

2020 IRP ASSUMPTIONS: STAKEHOLDER COMMENTS

FEBRUARY 27, 2020

APPROACH

GOALS FOR TODAY

- Discuss **general themes** of the comments received in each assumption category
- Provide **responses & updates** where available
- Facilitate **discussion** on assumptions and take away additional actions
- Propose **approach for closeout** on remaining stakeholder comments



FINANCIAL

STAKEHOLDER THEMES

- Ensure sensitivities reflect variability of financial assumptions
- Consider financing approaches other than utility-owned
- Recognize how the modular nature and increasing experience with some technologies could reduce underlying risks and potential variability of costs

NS POWER APPROACH

- Draft Modeling Plan suggests sensitivities on lower capital costs
 - These sensitivities also serve as a proxy for alternative capital structures
- Assumptions include trajectories showing capital costs for most developing technologies will decrease over time

LOAD

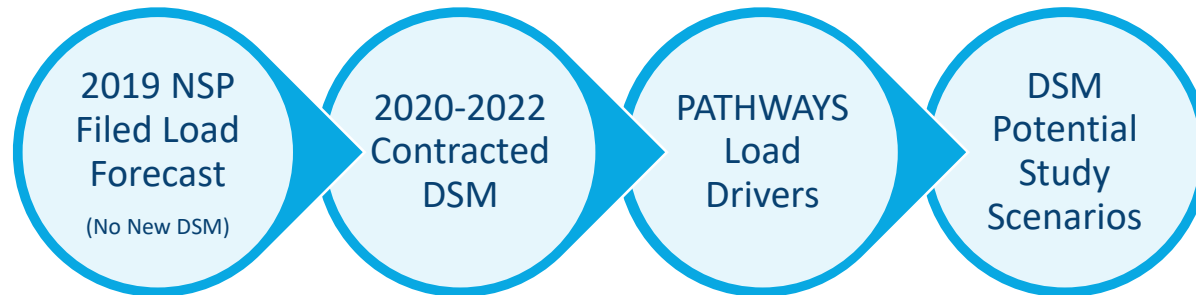
STAKEHOLDER THEMES

- How will electrification and technology change affect the uncertainty of future load (both energy and demand)?
- Is the spread of load forecasts sufficiently wide to capture the current uncertainty?
- How do we consider the broader provincial pathway to net zero emissions?
- Were any modifications made to 2019 Load Forecast as filed?
- How should we appropriately pair DSM scenarios with other drivers?
- How could electrification and technology change affect the future load shape?

