

SUMMARY OF FINDINGS AND
RECOMMENDATIONS
PREPARED FOR THE AUSTIN CITY
COUNCIL UTILITY OVERSIGHT
COMMITTEE

RFP #GAL0021 FOR INDEPENDENT
REVIEW OF RESOURCE GENERATION
PLAN

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BACKGROUND

The purpose of this presentation is to present the key findings and summary of recommendations from our independent review.

- As part of its 2014 Resource Plan update (“Plan”), Austin Energy identified potential retirements and additions to its generation fleet and AE committed to sponsoring an independent economic, financial and environmental review of a new Gas Plant and other options.
- Austin City Council awarded the contract to perform an independent “economic and financial assessment of the costs and benefits of a nominal 500 MW natural gas combined cycle plant (“Gas Plant”) to AE’s portfolio to be constructed in the Austin area at either the Decker Creek plant site or the Sand Hill Energy Center site” to the Navigant team which includes two subcontractors: Quality Power, LLC and Energy Utility Group, LLC.
- Navigant presented study assumptions to the to the Austin Electric Utility Commission (EUC) and the Austin City Council Utility Oversight Committee (AECUOC) in September, 2015.
- Navigant presented key findings and summary of recommendations to the EUC on November 16, 2015.

AUSTIN ENERGY'S 2014 GENERATION PLAN ACTIONS

Our study focused on the addition 500 MW - a Gas Plant or other options - all other elements of the Plan were included in our analysis.

Summary of AE Plan Actions

Action	Capacity	Resource	Description	Timing
Retire	735 MW	Natural gas (ST)	Decker Steam Unit	2018
Add	500 MW	Varies	7 different portfolios of either a Gas Plant or alternative resources*	2018
Retire	602 MW	Coal	AE's share of the Fayette Power Project	2023
Add	100 MW	Demand Response/ Demand-Side Management	Incremental	By 2025
Add	450 MW (min)	Wind	Contracts for coastal and western wind resources	By 2025
Maintain	800 MW	Energy efficiency and Demand Response	Current goal	By 2020
Increase	950 MW (min)	Solar	<ul style="list-style-type: none"> Reach City's goal of 200 MW of local solar including at least 100 MW of customer-sited local solar Add 600 MW of utility-scale solar from its RFP (2) Assume full build-out of the announced 150 MW of solar power currently contracted with Recurrent Energy 	By 2025
Obtain	30 MW (min)	Thermal and electrical storage	Local	by 2025

(1) All alternative portfolios are 500MW nominal capacity to be comparable to the 500 MW gas plant (e.g., matching energy, solar would be ~1,340 MW)

(2) Note that modeling was completed *before* Austin City Council approved 438MW of solar PPA procurement.

STUDY DESIGN – RESOURCE PORTFOLIOS

We modeled 7-alternative 500 MW resource portfolios along with all other elements of the Plan

AE Plan

Action	Capacity	Resource	Description	Timing
Retire	735 MW	Natural gas (ST)	Decker Steam Unit	2018
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Add	450 MW (min)	Wind	Contracts for coastal and western wind resources	By 2025
Maintain	800 MW	Energy efficiency and Demand Response	Current goal	By 2020
Increase	950 MW (min)	Solar	<ul style="list-style-type: none"> Reach City's goal of 200 MW of local solar including at least 100 MW of customer-sited local solar Add 800 MW of utility-scale solar from its RFP (2) Assume full build-out of the announced 100 MW of solar power currently contracted with Recurrent Energy 	By 2025
Obtain	30 MW (min)	Thermal and electrical storage	Local	by 2025

Resource Portfolios

#	Name	Description
C0	All Market	AE current 10-year plan without the addition of a 500 MW CC
C1	Decker CC	C0 + 500 MW CC addition at Decker
C2	Sand Hill CC	C0 + 500 MW CC addition at Sand Hill
C3	500 MW Solar	C0 + 500 MW of additional solar
C4	500 MW Wind	C0 + 500 MW of additional wind
C5	Alternative Mix	C0 + portfolio of renewable resources and DR with energy storage (200 MW wind, 200 MW solar, 50 MW DR, and 50 MW EE)
C6	Accelerated Solar	AE current 10-year plan without the addition of a 500 MW CC and with 600MW solar additions coming online in 2017

