ENO 2018 IRP
Technical Meeting #1

January 22, 2018

WE POWER LIFE℠

Goals and Agenda of Technical Meeting #1

Goals

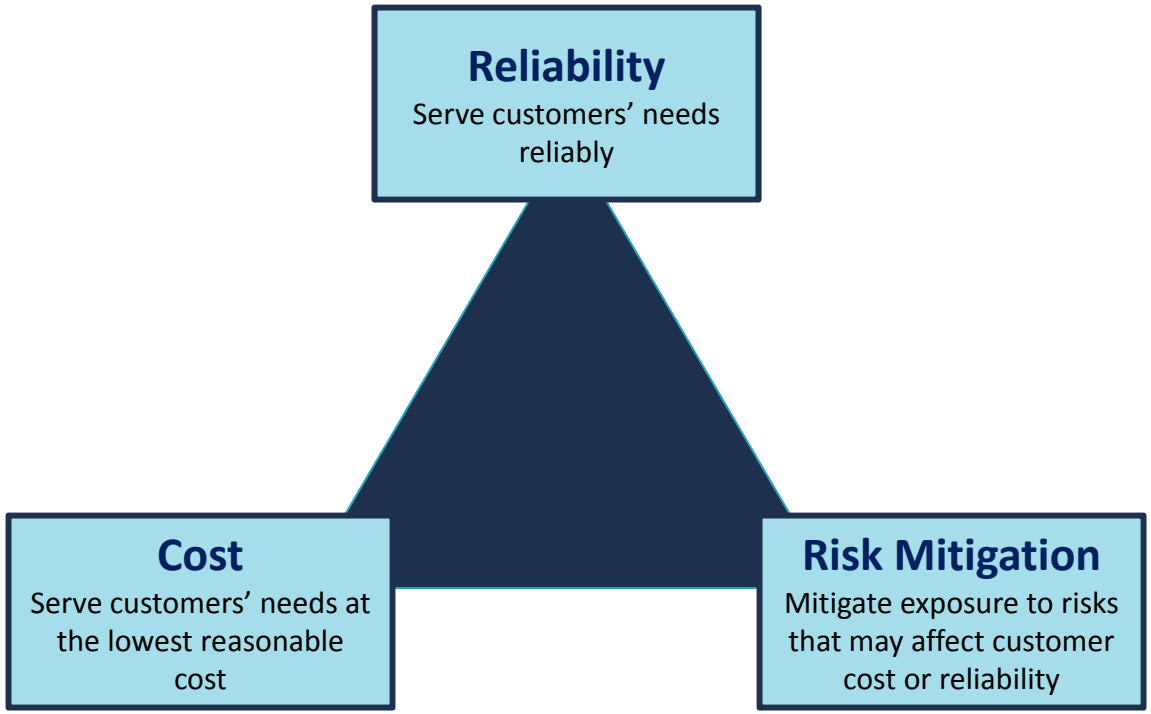
- As described in the Initiating Resolution (R-17-430), the main purpose of this meeting is for ENO, the Advisors, and Intervenors to discuss Planning Scenarios and Strategies with a view towards reaching consensus on the Scenarios and Strategies to be used in developing the 2018 IRP.
  - As such, per the Initiating Resolution, the meeting shall be treated as a settlement negotiation and subject to all applicable procedural and evidentiary protections.
- ENO will present its reference and alternative Planning Scenarios and its least-cost/reference Planning Strategy.
- Prior to the meeting, Intervenors should have discussed among themselves their priorities regarding Planning Scenarios and Strategies.
- Should the parties not agree that the proposed Scenarios and/or Strategies, or any Scenarios and/or Strategies developed during Technical Meeting #1, will adequately capture the Intervenors' point of view, the Intervenors shall prepare and submit, with the Advisors' assistance as needed, their proposed Planning Scenario and/or Strategy before Technical Meeting #2.

