

April 13, 2022

Entergy New Orleans 2021 Integrated Resource Plan

Public Meeting #2



Today's Meeting

- Following an extensive and collaborative process, ENO filed its 2021 Integrated Resource Plan Report on March 25, 2022.
- Today's meeting is to present the Report and answer questions from the public.
- Another public meeting is scheduled for May 3, 2022, at which attendees may make comments to the Council regarding the IRP Report.



What is the Integrated Resource Plan (IRP)?

- The Integrated Resource Plan is a study that looks at how ENO can reliably, affordably, and sustainably serve its customers' electricity needs over the next 20 years.
- Electric needs are served through different supply resources (e.g., generation) and demand side resources (e.g., energy efficiency).
- The study develops multiple portfolios of resources and the associated costs to serve customers.
- Portfolios are developed through modeling that considers different inputs and assumptions (e.g., projected customer demand, existing generation, projected costs of energy efficiency programs, fuel costs).
- ENO, stakeholders, and the Council Advisors agree on different market futures (called Planning Scenarios) and policy assumptions for New Orleans (called Planning Strategies) that incorporate inputs and assumptions at different levels.
- Modeling software produces a portfolio for each combination of a market future and a policy assumption; additional portfolios are developed manually to address specific objectives.
- Further analysis is conducted on several of the portfolios to produce 20-year projected costs to serve customers. enterau

Key Takeaways from the 2021 IRP Report

- <u>Deferred Capacity Need</u>—The timing of capacity needs varied based on the Scenario and Strategy constraints imposed but generally didn't arise until at least the late 2020s.
- Renewables and Storage—Once a capacity need arises for ENO, it can likely be met by a combination of renewable and storage resources rather than additional fossil generation.
- Continued Operation of Union 1—The analysis indicates it is more beneficial for customers for ENO to operate Union 1 until 2033 instead of deactivating it early in 2025.
- <u>Source for Energy Smart plan</u>—The programs identified in the two 20-year DSM potential studies will be valuable inputs to the Program Year 13-15 implementation plan that will be filed later in 2022.
- Reference for Council's Renewable and Clean Portfolio Standard (RCPS)—ENO will file its 2023-2025
 RCPS compliance plan as required by the Council's rules and use the designated IRP portfolio costs as its
 evaluation baseline.
- General Resource Planning Tool—The comparative value of this IRP report comes from considering the
 different inputs, assumptions, and risk sensitivities of each Portfolio as a guide for the future, not from
 focusing on the costs of one Portfolio versus another. Actual costs in the future will be driven by resource
 certifications and DSM implementations that rely on then-current market costs.
- <u>Action Plan</u>—Focus on initiatives that support Council policy goals and customer sustainability such as renewable and clean energy options, electric vehicles, and resilience.

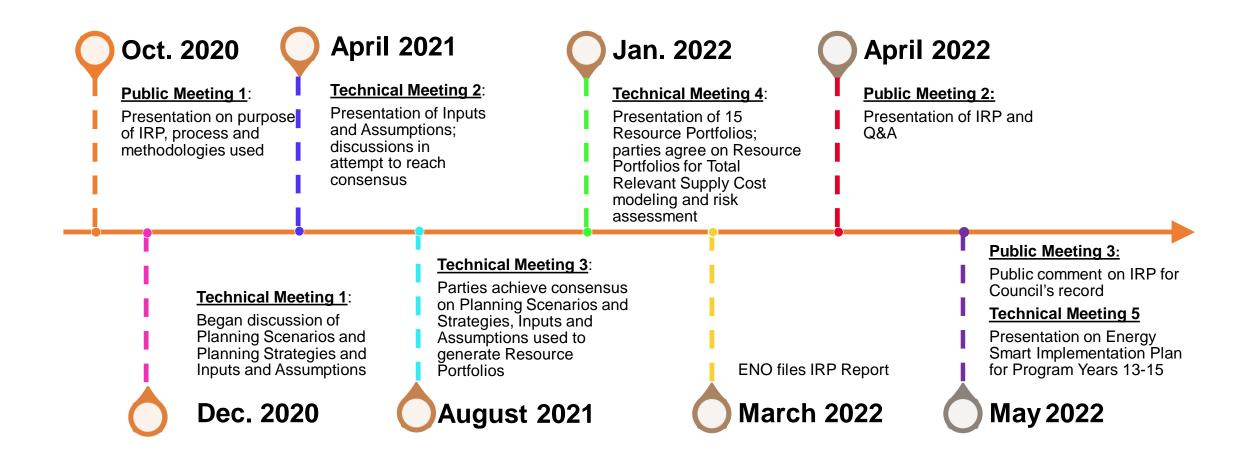


Agenda

- 2021 IRP Process Overview
- Inputs and Assumptions
- Planning Scenarios and Strategies
- Portfolio Optimization and Total Relevant Supply Cost Analysis
- Stochastic Risk Analysis
- Action Plan
- Question and Answer Period and Next Steps



Stakeholder and Public Process Review





Resource Planning Objectives

- Affordability means keeping customer costs reasonable, considering current and future cost impacts of infrastructure improvements made on behalf of our customers, and taking advantage of scale to provide cost synergies.
- Reliability means ensuring that the stability of the grid is maintained through adequate resources to meet capacity and energy needs along with adequate transmission and distribution systems to ensure that power is consistently delivered to customers.
- Environmental Stewardship refers to the use and protection of the natural environment, ensuring compliance with existing and likely regulation adaptability of resources, and paths towards a lowercarbon economy.