Source: Navigant

STUDY DESIGN – ERCOT MARKET SCENARIOS

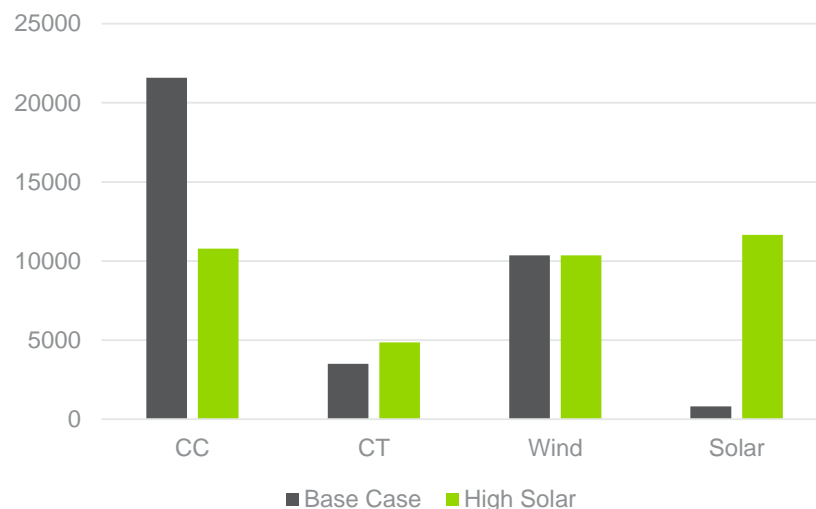
Navigant modeled the 7- resource portfolios in 4 ERCOT market scenarios

- The scenarios address uncertainty of natural gas prices and impact of increased grid-tied solar PV
- Similar to the recent Clean Power Plan whitepaper that ERCOT issued, the High ERCOT solar scenario contemplates a significant amount of new grid-tied solar in ERCOT

Market Scenarios

Market Scenarios		
	Name	Description
1	Base Gas	Navigant's reference gas price forecast
2	Low Gas	Navigant's low gas price forecast
3	High Gas	Navigant's high gas price forecast
4	High ERCOT Solar	Consistent with recent trends and forward-looking wind costs, the High ERCOT Solar penetration case tests the portfolios' value with 11.6 GW of grid-tied solar layered on top of the wind build.

ERCOT New Installed Capacity by Technology



Source: Navigant

Note that modeling was completed before Austin City Council approved 438MW of solar PPA procurement.

MODELING METHODOLOGY

We used the industry-standard Promod IV model to simulate the hourly day-ahead ERCOT market for a 20-year period for all 7-resource portfolios in each of the 4-market scenarios

- Promod IV:
 - Is an industry standard fundamental, day-ahead electric market simulation tool that incorporates the nodal structure of ERCOT and any forecasted congestion in the AE load zone or in other ERCOT zones.
 - performs an 8760-hour commitment and dispatch recognizing both generation and transmission impacts at the nodal level.
 - models the effects of transmission congestion, fuel costs, generator availability, and load growth on day-ahead energy market prices employing security constrained unit commitment.
- We used the model to calculate the wholesale power cost to the AE load zone and the generator revenue for each resource portfolio; fixed and finance costs of each portfolio are calculated and added to the Promod IV costs for a total cost impact.
- Risk analyses are conducted outside of Promod IV.

ANALYSIS RESULTS

Our analysis results shown below show AE's total cost to serve load over the 20-year study period net of revenue earned from AE owned or contracted generation.

Portfolio Net Cost (Net Present Value 2014 \$Millions)

Portfolio	Base	High Gas	Low Gas	High Solar
All Market	8,025 (452)	8,682 (691)	7,419 (429)	8,024 (314)
C1: Decker CC	7,573 (0)	8,097 (106)	6,990 (0)	7,754 (44)
C2: Sand Hill CC	7,574 (1)	8,097 (106)	6,991 (1)	7,754 (44)
C3: 500 MW Solar	7,608 (35)	8,025 (34)	7,158 (168)	7,775 (65)
C4: 500 MW Wind	7,639 (66)	7,991 (0)	7,240 (250)	7,710 (0)
C5: Alternative Mix	7,830 (257)	8,235 (244)	7,392 (402)	7,931 (221)
C6: Accelerated Solar	7,866 (293)	8,502 (511)	7,278 (288)	7,869 (159)

Results in **yellow** are the low cost portfolio in each scenario.

Results in (parenthesis) show the \$ difference between each result and the low cost portfolio.

Source: Navigant Note NPVs are limited to the 20-year study period and do not consider the residual value of the portfolios, thus it is a conservative view of the system costs.