LOAD

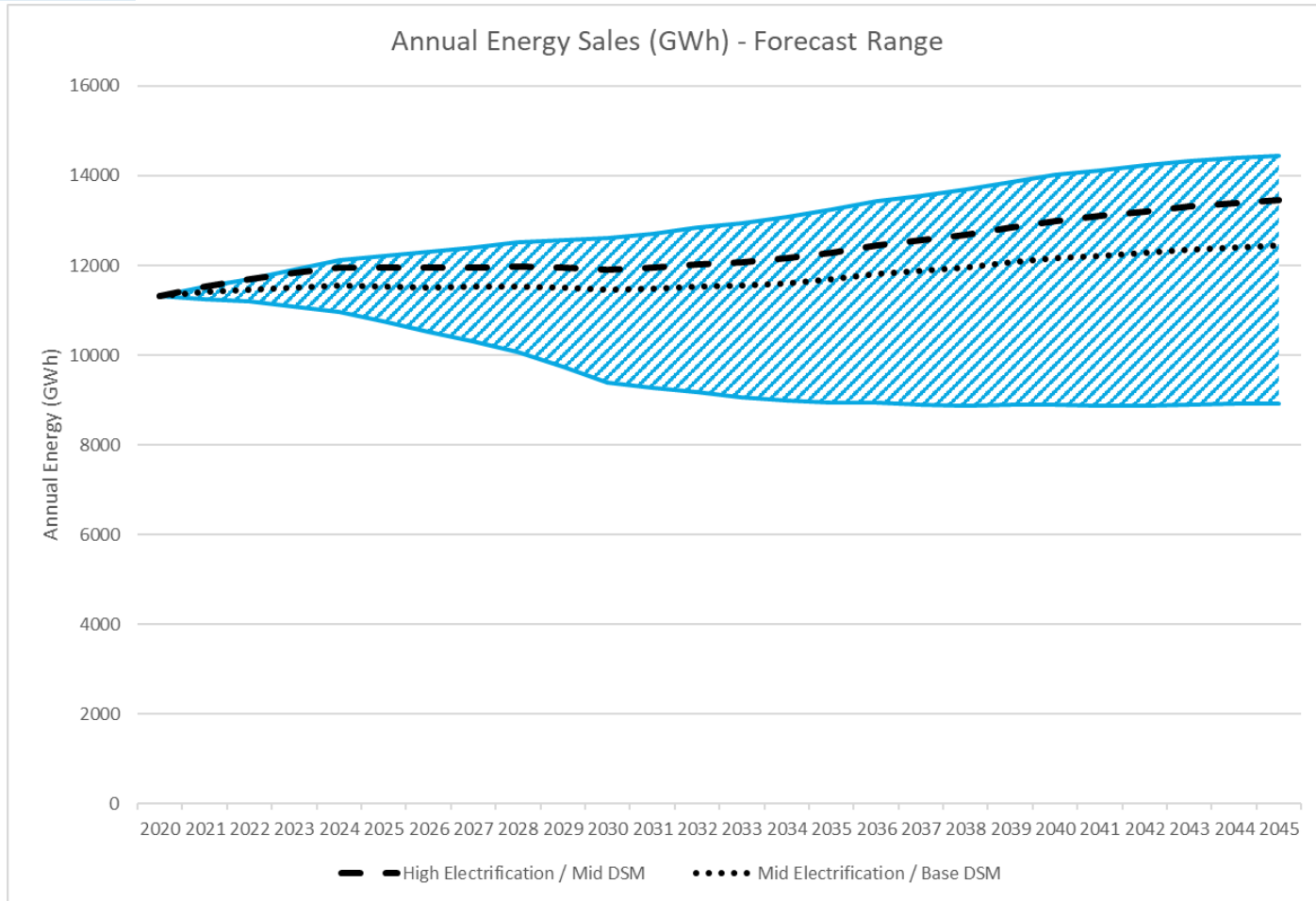
NS POWER APPROACH

- NSP proposes developing IRP load forecasts to integrate 4 sources of data:

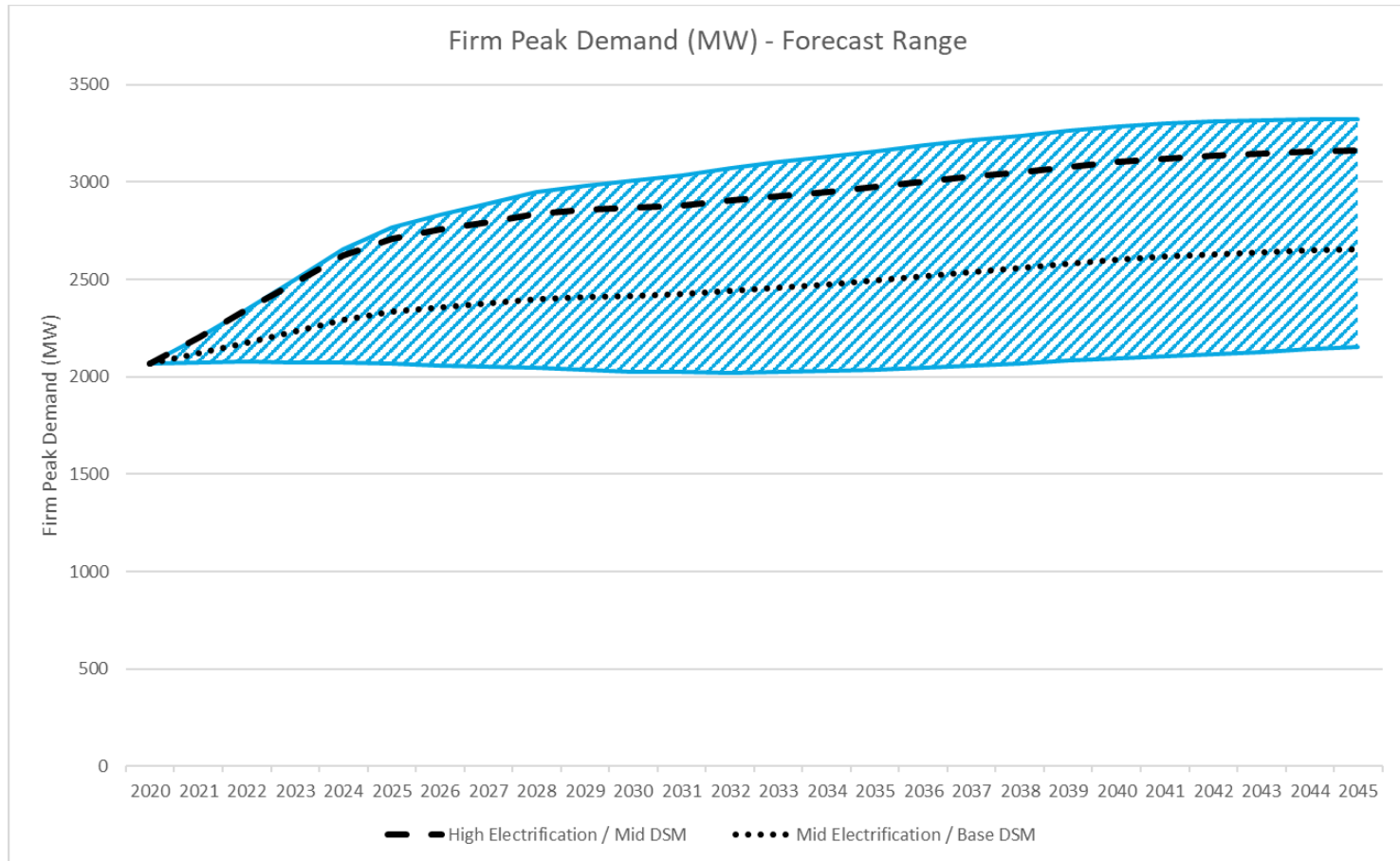


- These load forecasts will then be paired with the appropriate scenarios for the Initial Portfolio Study Phase (based on PATHWAYS Load Driver)
 - For interesting candidate resource plans, multiple DSM Scenarios can be tested
- Intent of this approach is to provide a broad range of forecasts that also captures the provincial pathway to the SDGA targets
- Load shape will be based on 2018 actuals; forecasted shapes will need to be evaluated to ensure reasonableness and adjusted if necessary

LOAD



LOAD



ENVIRONMENTAL

STAKEHOLDER THEMES

- Consider broader approach to decarbonization of Nova Scotia economy
- Look at modeling scenarios which reach Net Zero CO₂ / SDGA targets
- Consider further Renewable Energy Standard requirements
- Consider retirement of all coal units by 2030
- Suggest additional CO₂ emission reductions be modeled prior to 2030