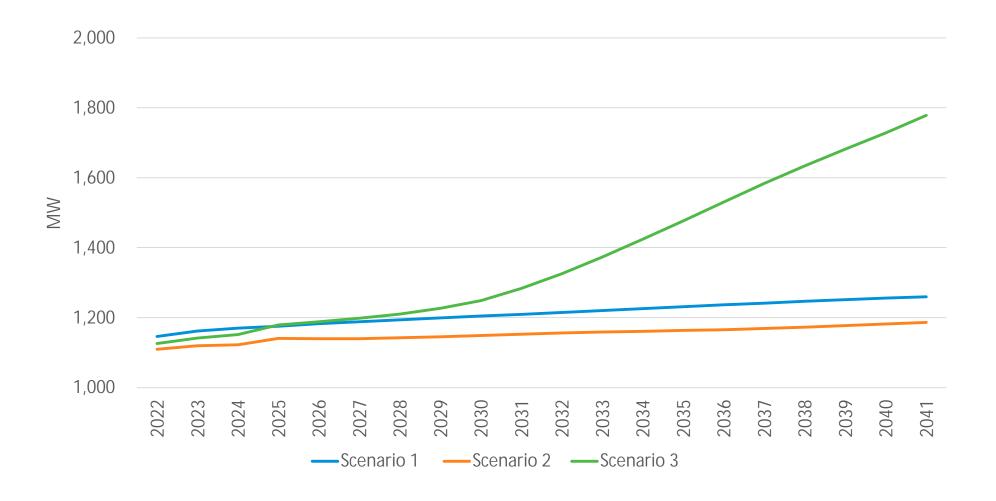


Key Inputs and Assumptions

- Peak load and Energy Forecast
- Long Term Capacity Need
- Existing Fleet Capability
- Supply Side Alternatives
- Demand Side Programs
- Fuel Forecast
- CO2 Price Forecast



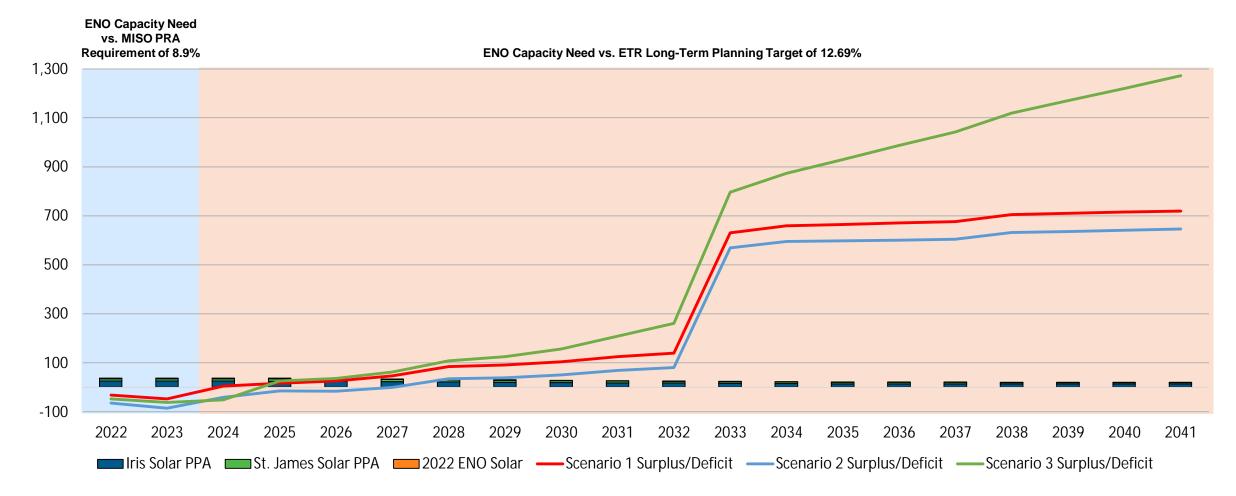
Peak Load Forecast by Scenario





ENO's Long-Term Capacity Need

ENO's existing and planned capacity portfolio over the 20-year planning period



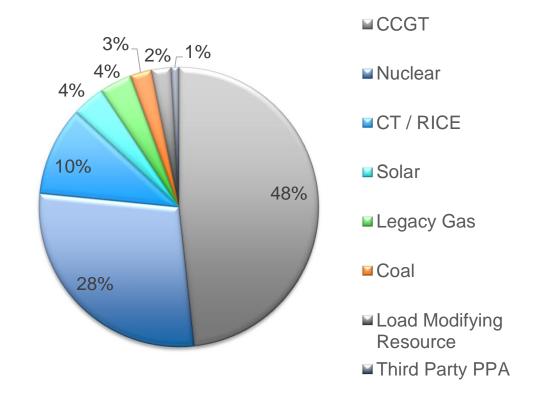
Assumptions:

- Requirements are based on ENO's peak coincident w/ MISO and resources are represented by UCAP accreditation ratings
- Chart assumes a 2% capacity credit step down for solar resources to align with MISO MTEP 2021 futures