RISK ANALYSIS

AE is exposed to risk of higher ERCOT market costs in the AE load zone

- AE is exposed to cost risks in the real-time and ancillary services market, which are not explicitly modeled by Promod IV and separately calculated.
- Navigant included estimates of these costs in its results; however, these costs can vary greatly and there is no historic data to benchmark against as the plants have not been retired.
- The table below shows our estimate of added risk that these local ERCOT market costs could reasonably add in the AE load zone.
- Revenues could be earned in the form of increased revenues to the Gas Plant, which reduces the financial risk to AE; wind and solar don't mitigate these risks as the resources are not controllable, are unable to earn ancillary service revenue, and not local to the AE load zone which adds ERCOT congestion risk.

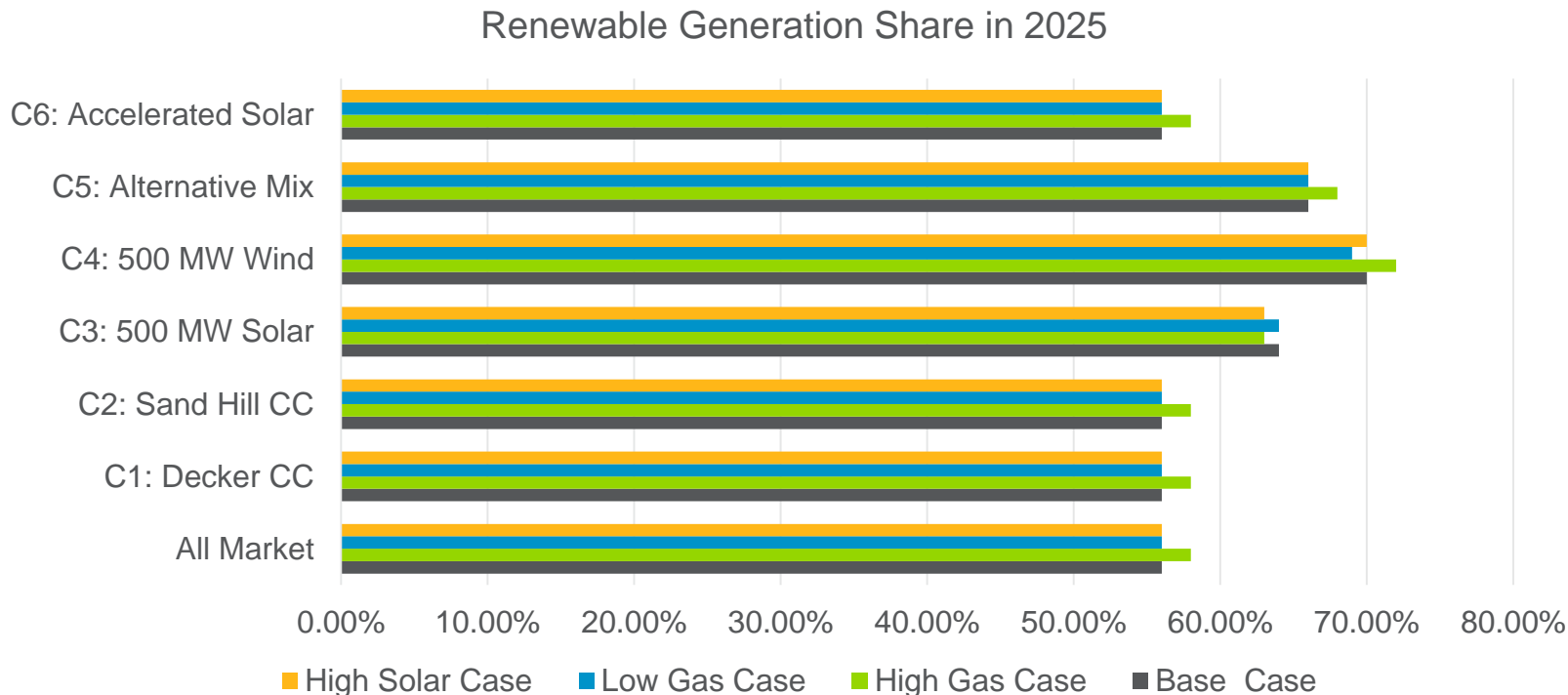
Financial Risks for Non-Local, Non-Dispatchable Generation (NPV 2014 \$Millions)

Local ERCOT Market Costs	Description	Cost Estimated in Study	Estimated Added Risk	Total Estimated Risk
Local Congestion	Costs due to transmission limitations into and out of the AE load zone largely occur during peak times and months when the ERCOT system is stressed.	70	130	200
Real-Time Price Volatility	Volatility of costs in the ERCOT real time market without local dispatchable generation.	0	16 – 32	16-32
Ancillary Services	Provided by dispatchable generation and the costs of these increase with greater renewable penetration in ERCOT.	84 – 102	42 – 51	126 – 153
Total		154 – 172	188 – 213	342 - 385

