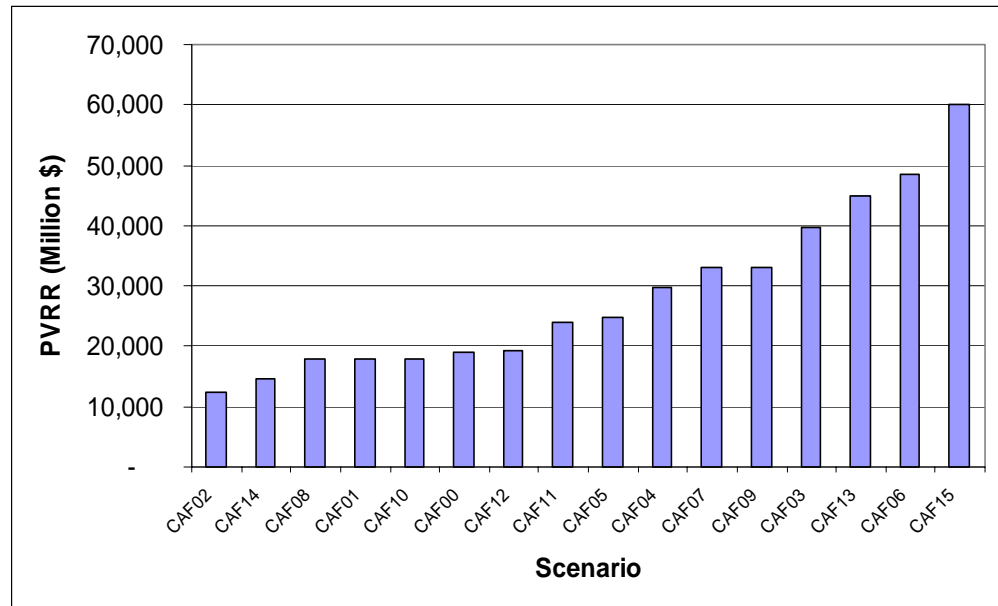
Highlighted rows indicate new scenarios.

General Observations

Total Portfolio Costs

- The Alternative Futures scenarios effectively capture the breadth of potential portfolio costs stemming from key deterministic risk factors; Portfolio PVRRs fall within a broad range—\$12.3 billion to \$60.0 billion.

CAF #	Name	PVRR (Million \$)
0	Business As Usual	19,078
1	Low Cost Coal/High Cost Gas	17,799
2	with Low Load Growth	12,309
3	with High Load Growth	39,783
4	High Cost Coal/Low Cost Gas	29,659
5	with Low Load Growth	24,876
6	with High Load Growth	48,544
7	Favorable Wind Environment	33,147
8	Unfavorable Wind Environment	17,794
9	High DSM Potential	33,165
10	Low DSM Potential	17,904
11	Medium Load Growth	24,015
12	Low Load Growth	19,364
13	High Load Growth	44,996
14	Low Cost Portfolio Bookend	14,517
15	High Cost Portfolio Bookend	60,044



General Observations

Generation, Demand-Side Management, and Market Purchases

- Wind shows up in every scenario except the “unfavorable wind environment” (no renewables Production Tax Credit) scenario.
- There is no dominant fuel type exhibited across the Alternative Futures scenarios; the model builds natural gas and coal in favorable scenarios (market prices, load growth, etc.).
- Integrated Gasification Combined Cycle (IGCC) units show up in some scenarios (high market prices, high load growth, low coal costs).
- Front Office Transactions (FOT) were relatively unconstrained in the Alternative Futures scenarios—historically unprecedented amounts were added in most scenarios with high load growth and low market price assumptions. Additional sensitivity scenarios with constrained FOT amounts were tested.
- DSM amounts are sensitive to load growth assumptions. Included in high load growth scenarios and lesser amounts in low growth scenarios. The “high DSM potential” scenario did not result in DSM being selected, presumably because realizing a higher potential incurs higher program costs.
- Supercritical pulverized coal and IGCC units were selected in the high market price scenarios.
- Combined Heat & Power (CHP) tended to be added preferentially over gas plants due to their assumed lower overall costs.

General Observations

Transmission

- Every scenario selected transmission between “West Main - Walla Walla”, “Walla Walla – Yakima”, and “Mona – Utah North”.
- The “Bridger – Ben Lomond” path was selected in 9 of 16 scenarios.
- The “Utah North – West Main” (DC) path was selected in 8 of 16 scenarios.
- “Yellowtail – Bridger” path was selected in 4 of 16 scenarios where massive wind builds were involved.
- A second Path C upgrade and a “Wyoming-Bridger” path were selected in 2 and 1 scenarios respectively.
- “Miners – Bridger” is not shown as a specific path option, but is built into the capital cost of SE Wyoming wind additions.

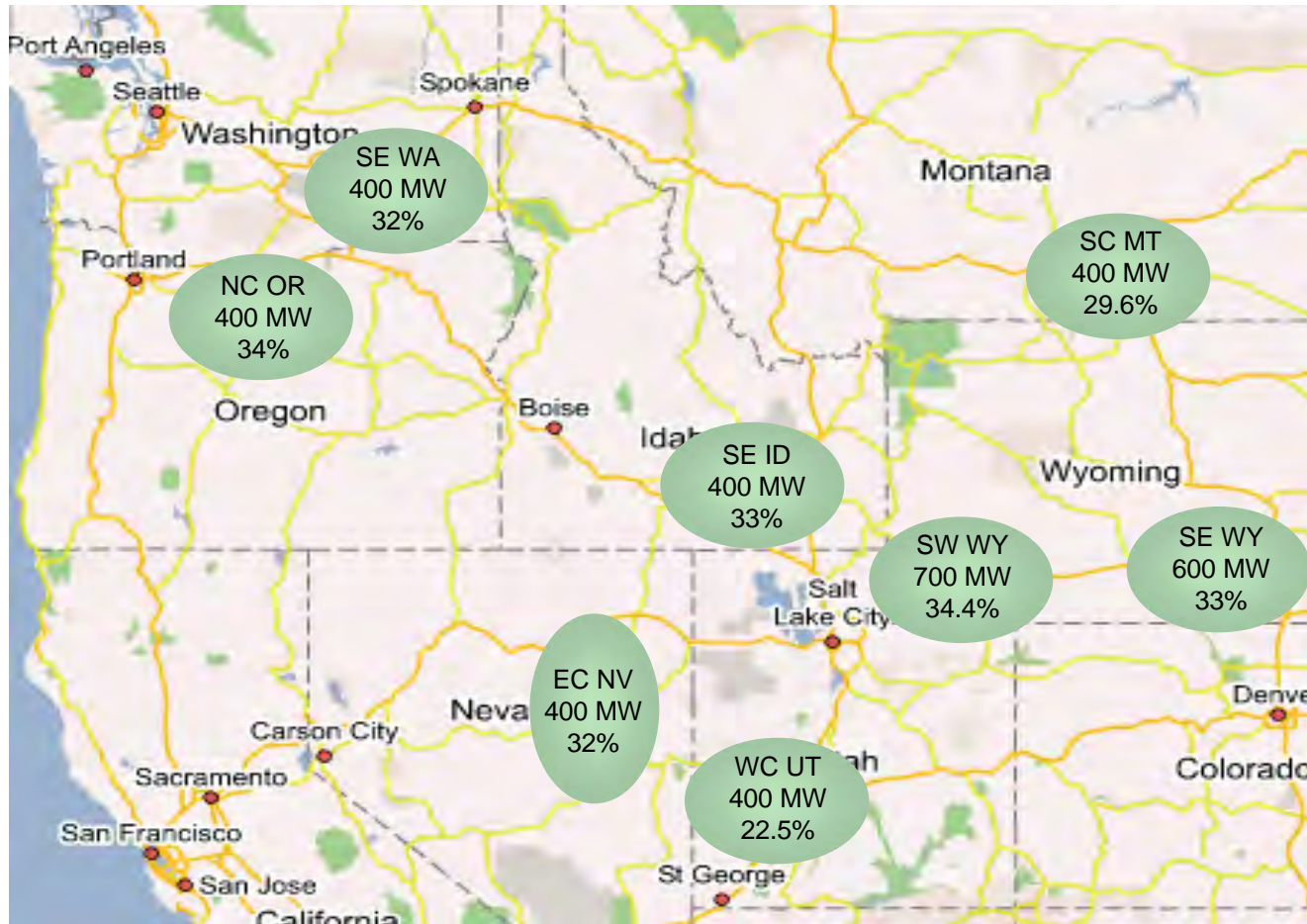
General Observations

Sensitivities

- The renewables Production Tax Credit (PTC) is necessary for the model to select any amount of wind.
- Selection of coal versus gas versus FOT is very sensitive to market price assumptions.
- CO₂ adder level has a relatively large (~10%) effect on PVRR and wind build level.
- Varying the planning reserve margin had relatively little (~1%) on PVRR and build levels (model tended to use FOT on the margin).

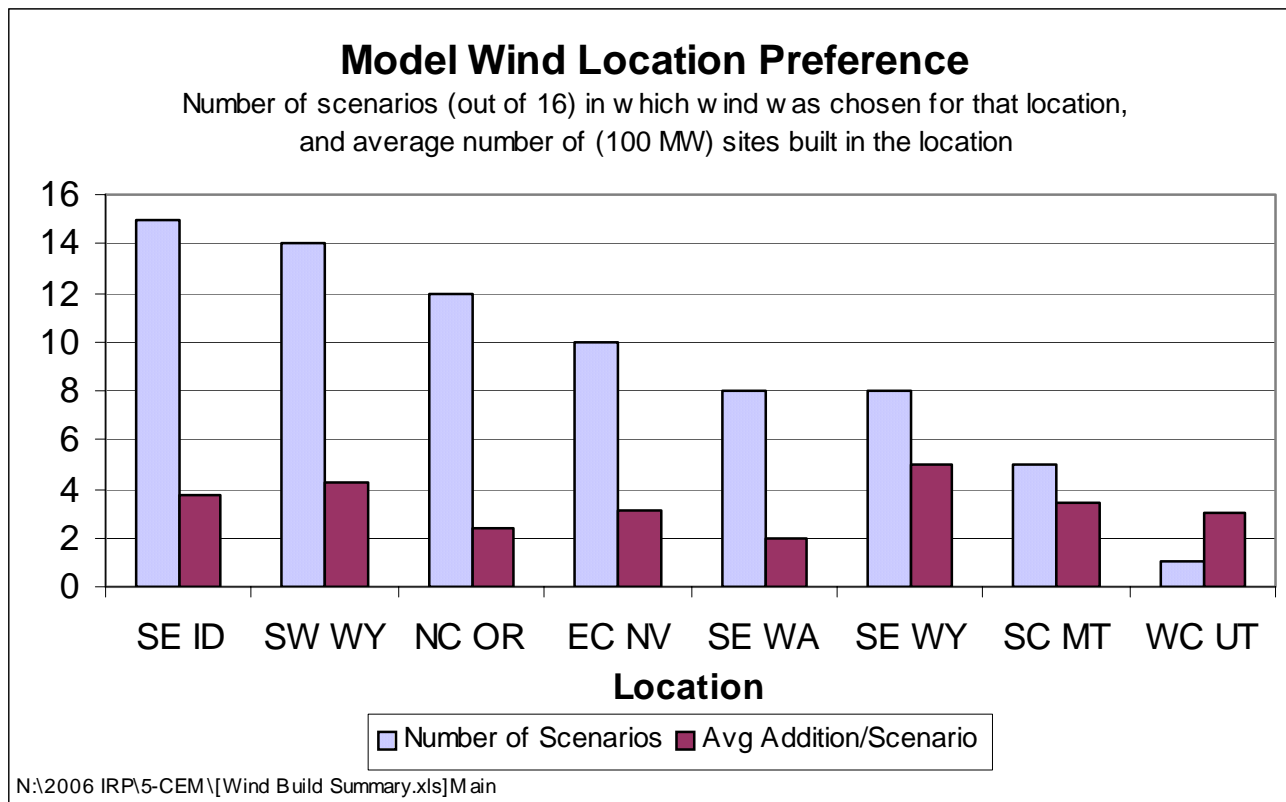
Wind Options

- Model built from zero to 3,600 MW of nameplate wind capacity over the scenarios, out of a total of 3,700 MW available.



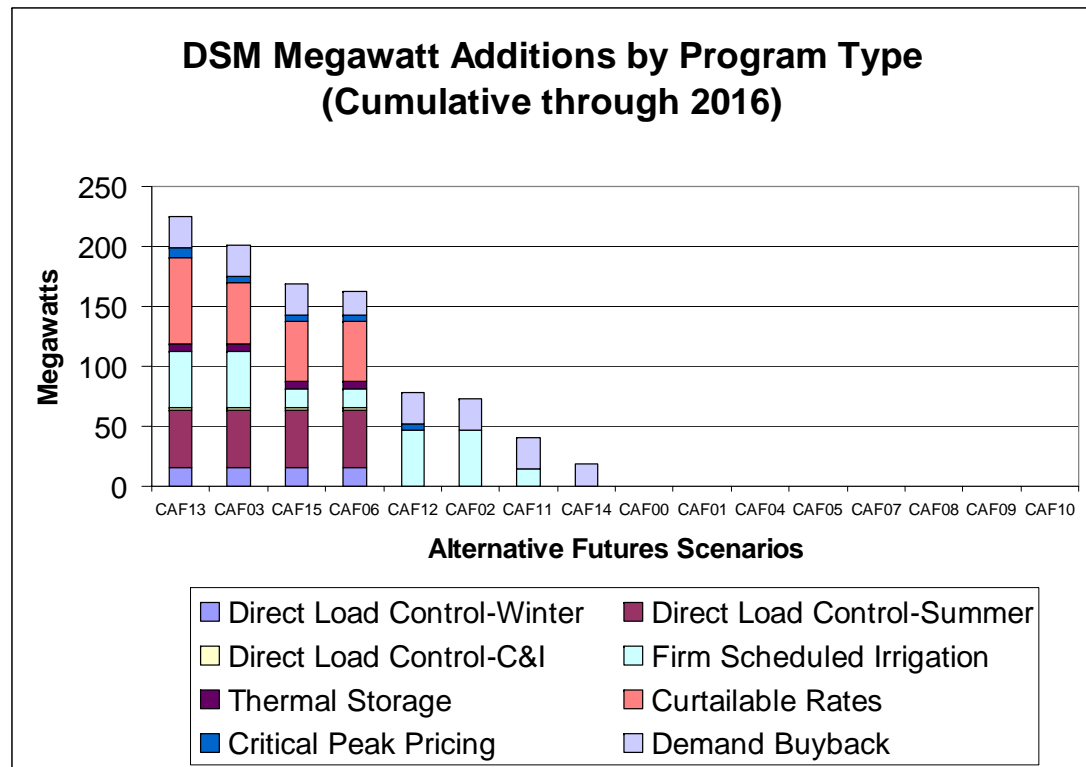
CEM Wind Addition Pattern

- CEM chose from the supply curve of wind projects.
 - ▶ The model suggests a strategy of building transmission to accommodate SW Wyoming wind options to meet the 1,400 MW target.
 - Model did not build transmission for the SE Idaho projects.