Agenda

1. 2018 IRP Objectives
2. Analytical Framework
3. Inputs and Assumptions
4. Resource Options
   a. Supply-Side Resources
   b. DSM Potential Study (Navigant)
5. Timeline

Section 1
2018 IRP Objectives

ENO's planning process seeks to accomplish three key objectives



Achieve these objectives while considering known utility regulatory policy goals of the Council

In the 2018 IRP, ENO will consider the ongoing evolution of the utility industry

The Changing Utility Industry

Customer Preferences

ENO's planning processes seek to address changing customer needs. Planning processes and tools will continue to evolve to help identify customer needs and wants.

Resource Alternatives

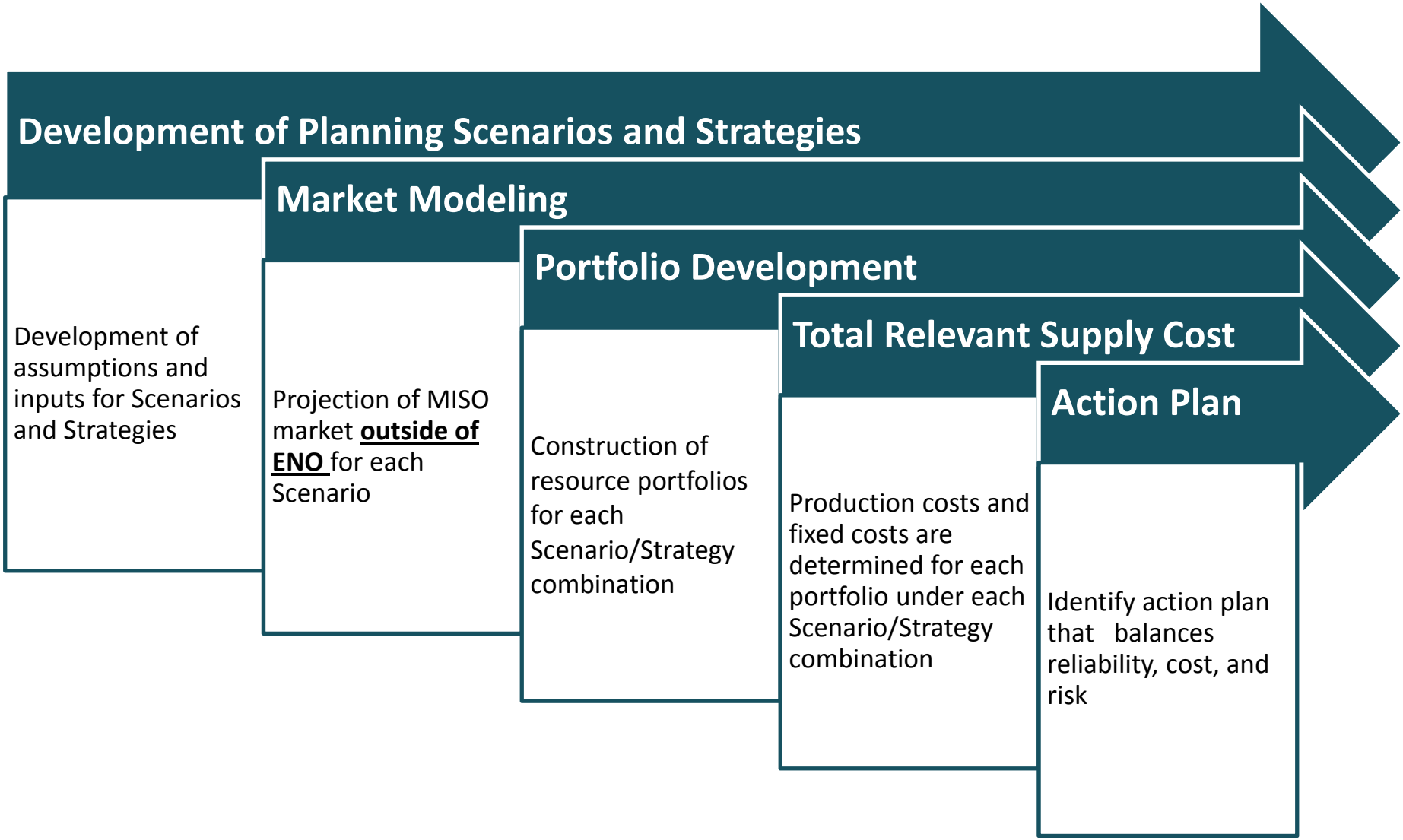
Ever advancing technology provides new opportunities to meet future customer needs reliably and affordably. Planning processes strive to understand these technological changes in order to enable us to design optimal portfolios of resources and services.

