

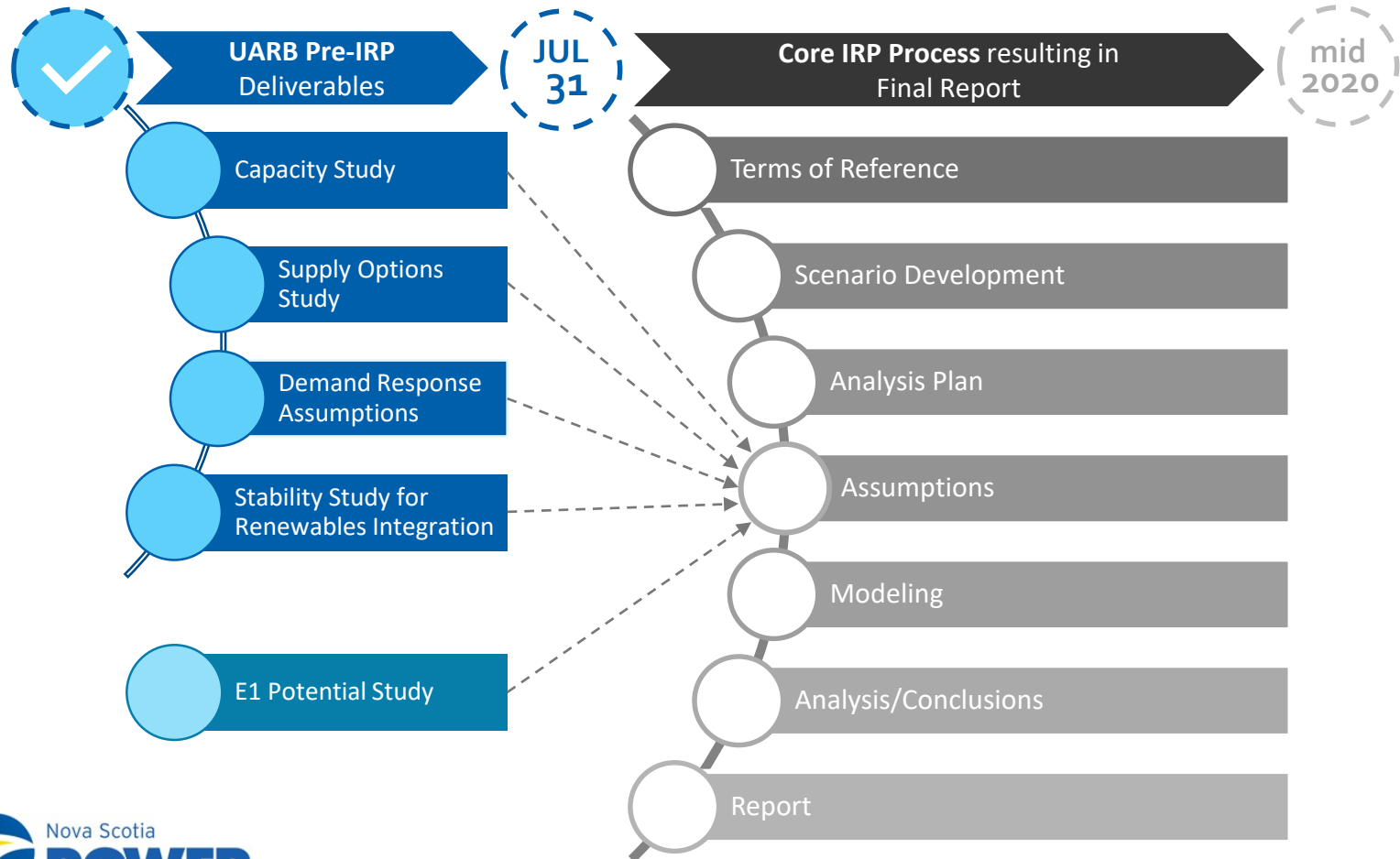
PRE IRP DELIVERABLES: SECONDARY SESSION

AUGUST 27, 2019

TODAY'S AGENDA

1. Continue discussion on pre-IRP deliverables:
 - I. **STABILITY STUDY FOR RENEWABLES INTEGRATION**
 - II. **SUSTAINING CAPITAL FORECAST**
 - III. **DEMAND RESPONSE PROGRAM ASSUMPTIONS**
2. Discuss Next Steps