ENVIRONMENTAL

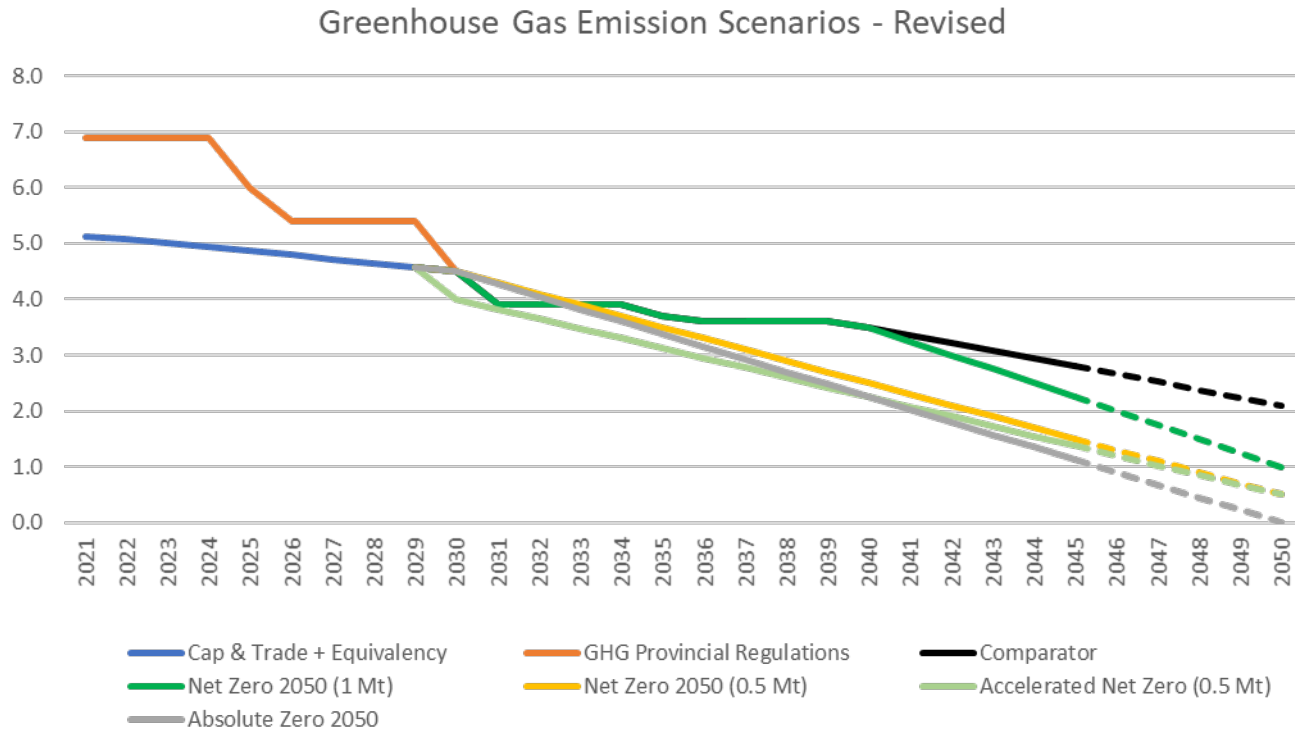
NS POWER APPROACH

- PATHWAYS report informs our approach to economy-wide decarbonization
- NSP has integrated the SDGA into its proposed Initial Portfolios:
 - 7/10 reach Net Zero in 2050
 - 2/10 reach Absolute Zero in 2050
- NSP has proposed an increased Renewable Energy Standard as a sensitivity
- NSP has proposed two GHG Scenarios which include Coal Closure by 2030
 - Net Zero – Moderate Electrification with Early Coal Closure
 - Absolute Zero World

ENVIRONMENTAL

NS POWER APPROACH

- Pre-2030 CO₂ Reductions – additional reductions are already in place:



SUPPLY SIDE

STAKEHOLDER THEMES

- Updates to capital costs with recent publicly available data (2019)
- Modeling of Battery Storage in Plexos (Charging Costs and Benefits)
- Include flexible solar and hybrid (renewable + storage) resources

NS POWER APPROACH

- Revised Assumption Set released Feb. 3 incorporated 2019 cost data
- Battery Storage Modeling in Plexos considers actual charging costs
- Plexos and RESOLVE will add storage and solar/wind together if beneficial; future project planning will inform whether these are co-located

DISTRIBUTED ENERGY RESOURCES

STAKEHOLDER THEMES

- How to consider other Market Drivers that will influence DER besides NPVRR?

NS POWER APPROACH

- This is considered in the load cases; a high DER case incorporates these resources into the load forecast rather than forcing the model to select a supply-side option



DEMAND SIDE MANAGEMENT (DSM)

STAKEHOLDER THEMES

- Adjustment for 2020-2022 DSM supply agreement (timing)
- Terminology – “No DSM” vs. “No New DSM”
- Alignment of DSM profiles with IRP Scenarios / Load Modifier Approach

NS POWER APPROACH

- NS Power will work with E1 on how to adjust the load forecast to incorporate the 2020-2022 contract period without double counting the initial years of the potential study
- 2019 Base Load Forecast includes inherent DSM, but does not include any new DSM assumptions over the IRP study period (“No New DSM”)
- NS Power will utilize a load modifier approach for DSM in the IRP; multiple DSM profiles can be evaluated in a given scenario by adjusting the forecast

IMPORTS

STAKEHOLDER THEMES

- How will reliability and contingency considerations be taken into account?
- How are imports priced based on source and emissions characteristics?
- Are we modeling dispatchable or fixed import volumes?

NS POWER APPROACH

- Reliability considerations for candidate resource plans of interest will be considered during the Reliability and Operability Screening phase
- The model will be provided with pricing for both emitting (with REC / carbon price) and non-emitting sourced imports
- The model will be offered both spot market prices and firm blocks of energy tied to capacity