Grid Modernization

ENO's distribution planning process will need to accommodate the integration of distributed energy resources safely and securely so they can be interoperable with the grid.

Section 2
Analytical Framework

Analytic Process to Create and Value Portfolios



ENO Planning Scenarios--Assumptions

	Scenario 1 (Reference)	Scenario 2	Scenario 3
Peak Load & Energy Growth	Reference	Low	High
Natural Gas Prices	Reference	Low	High
Market Coal & Legacy Gas Deactivations	Reference (60 years)	Accelerated (50 years)	Accelerated (55 years)
Magnitude of Coal & Legacy Gas Deactivations	12% by 2028 54% by 2038	54% by 2028 91% by 2038	31% by 2028 88% by 2038
MISO Market Additions Renewables / Gas Mix	34% / 66%	50% / 50%	50% / 50%
CO2 Price Forecast	Reference	High	Reference

If necessary, a fourth Stakeholder Scenario will be modeled.

ENO Planning Strategies--Assumptions

	Strategy 1 (Reference)	Strategy 2	Strategy 3
Objective	Least Cost Planning	0.2/2% DSM Goal	TBD
Resource Portfolio Criteria and Constraints	Meet 12% 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 determine remaining needs	
Description	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 and considers additional supply-side alternatives	

If necessary, an Stakeholder Planning Strategy will be modeled.

MISO Market Modeling and Total Relevant Supply Cost Calculation

1. **Market Model Set-Up**
   - Develop projection of MISO market outside ENO for each Scenario
     - 16% reserve margin target (based on MISO summer peak load and Resource Adequacy process)
     - Build out MISO resource pool to achieve target fuel mix per Scenario

2. **Initial Production Cost Simulation**
   - Using AURORA production cost model, simulate MISO market to generate market price curve (i.e., LMPs) for each Scenario

3. **Development of Portfolios using either AURORA or Manual Process**
   - Use AURORA capacity expansion model to select demand- and supply-side alternatives to create ENO portfolios for each Scenario/Strategy combination
     - 12% long term reserve margin (based on ENO long term planning assumption)
     - Portfolio addition decisions based on maximizing market value of supply additions
   - If the capacity expansion model is unable to select resources required by a particular Strategy consistent with identified resource needs, develop manual portfolios using defined constraints and professional judgment

4. **Final Production Cost Simulations and Total Relevant Supply Cost Calculations**
   - Compute variable supply costs for each portfolio in each of the Scenarios/Strategies using detailed MISO Zonal Model in AURORA
   - Calculate Total Relevant Supply Cost for each portfolio
     - Includes: variable supply costs, cost of DSM programs, incremental non-fuel fixed costs, and capacity purchases

Assessment of Portfolio Performance Across Scenarios

- Portfolios developed for each Scenario/Strategy combination will be tested across all other Scenarios to assess performance in a range of possible outcomes
- The total relevant supply cost of each of the Scenario/Portfolio combinations represents the present value of fixed and variable costs to customers in 2018$

