



# 2021 IRP Supplementary Data Posting Q&A

ENTERGY ARKANSAS, LLC

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Creating sustainable value for all

# Q&A 1

## ▪ **Can you provide a description of the NRC process and timing for “getting in the queue” to be considered for a nuclear license extension? (Donna Gray, APSC General Staff)**

- *From Information obtained from the NRC’s website, for nuclear power plants that have received a renewed license, the regulations in 10 CFR 54.31(d) state that "a renewed license may be subsequently renewed in accordance with all applicable requirements." A nuclear power plant licensee may apply to the NRC for a subsequent renewed license as early as 20 years before expiration of its current license (Note: a renewed license is for 20 years so owners essentially have that entire time frame to apply, by rule. The license terms for ANO Unit 1 and Unit 2 end in 2034 and 2038, respectively, so both units are within the 20-year window for submittal). There is no limit on how late a licensee may apply for second license renewal. However, if the licensee submits a renewal application at least five years before expiration of its current license and the agency is still reviewing the application at the expiration date, the plant can continue to operate until the NRC completes its review. If a sufficient application is not submitted at least five years before the current license expires the plant may have to stop operating if the license expires before a renewal decision is made. This regulation is consistent with the Administrative Procedure Act (5 U.S.C. Subchapter II, Section 558), enacted in 1946, which applies to all federal agencies, to protect licensees who have complied with agency rules in applying for a renewed license from losing valuable rights because of delays in the administrative process.*
- *The NRC staff conducted early reviews on a 22-month schedule from receipt of an application to a decision on license renewal (longer if there was an adjudicatory hearing). After studying lessons learned and identifying ways to make reviews more efficient, the staff aims to complete remaining license renewal reviews (and reviews for subsequent license renewals) within 18 months if there is no hearing.*
- *License renewal schedules depend on a number of factors, including available staff resources and the number of current and projected applications. In addition, the quality of the application, the complexity of the review, applicant timeliness in responding to requests for additional information, and the coordination of the timing for on-site audits and inspections may all affect the review timeline.*

# Q&A 2

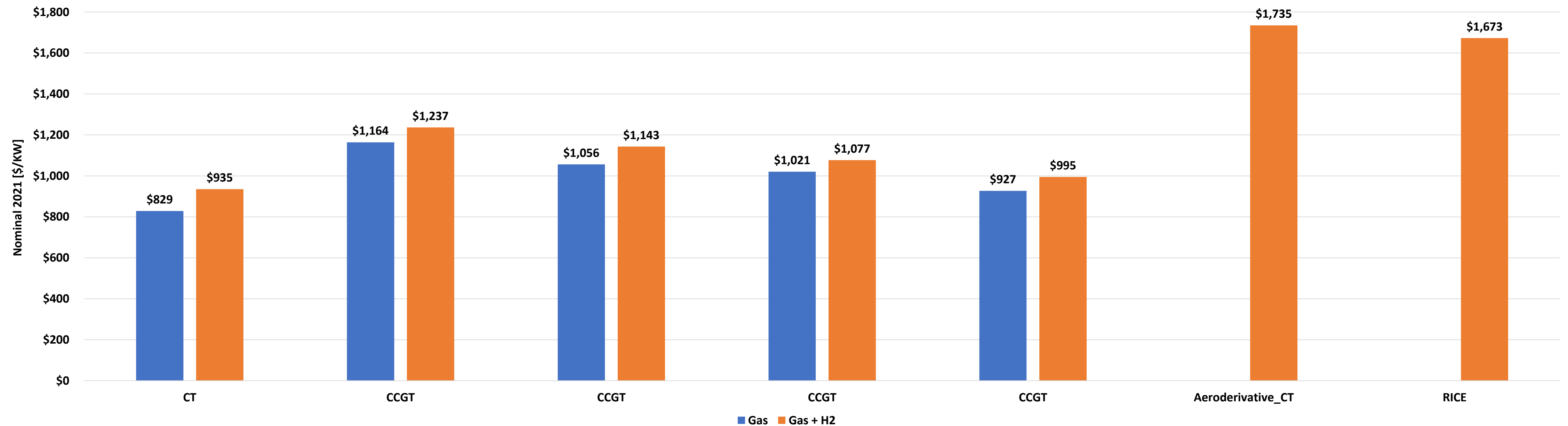
- **Please provide incremental capital costs for hydrogen capability. (Tyler Comings, Sierra Club)**
  - *Refer to the following slide for requested hydrogen cost information.*

