

MTEP16 FUTURES MATRIX

	Uncertainties																															
	Capital Costs													Demand and Energy				Fuel Cost (Starting Price)	Fuel Escalations			Emission Costs			Other Variables							
Future	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	
Business As Usual	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	L	L	L	M	L	M
High Demand	H	H	H	H	H	H	H	H	H	H	H	H	H	H	M	M	H	H	M	M	M	M	H	H	H	L	L	L	H	M	M	
Low Demand	L	L	L	L	M	L	L	L	L	L	M	L	L	L	M	M	L	L	L	L	L	L	M	L	L	L	L	L	L	L	M	M
Regional CPP Compliance	H	H	H	M	L	M	M	M	M	M	L	M	M	M	M	H	M	M	H	L	L	M	M	M	M	L	L	M	M	H	H	
Sub-Regional CPP Compliance	H	H	H	M	L	M	M	M	M	M	L	M	M	M	M	H	M	M	H	L	L	M	H	H	H	L	L	H	H	H	H	

To download the full MISO MTEP16 Futures Matrix please use the link below:

<https://www.misoenergy.org/layouts/MISO/ECM/Redirect.aspx?ID=195220>

For more information on the MISO MTEP16 Futures please visit the MISO PAC site:

<https://www.misoenergy.org/STAKEHOLDERCENTER/COMMITTEESWORKGROUPSTASKFORCES/PAC/Pages/home.aspx>

MTEP16 FUTURES MATRIX				
Uncertainty	Unit	Low (L)	Mid (M)	High (H)
New Generation Capital Costs¹				
Coal	(\$/KW)	2,279	3,039	3,799
CC	(\$/KW)	795	1,060	1,324
CT	(\$/KW)	525	700	875
Nuclear	(\$/KW)	4,296	5,728	7,160
Wind-Onshore	(\$/KW)	1,750	2,063	2,579
IGCC	(\$/KW)	2,940	3,919	4,899
IGCC w/ CCS	(\$/KW)	5,126	6,835	8,544
CC w/ CCS	(\$/KW)	1,627	2,170	2,712
Pumped Storage Hydro	(\$/KW)	4,108	5,477	6,846
Compressed Air Energy Storage	(\$/KW)	971	1,295	1,618
Photovoltaic	(\$/KW)	1,750	3,009	5,014
Biomass	(\$/KW)	3,196	4,261	5,326
Conventional Hydro	(\$/KW)	2,281	3,041	3,801
Wind-Offshore	(\$/KW)	4,840	6,453	8,066
MTEP16 FUTURES MATRIX				
Demand and Energy				
Baseline 20-Year Demand Growth Rate ²	%	0.11%	0.75%	1.55%
Baseline 20-Year Energy Growth Rate ³	%	0.19%	0.82%	1.61%
Demand Response Level	%	State mandates only	State mandates and goals	
Energy Efficiency Level	%	State mandates only	State mandates and goals	State mandates and goals + 1/2 of EPA CPP growth ⁴
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Natural Gas				
Natural Gas ⁵	(\$/MMBtu)	Bentek -20%	Bentek forecast from Phase III Gas Study	Bentek +20%
Fuel Prices (Starting Values)				
Oil	(\$/MMBtu)	Powerbase default -20%	Powerbase default ⁶	Powerbase default + 20%
Coal	(\$/MMBtu)	Powerbase default -20%	Powerbase default ⁷	Powerbase default + 20%
Uranium	(\$/MMBtu)	0.91	1.14	1.37
Fuel Prices (Escalation Rates)				
Oil	%	2.0	2.5	4.0
Coal	%	2.0	2.5	4.0
Uranium	%	2.0	2.5	4.0
MTEP16 FUTURES MATRIX				
Emissions Costs				
SO2	(\$/ton)	0	0	500
NOx	(\$/ton)	0	0	NOx: 500 Seasonal NOx: 1000
CO2	(\$/ton)	0	25	40
MTEP16 FUTURES MATRIX				
Other Variables				
Inflation	%	2.0	2.5	4.0
Retirements	MW	12.6 GW Coal MATS Retirements	MATS coal + age-related gas/oil/hydro = 22 GW	Regional: MATS + age-related + 14 GW CPP Coal = 36 GW Sub-Regional: MATS + age-related + 20 GW CPP Coal = 41 GW
Renewable Portfolio Standards	%	State mandates only	State mandates and goals	State mandates and goals + cost maturity curves

¹ All costs are overnight construction costs in 2014 dollars; sourced from EIA and escalated according to the GDP Implicit Price Deflator; H and L values are 20% +/- from the M value, except where otherwise noted

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 LFU metric

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

⁴ Energy Efficiency grows at half the rate proposed by the EPA in the Clean Power Plan for the MISO system

⁵ Bentek forecast prices reflect the Henry Hub natural gas price

⁶ Powerbase default for oil is \$19.39/MMBtu

⁷ Powerbase range for coal is \$1 to \$4, with an average value of \$1.69/MMBtu