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Entergy Arkansas, Inc.
2015 Integrated Resource Plan

July 15, 2015

Preliminary Materials for IRP Stakeholder Meeting

Preliminary | Work in progress

2015 EAI Integrated Resource Plan

Consistent with Section 6.1 of Attachment 1 to the APSC Order No. 6 in Docket No. 06-028-R Resource Planning Guidelines for Electric Utilities, EAI is beginning development of its next Integrated Resource Plan to be filed at the Commission no later than three years from the prior IRP submission, which is October 31, 2015.

The information contained in this presentation is part of the development of the 2015 EAI Integrated Resource Plan:

- Analytical Framework
- Generation Technology Assessment
- Energy and Peak Load Forecasts
- Fuel Price Forecasts
- Emissions Allowance Price Forecasts

The IRP development will be discussed in detail at the upcoming Stakeholder Meeting to be held Friday, August 7, 2015, at the MISO Energy – South Region building.

More information about the Stakeholder Meeting can be found at the website below:
http://www.entergy-arkansas.com/transition_plan/

Stakeholder Meeting Agenda

The preliminary agenda for the August 7th Stakeholder Meeting is below.

Topic	Start Time
Introduction and Meeting Objectives	8:00
Resource Planning Update	8:15
Transmission Planning Update	8:45
Demand-side Management Update	9:00
Overview of Environmental Issues	9:30
Break	*10:00*
IRP Process Overview	10:10
Generation Technology Assessment	10:25
Sales and Load Forecasts	10:50
Preliminary Results and Next Steps	11:15
Lunch	*12:00*
Stakeholder Committee Formation	1:00
Wrap-up	1:45

2012 IRP Action Plan Progress

1. MISO Transition
   - [*Complete*] EAI transitioned to the Mid-Continent ISO on December 19, 2013.
2. Coal Unit Environmental Compliance
   - [On-going] EAI continues to monitor changes in environmental law at state and federal level to evaluate options for compliance.
3. Hot Spring Plant Acquisition
   - [*Complete*] EAI acquired the Hot Spring Plant in December 2012.
4. Purchase Power Agreements from EAI's 2011 RFP
   - [*Complete*] EAI executed a power purchase agreement for Union Power Partners Unit 2 on October 22, 2012.
5. Available Wholesale Base Load Capacity to Retail
   - [*Complete*] In Order No. 12 of Docket No. 12-038-U, EAI received approval to transfer approximately 154 MW of the Available Wholesale Base Load generation to retail rates.
6. Hydro Peaking Capacity to Retail
   - [*Complete*] In Docket No. 13-028-U, 10 MW of capacity was moved to retail rates.

2012 IRP Action Plan Progress

7. DSM and Energy Efficiency Expansion
   - [*On-going*] Since 2012 EAI has added 135 MW[1] of capacity savings and 516,768 MWh of energy efficiency through its Energy Efficiency Portfolio[2].
8. Lake Catherine 4 Reliability / Sustainability
   - [Complete] The unit is now expected to operate through 2024.
9. Older Natural Gas Fired Unit Deactivation Decisions
   - [*Complete*] EAI has deactivated approximately 441 MW of legacy generation.
10. Renewable Energy Assessment
    - [*In progress*] EAI issued an RFP for renewable energy resources in May 2014. EAI is currently pursuing APSC approval of the solar energy resource selected out of the RFP.
11. Short- and Intermediate-Term RFPs
    - EAI has not had a need for a short- or intermediate-term RFP since the 2012 IRP.

1. Capacity savings are adjusted to reflect only the incremental savings added over the 2013-15 time period.
2. Accumulation of 2012, 2013 and 2014 reported and evaluated achievement.

2015 IRP Goals and Objectives

The study period for the 2015 IRP is the 20-year period of 2017 through 2036. A 20-year study period was chosen for the 2015 IRP in order for EAI to evaluate long-term trends under a broad range of possible future outcomes.

EAI established a set of resource planning objectives to guide its development of its 2012 IRP and to meet the requirements of the APSC Resource Planning Guidelines for Electric Utilities[1]. The planning objectives focus on four key areas:

- cost,
- risk,
- reliability and
- sustainability.

The 2015 IRP will also be guided by the resource planning objectives, which are described on the following slides.