# Technology Assessment: Hydrogen Cost

Gas without hydrogen-capability								
Generic Technology	CT	CCGT	CCGT	CCGT	CCGT			
Specific Technology	M501JAC	1x1_M501JAC	1x1_M501JAC_DF	2x1_M501JAC	2x1_M501JAC_DF			
Net Max Capacity (Summer)	[MW-ac]	380	557	667	1,114	1,333		
Installed Capital Cost	Nominal 2021 [\$/KW]	\$829	\$1,164	\$1,056	\$1,021	\$927		
Gas with hydrogen-capability								
Generic Technology	CT	CCGT	CCGT	CCGT	CCGT	Aeroderivative_CT	RICE	
Specific Technology	M501JAC_w/_30%	1x1_M501JAC_w/_30%	1x1_M501JAC_DF_w/_30%	2x1_M501JAC_w/_30%	2x1_M501JAC_DF_w/_30%	LMS100PA_w/_5%	Wartsila_18V50SG_w/_25%	
Net Max Capacity (Summer)	[MW-ac]	380	557	667	1,114	1,333	102	128
Installed Capital Cost	Nominal 2021 [\$/KW]	\$935	\$1,237	\$1,143	\$1,077	\$995	\$1,735	\$1,673
Difference/Adder		\$107	\$73	\$87	\$57	\$68	N/A	N/A

**Notes**  
 (1) Installed capital costs for gas conventional generation w/hydrogen (H2), include only the capital associated with the optionality to burn H2.  
 (2) Installed capital costs are preliminary and will continue to be updated. In addition, associated fuel and emissions cost are currently under development.

Installed Capital Costs: Natural Gas v. Natural Gas w/H2 Burning Capability

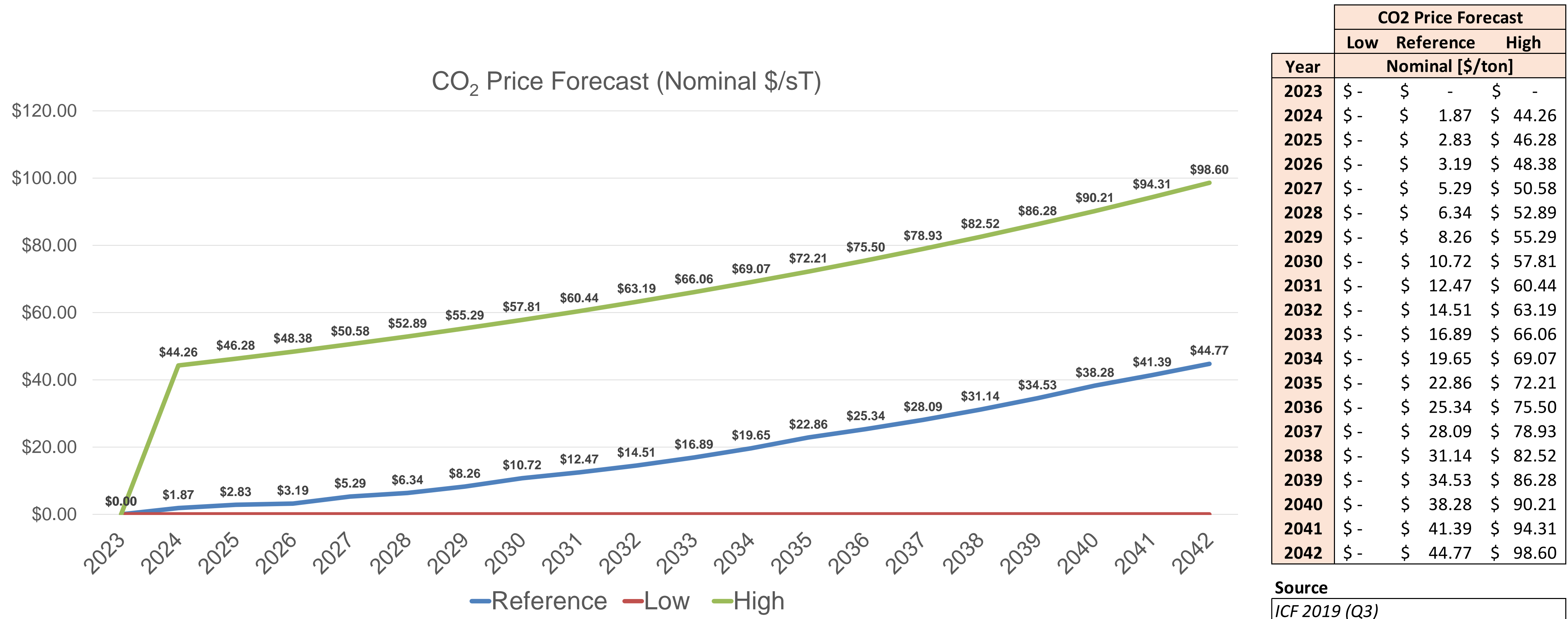


# Q&A 3

- **Why are solar-battery hybrid installations not considered in the Technology Assessment? (Tyler Comings, Sierra Club)**
  - *Solar resource alternatives and battery resource alternatives are separately available and AURORA capacity expansion can select both if a combination is the most economic resource alternative. Project-specific factors will be taken into consideration at the time of project execution; however, for purposes of the IRP, supply-side alternatives are intended to be modeled as generic and not site-specific. The planning within the IRP construct is more strategic in nature and provides some guidance of possible resource options for future needs. Once a specific need is determined, the tactical evaluations will consider factors such as co-location, potential for a battery to receive ITC, etc.*