Source: Navigant

AUSTIN ENERGY'S RENEWABLE GENERATION SHARE

AE's Plan met the goal of 55% renewable generation by 2025. Adding resources such as Wind or Solar increase the % above 60%



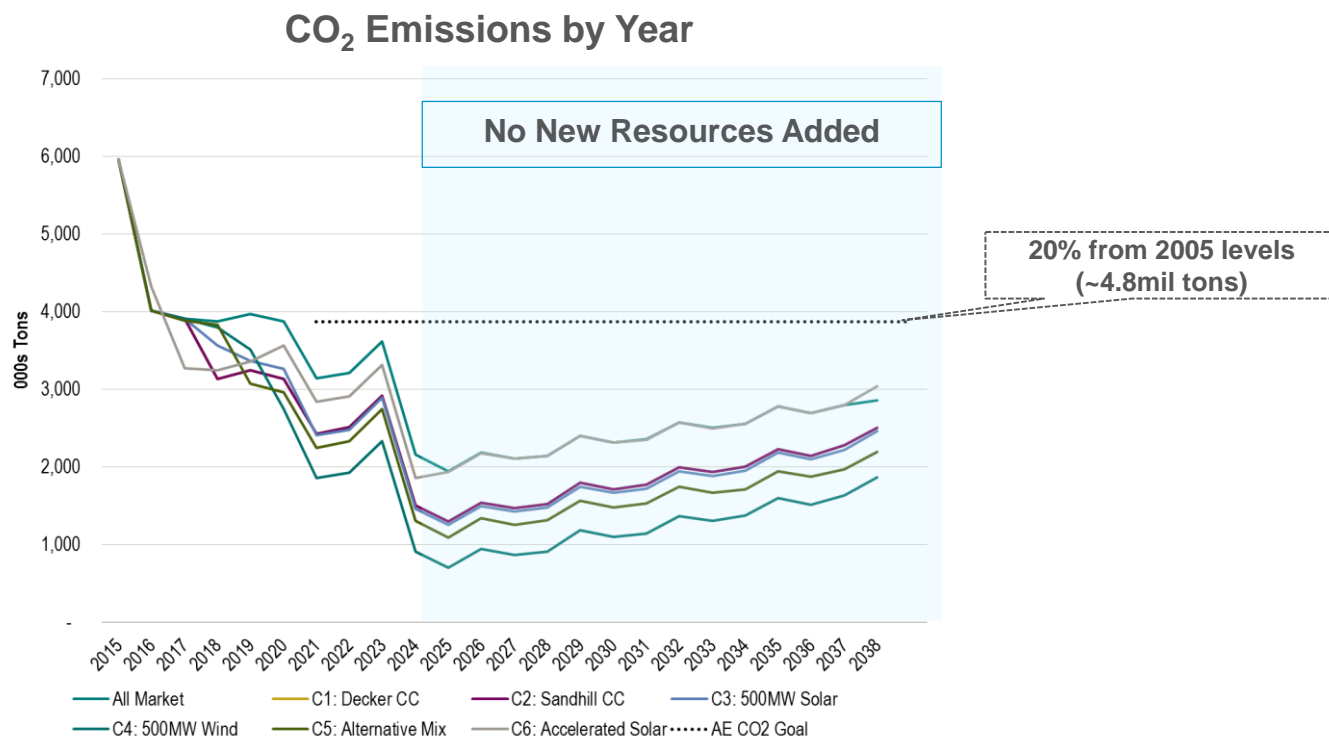
Source: Navigant

AUSTIN ENERGY CO2 EMISSIONS BY YEAR

AE's current goal requires reduction of total CO₂ by 20% from 2005 levels (~4.8mil tons) by 2020.