1. Order No. 6 in APSC Docket No. 06-028-R

Resource Planning Objectives (1 of 3)

1. Policy Objectives – The development of the IRP should reflect policy and planning objectives reviewed by the EAI RPOC and approved by EAI's President and Chief Executive Officer. Those policy and planning objectives will consider and reflect the policy objectives and other requirements provided by EAI's regulators.

2. Resource Planning – The development of the IRP will consider generation, transmission, and demand-side (e.g. demand response, energy efficiency) options.

3. Planning for Uncertainty – The development of the IRP will consider scenarios that reflect the inherent unknowns and uncertainties regarding the future operating and regulatory environments applicable to electric supply planning including the potential for changes in statutory requirements.

4. Reliability – The IRP should provide adequate resources to meet EAI's customer demands and expected contingency events in keeping with established reliability standards.

5. Baseload Production Costs – The IRP should provide baseload resources that provide stable long-term production costs and low operating costs to serve baseload energy requirements.

Resource Planning Objectives (2 of 3)

6. Operational Flexibility for Load Following – The IRP should provide efficient, dispatchable, load-following generation and fuel supply resources to serve the operational needs associated with electric system operations and the time-varying load shape levels that are above the baseload supply requirement. Further the IRP should provide sufficient flexible capability to provide ancillary services such as regulation, contingency and operating reserves, ramping and voltage support.

7. Generation Portfolio Enhancement – The IRP should provide a generation portfolio that over time will realize the efficiency and emissions benefits of technology improvements and that avoids an over-reliance on aging resources.

8. Price Stability Risk Mitigation – The IRP should consider factors contributing to price volatility and should seek to mitigate unreasonable exposure to the price volatility associated with major uncertainties in fuel and purchased power costs.

9. Supply Diversity and Supply Risk Mitigation – The IRP should consider and seek to mitigate the risk exposure to major supply disruptions such as outages at a single generation facility or the source of fuel supply.

Resource Planning Objectives (3 of 3)

10. Locational Considerations – The IRP should consider the uncertainty and risks associated with dependence on remote generation and its location relative to EAI's load so as to enhance the certainty associated with the resource's ability to provide and deliver power to EAI's customers.

11. Reliance on Long-Term Resources – EAI will meet reliability requirements primarily through long-term resources, both owned assets and long-term power purchase agreements. While a reasonable utilization of short-term purchased power is anticipated, the emphasis on long-term resources is to mitigate exposure to supply replacement risks and price volatility, and ensure the availability of resources sufficient to meet long-term reliability and operational needs. Over-reliance on limited-term purchased power (i.e., power purchased for a one to five year term) exposes customers to risk associated with market price volatility and power availability.

12. Sustainable Development – The IRP should be developed consistent with EAI's vision to conduct its business in a manner that is environmentally, socially and economically sustainable.

IRP Analytical Framework

Progress, Objectives, and a Futures-based Approach

Futures-based Approach

For the IRP to reasonably account for a broad range of uncertainty while focusing on an appropriate amount of meaningful, thoughtful modeling iterations, EAI Resource Planning is using a futures-based approach to the IRP analysis.

In this approach, a select number of “futures” were developed that represent different combinations of possible outcomes of many variables.

Major areas of uncertainty to consider:

- Sales and load growth
- Commodity price trends
- Environmental regulation and/or legislation

For each future, the AURORA Capacity Expansion tool will select (i.e., output) a 20-year resource portfolio that is economically optimal for EAI under that set of circumstances.

Overview of IRP Futures

Future 1	Future 2	Future 3
Reference Case Future	**Low Capacity Additions Future**	**High Capacity Additions Future**
• Current proposed FIP[1] scenario • Installation of required controls and use of coal over cost recovery period • Reference level assumptions for commodity price and load forecasts	• Current proposed FIP scenario • Installation of required controls and use of coal over cost recovery period • Assumes sustained reliability through end of study period for the gas units • Low sales and load growth as well as low commodity prices delay and/or decrease new capacity additions	• Approval of plan to cease using coal at White Bluff by a time certain (2028) that makes scrubber installation economically unsupportable under federal air regulations (and thus not required) • Final FIP does not require Independence scrubber installation; Assumption that similar controls required in later Regional Haze planning period (2028-2038) • High sales and load growth drive increased capacity requirements

1. Refers to the Federal Implementation Plan under the U.S. Environmental Protection Agency Regional Haze Program, a regulation to improve visibility in national parks and wilderness areas. More information available at http://www.epa.gov/visibility/actions.html.

