

Austin Energy Response to Scenarios

Austin Generation Resource Planning Task Force

9-16-09

General Modeling Assumptions:

- DSM costs: \$500 expected with a range of \$350-\$750
- Pace's capital costs (mid-years), levelized costs (2020), projected load (both at peak and annual energy demand) and capacity factor assumptions used. These assumptions are not used in the initial model provided to Task Force, but are similar.
- All other assumptions as defined by the Austin Energy Resource Portfolio Simulator user's guide

Staff Recommendation (base model)

Choose Your Generation Mix

Schedule of power generation additions and subtractions (net MW)													CF (% avg. 2009-2020)	CO ₂ EF (metric tons/MWh)			
Power Source	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			2020	Max CF (%)	Min C
Coal	607													72%	0.95		
Nuclear	422													87%	0.00		
Natural Gas Turbines - Sand Hill 1-4	189		100											18%	0.53	25%	10%
Natural Gas Combined Cycle - Sand Hill 5	312							200						70%	0.39	70%	61%
Natural Gas Steam Turbines - Decker 1 & 2	741													9%	0.65	20%	1%
Natural Gas Turbines - Decker	193													3%	0.70	10%	1%
Onshore Wind	274	165		123		150		100		74			115	41%	0.00		
Offshore Wind	0													42%	0.00		
Biomass	0				100				50					86%	0.00		
FPP w/ biomass co-firing	0													89%	0.00		
Landfill Gas	12													79%	0.00		
Solar PV - Centralized	0		30				30		20	30	20	30	40	26%	0.00		
Solar PV - Distributed	1													26%	0.00		
Concentrated Solar	0													32%	0.00		Parabolic Trough
IGCC w/ CCS	0													84%	0.13		
IGCC w/o CCS	0													84%	0.87		
Geothermal	0													95%	0.00		
Storage	0													0%	0.00		Storage Type 0
Accelerated Conservation	0		5	8	9	9	10	11	10	10	9	10	9	0%	0.00		Meet conservation demand? Yes
Purchased Power	0													100%	0.59		

Scenario Output Summary

System Reliability in 2020		Costs and Economic Impacts through 2020		Pace	AE
% of Annual Electricity Demand Met	100%	Total Expected Capital Costs through 2020 (\$ million)		2,700	
% of Peak Hourly Demand Met	100%	Annual Expected Fuel Costs in 2020 (\$ million)		410	2671
Carbon Impacts in 2020		Expected Increase in Cost of Electricity in 2020 (¢/kWh)		2.7	344
Carbon Emissions (metric tons)	4,491,400	4580			2.8
% Generation from Renewables in 2020	34.0%	36			
% Capacity from Renewables in 2020	33.0%	33			
		Pace			

Renewables/DSM to replace FPP (Submitted by Cyrus Reed – 9/4/09)

Choose Your Generation Mix

Schedule of power generation additions and subtractions (net MW)													CF (% avg. 2009-2020)	CO ₂ EF (metric tons/MWh)			
Power Source	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			2020		
Coal	607				-120		-120		-120		-120		-127	83%	0.95		
Nuclear	422													87%	0.00		
Natural Gas Turbines - Sand Hill 1-4	189		100											25%	0.53	25%	10%
Natural Gas Combined Cycle - Sand Hill 5	312													70%	0.39	70%	61%
Natural Gas Steam Turbines - Decker 1 & 2	741													16%	0.65	20%	1%
Natural Gas Turbines - Decker	193													7%	0.70	10%	1%
Onshore Wind	274	165					200		300	300	100	100	350	41%	0.00		
Offshore Wind	0													42%	0.00		
Biomass	0				100									86%	0.00		
FPP w/ biomass co-firing	0													89%	0.00		
Landfill Gas	12						15							79%	0.00		
Solar PV - Centralized	0		30				50		50		50		50	26%	0.00		
Solar PV - Distributed	1			10	10	10	10	10	10	10	10	10	10	26%	0.00		
Concentrated Solar	0													32%	0.00	Parabolic Trough	
IGCC w/ CCS	0													84%	0.13		
IGCC w/o CCS	0													84%	0.87		
Geothermal	0					25			25					95%	0.00		
Storage	0													0%	0.00	Storage Type 0	
Accelerated Conservation	0		10	20	20	20	20	20	20	20	20	20	10	0%	0.00	Meet conservation demand? Yes	
Purchased Power	0													100%	0.59		

Scenario Output Summary

System Reliability in 2020		Costs and Economic Impacts through 2020		Pace	AE
% of Annual Electricity Demand Met	100%	Total Expected Capital Costs through 2020 (\$ million)			
% of Peak Hourly Demand Met	95%	Annual Expected Fuel Costs in 2020 (\$ million)		320	2671
Carbon Impacts in 2020		Expected Increase in Cost of Electricity in 2020 (¢/kWh)		3.5	344
Carbon Emissions (metric tons)	1,332,100	4580			2.8
% Generation from Renewables in 2020	56.9%	36			
% Capacity from Renewables in 2020	54.0%	33			
		Pace			

Additional Assumptions:

- 75% of distributed PV is installed by commercial/industrial customers with a \$1/watt rebate cost share for AE; 25% of distributed PV is installed by residential customers with a \$2.50/watt rebate cost share for AE

Issues:

- High capital costs leads to higher expected increase in cost of electricity
- Inability to meet peak demand indicates greater exposure to power market prices
- May be difficult to achieve solar PV numbers at assumed rebate amount (less than current rebate), accelerated DSM amount, landfill gas amount, and geothermal amount