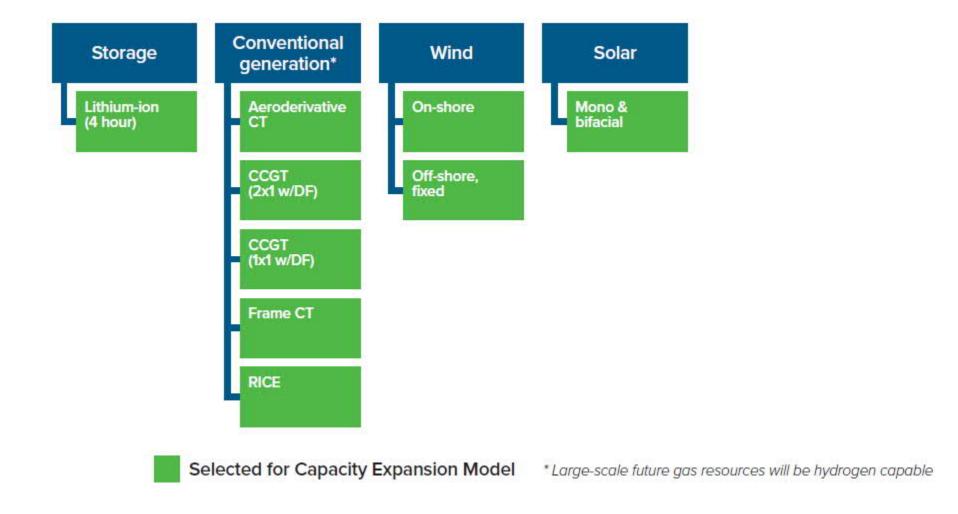
ENO's Existing Generation Fleet—2022

Fuel Type	MW UCAP
CCGT	597
Nuclear	350
CT / RICE	127
Solar	47
Legacy Gas	46
Coal	31
Load Modifying Resource	28
Third Party PPA	11
Total	1,237





Supply Side Alternatives





Demand-Side Management (DSM) Studies and Programs

- Long term DSM Studies look at the potential over a 20-year period of:
 - Energy efficiency (EE) programs--which offer incentives for customers to reduce electricity usage in their homes and businesses; and
 - Demand response (DR) programs--which offer incentives to customers who agree to reduce their own electric usage at times of high load across the system.
- GDS prepared a potential study on behalf of the Council and Guidehouse prepared a potential study for ENO. Both started from the same set of source documents and data including the N.O. Technical Resource Manual, historical Energy Smart program results, and current Energy Smart implementation plans.
- Both studies produced multiple sets of results (i.e., input cases). The parties agreed during the technical meetings which input cases to use in the IRP analysis.
- The studies presented generally consistent conclusions about available energy savings. The Guidehouse study projected generally lower costs to achieve savings than the GDS study.
- Both studies evaluated a behind-the-meter battery storage DR program as required by the Council but found the program to not be cost effective.
- Both Studies will inform the proposed Energy Smart Implementation Plan for 2023-2025 (Program Years 13-15).



Energy Efficiency Programs Evaluated and Included in the IRP

Guidehouse EE Programs

Residential – Home Performance w/Energy Star

Residential - Retail

Residential – Low Income/Multi-Family

Residential HVAC

Residential - School Kit

Residential Res Behavior

Residential – Recycling

Commercial & Industrial – Small C&I

Commercial & Industrial – Large C&I

Commercial & Industrial – COM Behavior

GDS EE Programs

EE – Commercial & Industrial (MW)

Home Performance

Residential Lighting & Appliance

Low Income

Multifamily

High Efficiency Tune Ups

Scorecard

No Program (i.e., misc. measures)