Assumptions by Future

	Future 1 Reference	Future 2 Low	Future 3 High
Existing Resource Portfolio			
Cease to Use Coal at White Bluff	2042	2042	2028
Cease to Use Coal at Independence	2044	2044	2035
Non-EAI Coal Plants	60 years	60 years	50 years
Customer Electricity Requirements			
Energy sales and Load	Reference	Low	High
Commodity Price Forecasts			
Fuel Prices	Reference	Low	High
Environmental Allowance Prices	Reference	Low	High

Load and Capability

Load Forecast and Existing Resource Portfolio

ALL CAPACITY VALUES SHOWN ARE 2015 GVTC RESULTS

Load Forecast

Summary of Results

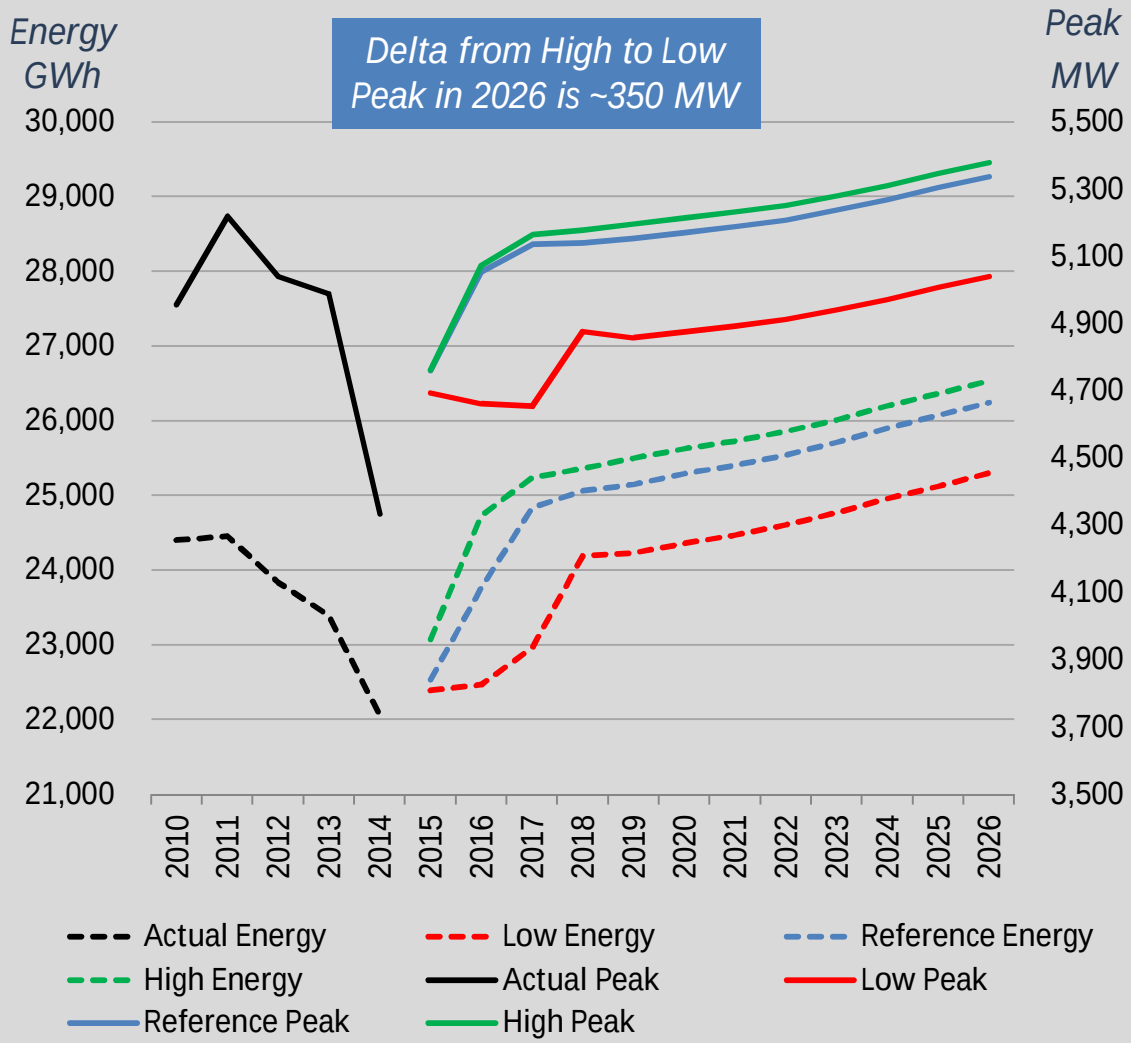
- Low and High cases driven by Economic Development assumptions (see next slide)
- DSM's reduction reaches a maximum of 95 MW in 2019