IRP PROCESS OVERVIEW

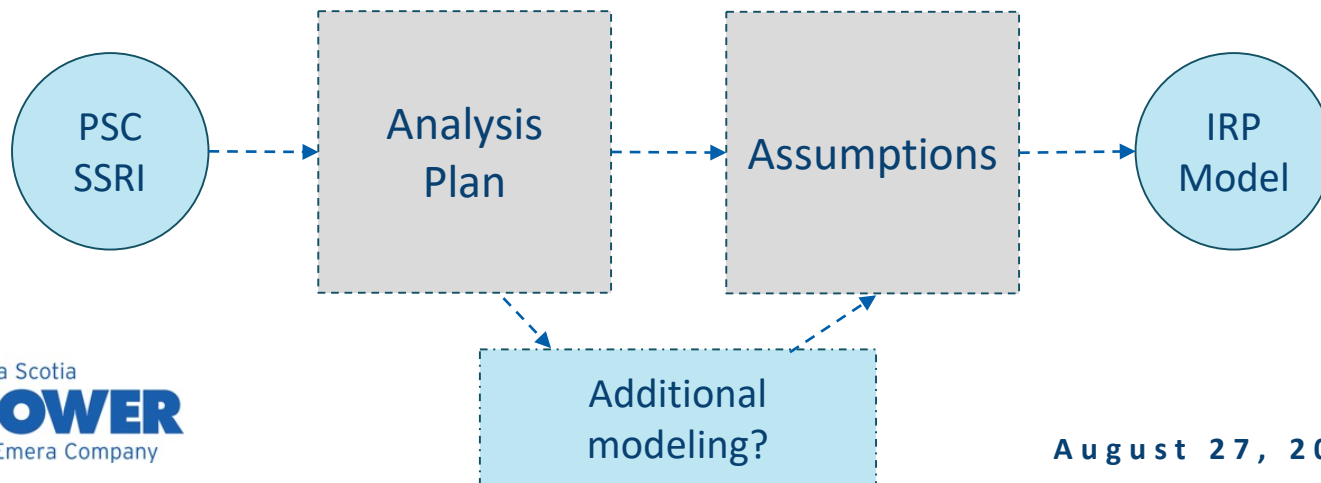


SSRI

STABILITY STUDY FOR RENEWABLES INTEGRATION

Context: How we will use the SSRI in the IRP

- NSP and our consultants are working to develop, as part of the IRP Analysis Plan, a methodology for estimating integration costs of additional wind based on stability issues that arise at higher penetrations (e.g. deficit in specific essential grid services) and the potential available solutions to solve the issues (this could involve additional PSSE model runs as required).
- Based on the SSRI as well as the methodology discussed above, we will define specific increments of wind, both up to and beyond 1000 MW, with interconnection requirements/costs to be brought forward to IRP stakeholders for review in the Analysis Plan and Draft Assumptions Phases.



SSRI: QUESTION & ANSWER

- Why did the Stability Study for Renewables Integration (SSRI) stop at 1000 MW of wind in Nova Scotia?
- How is the Maritime Link taken into account in the study?
- Are the challenges associated with additional inverter-based generation dependant upon the resource type? Would the results have been the same if solar was added instead of wind?
- How were the study cases selected?
- Are the results sensitive to the location of the conventional resources online, and/or the location of the incremental wind?

SSRI: QUESTION & ANSWER

- In cases with an additional New Brunswick tieline, does the additional tie change the level of MW import/export from/to New Brunswick?
- Re: Modifications to Case 01 (page 39 – 40): would this still be considered a “Light Load” case? Were any other load levels between 678 MW and 893 MW tested?
- In Case 04 with additional tieline, were the same mitigation measures implemented as described in the Base Case (additional thermal unit, shunts switched off)?