**1000 DSM / 1000 Solar / 1,500 Wind
(Submitted by Mike Sloan – 9/8/09)**

Choose Your Generation Mix

Schedule of power generation additions and subtractions (net MW)														CF (% avg. 2009-2020)	CO ₂ EF (metric tons/MWh)		
Power Source	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			Max CF (%)	Min C
Coal	607				-305		-302							83%	0.95		
Nuclear	422													87%	0.00		
Natural Gas Turbines - Sand Hill 1-4	189													24%	0.53	25%	10%
Natural Gas Combined Cycle - Sand Hill 5	312													70%	0.39	70%	61%
Natural Gas Steam Turbines - Decker 1 & 2	741													11%	0.65	20%	1%
Natural Gas Turbines - Decker	193													2%	0.70	10%	1%
Onshore Wind	274	165	300		270									41%	0.00		
Offshore Wind (Coastal)	0			300			200							42%	0.00		
Biomass	0													86%	0.00		
FPP w/ biomass co-firing	0													89%	0.00		
Landfill Gas	12						15							79%	0.00		
Solar PV - Centralized	0		30											26%	0.00		
Solar PV - Distributed (Customer-sited)	1		10	40	100	100	100	100	150	100	100	100	100	26%	0.00		
Concentrated Solar	0													32%	0.00		Parabolic Trough
IGCC w/ CCS	0													84%	0.13		
IGCC w/o CCS	0													84%	0.87		
Geothermal	0					25			25					95%	0.00		
Storage	0													0%	0.00		Storage Type 0
Accelerated Conservation	0		30	30	30	30	30	30	30	30	30	30	30	0%	0.00		Meet conservation demand? Yes
Purchased Power	0													100%	0.59		

Scenario Output Summary

System Reliability in 2020		Costs and Economic Impacts through 2020		Pace	AE
% of Annual Electricity Demand Met	100%	Total Expected Capital Costs through 2020 (\$ million)		3,600	
% of Peak Hourly Demand Met	100%	Annual Expected Fuel Costs in 2020 (\$ million)		280	2671
Carbon Impacts in 2020		Expected Increase in Cost of Electricity in 2020 (¢/kWh)		2.4	344
Carbon Emissions (metric tons)	1,224,200	4580			2.8
% Generation from Renewables in 2020	57.5%	36			
% Capacity from Renewables in 2020	58.5%	33			
		Pace			

Additional Assumptions:

- 100% of distributed PV is customer sited with a \$1/watt rebate cost share for AE
- AE can terminate its contracts for biomass and natural gas CT turbines w/o incurring any costs
- Onshore wind costs at \$45 MWh and \$1,700/kW; coastal wind costs at \$55 MWh and \$1,800/kW

Issues:

- May be difficult to achieve solar PV numbers at assumed rebate amount (less than current rebate), accelerated DSM amount, landfill gas amount, and geothermal amount

Cheap Wind (Submitted by Mike Sloan – 9/8/09)

Choose Your Generation Mix

Schedule of power generation additions and subtractions (net MW)													CF (% avg. 2009-2020)	CO ₂ EF (metric tons/MWh)			
Power Source	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			2020	Max CF (%)	Min C
Coal	607	-607												83%	0.95		
Nuclear	422	-422												87%	0.00		
Natural Gas Turbines - Sand Hill 1-4	189	-189												13%	0.53	25%	10%
Natural Gas Combined Cycle - Sand Hill 5	312	-312												63%	0.39	70%	61%
Natural Gas Steam Turbines - Decker 1 & 2	741	-741												17%	0.65	20%	1%
Natural Gas Turbines - Decker	193	-193												5%	0.70	10%	1%
Onshore Wind	274	4000												41%	0.00		
Offshore Wind (Coastal)	0													42%	0.00		
Biomass	0													86%	0.00		
FPP w/ biomass co-firing	0													89%	0.00		
Landfill Gas	12	-12												79%	0.00		
Solar PV - Centralized	0													26%	0.00		
Solar PV - Distributed (Customer-sited)	1	-1												26%	0.00		
Concentrated Solar	0													32%	0.00		Parabolic Trough
IGCC w/ CCS	0													84%	0.13		
IGCC w/o CCS	0													84%	0.87		
Geothermal	0													95%	0.00		
Storage	0													0%	0.00		Storage Type 0
Accelerated Conservation	0													0%	0.00		Meet conservation demand? Yes
Purchased Power	0													100%	0.59		

Scenario Output Summary

System Reliability in 2020		Costs and Economic Impacts through 2020		Pace	AE
% of Annual Electricity Demand Met	100%	Total Expected Capital Costs through 2020 (\$ million)	0	2671	
% of Peak Hourly Demand Met	22%	Annual Expected Fuel Costs in 2020 (\$ million)	0	344	
Carbon Impacts in 2020		Expected Increase in Cost of Electricity in 2020 (¢/kWh)	-3.8	2.8	2
Carbon Emissions (metric tons)	0				
% Generation from Renewables in 2020	100.0%				
% Capacity from Renewables in 2020	100.0%				

Additional Assumptions:

- Assume all resources can be taken off-line immediately and replaced with an addition of 4,000 MW of wind at \$22 per MWh
- Lowered electricity cost shown in graph assumes drop from average cost of 6 cents per kWh to generate electricity w/o considering power market prices to make up for gaps.

Issues:

- Highly unrealistic
- Only 22% of peak hourly demand met
- Complete reliance on variable resources (wind) causes major exposure to power market