Weather

- 15-year normal, 2000-2014
- 2015 Peak Date: 8/4/2015
- 2010-12 actual peaks shown are weather normalized; 2013-14 are not weather-normalized

14-24 CAGR	Low	Ref	High
Peak	1.4%	2.0%	2.1%
Energy	1.2%	1.6%	1.7%

*Forecast as of September 1, 2014



Existing Portfolio – Owned Generation

	Total Installed Capacity (MW)	Ownership (%)	Retail Capacity (MW)	Commercial Operations Date
Arkansas Nuclear One Unit 1	834	100%	789	1974
Arkansas Nuclear One Unit 2	986	100%	933	1980
Carpenter Unit 1	31	100%	31	1932
Carpenter Unit 2	31	100%	31	1932
Hot Spring	597	100%	597	2002
Independence Unit 1	839	31.5%	228	1983
Lake Catherine Unit 4	516	100%	516	1970
Ouachita Unit 1	247	100%	247	2002
Ouachita Unit 2	241	100%	241	2002
Remmel Units 1, 2 & 3	12	100%	12	1925
White Bluff Unit 1	815	57.0%	400	1980
White Bluff Unit 2	822	57.0%	404	1981

Existing Portfolio – Purchased Generation

	Total Installed Capacity (MW)	Retail Capacity (MW)	Commercial Operations Date
Blakely	86	11	1956
DeGray	78	10	1972
Grand Gulf	1,409	307	1985
Union Power	499	499	2003

Notes:
- The Blakely and DeGray capacity is assumed through 5/31/2019.
- The Grand Gulf capacity is assumed throughout the IRP study horizon.
- The Union Power PPA ends 5/31/2017, but EAI's acquisition of one power block is currently pending regulatory approval and would replace the PPA upon acquisition (see p. 18).

Future Portfolio – Planned Resource Additions

	Total Installed Capacity (MW)	Retail Capacity (MW)	Commercial Operations Date
Stuttgart Solar	81	81	TBD
Union Power	499	499	2003

Notes:
- These resources are currently pending regulatory approval.
- Stuttgart Solar is a 20-year PPA assumed to begin 1/1/2017.
- The Union Power capacity is assumed to be acquired by EAI and available throughout the IRP study horizon.

Existing Portfolio – Demand-side Resources

	Reduction during Peak Load Hours (MW)
Energy Efficiency	36

The peak and energy reducing impacts of EAI's Energy Efficiency programs are input to the development of the EAI sales forecast (p. 15).

	Reduction during Peak Load Hours (MW)
Demand Response	30
Interruptible Load	74

The capacity value of the Demand Response and Interruptible Load resources are included in the Load and Capability analysis and count toward EAI's planning reserve target in the same way as supply side resources.

Notes:
- Estimates above are total 2015 reductions.
- EAI's demand response include Residential Direct Load Control and Agricultural Irrigation Load Control programs.
- Demand Response and Interruptible capacity is increased to account for reserve margin and line loss value in the Load and Capability analysis.

Generation Technology Assessment

Cost and Performance

Technology Assessment Process & Overview

- An understanding of generation technology cost and performance is a necessary input to planning and decision support activities. EAI has engaged ESI to monitor and assess generation alternatives on an ongoing basis. This analysis uses a generic long-term capital structure of 11.0% ROE and 7.0% long-term debt and assumes 50% equity and 50% debt.

- The process has two main steps. First a screening level analysis is performed and then a detailed analysis is performed.