***ILLUSTRATIVE ONLY*—Actual number of Scenario/Portfolio combinations TBD**

Portfolios / Scenarios	Strategy 1 (Reference)				Strategy 2 (2% DSM Goal)				Strategy 3 (TBD)			
	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8	Port 9	Port 10	Port 11	Port 12
Scenario 1	R_{11}	R_{12}	R_{13}	R_{14}	R_{15}	R_{16}	R_{17}	R_{18}	R_{19}	R_{110}	R_{111}	R_{112}
Scenario 2	R_{21}	R_{22}	R_{23}	R_{24}	R_{25}	R_{26}	R_{27}	R_{28}	R_{29}	R_{210}	R_{211}	R_{212}
Scenario 3	R_{31}	R_{32}	R_{33}	R_{34}	R_{35}	R_{36}	R_{37}	R_{38}	R_{39}	R_{310}	R_{311}	R_{312}
Scenario 4	R_{41}	R_{42}	R_{43}	R_{44}	R_{45}	R_{46}	R_{47}	R_{48}	R_{49}	R_{410}	R_{411}	R_{412}

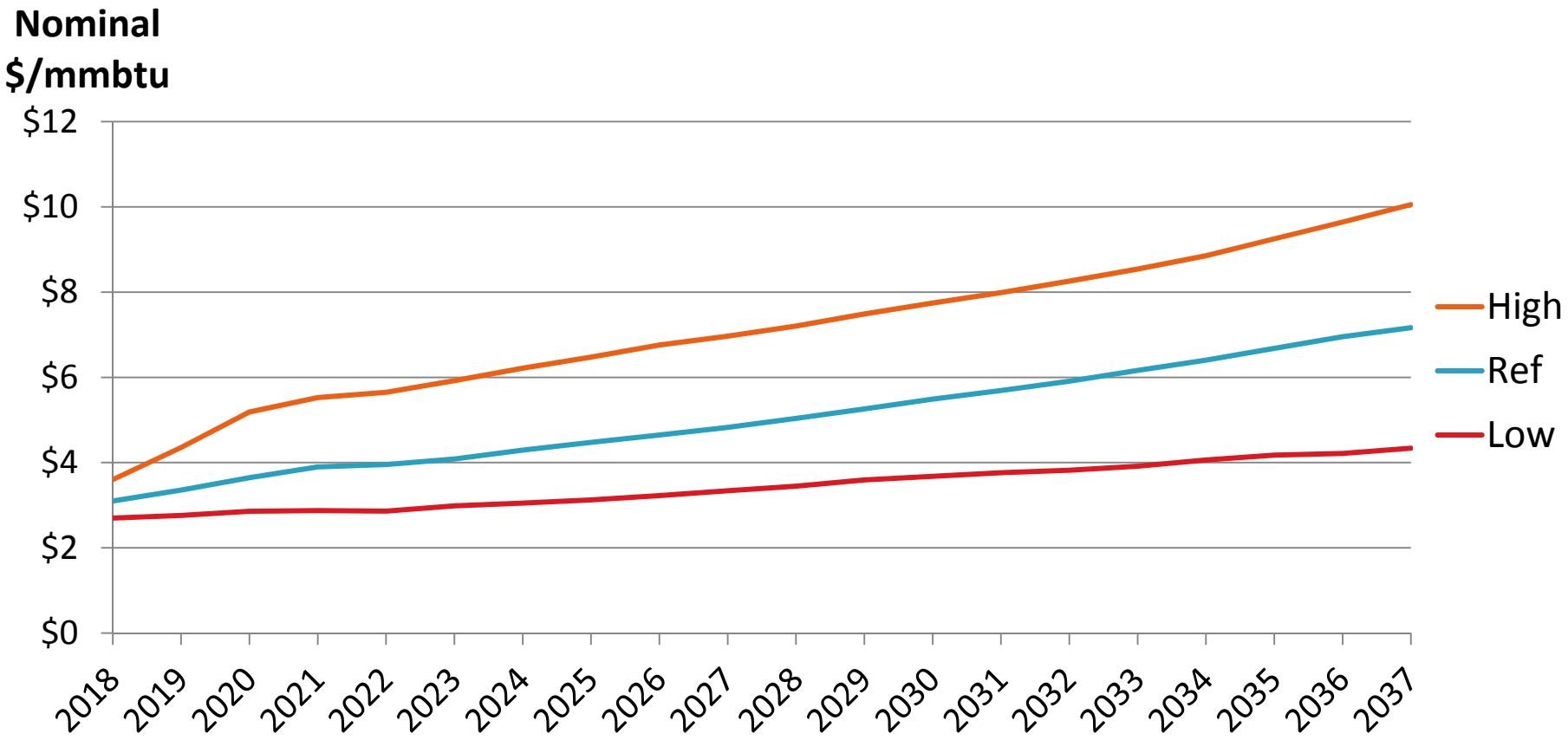
Note: “R” = resulting total relevant supply cost