Demand Response Programs Evaluated and Included in the IRP

Guide	ehouse	DR P	rogra	ms

Dynamic Pricing with Enabling Tech

DLC-Thermostat-HVAC

C&I Curtailment- Auto-DR HVAC Control

Dynamic Pricing w/o Enabling Tech

DLC-Thermostat-Res

C&I Curtailment-Standard Lighting Control

DLC-Switch-Central Air Conditioning

C&I Curtailment - Industrial

C&I Curtailment - Other

C&I Curtailment – Water Heating Control

C&I Curtailment – Advanced Lighting

Control

C&I Curtailment – Refrigeration Control

GDS DR Programs

Residential - Peak Time Rebate

Residential – Direct Load Control – Smart

Thermostat

Residential – Direct Load Control – Pool Pump

Residential – Critical Peak Pricing

Residential – PEV Charging

Non-Residential – Smart Thermostat

Non-Residential – Interruptible/Curtailable

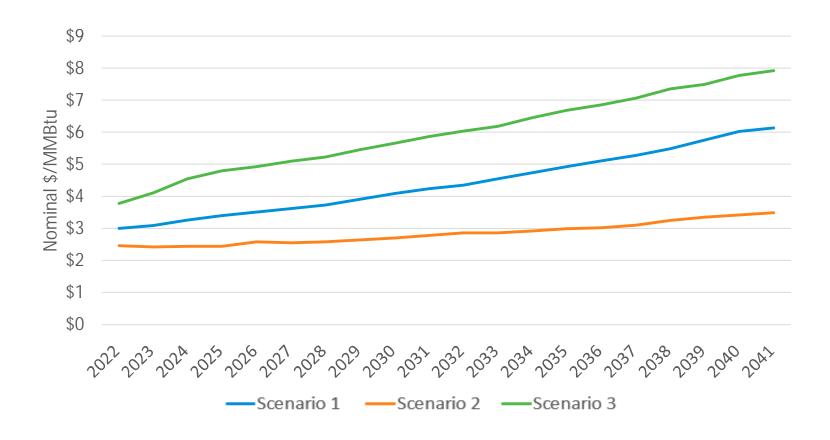
Non-Residential – Capacity Bidding

Non-Residential – Demand Bidding

Non-Residential – Critical Peak Pricing

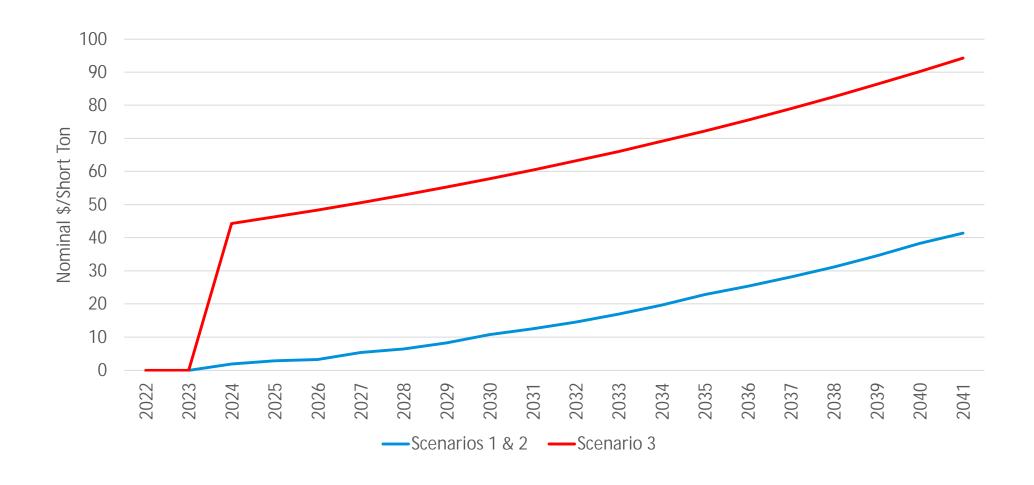


Natural Gas Price Forecast Scenarios





CO₂ Price Forecast Scenarios





Planning Scenarios and Strategies

- Planning Scenario
 —Definition of market outlook consisting of key parameters not controlled by ENO or the Council (Macroeconomic)
- **Planning Strategy**—Defined set of resource constraints, regulatory policies, or business decisions over which ENO, the Council, or Intervenors have control (Microeconomic or Policy Sensitivities; specific to New Orleans)
- Each Scenario combined with each Strategy results in one Optimized Resource Portfolio
- The 2021 IRP included three Planning Scenarios and four Planning Strategies which produced an initial set of 12 optimized portfolios
- Three additional Manual Portfolios were developed to study specific policy drivers for New Orleans



2021 IRP Planning Scenarios

	Scenario 1	Scenario 2	Scenario 3
Description	Reference	Decentralized Focus (DSM & renewables)	Stakeholder
Peak / Energy Load Growth	Reference	Low	High
Basis of DR / EE / DER Additions (Adjustment to Load)	Entergy (Medium)	Entergy (High)	Entergy (High)
Natural Gas Prices (Levelized Real, 2021\$/MMBtu)	Reference	Low	High
Market Coal Retirements	Reference (60 years)	Accelerated (55 years)	Accelerated (30 Years)
Legacy Gas Fleet Retirements	Reference (60 years)	Accelerated (55 years)	Accelerated (30 Years)
CO2 Tax Assumption (Levelized Real, 2021\$/short ton)	Reference	Reference	High
New-Build Resource Alignment with MTEP Future #3	No, Aurora capacity expansion tool will be used	No, Aurora capacity expansion tool will be used	Yes, via a manual MISO market portfolio buildout
Renewable Resource Costs	Entergy Technology Assessment	Entergy Technology Assessment	NREL 2020 ATB

Scenario 1: Reference load growth and gas prices, DSM additions, and CO₂ reduction targets

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Scenario 2: Low load growth and gas prices, high DSM additions, and moderately accelerated coal and legacy gas retirements. Aggressive DER and DSM contribute to lower peak load and energy projections. Continued political support for domestic gas production leads to sustained low gas prices.

Scenario 3: High load growth, gas prices, and DSM additions, as well as lower renewables costs. Social trends and corporate initiatives shift, demanding high penetration of DERs, DSM, and EE. Non-ENO coal and legacy plants are driven to retire earlier than anticipated resulting from stringent carbon mandates.

