

MEMO

CONSULTANT TEAM



TO: Energy and Environmental Economics, Inc.
FROM: Optimal Energy, an NV5 Company, Consultants to the EEC
DATE: March 10, 2025
RE: Comments on the 2025 Climate Action Strategy: Draft PATHWAYS Modeling Inputs & Assumptions

INTRODUCTION

The Consultants to the Rhode Island Energy Efficiency Council¹ (EEC or Council) submit this memorandum, on behalf of the Council, which summarizes comments and questions on the draft inputs and assumptions used in the 2025 Climate Action Strategy PATHWAYS Model. The EEC Consultants have closely engaged in climate strategy planning in Rhode Island, particularly in our involvement in Public Utilities Commission (PUC) Docket 22-01-NG or Future of Gas Docket. Our work included participation in meetings with the Model Technical Working Group (Model TWG) and review of modeling inputs. As several outputs from Docket 22-01-NG serve as inputs to the PATHWAYS Model, we submit the following feedback to support development of the 2025 Climate Action Strategy.

COMMENTS ON MODELING INPUTS AND ASSUMPTIONS

PATHWAYS MODEL TECHNICAL DOCUMENTATION

- Although device stocks are not explicitly modeled for Energy Only Subsectors, the capital costs that would be associated with equipment upgrades are represented as levelized annual costs on a dollars per MMBtu basis. The PATHWAYS Model Technical Documentation defines energy efficiency costs for Energy Only Subsectors as the “annual levelized costs representing capital investments needed to purchase equipment associated with energy efficiency measures (e.g. the levelized incremental capital cost of efficient boilers relative to conventional boilers).”
 - Does the PATHWAYS Model calculate efficiency costs by applying the levelized annual cost per unit energy saved to the assumed changes in efficiency over time for the equipment stock, or to changes in energy demand for each Energy Only Subsector?
 - Will scenario analysis results produce a range of costs/investment associated with energy efficiency and fuel switching?
 - What types of fuel switching will be assumed in the PATHWAYS Model (e.g., space and water heating electrification, vehicle fleet electrification)?
 - Both publications that inform efficiency costs (Footnotes 18 and 19 in the Technical Documentation) use data from 2018 or earlier. Did the E3 team identify any more recent information that could use more current incremental costs for energy efficiency or adjust cost assumptions derived from the publication sources in the Technical

¹ All materials associated with the Energy Efficiency Council are the work of the “Energy Efficiency and Resource Management Council” and any public meeting materials posted on the RI Secretary of State website should be searched using that title.

Documentation? It is widely understood that costs for incremental efficiency have largely increased due to the market effects of energy efficiency programs over time and increased baselines.

- We anticipate that RI Energy may be able to provide updated incremental cost data, but the EEC Consultants would be willing to support this effort if beneficial.
- Footnote 19 in the PATHWAYS Model Technical Documentation appears to have a broken link. Is this the final version of the presentation by Frick, Murphy, Miller, and Pigman? https://eta-publications.lbl.gov/sites/default/files/cose_cspd_analysis_2021_final_v4.pdf

PATHWAYS MODEL DATA INPUT WORKBOOK

Device Costs Sheet

- We observed some interesting patterns when looking at the changes (or lack thereof) in costs assumptions over time. Are these realistic, and if so, what is driving these patterns of change?
 - Measures are assumed to have no change in capital costs or annual maintenance costs for the entirety of the modeling period
 - Measures assumed to have no change in capital costs for the entirety of the modeling period, except until the last year 2050)
 - Measures have patterns that include steady changes for a period of years, followed by a pause, followed by on and off again changes through the remainder of modeling period
 - Measures have a patter of decreases in capital and/or annual maintenance costs for the first 5-15 years of the modeling period followed by no changes through the remainder of the modeling period
- Why are Efficient Reciprocating Chillers in the Commercial Air Conditioning Subsector the only measure that is assumed to have a change in maintenance costs?
- Why are WalkIn Refrigerators the only measure in the Commercial Refrigeration Subsector that is assumed to have a change in capital costs?
- Why do some of the non “efficient” technologies in the Commercial Water Heating Subsector have decreasing maintenance costs through 2030 while the “efficient” version is static (e.g. Gas Instance vs. Efficient Gas Instant)?
- Gas and LPG Furnace Annual Maintenance Costs in the Residential and Multifamily Space Heating Subsectors observe massive increases in the first few eight years of the modeling period, totaling increases that are orders of magnitude higher than any other measure that is assumed to have capital/maintenance cost increases. Is this accurate? If so, what is the key driver here?

Device Efficiency Sheet

- Of the 175 non-transportation measures, 117 are assumed to have no change in average efficiency over the period of 2025-2050. Is this a realistic assumption?

- Many measures assume increases in efficiency for a period of time to start before defaulting to no increase in efficiency. For these measures, what is the underlying assumption that after a certain point in time efficiency gains will no longer be possible?
- There are several measures that begin with increase in efficiency for several years before moving to no increases for several years, and then increases again for 1 or 2 years in 2041/2042, before returning once again to no increases through the remaining of the modeling period. What is driving this pattern?
- The Air Source Heat Pump – Cooling measure in the Commercial Air Conditioning Subsector is the only measure with changes in efficiency assumptions that starts with no change in the period of 2025-2031 before seeing increases in efficiency beginning in 2032. What is unique about this measure that it has this pattern of change for efficiency assumptions?

Building Shell Inputs Sheet

- What are the assumptions that differentiate Basic and Enhanced Retrofit?
- It appears that the assumption for the additional heating/cooling demand savings from enhanced retrofit over basic retrofit is the same for residential and commercial. In the case of space heating, the enhanced is ~2.06x the basic. For cooling, it is 1.23x. What is driving these assumptions?
- Similarly, for the incremental capital costs, what is driving the assumption that the enhanced retrofits are 3.46x compared to the basic retrofit?
- Since these assumptions are at a single point in time, is there no assumption that costs and/or reductions in heating/cooling demand would change over time, and therefore are static for the entire modeling period?
- Should the assumptions for New Construction Building Shell be updated to align with IECC 2024 Code as it was adopted into statewide building energy codes? If so, how (if at all) would that impact the heating/cooling savings assumptions associated with the Basic and Enhanced shell retrofits?
- Are there underlying assumptions for Commercial building characteristics (e.g., building type)? We ask this question because there are more residential-style/residential-scale Commercial buildings that may have very different characteristics than larger Commercial buildings, particularly as it relates to Building Shell impacts and costs.