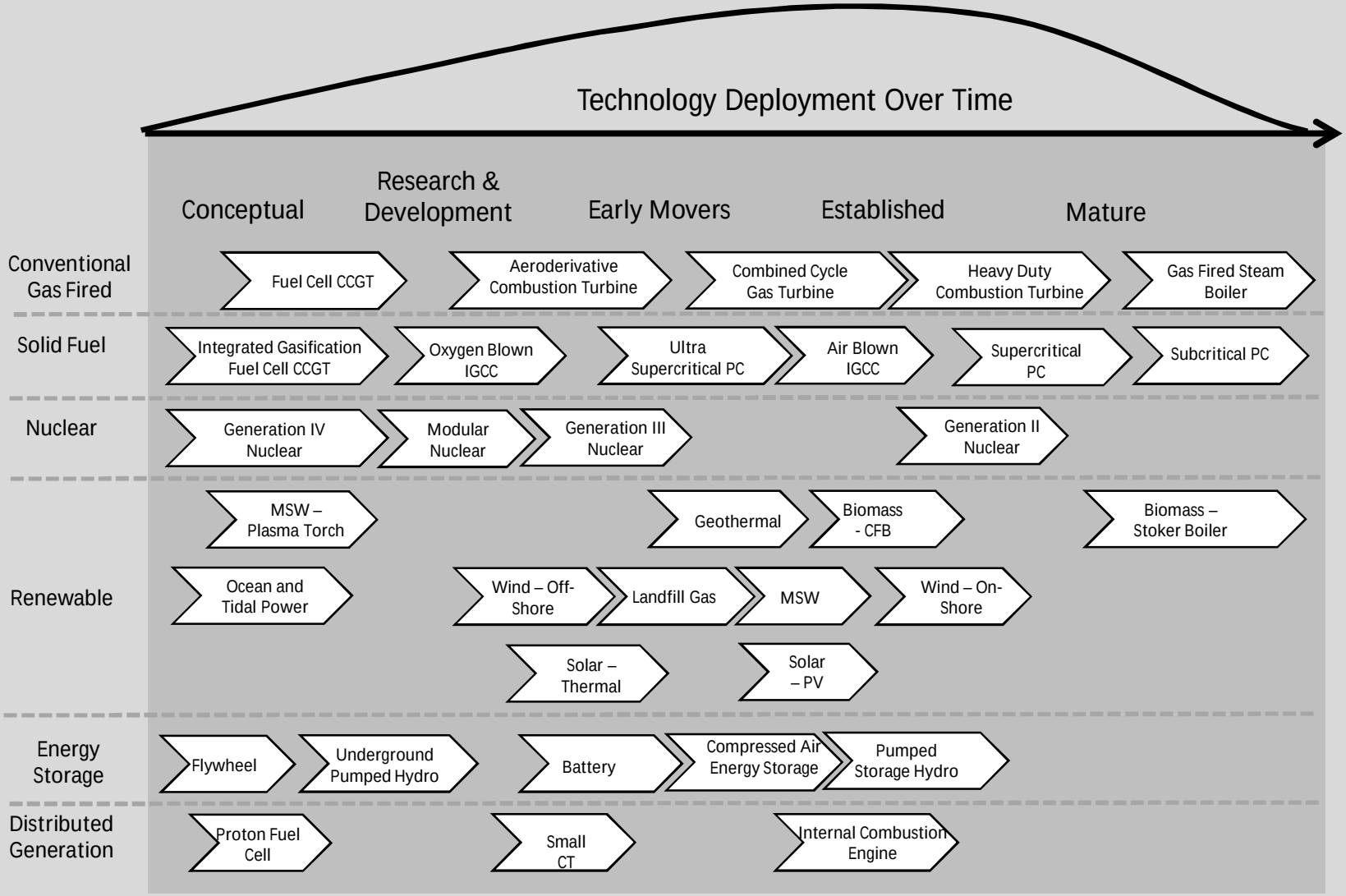
- The 2014 Generation Technology Assessment began by surveying available central state electricity generation technologies, generally those that are two megawatts or greater. The objective is to identify a reasonably wide range of generation technologies. The initial list was subject to a screening analysis to identify technologically mature alternatives which could be reasonably expected to be operational in or around the Entergy regulated service territory, except as otherwise noted.

- EAI prefers technologies that are proven on a commercial scale. Some technologies identified in this document lack the commercial track record to demonstrate their technical and operational feasibility. A cautious approach to technology development and deployment is therefore reasonable and appropriate in order to maintain system reliability and to protect EAI's customers from undue risks. EAI generally does not plan to be the "first movers" for emerging, unproven technologies.