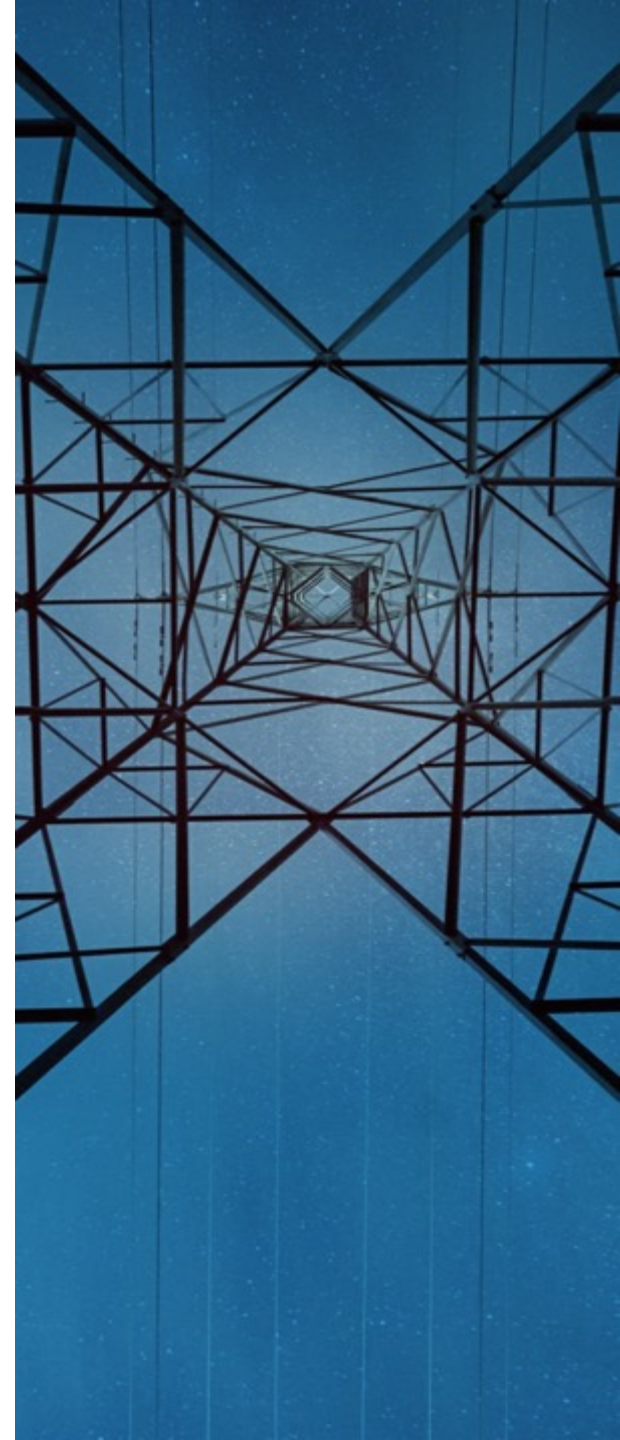
FUEL PRICING

STAKEHOLDER THEMES

- Gas Pricing considerations for new gas generation
- Gas Supply considerations for new gas generation

NS POWER APPROACH

- This is considered in NS Power's proposed approach to fuel pricing with 3 gas supply options:
 - Option 1 – Existing Gas
 - 20,000 MMBtu/day contracted capacity
 - Option 2 – Peaking Gas
 - 100,000 MMBtu/day LNG Winter / Dawn Summer
 - Option 3 – New Baseload Gas
 - 100,000 MMBtu/day new supply
 - Fixed Cost adder to new high C.F. gas builds