Section 3
Inputs and Assumptions

2018 IRP Inputs and Assumptions

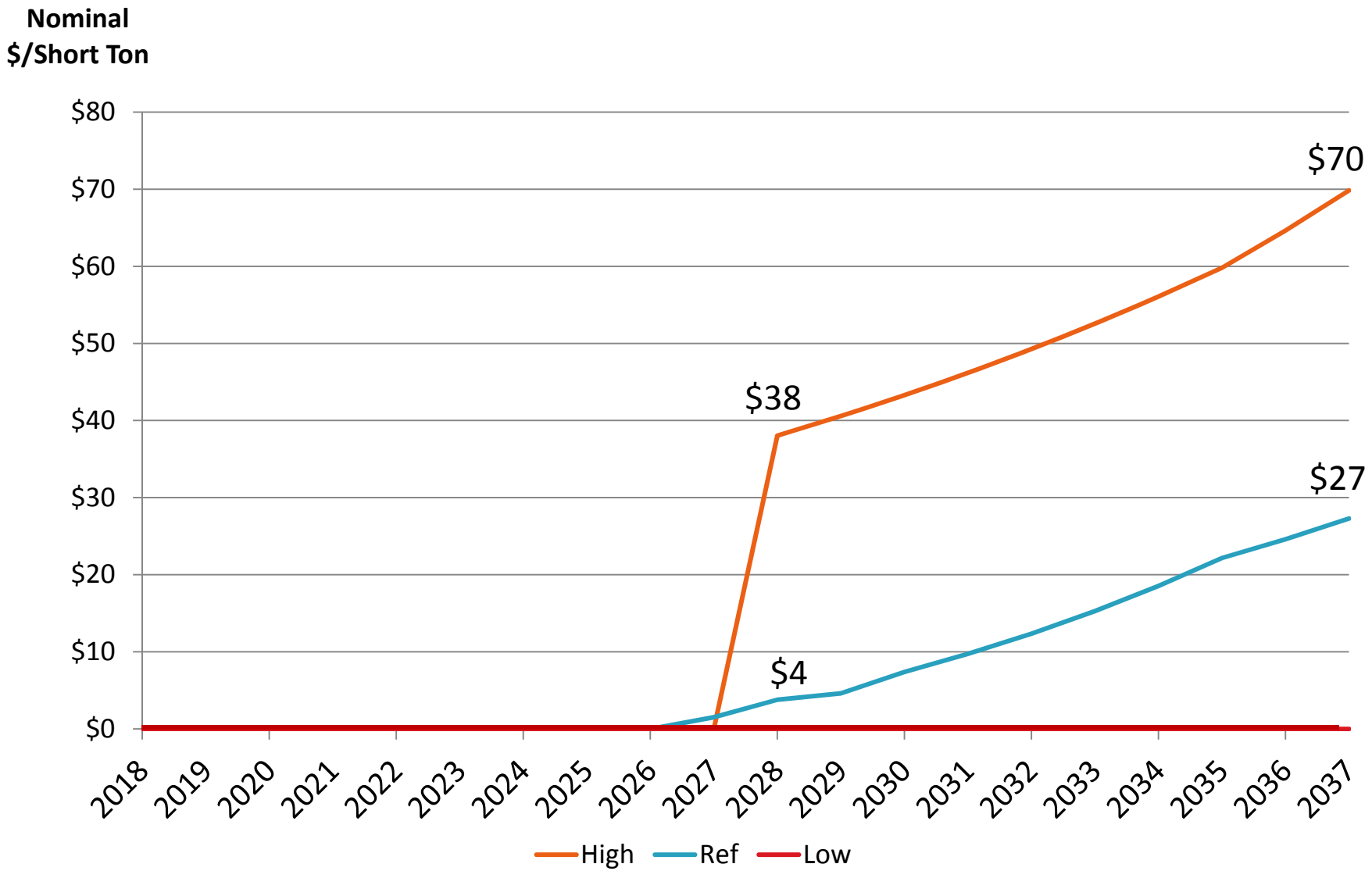
Input/Assumption	Present at Technical Meeting #	MISO Market Modeling	Portfolio Development	Total Relevant Supply Costs
Scenarios & Strategies	1	✓	✓	✓
Gas Price Forecast	1	✓	✓	✓
CO2 Price Forecast	1	✓	✓	✓
Capacity Value	1		✓	✓
Supply-Side Resource Alternative Costs	2		✓	✓
Load Forecast	2	✓	✓	
ENO's Long-Term Capacity Need	2		✓	✓
Input Sensitivities	2			✓
DSM Potential Study Results	3		✓	✓