Demand-Side Management Addition Pattern

- DSM resources added in 8 of the 16 Alternative Futures scenarios, with significant amounts present only in the high load growth scenarios (ranging from 160 to 225 MW).
- Firm scheduled irrigation appears in 7 out of the 8 scenarios in which DSM is selected, averaging about 33 MW; demand buyback appears in all 8 scenarios, averaging about 24 MW.
- DSM (firm scheduled irrigation and demand buyback) appears in most of the low load growth scenarios.



Effect of CO₂ Adder Level on Portfolio Mix

- The medium load growth scenario (CAF11) was rerun for Sensitivity 5 (SAS05) with \$5 incremental increases in the CO₂ adder amounts within a range of \$15/ton to \$40/ton.
 - ▶ At \$15/ton, CEM delays the 2016 coal build to 2018, delays gas additions, and builds 800 MW more wind than CAF 11 in 2018.
 - ▶ At \$20/ton, further delays and reductions in gas build, and another 100 MW of wind is added by 2018.
 - ▶ At \$25/ton, the coal plant is fully displaced, and an additional 1,000 MW of wind is added (2,600 MW total).
 - ▶ At \$40/ton, gas build is all but eliminated (25 MW CHP still in), and an additional 400 MW of wind is added (3,000 MW total).
- Not reflected in the CEM analysis:
 - ▶ Full operational impacts of greater amounts of wind capacity.
 - ▶ CO₂ costs that can be attributed to market purchases.

Coal, Gas, and Front Office Transaction Megawatt Additions for 2009-2016 by “Low/High” Alternative Futures Scenario Group

Low and High Gas/Electricity Price Scenarios

Low Gas/Electricity Prices

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF04	-	482	2,088
CAF05	-	673	2,051
CAF06	-	1,209	4,308
CAF08	-	-	2,333
CAF10	-	-	2,243
CAF14	-	327	2,219
Average	-	449	2,540

High Gas/Electricity Prices

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF01	2,940	-	824
CAF02	2,190	-	1,459
CAF03	4,442	2,008	2,053
CAF07	1,850	-	2,327
CAF09	1,590	100	1,232
CAF15	2,940	661	2,753
Average	2,659	462	1,775

*Coal includes IGCC resources

Low and High CO₂ Adder Scenarios

Low CO₂ Adder

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF00	750	25	2,377
CAF01	2,940	-	852
CAF02	2,190	-	1,459
CAF03	4,442	2,008	2,053
CAF08	-	-	2,333
CAF10	-	-	2,476
CAF14	-	327	2,219
Average	1,475	337	1,967

High CO₂ Adder

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF04	-	1,221	2,088
CAF05	-	673	2,051
CAF06	-	1,209	4,308
CAF07	1,850	-	2,327
CAF09	1,590	100	1,232
CAF15	2,940	661	2,753
Average	1,063	644	2,460

*Coal includes IGCC resources

Low and High Load Growth Scenarios

Low Load Growth

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF02	2,190	-	1,349
CAF05	-	673	2,273
CAF12	-	1,029	1,693
CAF14	-	327	2,600
Average	548	507	1,979

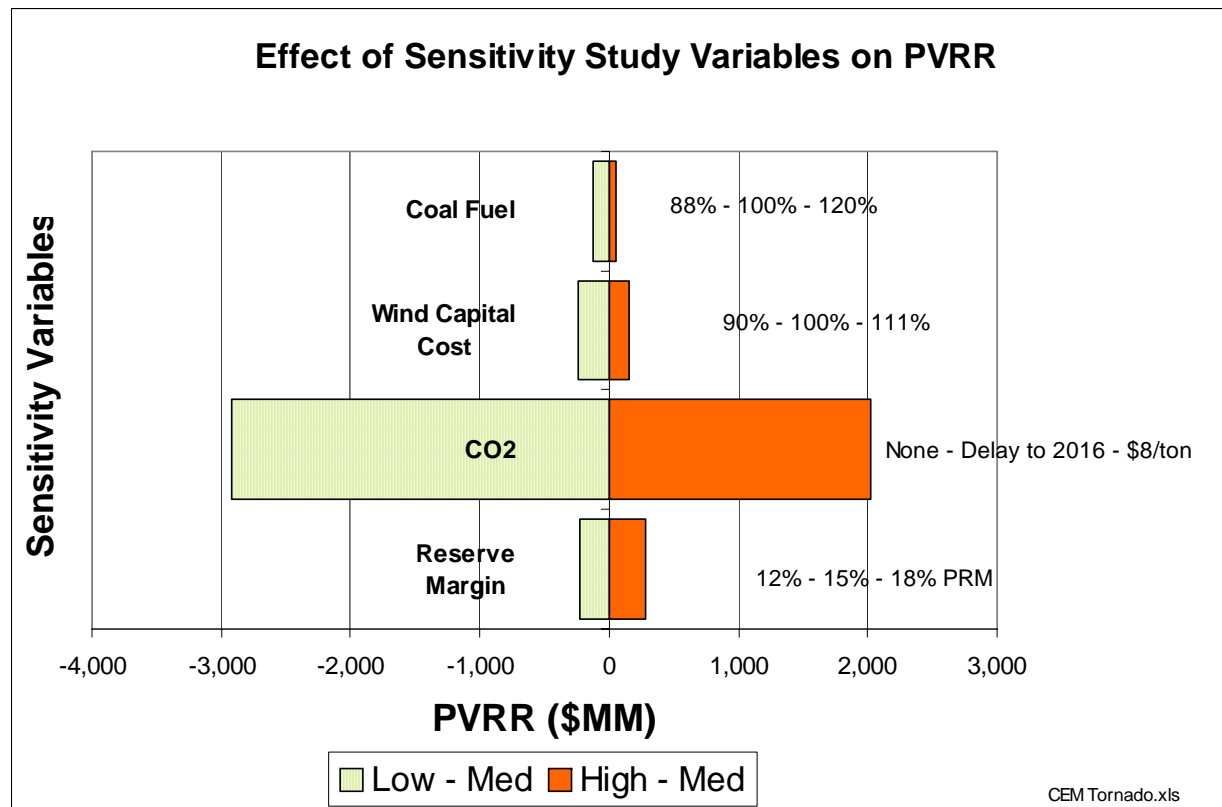
High Load Growth

Scenario	Coal	Gas	FOT
	Cumulative Build Amounts	Annual Ave.	
CAF03	4,442	2,103	2,047
CAF06	-	1,767	4,509
CAF13	750	3,685	2,156
CAF15	2,940	1,219	2,884
Average	2,033	2,194	2,899

*Coal includes IGCC resources

Sensitivity Study Results – Effect on Present Value Revenue Requirement (PVRR)

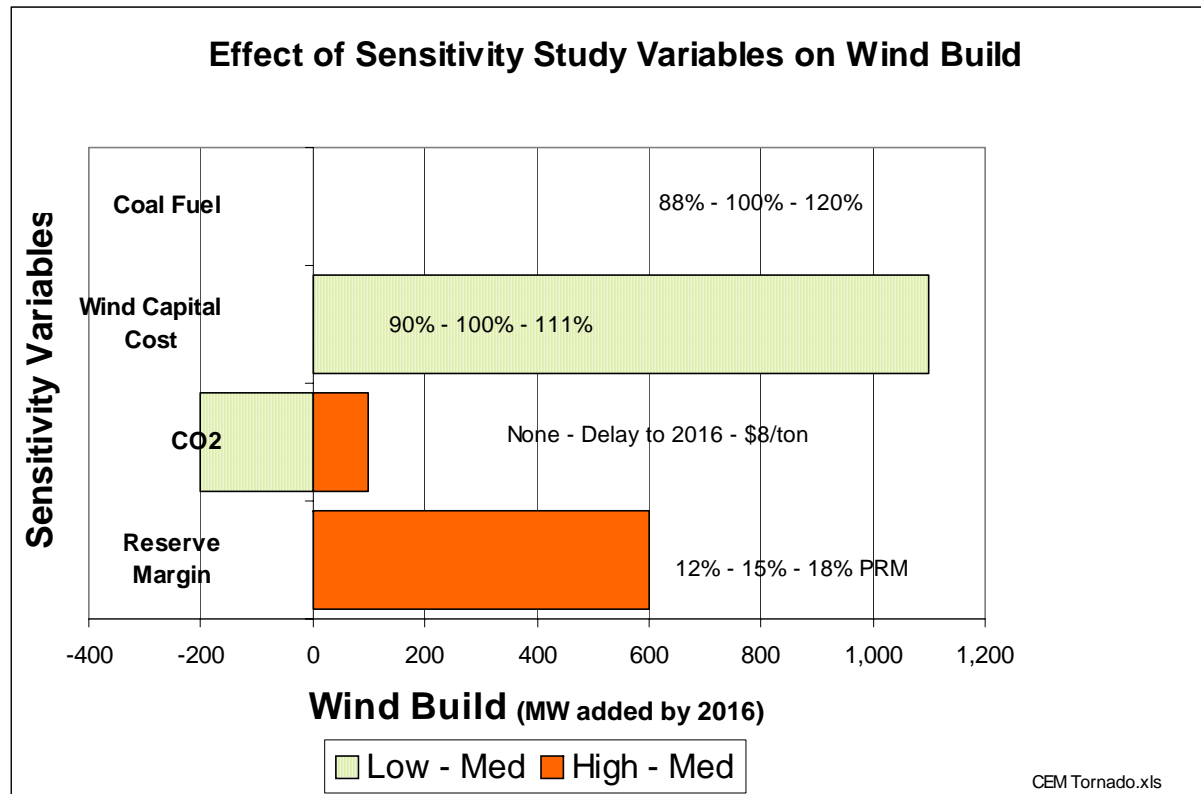
- PVRR is relatively sensitive to the CO₂ adder.
 - May be improved by grandfathering.
- Sensitivity to wind capital costs is constrained by quantity of wind additions.
- PVRR moderately sensitive to reserve margin requirement.



Note: The cost impact of a CO₂ cap-and-trade program is not reflected in the CEM results. The PVRR impact may be significantly reduced by such a program, which will be modeled as part of the detailed simulations.

Sensitivity Study Results – Effect on Wind Builds

- Cost effectiveness of wind is strongly influenced by wind capital costs, and planning reserve margin.
- CO₂ adder is an important but lesser driver of wind economics.
- Cost of coal is a relatively less important factor.

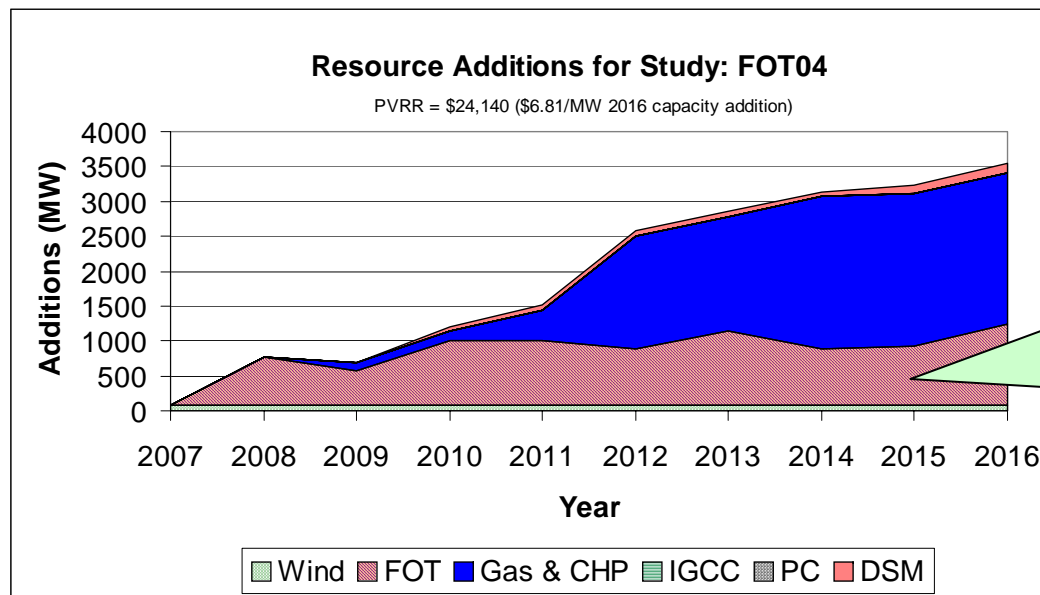


Conclusions for Constructing Test Portfolios

- Wind, DSM, and CHP should be part of each test portfolio.
 - ▶ Include a minimum of 1,400 MW wind build, and test a larger build for mitigating gas and electric price volatility risks. Operational impact considerations will help inform selection of an appropriate size for the larger wind build.
 - ▶ Include 100 MW of Class 1 DSM, with 50 MW in 2009 and 50 MW in 2012.
 - ▶ Include 70 MW of Class 3 DSM—50 MW of Curtailable Rate programs and 20 MW of Demand Buyback programs—for PaR sensitivity scenario #1 (“Plan to 12% capacity reserve margin”).
 - ▶ Include 75 MW of CHP.
- The range of variables was sufficient to cause every resource type to show up in some Alternative Futures scenario.
- Construct portfolios with a range of coal, natural gas, and market purchases.
 - ▶ When considering the mix of large fossil fuel resources that is suitable for mitigating risks from variations in natural gas/electricity prices, CO₂ adders, and load growth (slide #14), it appears that candidate portfolios should be developed with two to three coal resources and two gas resources as the starting point.
 - ▶ Stochastic analysis will help determine the reasonable tradeoff between resources with lower fixed costs and higher variable costs and volatility (from natural gas and electricity market prices), and those with higher fixed costs and lower variable costs and volatility, such as coal and wind.