SUSTAINING CAPITAL

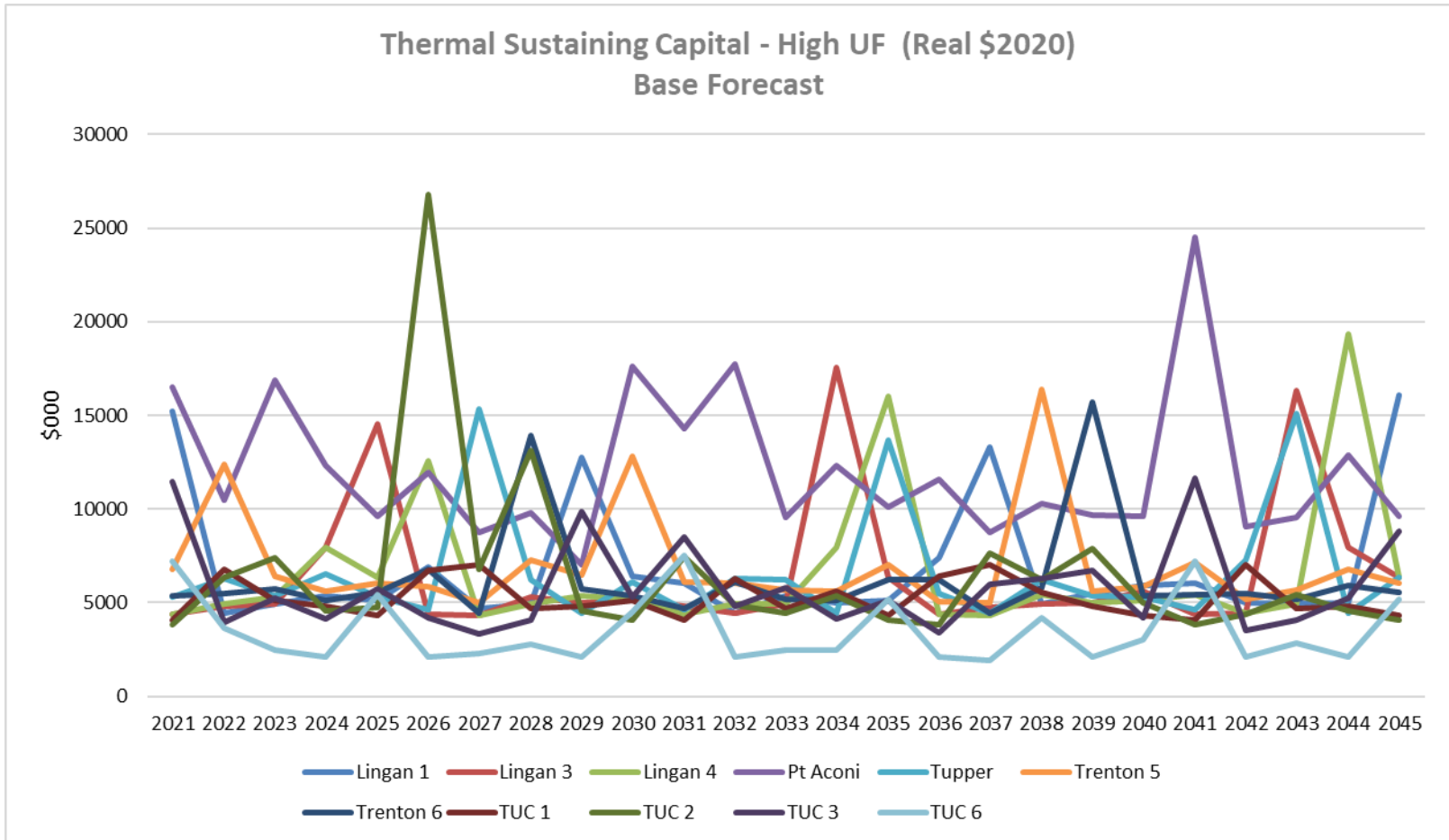
STAKEHOLDER THEMES

- Interested in understanding updated assumptions issued February 3, 2020
- Are we considering adjustments for Utilization Factor?
- Are we considering adjustments for Age of Plant?