Gas Forecast

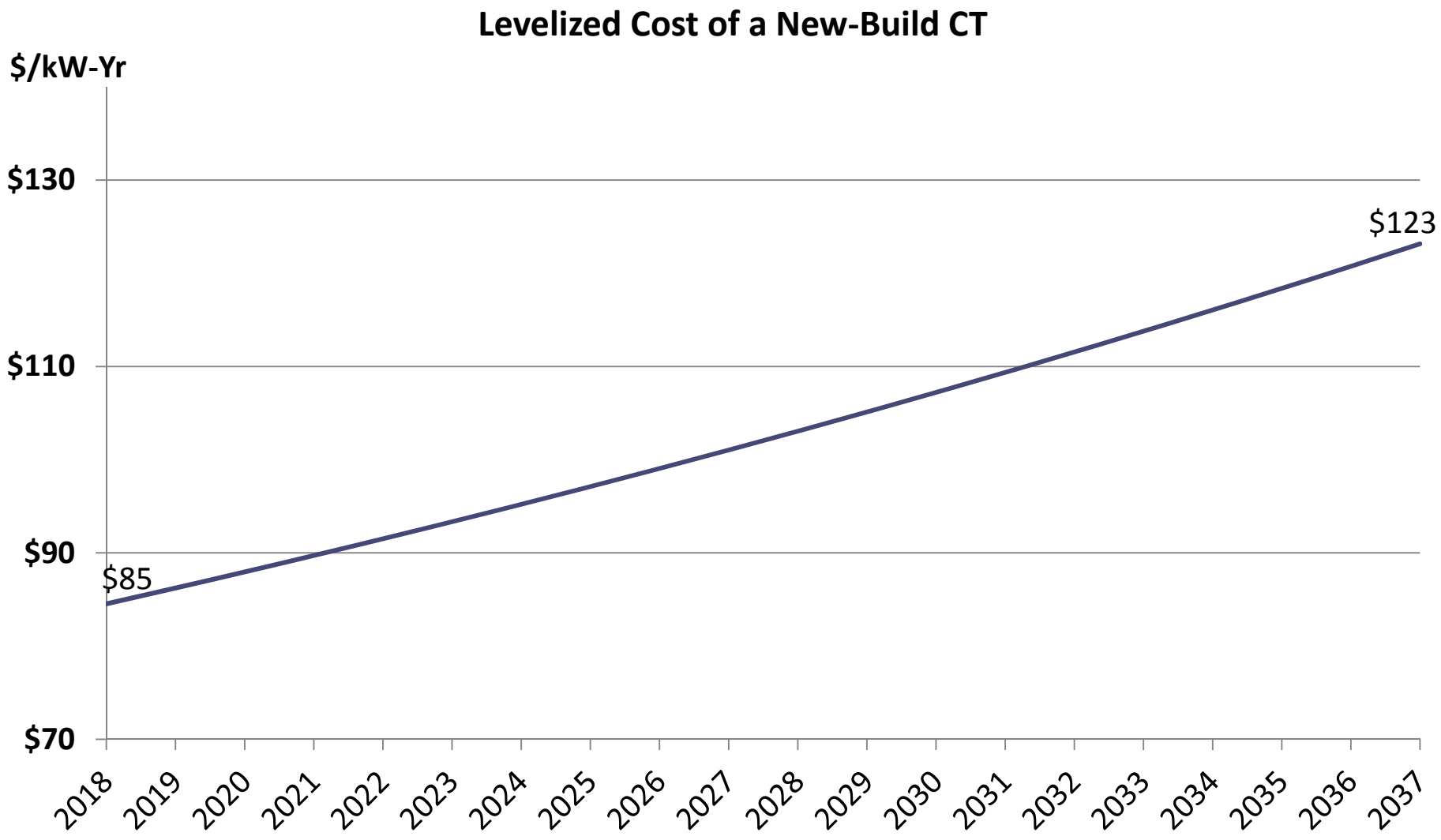


Case	2018	2025	2030	2037
Low	$2.67	$3.12	$3.68	$4.34
Reference	$3.08	$4.48	$5.49	$7.16
High	$3.55	$6.48	$7.74	$10.05