Candidate Portfolio Development Process

- Begin with a limited-market, medium load growth study (FOT04) and increment the amount of fixed cost (coal, wind, and DSM) resources to limit risk exposure.



Beginning in 2012, purchases at Four Corners and Mona limited to 700 MW, while west-side purchases limited to 500 MW.

- ▶ High market purchase cases rely too much on volatile and potentially constrained markets.
- ▶ Use existing model results for timing and location of additions.
- Repeat process for a more constrained market case.

Next Steps

- Soliciting written comments on modeling results and approach for developing candidate portfolios for detailed simulation.
 - Please provide a written response via the IRP mailbox (irp@pacificorp.com) by no later than August 28.
- Planning on distributing a paper to meeting participants describing candidate portfolios once developed.
- Next modeling phase—candidate portfolio runs using the Planning and Risk module—beginning late August.

Appendix:
Capacity Expansion Module (CEM) Results
Annual Resource Additions by Scenario



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Total Resource Additions and PVRR (Million \$)

Scenario	PVRR	Resource Additions (MW)										PVRR \$/2016 MW
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
CAF00	\$19,078	45.3	748	698	1187	1474	2576	2843	3114	3209	3476	5.5
CAF01	\$17,799	62	748	698	1187	1473	2575	2883	3156	3260	3560	5.0
CAF02	\$12,309	150	1249	557	1356	1950	3628	2857	2493	4237	3295	3.7
CAF03	\$39,783	164	1994	3036	2809	3819	7462	6595	6690	7808	7861	5.1
CAF04	\$29,659	85.1	749	698	1187	1470	2573	2841	3067	3188	3499	8.5
CAF05	\$24,876	200	1249	556	1355	1947	3608	2707	1858	4195	3130	7.9
CAF06	\$48,544	135	1993	2877	2787	3687	7515	6645	6733	7774	7827	6.2
CAF07	\$33,147	151	749	695	1187	1473	2580	2866	3132	3226	3527	9.4
CAF08	\$17,794		746	696	1183	1467	2570	2840	3116	3218	3525	5.0
CAF09	\$33,165	118	749	697	1186	1474	2554	2846	3099	3175	3483	9.5
CAF10	\$17,904	62	749	698	1187	1474	2573	2841	3113	3206	3524	5.1
CAF11	\$24,015	68.4	764	692	1208	1475	2604	2900	3150	3255	3520	6.8
CAF12	\$19,364	211	1271	536	1370	1952	3656	2751	1873	4210	3152	6.1
CAF13	\$44,996	177	1995	3030	2804	3943	7503	6636	6728	7654	7711	5.8
CAF14	\$14,517	106	1249	563	1354	1951	3611	2703	1856	4203	3125	4.6
CAF15	\$60,044		1946	2817	2785	3670	7517	6563	6636	7678	7757	7.7
SAS01	\$23,783	85.1	472	401	909	1205	2258	2538	2829	2929	3193	7.4
SAS02	\$24,301	252	1040	968	1478	1787	2895	3189	3491	3594	3912	6.2
SAS03	\$21,995	68.4	748	698	1187	1474	2576	2846	3134	3237	3475	6.3
SAS04												
SAS06	\$23,774	263	750	682	1199	1497	2578	2872	3172	3265	3557	6.7
SAS07	\$24,167	68.4	764	692	1208	1475	2599	2898	3171	3239	3577	6.8
SAS08	\$23,888	85.1	764	692	1209	1475	2602	2901	3170	3243	3581	6.7
SAS09	\$24,068	85.1	764	692	1209	1472	2597	2895	3171	3251	3570	6.7
SAS10	\$24,000	85.1	764	692	1209	1494	2635	2912	3147	3251	3521	6.8
SAS11	\$24,015	68.4	764	692	1208	1475	2604	2900	3150	3255	3520	6.8
SAS12	\$24,295	85.1	764	692	1209	1496	2635	2912	3147	3251	3558	6.8
SAS13	\$24,339	74.8	765	693	1210	1495	2637	2913	3148	3253	3557	6.8
SAS14	\$24,770	85.1	764	692	1209	1494	2635	2912	3147	3250	3558	7.0
SAS15	\$27,418	74.8	521	445	960	1255	2313	2655	2917	2961	3283	8.4
FOT04	\$24,140	85.1	764	692	1209	1509	2584	2851	3141	3237	3544	6.8

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

Wind Resource Additions

Wind Additions (MW)

Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	200	200	200	200	200	200	200	200	200	200
CAF01	300	400	400	400	400	400	500	500	500	500
CAF02	600	800	800	800	800	800	800	800	800	800
CAF03	900	1700	1700	1700	2200	2200	2300	2300	2300	2300
CAF04	400	400	400	400	400	400	400	400	400	1700
CAF05	900	900	900	900	900	900	900	900	900	900
CAF06	700	1400	1400	1400	1400	1400	1400	1400	1600	2200
CAF07	800	1000	1000	1000	1000	1000	2000	2700	3100	3100
CAF08		0	0	0	0	0	0	0	0	0
CAF09	600	800	800	800	800	800	1800	2600	3100	3100
CAF10	300	400	400	400	400	400	400	400	400	400
CAF11	300	300	300	300	300	300	400	400	400	500
CAF12	900	900	900	900	900	900	900	900	900	900
CAF13	1000	1700	1700	1700	1800	1800	1800	1800	1800	1800
CAF14	400	400	400	400	400	400	400	400	400	400
CAF15		700	700	700	700	700	700	900	1000	2400
SAS01	400	400	400	400	400	400	400	400	400	500
SAS02	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
SAS03	300	400	400	400	400	400	400	400	400	400
SAS04										
SAS06	1400	1600	1600	1600	1600	1600	1600	1600	1600	1600
SAS07	300	300	300	300	300	400	400	400	400	500
SAS08	400	400	400	400	400	400	400	400	400	500
SAS09	400	400	400	400	400	400	400	400	400	500
SAS10	400	400	400	400	400	400	400	400	400	400
SAS11	300	300	300	300	300	300	400	400	400	500
SAS12	400	400	400	400	400	400	400	400	400	500
SAS13	400	400	400	400	400	400	400	400	400	500
SAS14	400	400	400	400	400	400	400	400	500	500
SAS15	400	400	400	400	400	400	400	400	500	500
FOT04	400	400	400	400	400	400	400	400	400	400

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

Front Office Transaction Additions

FOT Additions (MW)										
Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	0	703	628	1117	1404	2506	2773	3044	3138	2655
CAF01	0	674	623	1112	1398	1561	367	439	544	544
CAF02	0	1084	392	1191	1766	2498	976	413	2109	867
CAF03	0	1543	1868	1641	2226	5166	2162	1259	1279	823
CAF04	0	664	613	1102	1385	2487	2755	2957	2621	2786
CAF05	0	1049	355	1155	1747	3407	2507	1657	3321	2256
CAF06	0	1580	1903	1814	2165	5994	5123	5212	6123	6127
CAF07	0	583	529	1021	1308	2414	1198	1157	1162	1163
CAF08		746	696	1183	1467	2570	2841	3117	3218	3525
CAF09	0	616	565	1053	1341	2082	1425	1063	1045	1279
CAF10	0	664	613	1102	1389	2487	2755	3028	3121	3439
CAF11	0	696	499	974	638	1768	2047	1965	2070	1548
CAF12	0	988	153	957	936	2640	1735	858	2892	1834
CAF13	0	1501	1387	769	731	3276	2409	2501	2674	2731
CAF14	0	1143	458	1249	1826	3487	2578	1732	3751	2674
CAF15		1630	1840	1808	2145	5992	2598	2125	3130	3012
SAS01	0	386	191	673	922	1373	1653	1944	2044	1520
SAS02	0	762	590	743	1005	1511	1806	2107	2154	2473
SAS03	0	667	592	1081	1369	2470	2740	3028	3112	2500
SAS04										
SAS06	0	473	329	771	1021	1501	1794	2094	2187	2147
SAS07	0	696	499	974	638	1734	2033	2307	1625	1946
SAS08	0	679	482	973	637	1764	2063	2332	1655	1980
SAS09	0	679	482	926	587	1712	2010	2286	2034	2328
SAS10	0	679	482	926	879	2019	2297	1930	2034	1554
SAS11	0	696	499	974	638	1768	2047	1965	2070	1548
SAS12	0	679	482	926	1213	2352	2297	1930	2034	1578
SAS13	0	690	493	937	890	2032	2308	1941	2046	1588
SAS14	0	679	482	926	879	2019	2297	1930	2021	1578
SAS15	0	446	245	734	1014	2072	2414	2075	1356	1678
FOT04	0	679	482	926	923	795	1061	804	844	1151

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

Gas Resource Additions

Gas Additions (MW)-- Includes CHP

Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	0	0	25	25	25	25	25	25	25	25
CAF01	0	0	0	0	0	0	0	0	0	0
CAF02	0	0	0	0	0	0	0	0	0	0
CAF03	0	0	717	717	1074	1406	1406	1406	2008	2008
CAF04	0	0	0	0	0	0	0	25	482	482
CAF05	0	0	0	0	0	0	0	0	673	673
CAF06	0	0	561	561	1109	1109	1109	1109	1209	1209
CAF07	0	0	0	0	0	0	0	0	0	0
CAF08	0	0	0	0	0	0	0	0	0	0
CAF09	0	0	0	0	0	0	25	25	25	100
CAF10	0	0	0	0	0	0	0	0	0	0
CAF11	0	0	125	125	727	727	727	1059	1059	1059
CAF12	0	0	100	125	727	727	727	727	1029	1029
CAF13	0	0	1149	1541	2691	3685	3685	3685	3685	3685
CAF14	0	0	0	0	0	0	0	0	327	327
CAF15		0	661	661	1209	1209	1209	1209	1209	1209
SAS01	0	0	125	125	125	727	727	727	727	727
SAS02	0	0	100	457	457	1059	1059	1059	1059	1059
SAS03	0	0	25	25	25	25	25	25	25	125
SAS04										
SAS06	0	0	75	125	125	727	727	727	727	1059
SAS07	0	0	125	125	727	727	727	727	727	727
SAS08	0	0	125	125	727	727	727	727	727	727
SAS09	0	0	125	125	727	727	727	727	1059	1059
SAS10	0	0	125	125	457	457	457	1059	1059	1059
SAS11	0	0	125	125	727	727	727	1059	1059	1059
SAS12	0	0	125	125	125	125	457	1059	1059	1059
SAS13	0	0	125	125	457	457	457	1059	1059	1059
SAS14	0	0	125	125	457	457	457	1059	1059	1059
SAS15	0	0	125	125	125	125	125	727	727	727
FOT04	0	0	125	125	427	1631	1631	2179	2179	2179

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

IGCC Resource Additions

IGCC Additions (MW)										
Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	0	0	0	0	0	0	0	0	0	0
CAF01	0	0	0	0	0	0	0	200	200	500
CAF02	0	0	0	0	0	0	0	200	200	500
CAF03	0	0	0	0	0	0	0	997	1494	2002
CAF04	0	0	0	0	0	0	0	0	0	0
CAF05	0	0	0	0	0	0	0	0	0	0
CAF06	0	0	0	0	0	0	0	0	0	0
CAF07	0	0	0	0	0	0	0	200	200	500
CAF08		0	0	0	0	0	0	0	0	0
CAF09	0	0	0	0	0	0	0	500	500	500
CAF10	0	0	0	0	0	0	0	0	0	0
CAF11	0	0	0	0	0	0	0	0	0	0
CAF12	0	0	0	0	0	0	0	0	0	0
CAF13	0	0	0	0	0	0	0	0	0	0
CAF14	0	0	0	0	0	0	0	0	0	0
CAF15		0	0	0	0	0	0	500	500	500
SAS01	0	0	0	0	0	0	0	0	0	0
SAS02	0	0	0	0	0	0	0	0	0	0
SAS03	0	0	0	0	0	0	0	0	0	0
SAS04										
SAS06	0	0	0	0	0	0	0	0	0	0
SAS07	0	0	0	0	0	0	0	0	0	0
SAS08	0	0	0	0	0	0	0	0	0	0
SAS09	0	0	0	0	0	0	0	0	0	0
SAS10	0	0	0	0	0	0	0	0	0	0
SAS11	0	0	0	0	0	0	0	0	0	0
SAS12	0	0	0	0	0	0	0	0	0	750
SAS13	0	0	0	0	0	0	0	0	0	750
SAS14	0	0	0	0	0	0	0	0	0	750
SAS15	0	0	0	0	0	0	0	0	0	0
FOT04	0	0	0	0	0	0	0	0	0	0