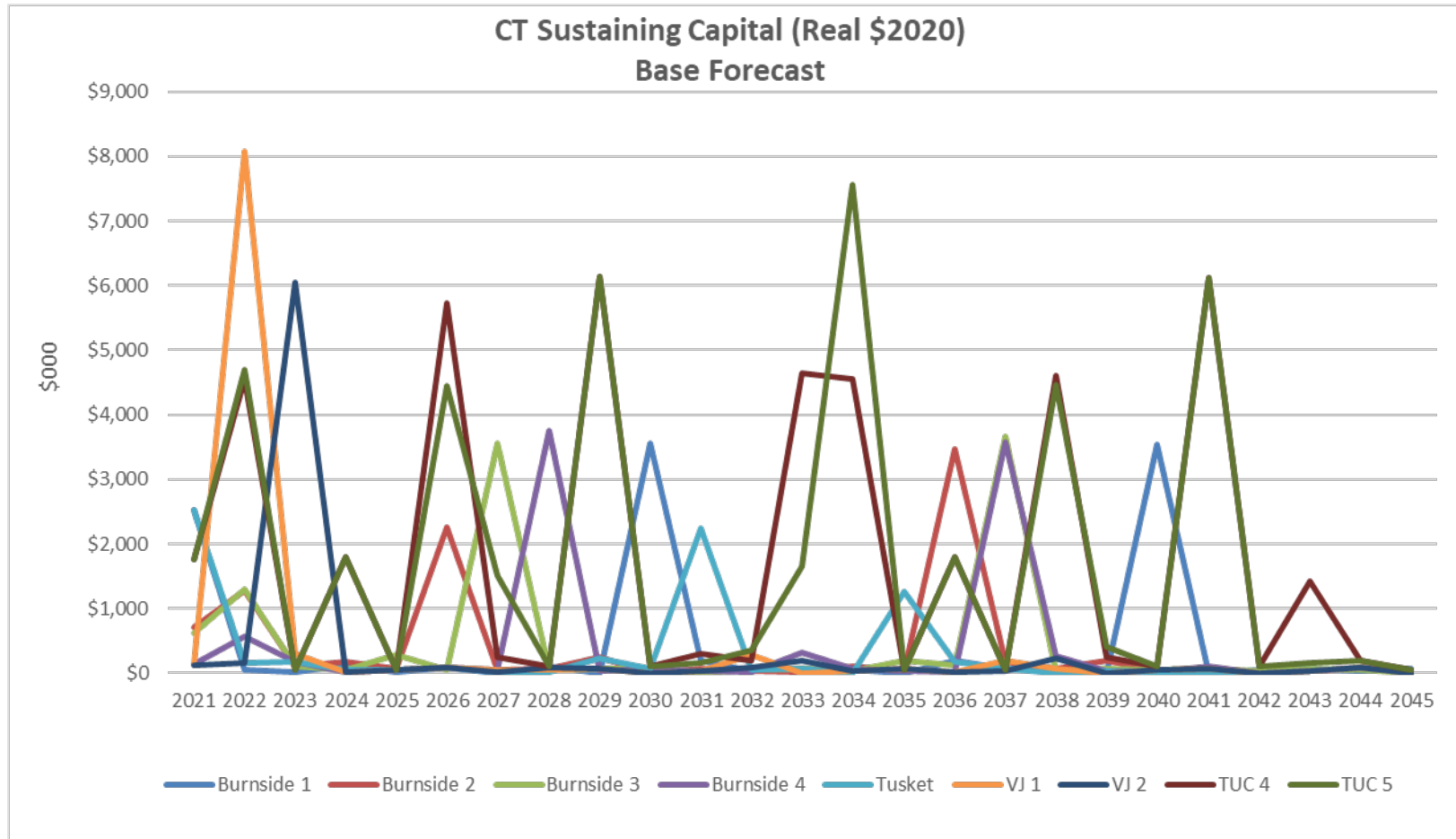
NS POWER APPROACH

- The sustaining capital forecasts issued in the updated assumption set had an error in the title (Nominal \$ should have been replaced with Real \$); corrected assumptions are on the following slides
- Current sustaining capital forecasts are based on current utilization projections; the intention is not to iterate on these costs unless utilization changes dramatically from current expectations