2021 IRP Planning Strategies

	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Description	Least Cost Planning	But For RCPS (Reference)	RCPS Compliance	Stakeholder Strategy
Resource Portfolio Criteria and Constraints	Meet long-term Planning Reserve Margin (PRM) target using least-cost resource portfolio of supply and DSM resources	Include a portfolio of DSM programs that meet the Council's stated 2% goal and meet long-term PRM target	Include a portfolio of DSM programs that meet the Council's stated 2% goal and meet long-term PRM target in compliance with RCPS policy goals	Include a portfolio of DSM programs that meet the Council's stated 2% goal and meet long-term PRM target in compliance with RCPS policy goals; NREL 2020 ATB LCOE values for renewables costs provided by Stakeholders
Objective	Assess demand- and supply-side alternatives to meet projected capacity needs with a focus on total relevant supply costs.	Design a portfolio that includes a set of potential DSM programs intended to meet the Council's stated 2% goal.	Design a portfolio that includes a set of potential DSM programs intended to meet the Council's stated 2% goal. Excludes new resources that would not be RCPS compliant.	Design a portfolio that includes a set of potential DSM programs intended to meet the Council's stated 2% goal. Excludes new resources that would not be RCPS compliant.
DSM Input Case	Low Case (Guidehouse)	2% Program Case (Guidehouse)	2% Program Case (Guidehouse)	High Case (GDS)
Manual Portfolio	Alternative Deactivation – Union Power Station (2025) (Manual Portfolio 1a) ¹	N/A	Held Union 1 deactivation in 2033 and accelerated renewable generation additions to comply with near-term RCPS mandates (Manual Portfolio 3a) ²	Alternative Deactivation – Union Power Station (2025) (Manual Portfolio 4a) ³
Sensitivity	N/A	N/A	N/A	Lower renewables costs provided by Stakeholders (Sensitivity 4b) ⁴

¹ An additional manual portfolio informed by the optimized portfolio developed under Strategy 1 and Scenario 1 ("Strategy 1a") was be developed.

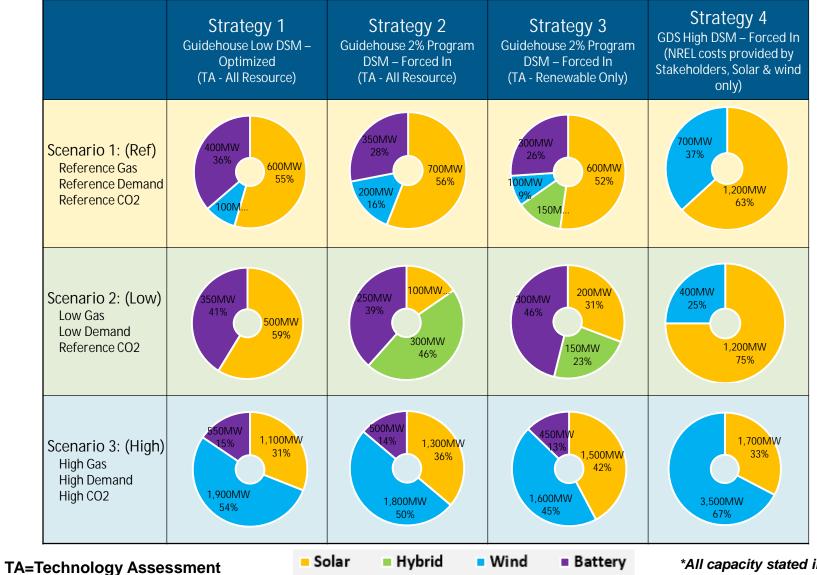
⁴ A sensitivity using the alternative cost assumptions provided by the Stakeholders on the resources identified in the optimized portfolio developed under Strategy 4 and Scenario 3 ("Strategy 4b").



² An additional manual portfolio informed by the optimized portfolio developed under Strategy 3 and Scenario 1("Strategy 3a") was be developed

³ An additional manual portfolio informed by the optimized portfolio developed under Strategy 4 and Scenario 3 ("Strategy 4a") was be developed.

Capacity Expansion Portfolios

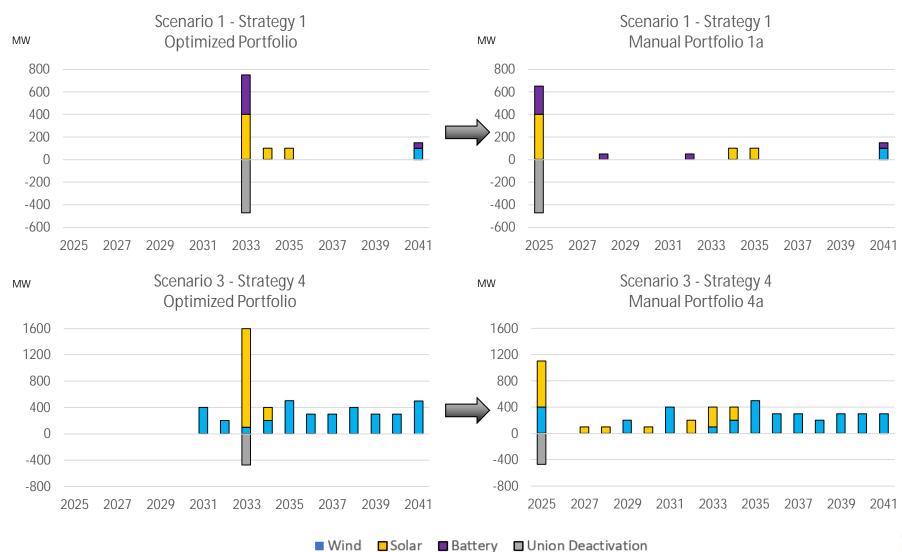


*All capacity stated in ICAP
"Hybrid" resources include solar +
storage



Manual Portfolio Development

Manual Portfolios 1a and 4a: Accelerate Union 1 deactivation assumption from 2033 to 2025 and pull forward resources selected from Strategy 1/Scenario 1 and Strategy 4/Scenario 3, respectively, to maintain target reserve margin.