- ESI, through this Technology Screen, has selected certain traditional and renewable generation technology alternatives which may reasonably be expected to meet primary objectives of cost, risk mitigation, and reliability. For each selected technology, Planning Analysis developed the necessary cost and performance parameter inputs into the detailed modeling used to develop the reference technologies comprising the IRP Portfolio.

- ESI will monitor for EAI the technologies eliminated as a result of the initial screen and incorporate changes into future technology assessments and IRPs.

A Variety of Available Alternatives



Technologies Screened

- Pulverized Coal
  - Subcritical Pulverized Coal
  - Supercritical Pulverized Coal
  - Ultra Supercritical Pulverized Coal
- Fluidized Bed
  - Atmospheric Fluidized Bed
  - Pressurized Fluidized Bed
- Integrated Gasification ("IGCC")
  - Oxygen-Blown IGCC
  - Air-Blown IGCC
  - Integrated Gasification Fuel Cell Combined Cycle
- Combustion Turbine / Combined Cycle / Other Natural Gas
  - Combustion Turbine
  - Combined Cycle
  - Large & Small Scale Aeroderivative
  - Steam Boiler
- Fuel Cells
  - Molten Carbonate
  - Solid Oxide
  - Phosphoric Acid
  - Proton Exchange Membrane
  - Fuel Cell Combined Cycle
- Nuclear
  - Advanced Boiling Water Reactor
  - Generation IV
  - Modular Reactors
- Energy Storage
  - Pumped Hydro
  - Underground Pumped Hydro
  - Battery
  - Flywheel
  - Compressed Air Energy Storage
- Renewable Technologies
  - Biomass
  - Solar Photovoltaic (Fixed Tile and Tracking)
  - Solar Thermal
  - Wind Power
  - Municipal Solid Waste
  - Landfill Gas
  - Geothermal
  - Ocean & Tidal

Technologies Selected For Detailed Analysis

The following technologies are being carried forward for development of detailed planning assumptions

- Pulverized Coal
  - Supercritical Pulverized Coal with carbon capture and storage*
- Natural Gas Fired
  - Combustion Turbine ("CT")
  - Combined Cycle Gas Turbine ("CCGT")
  - Large Scale Aeroderivative CT
  - Internal Combustion Engine

**Proposed EPA regulations on CO_2 have effectively eliminated all new coal plants without carbon capture.*

- Nuclear
  - Advanced Boiling Water Reactor
- Renewable Technologies
  - Biomass
  - Wind Power
  - Solar PV (Fixed Tilt and Tracking)
- Battery Storage

Technology Assumptions for Combined Cycle Application

Cost & Performance Appropriate For Technology Deployment in MISO South	Units	1x1 F Frame CCGT	2x1 F Frame CCGT	1x1 G Frame CCGT	2x1 G Frame CCGT
Net Max Capacity (Summer)	(MW)	382	764	450	900
Installed Cost, 2014 (Summer)	($/kW)	$1,095	$1,045	$1,100	$900
Full Load Heat Rate (Summer)	(Btu/kWh)	6,900	6,750	6,650	6,650
Typical Capacity Factor	(%)	65%-85%	65%-85%	65%-85%	65%-85%
Fixed O&M (Summer)	($/kW-yr)	$17.50	$15.00	$15.50	$10.00
Variable O&M (Summer)	($/MWh)	$2.00	$2.00	$2.00	$2.00
Inlet Air Conditioning Assumption		Evaporative Coolers			
NOx Control Technology		SCR	SCR	SCR	SCR
NOx emissions, post control	(lbs/MMBtu)	0.01	0.01	0.01	0.01

- Cost of supplemental capacity (duct firing) assumed to be $250/kW
- Max Capacity, Installed Cost, and Fixed O&M include supplemental capacity. Heat rates reflect base capacity only.