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

Pulverized Coal Resource Additions

Pulverized Coal Additions (MW)										
Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	0	0	0	0	0	0	0	0	0	750
CAF01	0	0	0	0	0	940	2440	2440	2440	2440
CAF02	0	0	0	0	0	940	1690	1690	1690	1690
CAF03	0	0	0	0	0	340	2440	2440	2440	2440
CAF04	0	0	0	0	0	0	0	0	0	0
CAF05	0	0	0	0	0	0	0	0	0	0
CAF06	0	0	0	0	0	0	0	0	0	0
CAF07	0	0	0	0	0	0	1350	1350	1350	1350
CAF08	0	0	0	0	0	0	0	0	0	0
CAF09	0	0	0	0	0	340	1090	1090	1090	1090
CAF10	0	0	0	0	0	0	0	0	0	0
CAF11	0	0	0	0	0	0	0	0	0	750
CAF12	0	0	0	0	0	0	0	0	0	0
CAF13	0	0	0	0	0	0	0	0	750	750
CAF14	0	0	0	0	0	0	0	0	0	0
CAF15		0	0	0	0	0	2440	2440	2440	2440
SAS01	0	0	0	0	0	0	0	0	0	750
SAS02	0	0	0	0	0	0	0	0	0	0
SAS03	0	0	0	0	0	0	0	0	0	750
SAS04										
SAS06	0	0	0	0	0	0	0	0	0	0
SAS07	0	0	0	0	0	0	0	0	750	750
SAS08	0	0	0	0	0	0	0	0	750	750
SAS09	0	0	0	0	0	0	0	0	0	0
SAS10	0	0	0	0	0	0	0	0	0	750
SAS11	0	0	0	0	0	0	0	0	0	750
SAS12	0	0	0	0	0	0	0	0	0	0
SAS13	0	0	0	0	0	0	0	0	0	0
SAS14	0	0	0	0	0	0	0	0	0	0
SAS15	0	0	0	0	0	0	0	0	750	750
FOT04	0	0	0	0	0	0	0	0	0	0

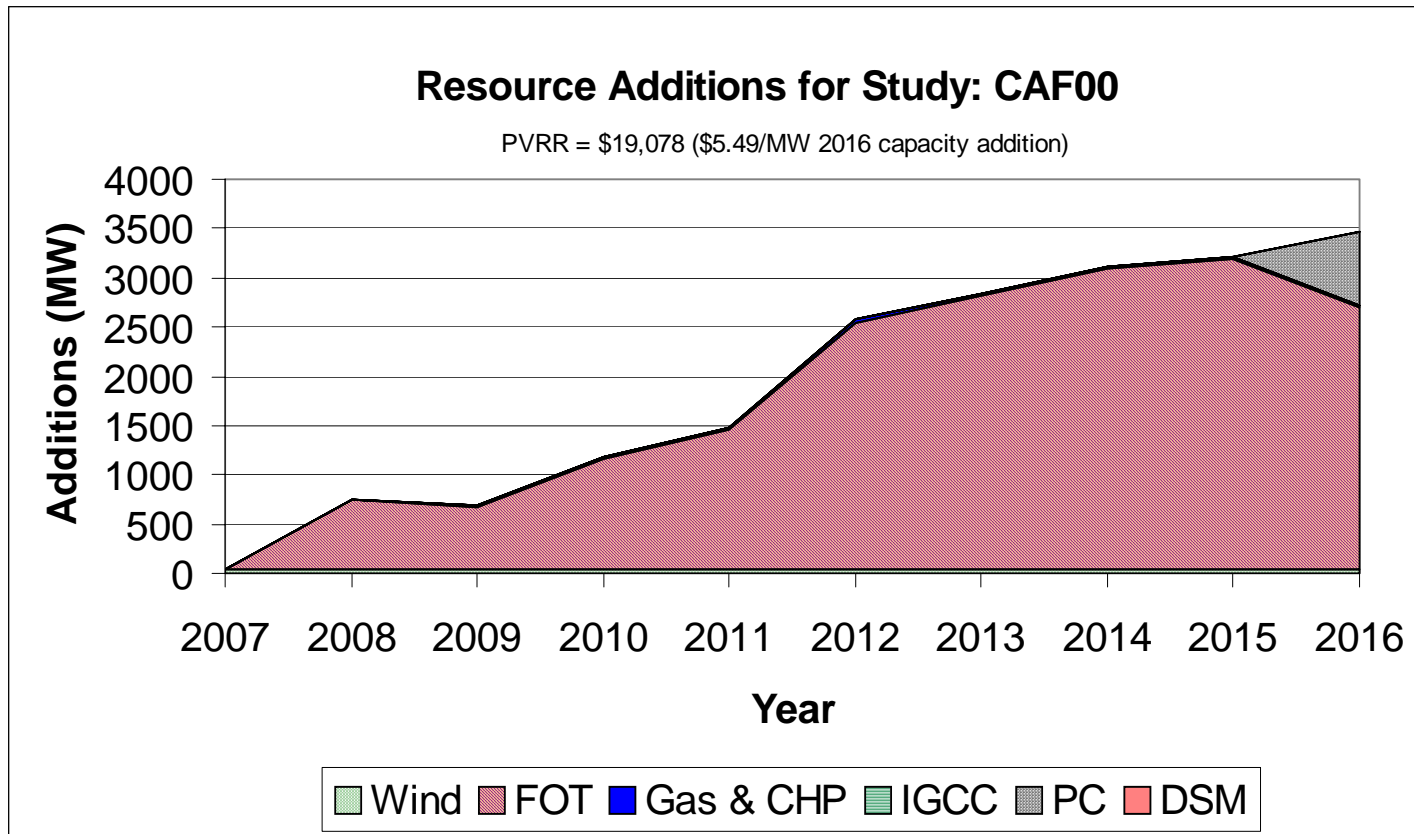
Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

DSM Additions

DSM Additions (MW)										
Scenario	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAF00	0	0	0	0	0	0	0	0	0	0
CAF01	0	0	0	0	0	0	0	0	0	0
CAF02	0	0	0	0	19	26	26	26	73	73
CAF03	0	169	169	169	169	201	201	201	201	201
CAF04	0	0	0	0	0	0	0	0	0	0
CAF05	0	0	0	0	0	0	0	0	0	0
CAF06	0	162	162	162	162	162	162	162	162	162
CAF07	0	0	0	0	0	0	0	0	0	0
CAF08	0	0	0	0	0	0	0	0	0	0
CAF09	0	0	0	0	0	0	0	0	0	0
CAF10	0	0	0	0	0	0	0	0	0	0
CAF11	0	0	0	41	41	41	41	41	41	41
CAF12	0	73	73	78	78	78	78	78	78	78
CAF13	0	201	201	201	201	222	222	222	225	225
CAF14	0	0	0	0	19	19	19	19	19	19
CAF15		169	169	169	169	169	169	169	169	169
SAS01	0	0	0	26	73	73	73	73	73	73
SAS02	0	26	26	26	73	73	73	73	129	129
SAS03	0	0	0	0	0	0	0	0	19	19
SAS04										
SAS06	0	0	0	26	73	73	73	73	73	73
SAS07	0	0	0	41	41	41	41	41	41	41
SAS08	0	0	0	26	26	26	26	26	26	26
SAS09	0	0	0	73	73	73	73	73	73	78
SAS10	0	0	0	73	73	73	73	73	73	73
SAS11	0	0	0	41	41	41	41	41	41	41
SAS12	0	0	0	73	73	73	73	73	73	73
SAS13	0	0	0	73	73	73	73	73	73	73
SAS14	0	0	0	73	73	73	73	73	73	73
SAS15	0	0	0	26	41	41	41	41	41	41
FOT04	0	0	0	73	73	73	73	73	129	129

Note: Model results are not yet available for Sensitivity Scenario 04 (SAS04), "Regional Transmission Project". Results for SAS05 consist of multiple model runs, and are therefore not reported in the table.