CO_2 Forecast



ENO Capacity Value

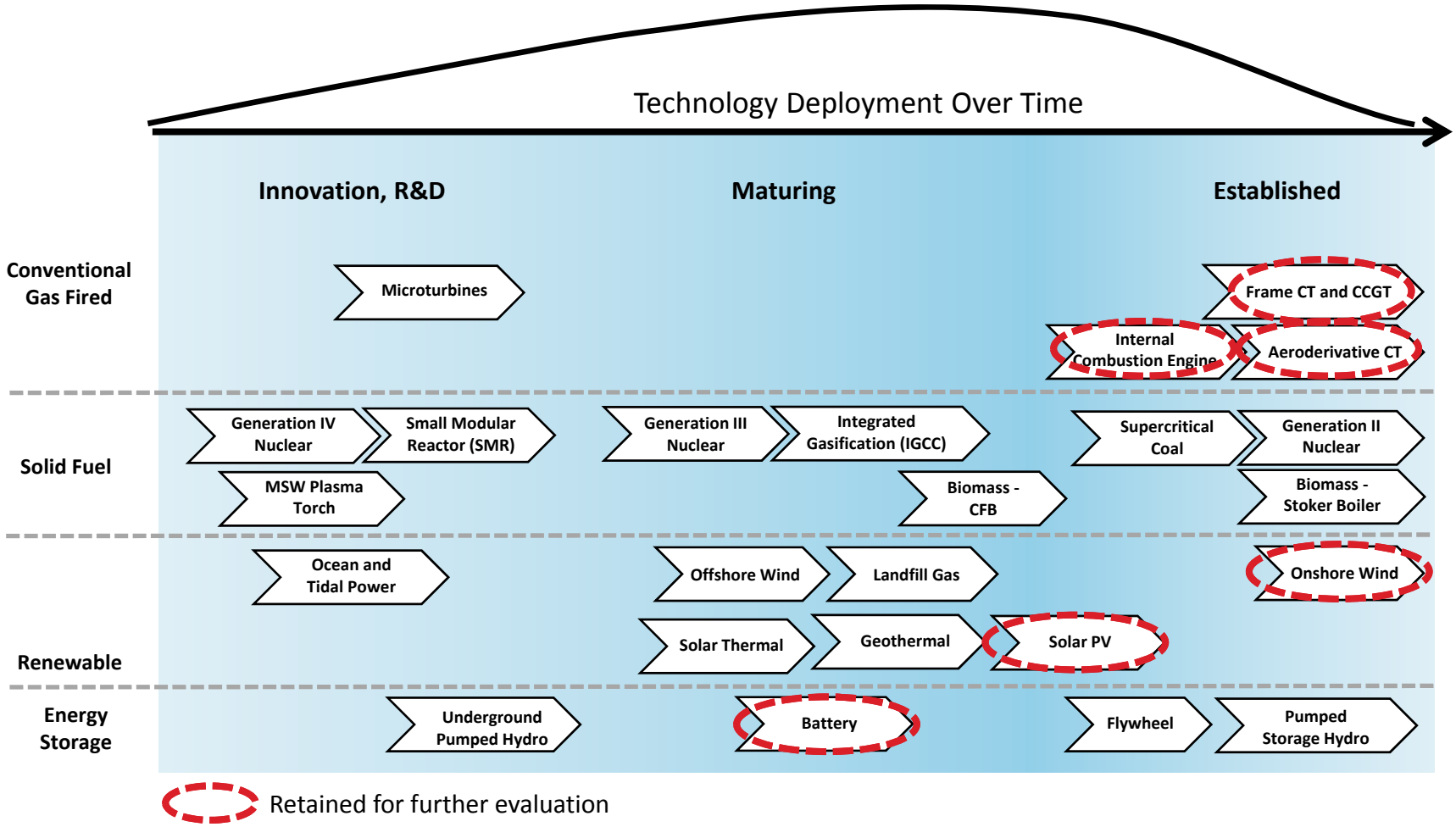


Section 4a
Supply-Side Resource Options

Technology Assessment Process and Purpose

- Generation technology cost and performance are a necessary input to resource planning and portfolio development.
- The process to evaluate generation technologies has two main steps – an initial screening level analysis and a more detailed economic analysis.
- The technology assessment includes technologically mature alternatives that are expected to be operational in or around the Entergy regulated service territory.
- In an effort to minimize operational and economic risk, ENO prefers technologies that are proven on a commercial scale. Some technologies identified lack the commercial track record to demonstrate their technical and operational feasibility.
- The technology screening analysis identifies generation technology alternatives which are expected to reasonably meet primary planning objectives of reliability, cost, and risk mitigation. Economic modeling parameters are developed for the identified technologies.
- Technologies that are eliminated as a result of the initial screen will continue to be monitored and changes in technology assessments will be incorporated in future IRPs, when appropriate.