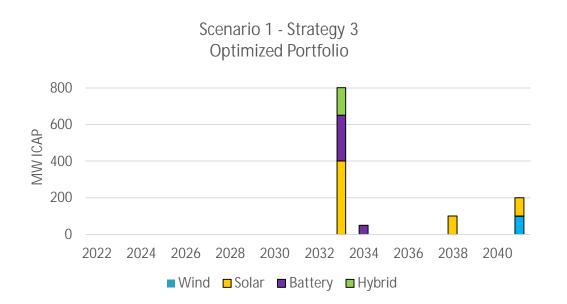


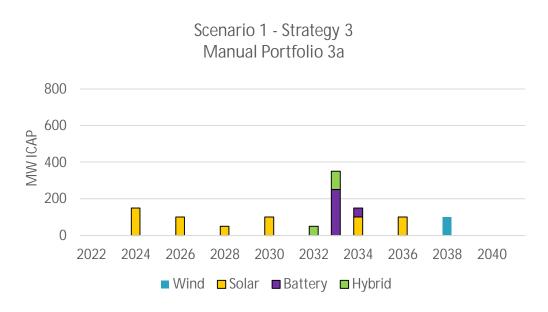


Manual Portfolio Development cont.

Manual Portfolio 3a:

- As discussed at ENO IRP Technical Meeting #4, there was a request to develop a manual portfolio based on the optimized portfolio selected for Scenario
 1/Strategy 3 with the goal of evaluating near-term RCPS compliance by accelerating blocks of renewable resources as an alternative to relying on the purchase of unbundled Renewable Energy Certificates (RECs) all while holding the deactivation date of Union 1 constant in 2033.
- Construction of the manual portfolio would begin with ENO's demand requirement from Scenario 1, net the DSM from the demand, and apply the RCPS compliance % as outlined in Section 3.A of the RCPS rules to estimate a "Clean Power Requirement".
- The clean energy projected to be generated by existing resources is based on results from the Capacity Optimization run for Scenario 1/Strategy 3. The requirement net of the existing resource clean energy is used to estimate the amount of "Additional Clean Power" required to satisfy the RCPS standard throughout the study period (2022-2041).
- The "Additional Clean Power" is then used to inform the amount of clean capacity and associated energy that must be accelerated in order to satisfy the RCPS requirement in the early years of the planning period. For "new, clean resources" the assumption for MWhs is (ICAP MWs * Capacity Factor * 8760 Hrs/Year).

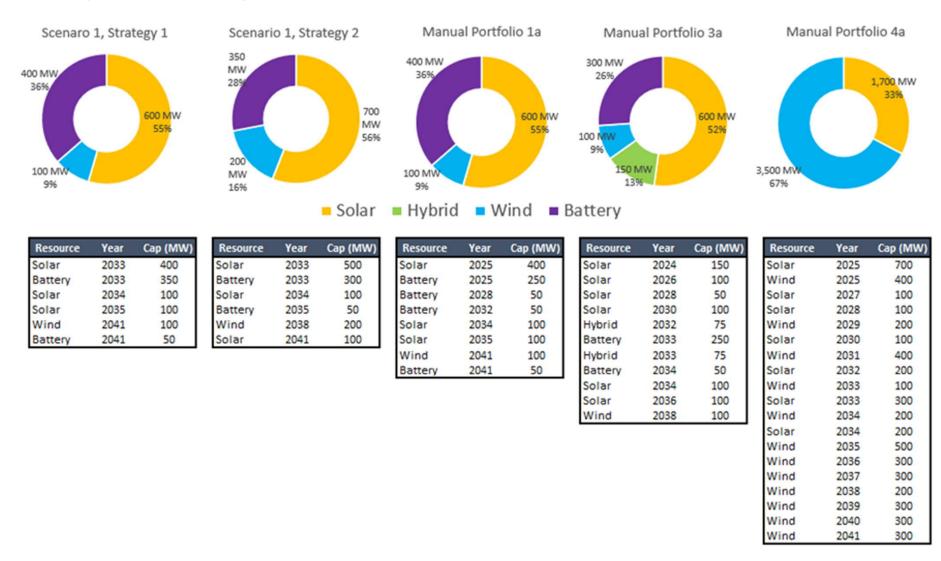






Total Relevant Supply Costs – Portfolios Analyzed

Parties agreed following Technical Meeting 4 that these Resource Portfolios should be carried forward for Total Relevant Supply Cost analysis.





Total Relevant Supply Cost Analysis Results (2022\$ NPV)

Strategy 1 : Scenario 1 (Least Cost Planning)		Scenario 1	Scenario 2	Scenario 3
Net Variable Supply Cost (Benefit)	[\$MM]	\$1,125	\$813	\$1,596
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$324	\$324	\$324
DSM Levelized Fixed Cost	[\$MM]	\$202	\$202	\$202
Capacity Purchases (Benefit)	[\$MM]	(\$125)	(\$125)	(\$125)
Avoided Levelized Union Costs (Benefit)	[\$MM]	\$0	\$0	\$0
Total Relevant Supply Cost	[\$MM]	\$1,526	\$1,214	\$1,997

Manual Portfolio 3a		Scenario 1	Scenario 2	Scenario 3
Net Variable Supply Cost (Benefit)	[\$MM]	\$1,226	\$906	\$1,691
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$530	\$530	\$530
DSM Levelized Fixed Cost	[\$MM]	\$250	\$250	\$250
Capacity Purchases (Benefit)	[\$MM]	(\$205)	(\$205)	(\$205)
Avoided Levelized Union Costs (Benefit)	[\$MM]	\$0	\$0	\$0
Total Relevant Supply Cost	[\$MM]	\$1,802	\$1,481	\$2,266