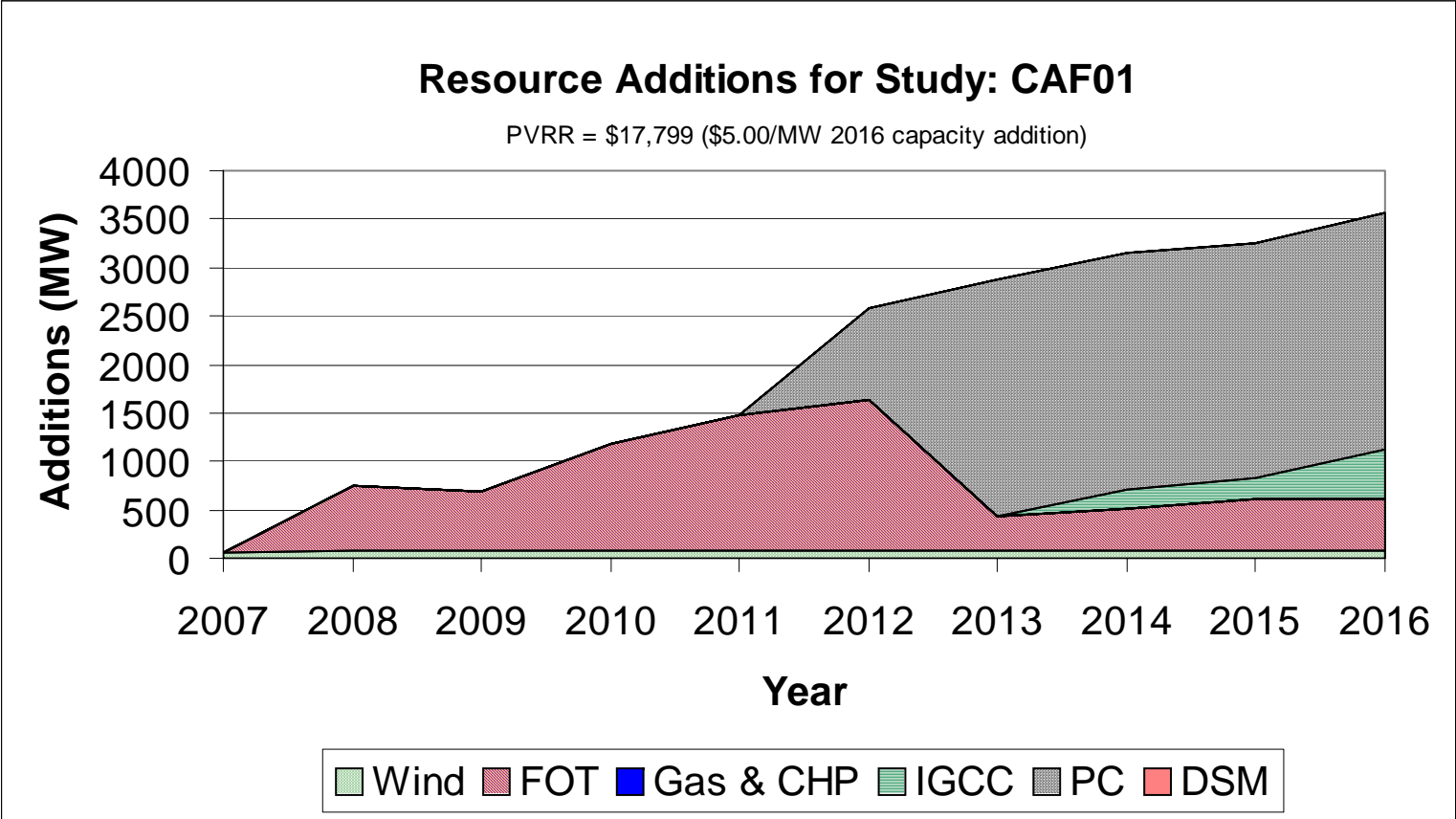
Business as Usual



Note: Wind additions represent capacity contribution

Low Cost Coal / High Cost Market

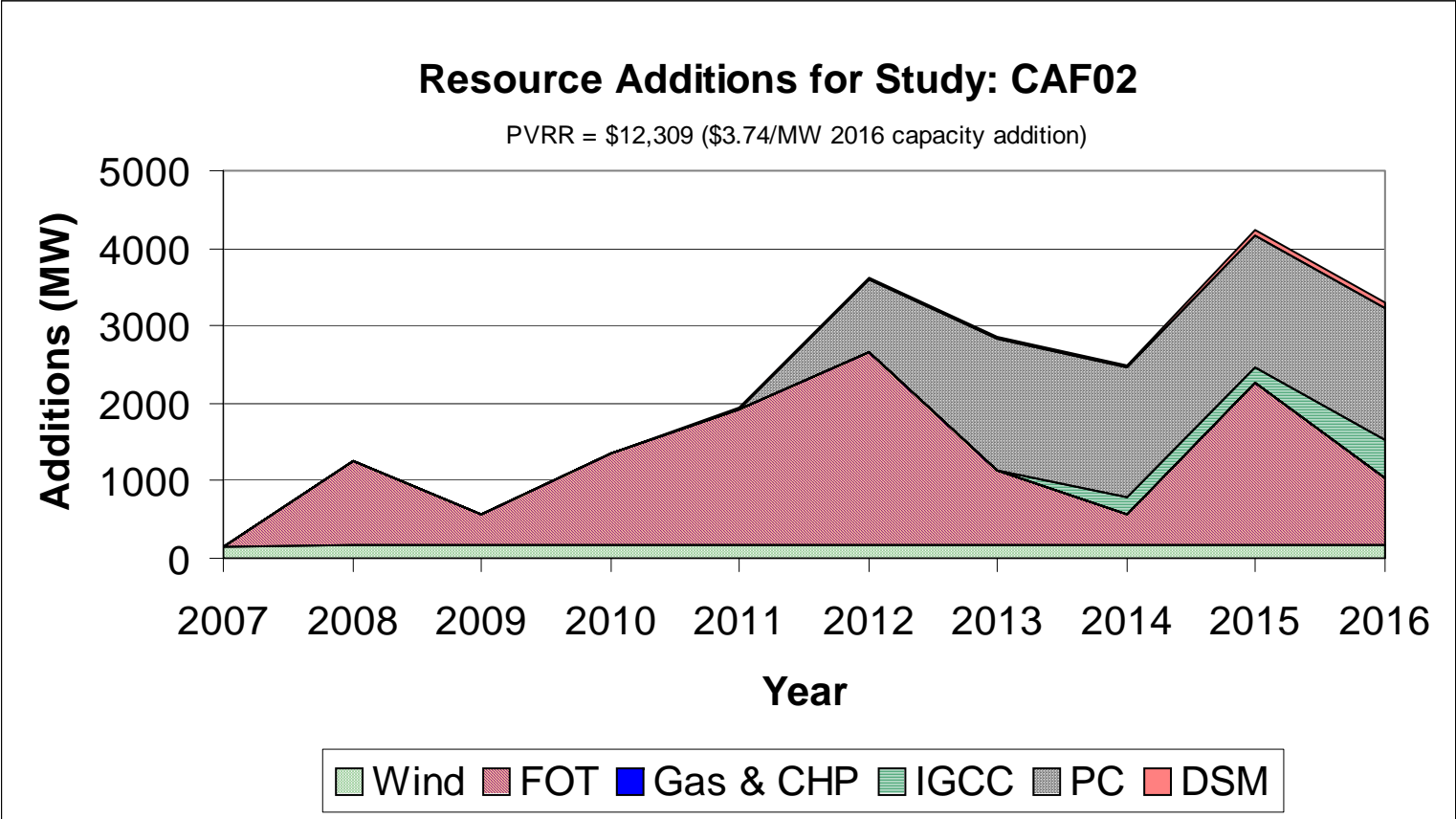
with Medium Load Growth



Note: Wind additions represent capacity contribution

Low Cost Coal / High Cost Market

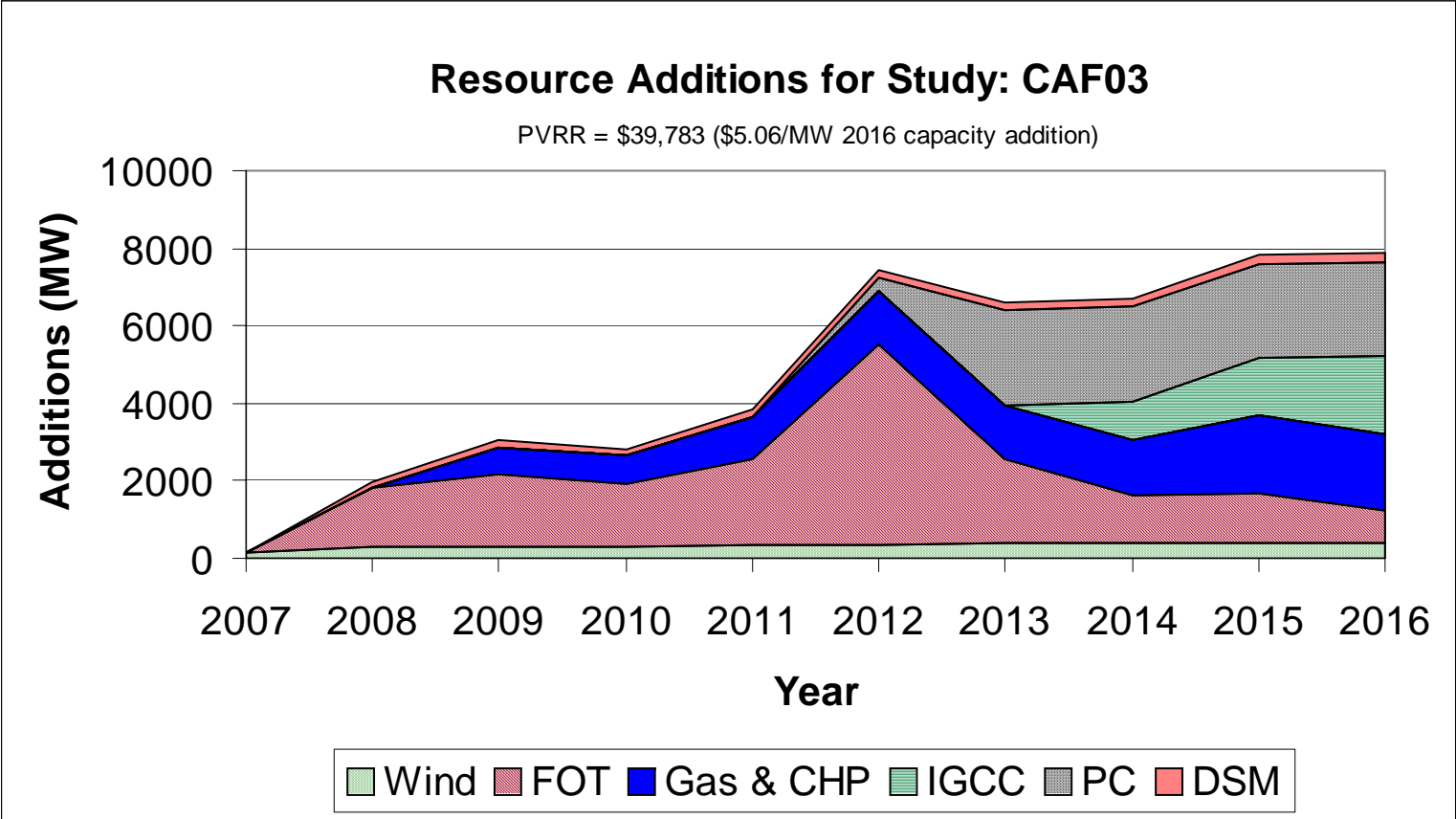
with Low Load Growth



Note: Wind additions represent capacity contribution

Low Cost Coal / High Cost Market

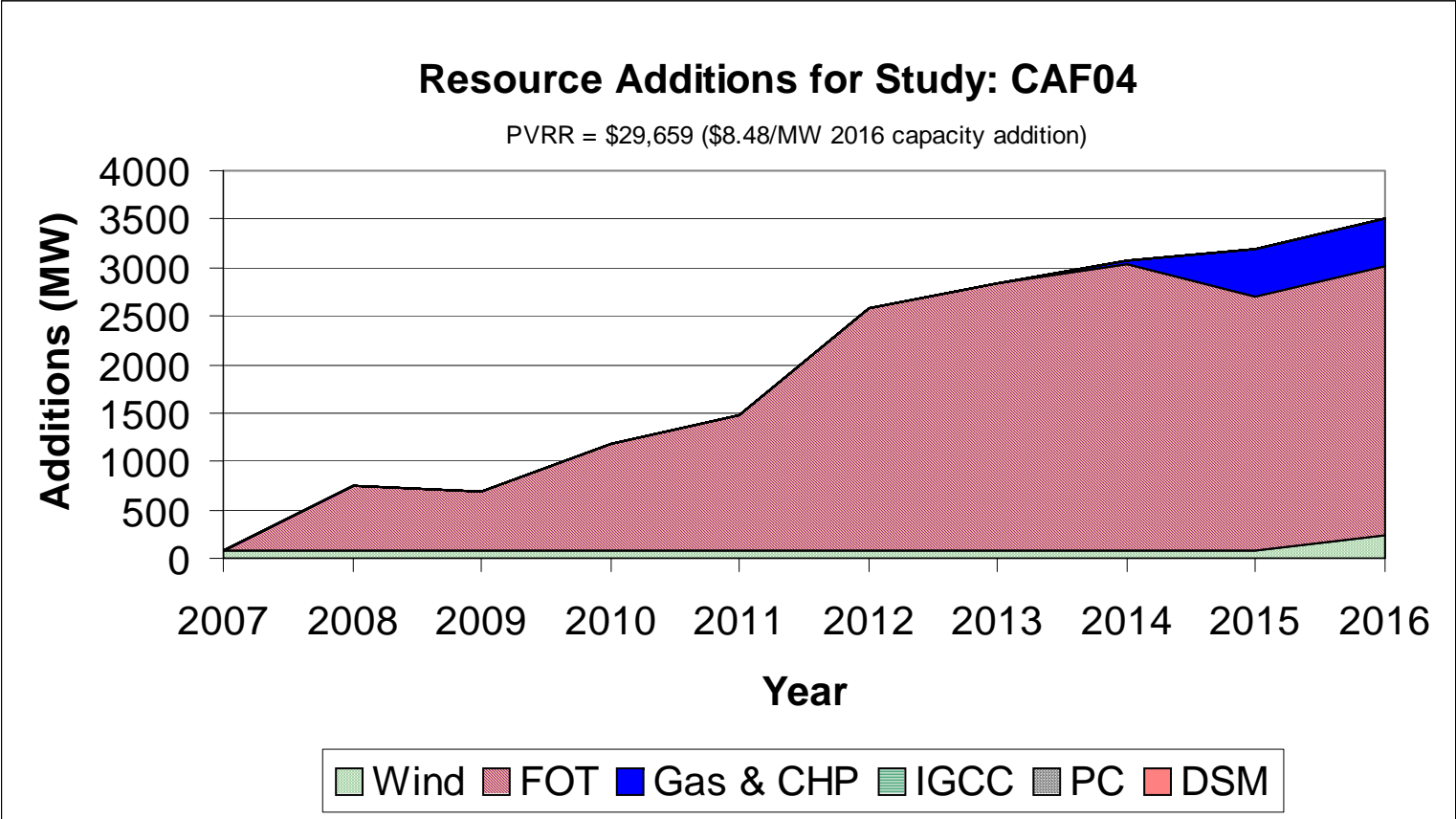
with High Load Growth



Note: Wind additions represent capacity contribution

High Cost Coal / Low Cost Market