Identified Supply-Side Resource Alternatives



Section 4b
DSM Potential Study
(Navigant Presentation)

Section 5
Timeline

Current Timeline

Description	Target Date	Status
Public Meeting #1- Process Overview	September 2017	✓
Technical Meeting #1 Material Due	January 2018	✓
Technical Meeting #1	January 2018	✓
Technical Meeting #2 Material Due	March 2018	-
Technical Meeting #2	April 2018	-
Technical Meeting #3 Material Due	May 2018	-
Technical Meeting #3	June 2018	-
IRP Inputs Finalized	**June 2018**	-
Optimized Portfolio Results Due	October 2018	-
Technical Meeting #4 Material Due	October 2018	-
Technical Meeting #4	November 2018	-
File IRP Report	January 2019	-
Public Meeting #2 Material Due	January 2019	-
Public Meeting #2 - Present IRP Results	February 2019	-
Intervenors and Advisors Questions & Comments Due	February 2019	-
ENO Response to Questions and Comments Due	February 2019	-
Public Meeting #3 Material Due	February 2019	-
Technical Meeting #5 Material Due	February 2019	-
Public Meeting #3 - Public Response	March 2019	-
Technical Meeting #5	March 2019	-
ENO File Reply Comments	May 2019	-
Advisors File Report	June 2019	-