Strategy 2 : Scenario 1 (But for RCPS)		Scenario 1	Scenario 2	Scenario 3
Net Variable Supply Cost (Benefit)	[\$MM]	\$1,077	\$772	\$1,540
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$370	\$370	\$370
DSM Levelized Fixed Cost	[\$MM]	\$250	\$250	\$250
Capacity Purchases (Benefit)	[\$MM]	(\$138)	(\$138)	(\$138)
Avoided Levelized Union Costs (Benefit)	[\$MM]	\$0	\$0	\$0
Total Relevant Supply Cost	[\$MM]	\$1,560	\$1,254	\$2,023

Manual Portfolio 4a		Scenario	Scenario	Scenario
		1	2	3
Net Variable Supply Cost (Benefit)	[\$MM]	(\$910)	(\$888)	(\$385)
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$2,165	\$2,165	\$2,165
DSM Levelized Fixed Cost	[\$MM]	\$598	\$598	\$598
Capacity Purchases (Benefit)	[\$MM]	(\$101)	(\$101)	(\$101)
Avoided Levelized Union Costs (Benefit)	[\$MM]	(\$106)	(\$106)	(\$106)
Total Relevant Supply Cost	[\$MM]	\$1,645	\$1,667	\$2,170

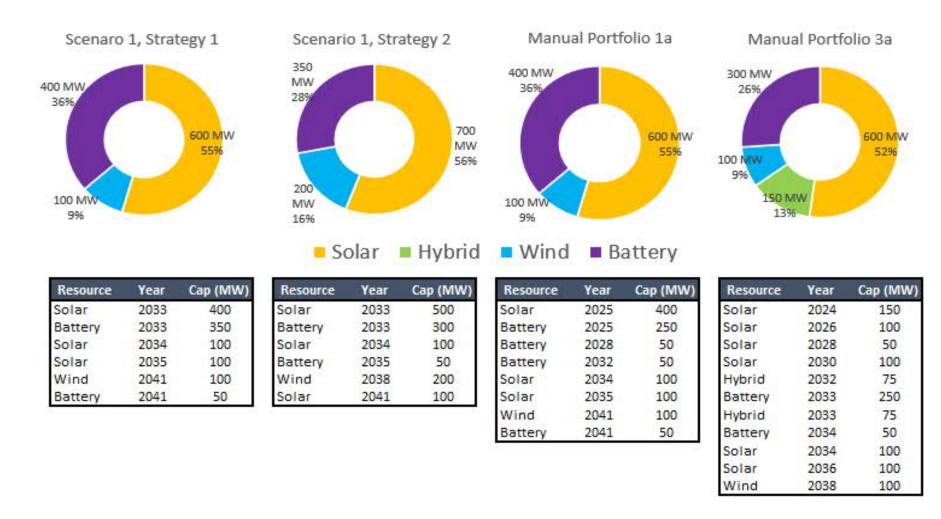
Manual Portfolio 1a		Scenario 1	Scenario 2	Scenario 3
Net Variable Supply Cost (Benefit)	[\$MM]	\$980	\$701	\$1,378
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$690	\$690	\$690
DSM Levelized Fixed Cost	[\$MM]	\$202	\$202	\$202
Capacity Purchases (Benefit)	[\$MM]	(\$115)	(\$115)	(\$115)
Avoided Levelized Union Costs (Benefit)	[\$MM]	(\$106)	(\$106)	(\$106)
Total Relevant Supply Cost	[\$MM]	\$1,650	\$1,372	\$2,049

MP 4a Scenario 3 vs. Sensitivity 4b		MP 4a Scenario 3	Sensitivity 4b
Net Variable Supply Cost (Benefit)	[\$MM]	(\$385)	(\$385)
Resource Additions Levelized Fixed Costs [6/1 COD]	[\$MM]	\$2,165	\$1,841
DSM Levelized Fixed Cost	[\$MM]	\$598	\$598
Capacity Purchases (Benefit)	[\$MM]	(\$101)	(\$101)
Avoided Levelized Union Costs (Benefit)	[\$MM]	(\$106)	(\$106)
Total Relevant Supply Cost	[\$MM]	\$2,170	\$1,847



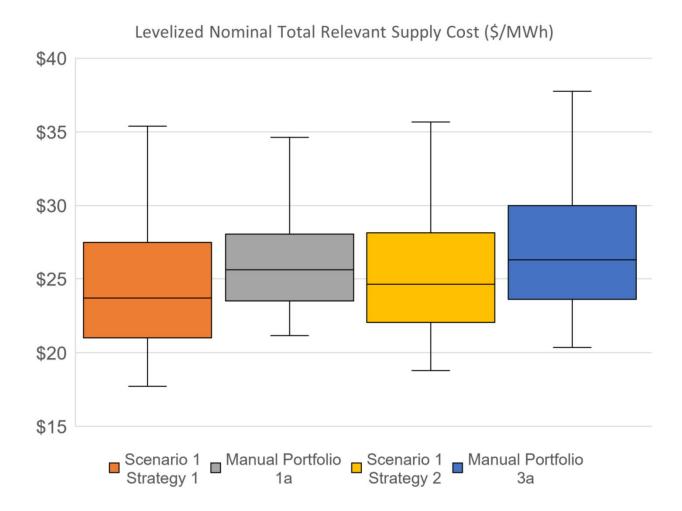
Stochastic Risk Analysis

In order to meet schedule deadlines, the Parties agreed to stochastic analysis on four portfolios