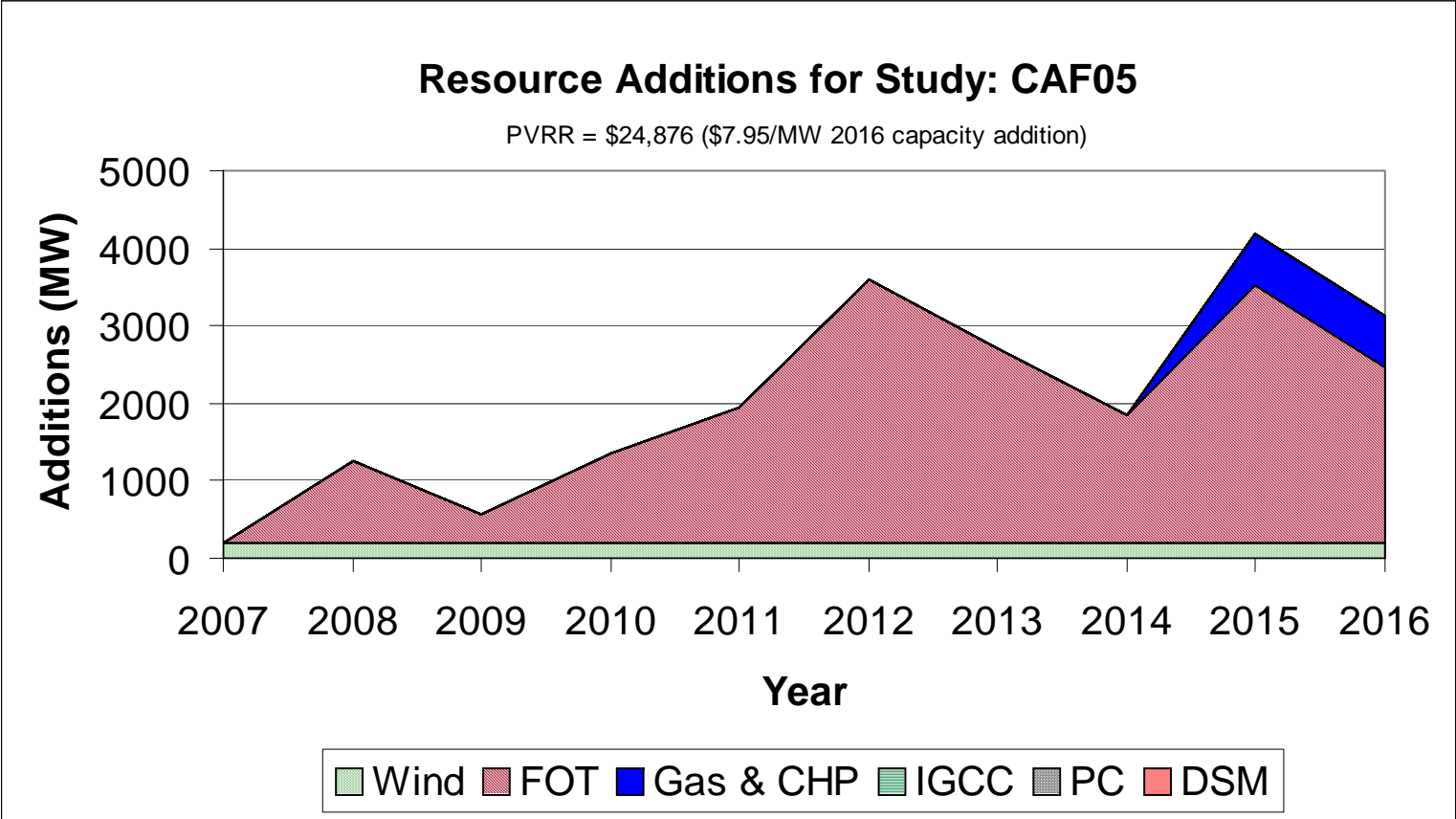
with Medium Load Growth



Note: Wind additions represent capacity contribution

High Cost Coal / Low Cost Market

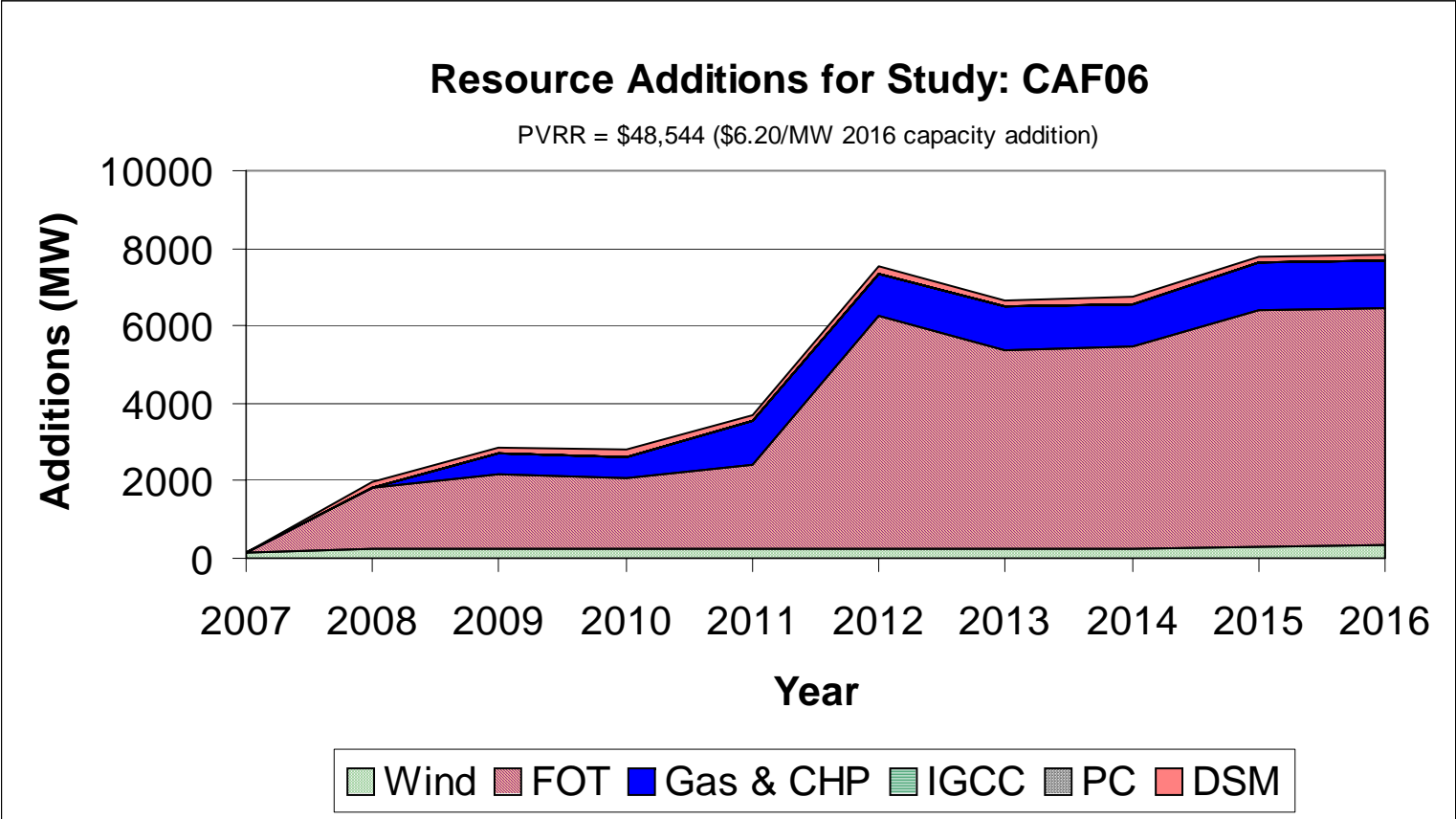
with Low Load Growth



Note: Wind additions represent capacity contribution

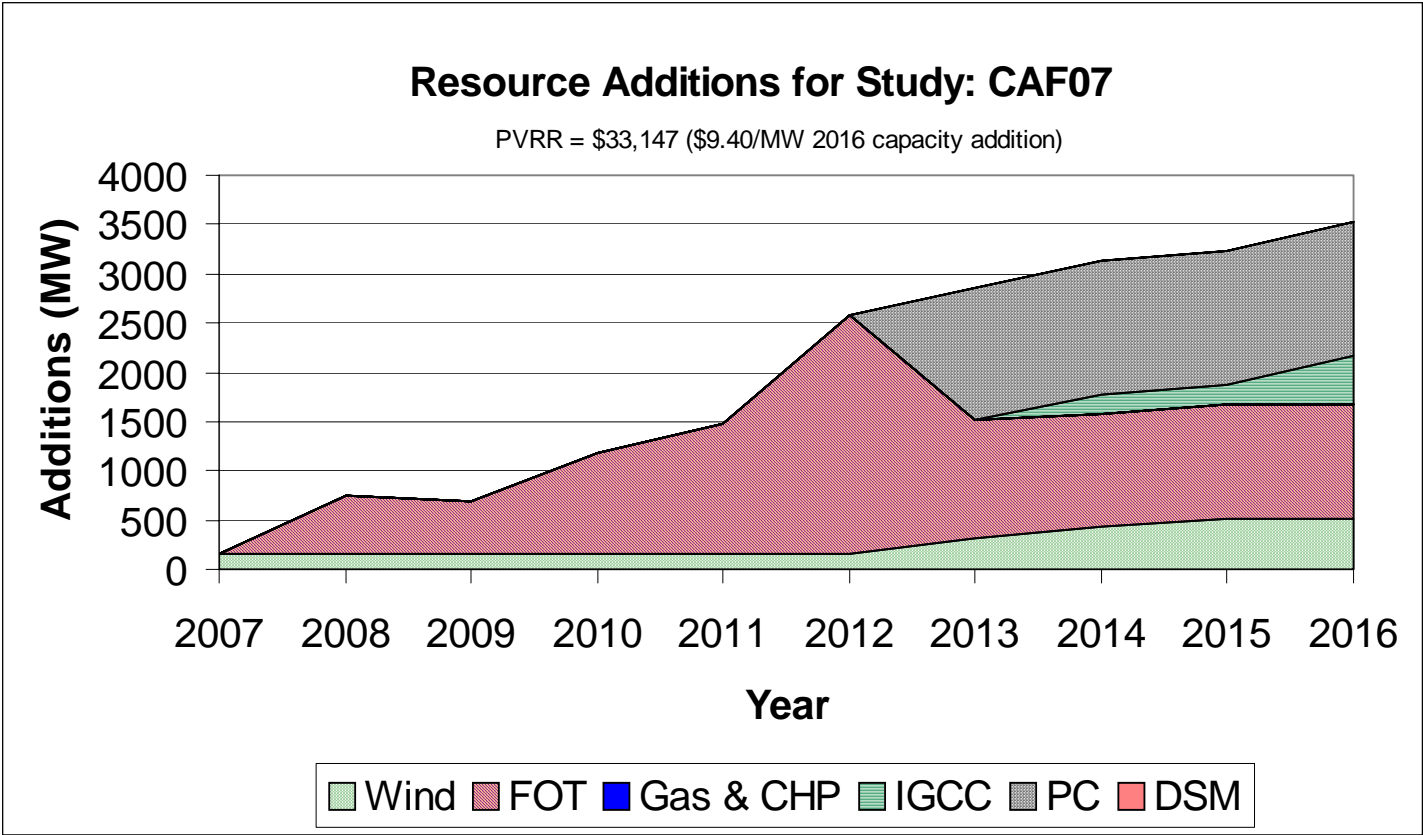
High Cost Coal / Low Cost Market

with High Load Growth



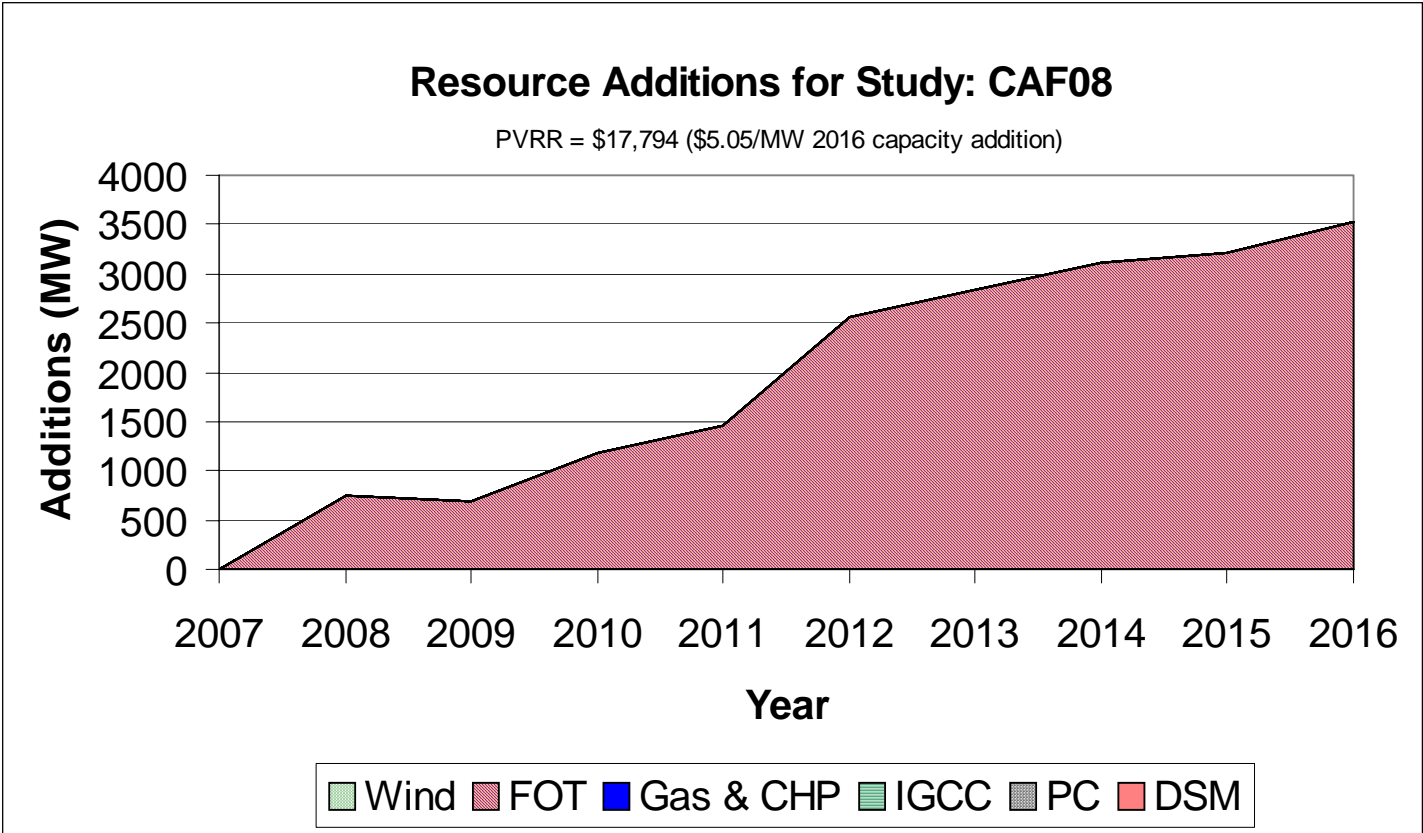
Note: Wind additions represent capacity contribution

Favorable Wind Environment



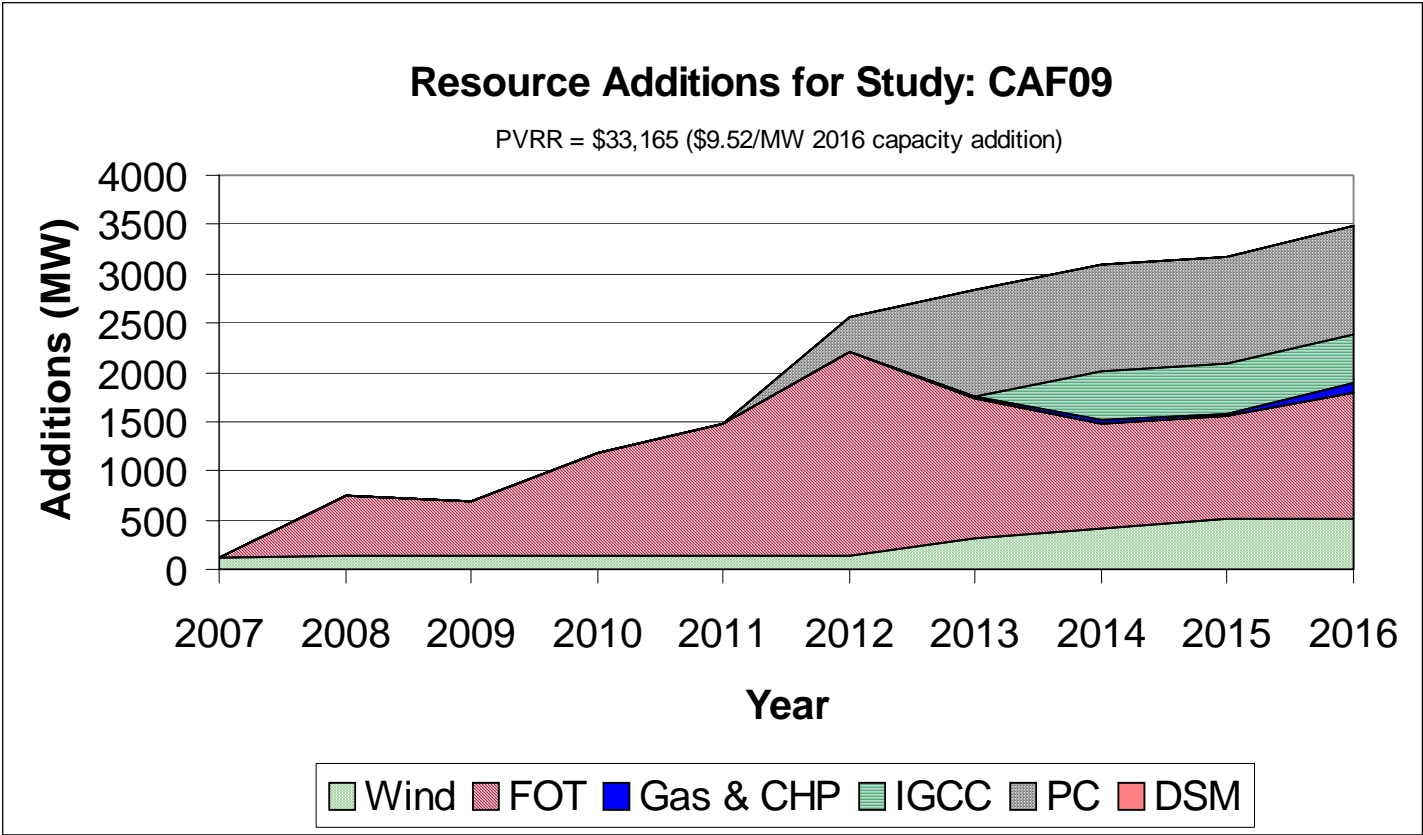
Note: Wind additions represent capacity contribution