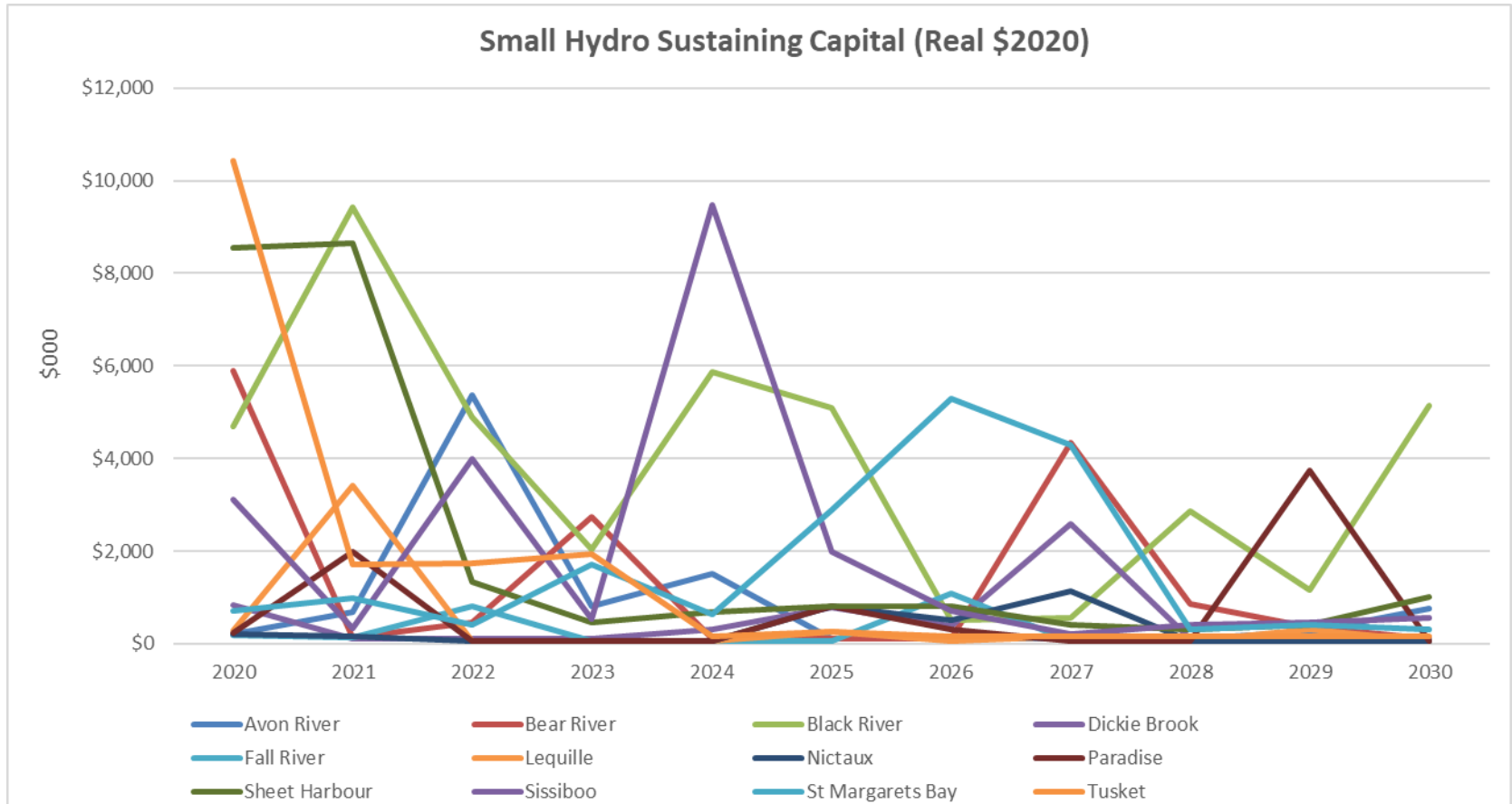
SUSTAINING CAPITAL



SUSTAINING CAPITAL



SUSTAINING CAPITAL



RENEWABLE INTEGRATION

STAKEHOLDER THEMES

- Several stakeholders requested additional detail requested on modeling assumptions being considered for integration of additional variable generation

NS POWER APPROACH

- Additional criteria have been developed via the Pre-IRP PSC Renewable Integration Study work

RENEWABLE INTEGRATION

- The stability study report has identified two possible options to integrate an additional 400 MW of inverter-based generation, represented by a wind as a proxy.
 - **Interconnection Option** : A second 345 KV AC tie between Onslow NS and Salisbury NB.
 - **Local mitigation Option** : A 200 MVA Synchronous Condenser and 200 MW Battery.
- Preliminary results showed that the system is stable with up to an additional 100 MW of wind depending on local mitigations/interconnections.

*Nova Scotia Power Stability Study for Renewable Integration Report, PSC North America, July 2019

RENEWABLE INTEGRATION

- Additional ramping/regulation reserve is required for dealing with increased variability and uncertainty in net load; in addition, retirement of coal units will create a ramping deficit
- 5-minute net load was studied and the 3-sigma approach was used determine the additional ramping reserve requirements
- With large increments of new wind additions, fast-acting generation will be required to offset the increased variability associated with high wind penetration
- For the purpose of IRP modeling, building new inverter-based generation will be linked to additional fast acting generation to satisfy the ramping reserve constraint:

$$* Y \geq 0.028X + 13.455$$

Where: Y ramping reserve in MW and;

X is the inverter-based installed capacity in MW

*Nova Scotia Power Stability Study for Renewable Integration Report, PSC North America, July 2019

ASSUMPTIONS CLOSEOUT

NS POWER APPROACH

- NS Power appreciates the comments that have been submitted by stakeholders in advance as well as the additional discussion in today's session
- NS Power will follow up on any action items taken today and issue a final assumption set on **March 5th**.



ADDITIONAL DISCUSSION