- Scope of work focused on the AE Plan and after 2025 no resources added to the AE portfolio

- Portfolio emissions reflect the NET of AE's generating unit production and ERCOT purchases.
- ERCOT wholesale power has a carbon intensity to it.
- ZERO direct emissions are produced by the solar, wind and alternative mix resources (C3, C4, C5, C6)



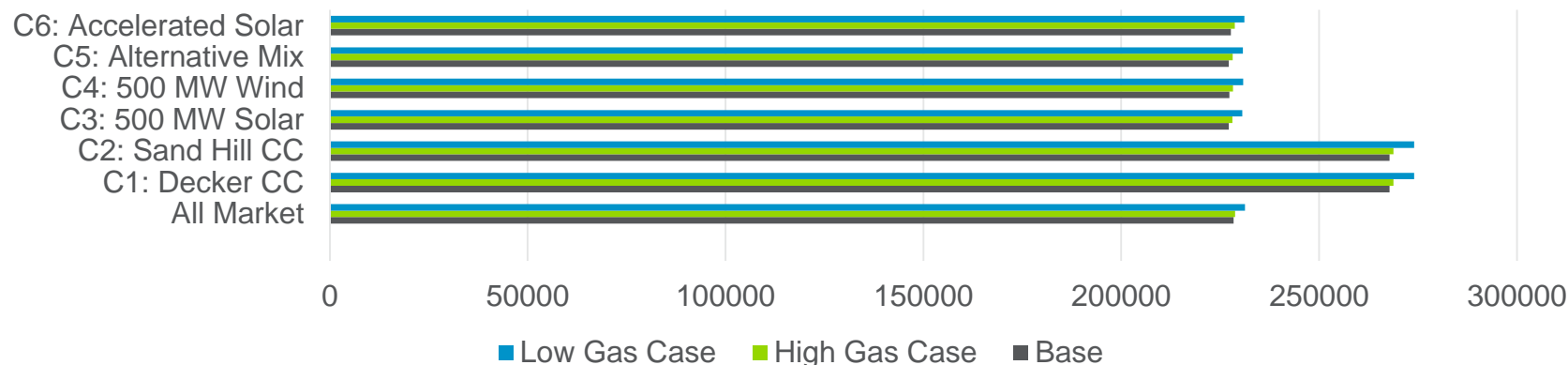
Source: Navigant

WATER USE

The Gas Plant water use rate is 65% less per MWh than the retiring steam units at Fayette and Decker

- Replacing the Decker steam units with a Gas Plant results in ~15%, or less depending on cooling technology, more water usage over other portfolios.
- We modeled the Gas Plant with once-thru cooling technology, in its preliminary engineering report, Stanley Consulting identified less water intensive technologies.
- The Gas Plant would likely displace more water-intensive generation in ERCOT the effect of which would be a reduction in the overall ERCOT water usage.

Water Usage Results (acre feet)



Source: Navigant

OTHER IMPACTS

- ***Land Use Impacts***

- There are no identifiable land use impacts for the All Market option. For both of the Gas Plant build options (C1: Decker and C2: Sand Hill), the existing sites have more than adequate land available.
- ***Full assessment of land use requires engineering and environmental studies***

- ***Local Economic Impacts***

- For the gas plant, total local/regional construction spending is estimated to be roughly \$74 million, of which 75% is assumed to be labor (\$55 million).
- This corresponds to about 400 full-time equivalent construction-related jobs (including support).
- Approximately 20 full-time jobs will be needed for O&M after the Gas Plant begins commercial operation.

FINDINGS AND RECOMMENDATIONS

- Our analysis confirms that owning generation and in particular, local generation, mitigates ERCOT market price risks.
- The results between the portfolios assessed are very close which is why it is important to consider the range of risks to AE and its customers that can be mitigated by the Gas Plant.
- The portfolios with the Gas Plant (at Decker or Sand Hill) resulted in the best mix of value and risk mitigation among the portfolios studied.
- The Gas Plant portfolios:
 - are the lowest-cost portfolio in two of the four scenarios on a day-ahead basis (and the lowest overall cost/risk portfolios).
 - support the planned retirement of ~1,300 MW of generation, specifically Decker's 735 MW in the AE load zone.
 - mitigate locational market risks while supporting Plan goals such as 55% renewable portfolio by 2025, reduction of total CO2 by 20% from 2005 levels (~4.8mil tons) by 2020.
 - uses less water per megawatt hour than either Decker or FPP.
 - provide positive local economic impacts from the construction and operation of the plant.

FINDINGS AND RECOMMENDATIONS

- Our recommendation to Council on the basis of the benefits and costs and impacts of each of the scenarios we assessed is that AE build the Gas Plant in the AE load zone to replace the Decker Creek Power Station's steam units when they are retired, and to support the planned retirement of FPP.
- Other Findings:
 - Given the pace of change in renewable and storage costs, AE should continue to monitor and consider these resources.
 - EE and DR resources are often highly valuable if they can be procured cost-effectively.
 - AE should consider other quick-starting generating technologies that were not in this scope of work to address evolving ERCOT market.