Unfavorable Wind Environment



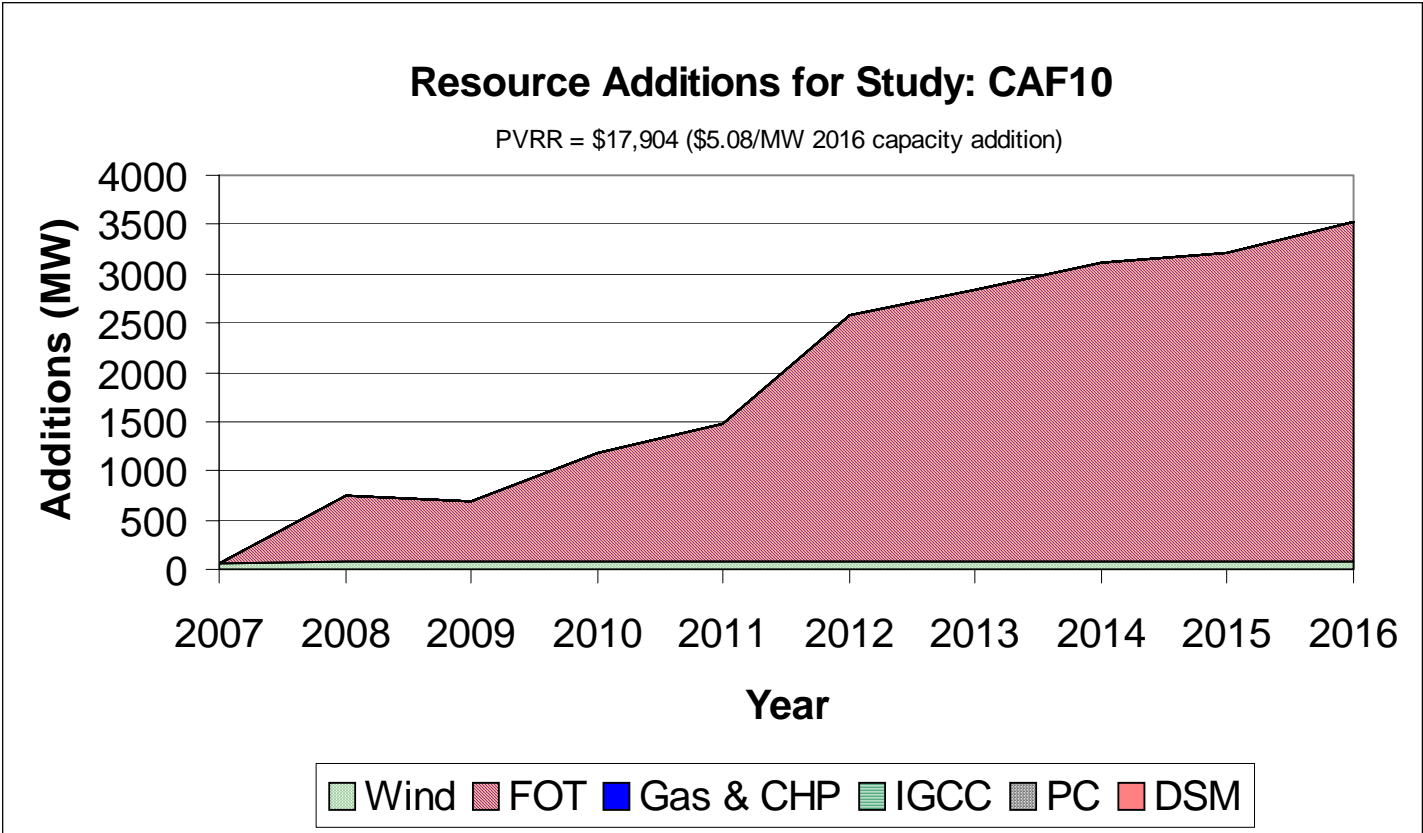
Note: Wind additions represent capacity contribution

High DSM Penetration



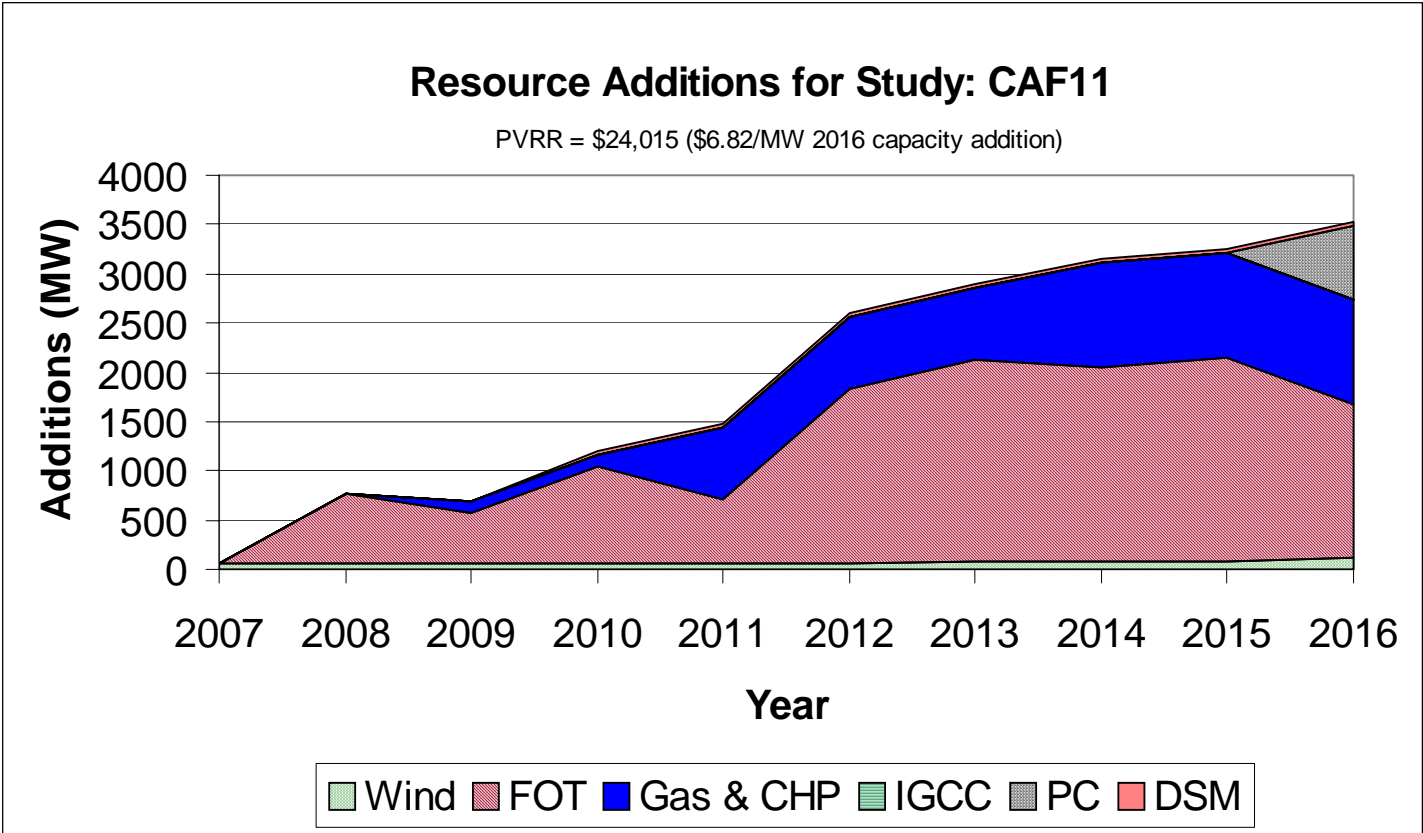
Note: Wind additions represent capacity contribution

Low DSM Penetration



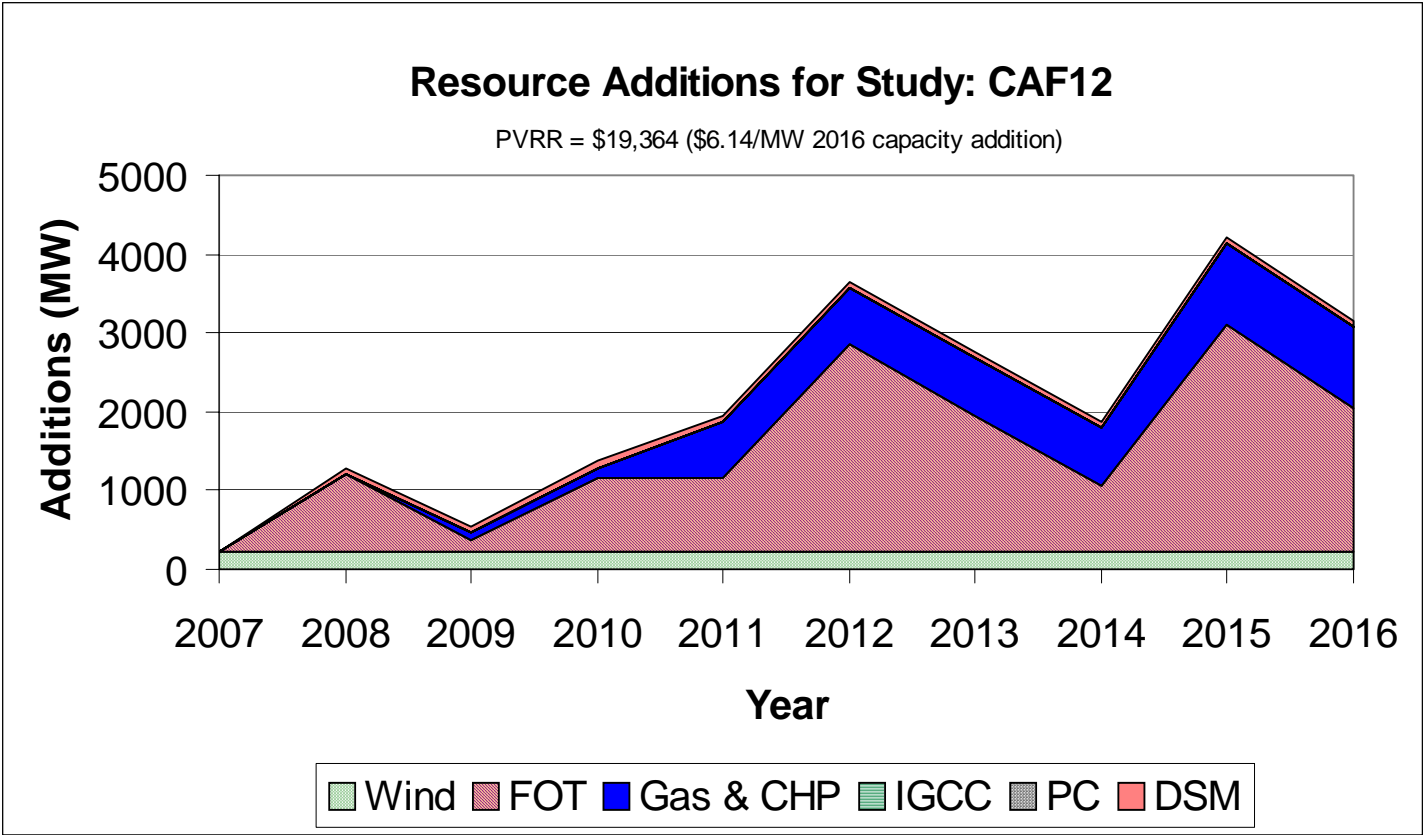
Note: Wind additions represent capacity contribution

Medium Scenario



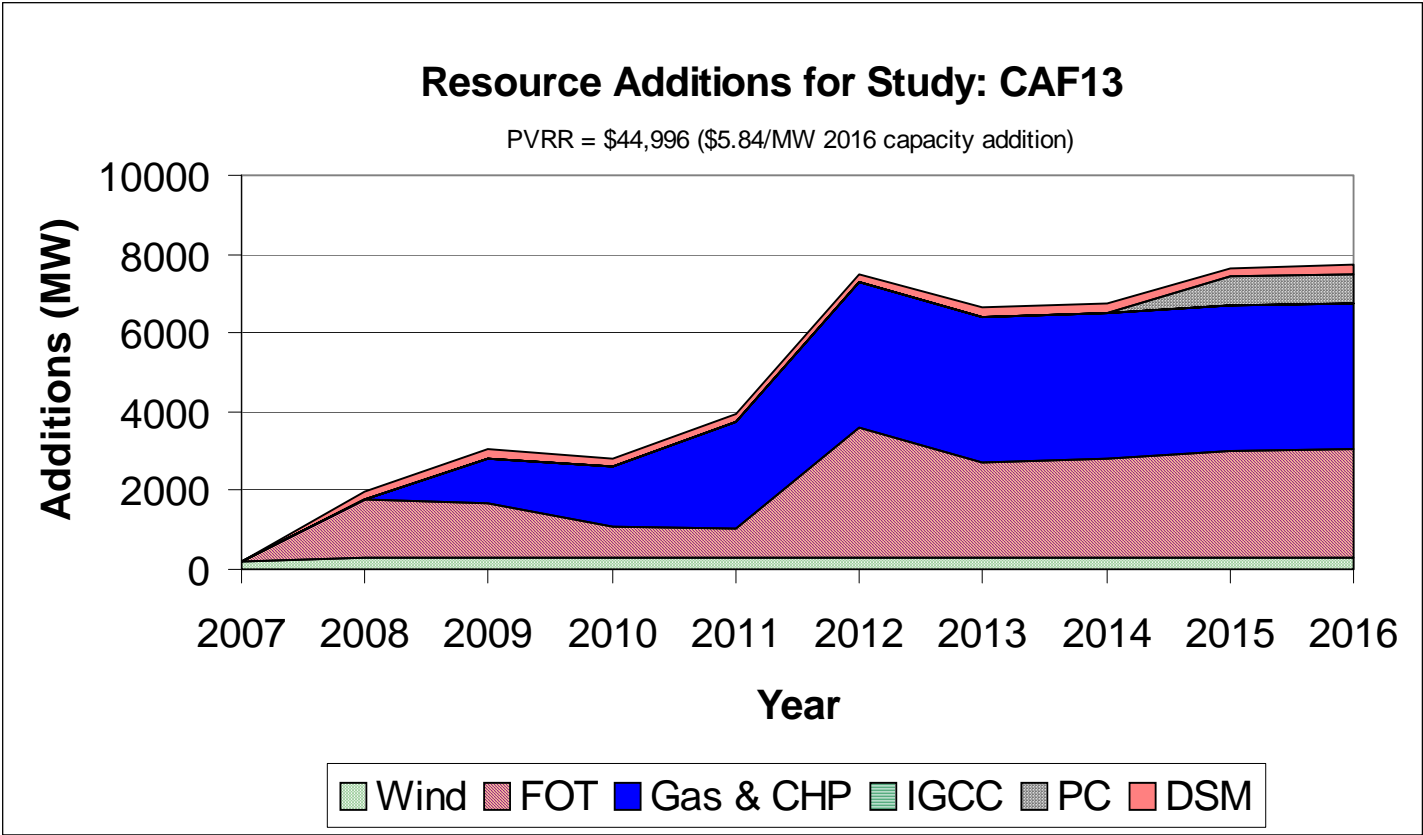
Note: Wind additions represent capacity contribution