Technology Assumptions for Peaking Applications

Cost & Performance Appropriate For Technology Deployment in MISO South	Units	F Frame CT	G Frame CT	Large Aeroderivative CT	Internal Combustion
Net Max Capacity (Summer)	(MW)	194	250	102	18.8
Installed Cost, 2014	($/kW)	$820	$700	$1,275	$1,360
Full Load Heat Rate – Summer	(Btu/kWh)	10,200	9,600	9,125	8,440
Typical Capacity Factor	(%)	0%-10%	0%-10%	0%-40%	0%-40%
Fixed O&M	($/kW-yr)	$3.50	$3.00	$14.25	$29.25
Variable O&M	($/MWh)	$10.00	$12.50	$0.75	$2.25
Inlet Air Conditioning Assumption		-	Evaporative Cooling	Inlet Chillers	-
NOx Control Technology		Dry Low NOx burners	Dry Low NOx burners	SCR	SCR
NOx emissions, post control	(lbs/MMBtu)	0.03	0.03	0.01	0.01

Technology Assumptions for Solid Fuel Application

Cost & Performance Appropriate For Technology Deployment in MISO South		PC With 90% CCS
Net Max Capacity	(MW)	800
Installed Cost, 2014	($/kW)	$4,900
Full Load Heat Rate – Summer	(Btu/kWh)	13,200
Levelized Fuel Cost	($/mmbtu)	$3.12
Typical Capacity Factor	(%)	85%
Fixed O&M	($/kW-yr)	$140.00
Charging Cost	($/MWh)	n/a
Expected Useful Life		40

Technology Assumptions for Renewable Applications

Cost & Performance Appropriate For Technology Deployment in MISO South		Biomass	Nuclear	Wind	Solar PV (fixed tilt)	Solar PV (tracking)	Battery Storage (Lead Acid Batteries)
Net Max Capacity	(MW)	100	1,310	200	100	100	50
Installed Cost, 2014	($/kW)	$4,760	$8,000	$2,050	$2,300	$2,550	$2,400
Full Load Heat Rate – Summer	(Btu/kWh)	12,900	10,200	-	-	-	-
Levelized Fuel Cost	($/mmbtu)	$3.04	$0.90	-	-	-	-
Typical Capacity Factor	(%)	85%	90%	48%	21%	24%	20%
Fixed O&M	($/kW-yr)	$104.60	$115.60	$22.10	$19.00	$23.00	$0.00
Charging Cost	($/MWh)	n/a	n/a	n/a	n/a	n/a	$25.00
Expected Useful Life		30	40	25	25	25	20

- Capacity for these technologies is not significantly affected by ambient air temperature.
- All O&M is considered fixed.
- Wind capacity factor representative of resources located in mid-west geographical area.