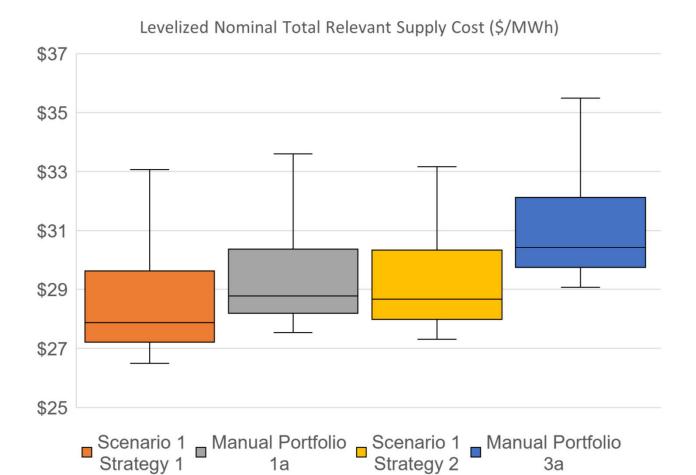
2021 ENO IRP Stochastics Results – Gas Price



Percentile	Levelized Real Gas Price (2022 \$/mmBtu)
1	\$0.75
5	\$0.92
10	\$1.17
20	\$1.46
30	\$1.68
40	\$2.07
50	\$2.61
60	\$2.95
70	\$3.68
80	\$4.49
90	\$6.17
95	\$8.14
99	\$18.43



2021 ENO IRP Stochastics Results – CO₂ Price



Percentile	Levelized Real CO2 Price \$2022
1	\$0.65
5	\$0.96
10	\$1.49
20	\$2.22
30	\$3.31
40	\$4.32
50	\$5.56
60	\$8.35
70	\$11.95
80	\$17.54
90	\$25.28
95	\$33.96
99	\$64.04



2021 IRP Action Plan

<u>Description</u>	Action to be Taken
90 MW Portfolio Implementation	The projects underlying the Iris and St. James PPAs approved in Docket UD-18-06 have been delayed and sustained damage in Hurricane Ida. ENO continues to monitor counterparty efforts to achieve commercial operation for both projects by the updated estimated dates of August 2022 (Iris) and October 2022 (St. James).
	Upon commencement of the two PPAs, ENO will have fulfilled approximately 95 MW of the 100 MW renewables commitment it previously made to the Council. ENO will seek to identify a suitable small project to help it meet or exceed the 100 MW threshold. Possible options could include an expansion of the commercial rooftop solar or ReNEWable Orleans residential rooftop programs, possibly with battery storage components.
City Clean Power Plan (100% Renewables Options for City and SWB)	ENO plans to engage with the Council and City stakeholders to discuss possible offerings for a City Clean Power Plan responsive to Resolution R-22-11 that directed the City and SWB to serve their operations with 100% renewable energy by 2025.
RCPS Compliance Plan	ENO will develop and file its first three-year RCPS compliance plan for 2023-25 within 90 days after submission of the IRP Report as required under the RCPS rules.
Electric Vehicle Charging Infrastructure Plans	ENO will continue to work towards completion of the 25 site Public Charging pilot approved through the 2018 Rate Case. ENO will also continue to work with the Advisors and stakeholders regarding the filing made in January 2022 seeking modifications to Rider EVCI and other regulatory policies necessary to support more robust adoption of electric vehicles in New Orleans.
	Additionally, ENO will seek to develop proposals to the Council that would expand public access to Direct Current Fast Chargers (DCFC) and Level 2 chargers throughout the city and foster greater adoption of EVs in the city.
Bring Your Own Battery (BYOB) Demand Response Pilot	ENO will pursue approval of the application for a BYOB DR pilot program filed in March 2022. If approved, ENO will work with Honeywell, the program implementer, to execute the program during Energy Smart PY12 and develop experience to possibly inform a similar program during PY 13-15.



2021 IRP Action Plan cont.

<u>Description</u>	Action to be Taken
DSM/DR Implementation	File Implementation Plan for Energy Smart Program Years 13-15 as required under Resolution R-20-257 and the subsequent Order amending the procedural schedule in the IRP docket.
Expansion of Green Power Option for Large Customers	In response to interest expressed by several large electric customers in New Orleans, ENO will evaluate a possible expansion of the current Green Power Option program to accommodate larger usage offsets.
Customer Backup Generation Solutions	In response to growing customer interest in backup generation following Hurricane Ida, ENO will consider solutions that could be offered to residential and commercial customers. Solutions could include make ready infrastructure and other equipment that would facilitate the safe and quick installation of temporary backup generation in response to storm events, or permanently installed backup generation for customers requiring continuous power to support their operations.



Recap—Key Takeaways from the 2021 IRP Report

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 certifications and DSM implementations that rely on then-current market costs.
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Question and Answer Period; Next Steps

- Q/A Portal open on ENO IRP website until April 28
- Link: https://www.entergy-neworleans.com/irp/2021_irp/
- Public Meeting #3—Scheduled for May 3