SUSTAINING CAPITAL FORECAST

OVERVIEW

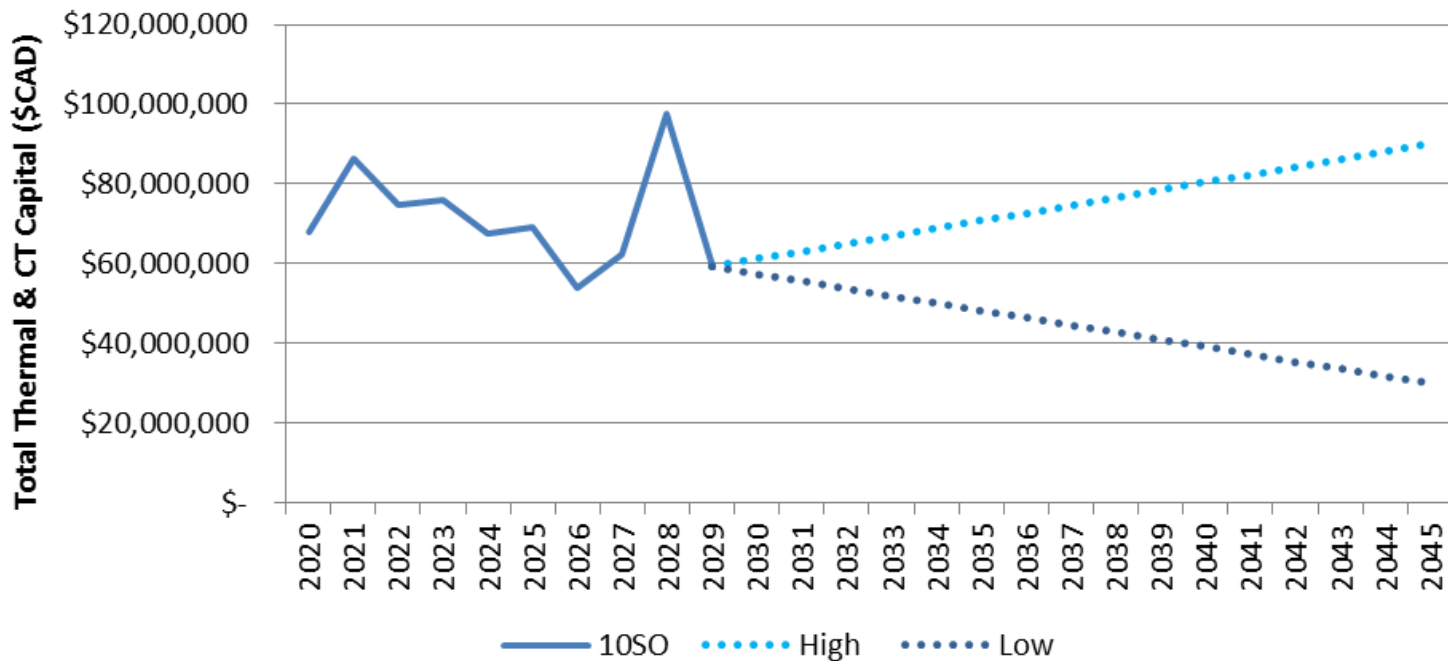
- The Pre-IRP Work provided preliminary high level cost projections for the existing supply side assets on the NS Power system.
- NS Power anticipates the Modeling Plan and Assumptions will include scenarios and/or sensitivities around these assumptions.
- Further detailed unit cost and operating assumptions will be provided in the Assumptions Development phase prior to modeling.
- The team will provide current updates to these parameters during the Assumptions Development phase of the IRP.

SUSTAINING CAPITAL FORECAST: BACKGROUND

- The sustaining capital forecast is developed based upon the expected utilization of the assets. The most recent cost forecast is from the 2019 10 Year System Outlook Report.
- NS Power conducted a Hydro Asset Study to estimate the costs of sustaining and decommissioning small hydro assets on the NS system. These costs, with updates as applicable, will be used as the cost assumptions for existing hydro units.
- Scenarios for sustaining capital (for example, different utilization factors driving different investment profiles) around sustaining capital, particularly in the longer term where uncertainty is increased, will be developed in collaboration with stakeholders through the Modeling Plan and Assumptions Development phases.

SUSTAINING CAPITAL FORECAST: EXAMPLE SCENARIOS

Potential Scenarios for Sustaining Capital
(ILLUSTRATIVE EXAMPLES FOR DISCUSSION ONLY)



PRELIMINARY DR PROGRAM ASSUMPTIONS

DR PROGRAM ASSUMPTIONS: INTRODUCTION

- NS Power has developed draft assumptions for three specific DR programs for discussion.
- Efficiency One (E1) has developed information on DR programs as part of its DSM Potential Study.
- The DR program assumptions are meant to be viewed as potential details of a few specific programs within the larger scope of DR considered by E1.
- NSP will continue to discuss with E1 and stakeholders to define the DR programs to be assessed in the Assumptions Development and Modeling phases of the IRP.

SUMMARY OF PROPOSED DR PROGRAM ASSUMPTIONS

Device	Program	Peak shaving potential (kW/device)	Customer Incentive ¹	Participation Scenario (in year 25)	NSP Total Program Costs (25 year)
Water Heater	Controller installed on customer WH and used during peak shifting events	0.5	\$25 enrollment, \$25/yr when compliant to program criteria	Cumulative 50,779 participants (10% of market), 27 MW peak shaving potential	\$1.49M/MW
EV Supply Equipment	Customer owned and installed EVSE with peak shifting participation incentives	0.7	\$150 enrollment, \$50/yr when compliant to program criteria	Cumulative 89,704 participants (70% of market), 63 MW peak shaving potential	\$1.19M/MW
Residential Battery	Customer contribution comparable to diesel generator installation, utility control for up to defined number of system peak events	2.5	\$2500 customer contribution, Balance of battery cost covered by NSP and funding where available	Cumulative 4,000 participants, 6.25 MW peak shaving potential	\$8M/MW

¹ Customer behaviour-based peak shifting also through residential time of use, commercial time of use, and critical peak pricing rates.