

Futures	Narratives
Existing Fleet	<p>The existing generation fleet is largely unchanged. No carbon regulations are modeled, though some reductions are expected due to age-related coal retirements and renewable additions driven by renewable portfolio standards and goals as well as economics.</p> <ul style="list-style-type: none"> • Natural gas prices remain low due to increased well productivity and supply chain efficiencies. • Footprint wide, demand and energy growth rates are low to model a more static system with no notable drivers of higher growth; however, as a result of low natural gas prices, industrial production along the Gulf Coast increases. • Low natural gas prices and static economic growth reduce the economic viability of alternative technologies. • Thermal generation retirements are driven by unit age-limits. Nuclear units are assumed to have license renewals granted and remain online.
Policy Regulations	<p>Carbon regulations targeting a 25% reduction across all aggregated unit outputs are enacted driving some coal retirements and an increase in natural gas reliance. Increased renewable additions are driven by renewable portfolio standards and goals, economics, and business practices to meet carbon regulations.</p> <ul style="list-style-type: none"> • Demand and energy growth rates are modeled at a level equivalent to a 50/50 forecast. • Natural gas prices are consistent with industry long-term reference forecasts. • Current demand response, energy efficiency, and distributed generation programs remain in place and grow to help comply with additional regulations. • Non-nuclear, non-coal generators will be retired in the year the age limit is reached. Coal units will be retired reflecting economics of carbon regulations. Nuclear units are assumed to have license renewals granted and remain online. • Maturity cost curves for renewable technologies applied reflecting some advancement in technologies and supply chain efficiencies.
Accelerated Alternatives Technologies	<p>A robust economy drives technological advancement and economies of scale resulting in a greater potential for demand response, energy efficiency, and distributed generation as well as lower capital cost for renewables reflected in the maturity cost curves. Carbon reductions targeting 35% across all aggregated unit outputs are achieved.</p> <ul style="list-style-type: none"> • Natural gas prices are high due to increased demand. • Robust economy leads to increased demand & energy consumption. Footprint wide, demand and energy growth rates are high due to a robust economy; however, as a result of high natural gas prices, industrial production along the Gulf Coast decreases. • A robust economy drives technological advancement and economies of scale resulting in a greater potential for demand response, energy efficiency, and distributed generation as well as lower capital cost for renewables reflected in the maturity cost curves. • Non-nuclear, non-coal generators will be retired in the year the age limit is reached. Coal units will be retired reflecting economics of carbon regulations. Nuclear units are assumed to have license renewals granted and remain online.

MTEP17 FUTURES MATRIX

Future	Uncertainties																															
	Capital Costs												Demand and Energy				Fuel Cost (Starting)		Fuel Escalations		Emission Costs			Other Variables								
	Coal	CC	CT	Nuclear	Wind Onshore	IGCC	IGCC w/ CCS	CC w/ CCS	Pumped Storage Hydro	Compressed Air Energy Storage	Photovoltaic	Biomass	Conventional Hydro	Wind Offshore	Demand Response Level	Energy Efficiency Level	Demand Growth Rate	Energy Growth Rate	Natural Gas Forecast	Oil	Coal	Uranium	Oil	Coal	Uranium	SO ₂	NO _x	CO ₂	Inflation	Retirements	Renewable Portfolio Standards	Wind/Solar Cost Maturity
Existing Fleet	M	M	M	M	H	M	M	M	M	M	H	M	M	M	L	L	L	L	L	M	M	M	M	M	M	-	M	-	M	L	M	-
Policy Regulations	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	-	M	M	M	M	M	M
Accelerated Alternative Technologies	M	M	M	M	L	M	M	M	M	L	M	M	M	H	H	H	H	H	M	M	M	M	M	M	-	M	H	M	H	M	M	

MTEP17 UNCERTAINTY VARIABLES

Uncertainty	Unit	Low (L)	Mid (M)	High (H)
New Generation Capital Costs¹				
Coal	(\$/KW)	2,603	3,470	4,338
CC	(\$/KW)	733	977	1,221
CT	(\$/KW)	622	829	1,036
Nuclear	(\$/KW)	4,408	5,877	7,346
Wind-Onshore	(\$/KW)	1,213	1,617	2,021
IGCC	(\$/KW)	2,890	3,853	4,816
IGCC w/ CCS	(\$/KW)	4,933	6,577	8,221
CC w/ CCS	(\$/KW)	1,581	2,108	2,635
Pumped Storage Hydro	(\$/KW)	4,124	5,477	6,873
Compressed Air Energy Storage	(\$/KW)	971	1,295	1,619
Photovoltaic	(\$/KW)	1,411	1,881	2,351
Biomass	(\$/KW)	2,880	3,885	4,799
Conventional Hydro	(\$/KW)	1,862	2,483	3,104
Demand and Energy				
Baseline 20-Year Demand Growth Rate ²	%	0.4%	0.6%	0.9%
Baseline 20-Year Energy Growth Rate ³	%	0.4%	0.7%	0.9%
Demand Response & Energy Efficiency Levels	%	AEG Low Growth	AEG Existing Programs Plus	AEG CPP 111(d) Case
Natural Gas				
Natural Gas ⁴	(\$/MMBtu)	Forecast-30%	Combined NYMEX, EIA, and Wood Mackenzie	Forecast +30%
Fuel Prices (Starting Values)				
Oil	(\$/MMBtu)		Powerbase default ⁵	
Coal	(\$/MMBtu)		Powerbase default ⁶	
Uranium	(\$/MMBtu)		Powerbase default	
Fuel Prices (Escalation Rates)				
Oil	%		2.5%	
Coal	%		2.5%	
Uranium	%		2.5%	
Emissions Costs/Constraints				
NO _x	(\$/ton)		Annual \$155 Seasonal \$300	
CO ₂	(Tons) ⁷		25% by 2030	35% by 2030
Other Variables				
Inflation	%		2.5	
Retirements	MW	Age-related oil/gas (55 years) & coal (65 years)	Age-Related oil/gas + 16 GW Coal Retirements	Age-Related oil/gas + 24 GW Coal Retirements
Renewable Portfolio Standards	%	State Mandates and goals	State Mandates and goals	State Mandates and goals
Cost Maturity Curves	%	None	Based on NREL ATB	Based on NREL ATB

¹ All costs are overnight construction costs in 2016 dollars; sourced from NREL Annual Technology Baseline; H and L values are 25% +/- from the M value, except for CC, CT, Wind & Solar which follow NREL ATB cost maturity curves

² Mid values for years 1 - 10 of demand growth are derived from Module-E; Years 11-20 are extrapolated; H & L values are derived using

³ Energy values are calculated using Module E, the corresponding demand forecast and historical load factors

⁴ NYMEX, EIA, and Wood Mackenzie

⁵ Powerbase default for oil is \$9.87/MMBtu

⁶ Powerbase range for coal is \$1 to \$4, with an average value of \$1.84/MMBtu

⁷ Tonnage limit applies all units evenly