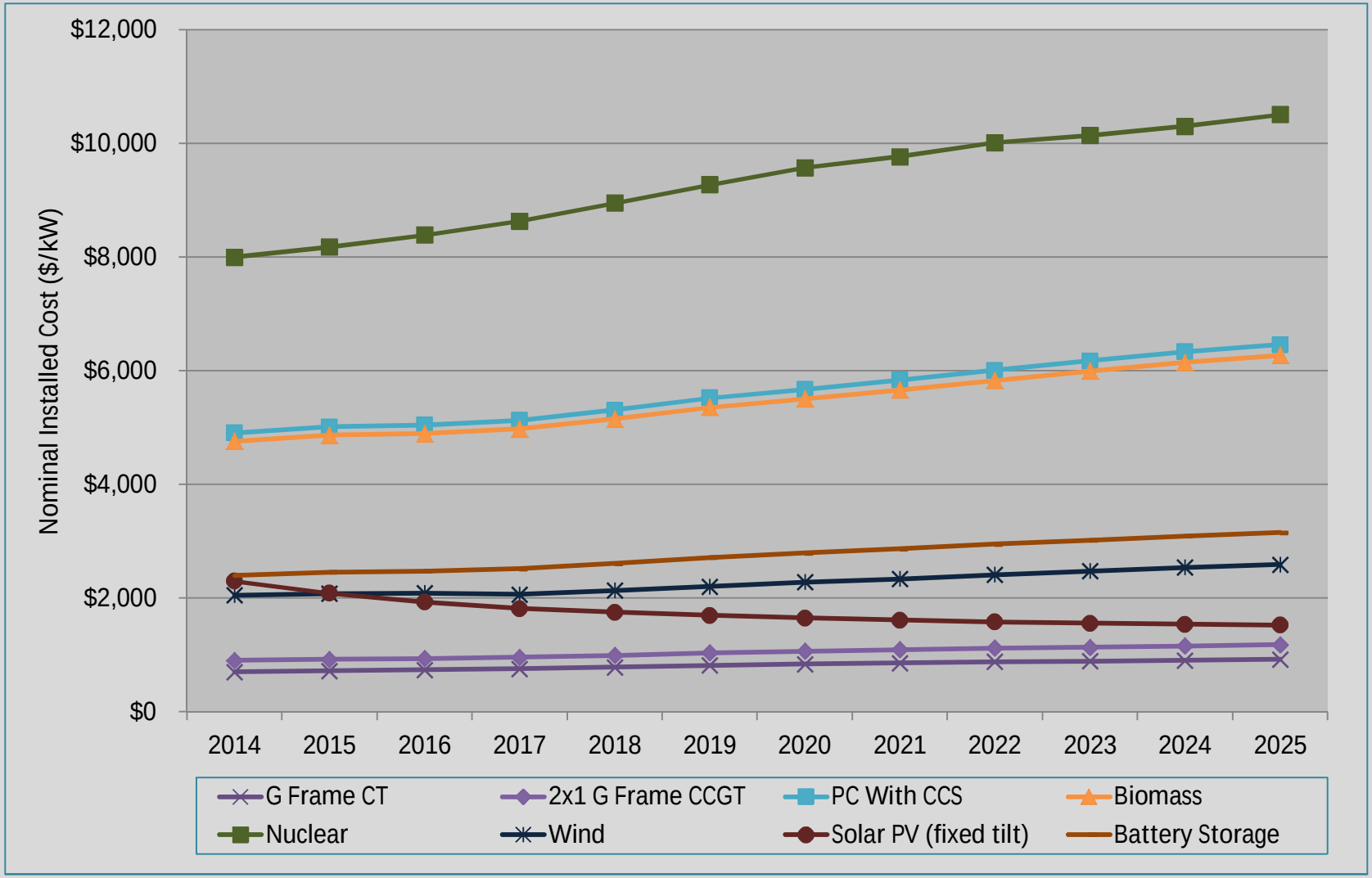
Additional Supply Considerations

Schedule and location can influence which technology is preferred for a given application

Technology	Time to Market	Environmental	Gas Supply	Flexibility
CCGT	◐	●	◐	◐
Frame CT w/ SCR	◕	●	◐	◐
Small Aeroderivative	●	●	○	◕
Large Aeroderivative	◕	●	○	◕
Internal Combustion Engine	●	◐	●	●
Nuclear	○	◕		○
Coal	◔	○		●
Wind	●	●		○
Solar	●	●		○
Considerations included in category	• Permitting Requirements • Lead time of major components • Engineering Required • Installation Time	• Impact of Non-Attainment Zone • NOx Emissions • SOx Emissions • COx Emissions • Residual Fuel	• Gas Pressure Required	• Ramp Rate • Turndown Ratio • Start Time • Performance at Part Load

Considerations are scored relative to each other ● *Most favorable* ○ *Least Favorable*

Capital Cost Projections



Commodity Price Forecasts

Fossil Fuels, Solid Fuel and Air Emissions Allowances

LEVELIZED PRICES SHOWN ARE FOR THE PERIOD 2017-2036

Fuel Price Forecasts

Levelized 2015 $/MMBtu	Reference	Low	High
Henry Hub Natural Gas Price	$4.89	$3.50	$7.68
EAI Coal Plants	$2.43	$2.12	$3.54
Non-EAI Coal Plants in Entergy Region	Reference Case (Price Varies by Plant)	Low Case (Price Varies by Plant)	High Case (Price Varies by Plant)
Coal Plants in Non Entergy Regions	Reference Case (Price Varies by Plant)	Low Case (Price Varies by Plant)	High Case (Price Varies by Plant)

Notes:
- EAI Owned Plants: volume weighted average based on plant specific pricing which includes current contracts
- Forecast as of May 1, 2015

CO_2 Price Forecast

Levelized 2015 $/short ton	Reference	Low	High
CO_2	$10.02 ($CO_2$ pricing begins in 2020)	None	$29.68 ($CO_2$ pricing begins in 2020)

Cross-State Air Pollution Rule (CSAPR) Forecast

Levelized 2015 $/ton	Reference
Seasonal NO_X	$5.19
Annual NO_X	$51.93
SO_2 Group 1	$15.09
SO_2 Group 2	$26.32

Notes:
- Low and High sensitivities were not developed for this program.
- Arkansas is subject to compliance under the Seasonal NOX program only.
- Source: Energy Ventures Analysis, 2015.