Low Load Growth



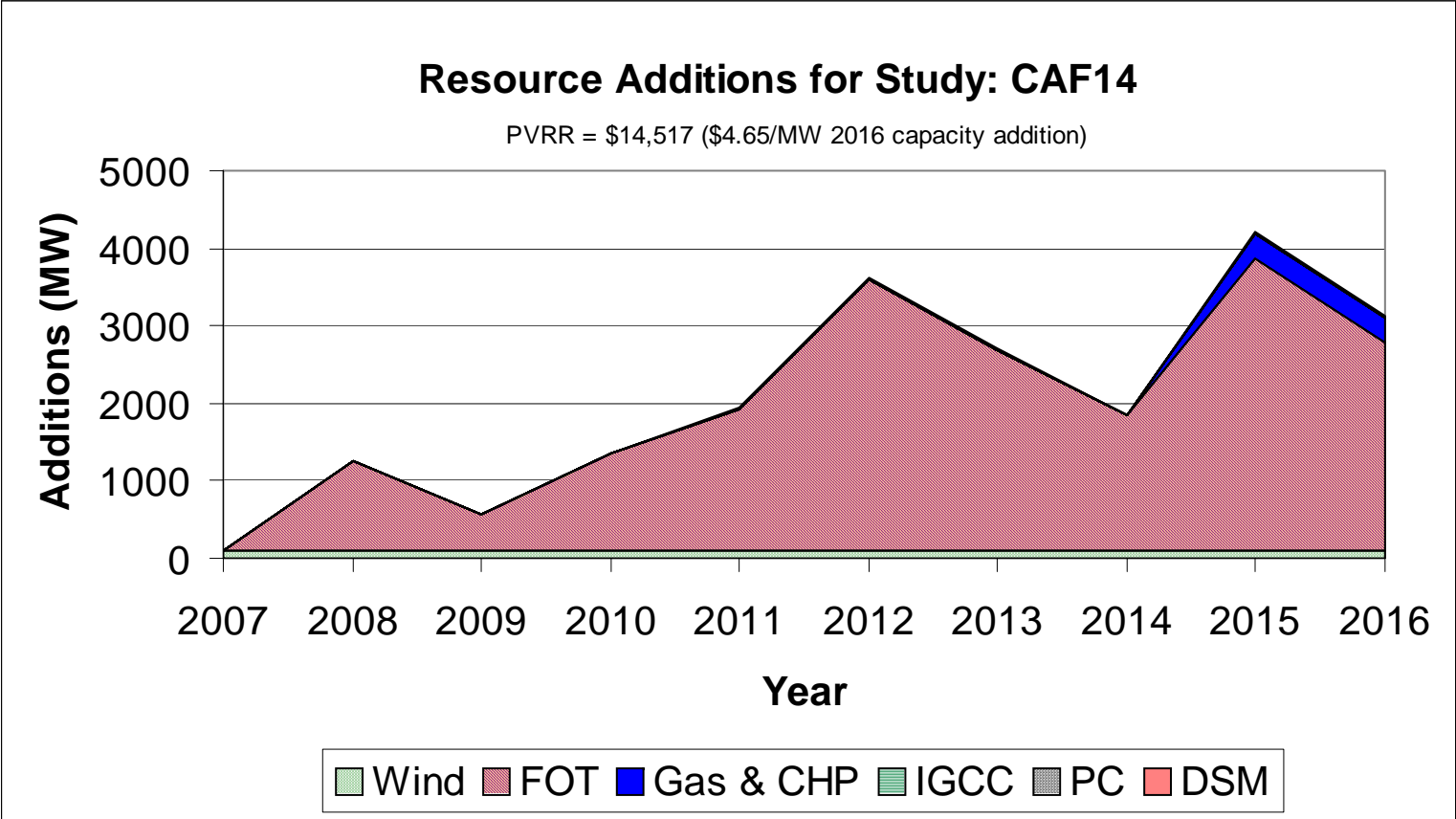
Note: Wind additions represent capacity contribution

High Load Growth



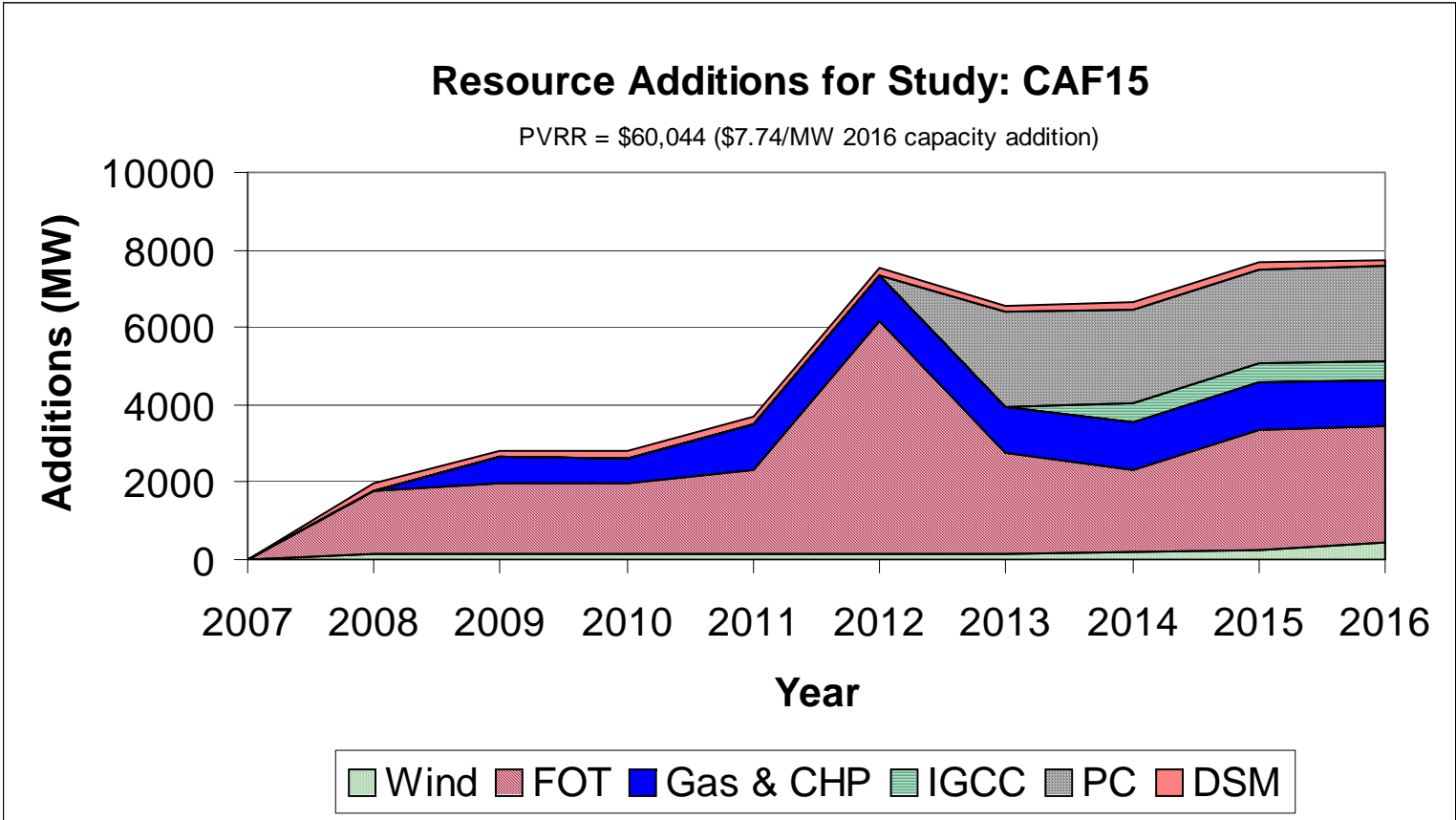
Note: Wind additions represent capacity contribution

Low Cost Portfolio Bookend



Note: Wind additions represent capacity contribution

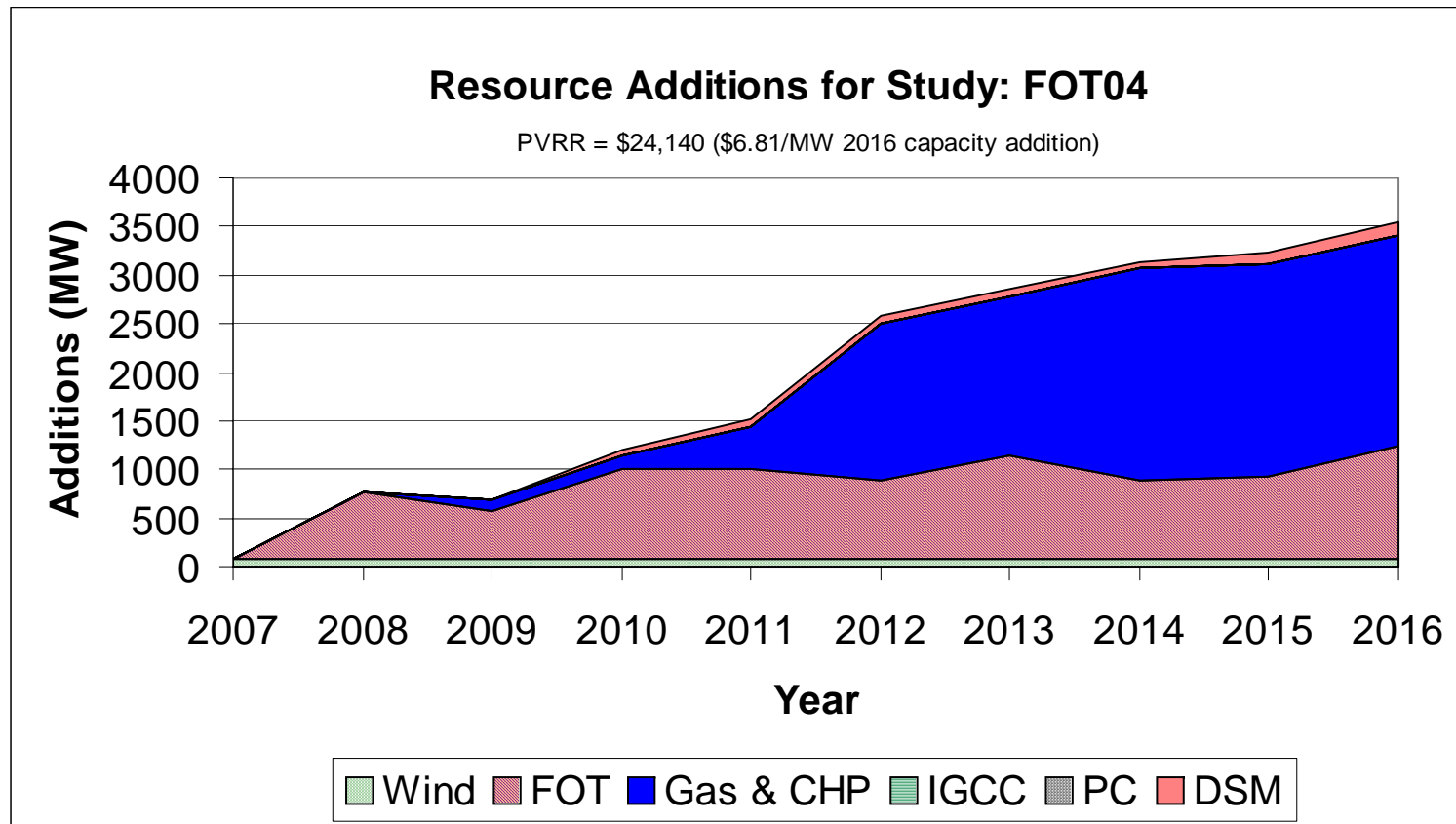
High Cost Portfolio Bookend



Note: Wind additions represent capacity contribution

Limited Market Purchases, Medium Load Growth Scenario

- Beginning in 2012, purchases at Four Corners and Mona limited to 700 MW, and west-side purchases limited to 500 MW (Consistent with 2004 IRP and 2004 IRP Update)



Note: Wind additions represent capacity contribution