# Q&A 4

- Please provide the CO<sub>2</sub> price assumption in the LCOE calculations for CCGTs (Tony Mendoza, Sierra Club)
  - *The Technology Assessment's LCOE calculations reflect the Reference CO<sub>2</sub> price forecast.*



# Q&A 5

- **What is the difference in cost and performance assumptions for SPP-sited wind versus Arkansas-sited wind or wind in MISO North? (Simon Mahan, SREA)**
  - *See below for requested wind cost and performance information.*

Generic Technology		Wind	Wind	Wind	Wind
Specific Technology		On-shore_Wind (MISO South)	On-shore_Wind (MISO N-C)	On-shore_Wind Off-system (SPP)	On-shore_Wind (Arkansas)
Net Max Capacity (Summer)	[MW-ac]	200	200	200	200
Installed Capital Cost	Nominal 2021 [\$/KW]	\$1,476	\$1,418	\$1,387	\$1,476
Capacity Factor	[% in 2021]	36.8%	45.0%	49.6%	40.5%

## Notes

- |   |
|---|
| (1) The EAL IRP considers yearly technology improvement for wind capacity factor.                         |
| (2) Installed capital cost of \$1,476/kW is based on U.S Generic, due to unavailable data for MISO South. |
| (3) Installed capital cost of \$1,418/kW is based on MISO West region.                                    |

# Q&A 6

- **Based on the Scope Matrix, can EAL disaggregate the DSM assumptions across the different IRP Futures? (Forest Bradley-Wright, SACE)**
  - *Please refer to the expanded Scope Matrix on the following slide, which more clearly differentiates between EAL-sponsored energy efficiency (EE) program levels, ICF Demand Response (DR) programs, and ICF Distributed Energy Resource (DER) projections.*
  - *The energy and load forecasts for the four IRP futures reflect “Reference” energy efficiency savings that are consistent with the incremental savings planned in EAL’s APSC-approved 2020-2022 EE Program Plan. Because changes to EE targets from the APSC are not known at this time, EAL assumes the same level of annual EE investment through the study period and no “High” or “Low” EE levels will be included as part of the IRP modeling.*
  - *Based on ICF’s Potential Study results, Demand Response programs will be included in the AURORA optimization modeling process, and ICF’s DER projections will be included at the respective levels in each future as noted in the Scope Matrix.*



# 2021 EAL IRP Scope Matrix

IRP Future Assumptions				
	Future 1 Reference	Future 2 Policy Paralysis	Future 3 DSM & Renewables	Future 4 Growth & Renewables
Peak / Energy Load Growth	Reference	Reference*	Low	High
Natural Gas Prices	Reference	Low	Low	High
CO <sub>2</sub> Tax Assumption	Reference	None	Reference	High
EAL EE / DR / DER Additions				
EAL EE Programs	Reference (EAL 20-22 Plan)	Reference (EAL 20-22 Plan)	Reference (EAL 20-22 Plan)	Reference (EAL 20-22 Plan)
ICF DR Portfolios (Hi, Med, Lo)	AURORA Optimization	AURORA Optimization	AURORA Optimization	AURORA Optimization
ICF DER Portfolios (Hi, Med, Lo)	Medium	Low	High	High
EAL CCGT Life Assumption**	Reference (30 Year Life)	Extend through end of study period	Reference (30 Year Life)	Reference (30 Year Life)
EAL Nuclear Life Assumption	ANO1: 2034, ANO2: 2038	ANO1: 2034, ANO2: 2038	ANO1: 2054, ANO2: 2058 (20-year extension)	ANO1: 2054, ANO2: 2058 (20-year extension)
EAL Coal Retirements	Reference Case (All Futures) WB: 2028, ISES: 2030			
	Sensitivity Cases (Future 1): S1: WB1:2023, WB2:2026, S2: WB1-2:2026, S3: ISES1-2:2026, WB1-2:2028			

	Future 1	Future 2	Future 3	Future 4
Generation Focus	Gas & Renewables	Gas	DSM & Renewables	Renewables

\*Load levers for this future are expected to result in peak and energy levels slightly lower than reference, however the profile/shape will vary due to different underlying assumptions