

2023 NYSERDA Heat Pumps Phase 2
Indirect Impact Analysis Report (2020-2030)

Final Memo

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Introduction

The NYS Public Service Commission’s Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios through 2025, issued and effective January 16, 2020, approved the deployment of heat pump installations by New York electric utilities through 2025¹. The Order also directed NYSERDA, with an investment of approximately \$230 million through the Clean Energy Fund, to conduct market enabling actions such as consumer education, community engagement, supply chain development, technical assistance, technology innovation and demonstrations and workforce training and development in support of utility heat pump deployment and in support of the state’s energy savings targets from the installation of heat pumps.^{2,3} The electric utilities were also directed to implement a common statewide framework to directly incentivize the adoption of heat pump systems in their territories.

The NYS Clean Heat Program supports the installation of heat pump technologies that are best suited to heat efficiently in cold climates; this requires participating contractors to follow best practices related to sizing, selecting, and installing heat pumps in those climates. While the NY electric utilities incentivize installation of cold climate heat pump systems (ccHPs), NYSERDA promotes education for both consumers and contractors, including required guidance provided by participating contractors to customers who have heat pumps installed on how to operate and maintain their system.

To provide the needed market development support NYSERDA invests in enablement activities, such as:

- Consumer education and community engagement to build demand and reduce soft costs.
- Support of the clean heat supply chain development to ensure that products are affordable and available when and where consumers need them.
- Technical assistance to help consumers navigate/assess options and build market confidence.
- Technology innovation/demonstrations to drive performance improvements.
- Training and development of a clean heating and cooling workforce that ensures a talent pipeline to support the market growth necessary to meet NYS goals.

In addition to implementing these activities, NYSERDA also manages a website with educational material for contractors, generating “contractor leads”. Based on NYSERDA programmatic data, through 2022, there were 431,394 leads generated through marketing activities, with the website being responsible for 245,480 of those leads. The full generation of leads are bulleted below:

- NYSERDA’s [Cooperative Advertising](#) program: 176,996 leads
- [Clean Heating & Cooling Community Campaigns](#): 8,918 leads
- Repeat visitors to [CleanHeat.ny.gov](#) website: 245,480 leads

¹ NYS Public Service Commission. CASE 18-M-0084 Order Authorizing Utility Energy Efficiency and Building Electrification Portfolios Through 2025. Issued and effective January 1, 2020.

² NYS Clean Heat Implementation Plan.

³ With the transition of heat pump programming from Heat Pumps Phase 1 to Heat Pumps Phase 2, utilities took on the role of incentivizing the installation of heat pumps while NYSERDA was directed to support market enabling activities as described herein.

As a result of these market enabling activities, NYSERDA anticipated indirect impacts in the form of increased heat pump adoption and associated energy benefits. For the time period 2020-2022, for which indirect impacts would be assessed in this analysis, NYSERDA anticipated approximately 0.2 Tbtu.

Third-Party Review

In 2023, NYSERDA undertook an internal analysis of heat pump indirect impacts for the Heat Pumps Phase 2 initiative of the Clean Heating and Cooling focus area. This analysis quantified acquired indirect energy savings for the period 2020-2022 and updated the forecast of expected indirect energy savings for the time period of 2023-2030. The analysis relied upon Heating Air Conditioning and Refrigeration Distributors International (HARDI) shipment data as well as data on heat pump installations from NYSERDA and utilities. NYSERDA engaged with an independent evaluator, Cadmus Group, to review and verify the analytic approach and findings.

This section will review the data sources, calculations and assumptions undertaken for the analysis as well as key recommendations and findings.

Data Sources

Cadmus began with NYSERDA's initial indirect forecast, which incorporated data from multiple sources as noted earlier in this memo. Cadmus verified these data sources and found them to be an appropriate source for the forecast and that NYSERDA used them appropriately. Specifically, Cadmus views the HARDI data (used as the base for this forecast) as an accurate source for historical heat pump shipments in the market. To back out utility- and NYSERDA-incentivized heat pump installations, NYSERDA used data directly from utilities, the annual Utility Clean Heat Report, and NYSERDA program data. Cadmus found that NYSERDA included appropriate data, including the projected future installations from these sources. Cadmus found that NYSERDA included some GSPHs and HPWHs in their ASHP totals, which NYSERDA removed in a subsequent iteration. Overall, Cadmus did not recommend any changes in primary data sources.

Calculations and Assumptions

Cadmus reviewed the calculations and assumptions that NYSERDA used in the forecast. Cadmus found that the calculations were generally sound, with minor corrections needed in some places. One calculation that Cadmus recommended NYSERDA modify is the calculation of future ccHP shipments. In the original version, NYSERDA applied a growth rate to both total shipments and ccHP shipments. Instead, Cadmus applied a growth rate to the total HP shipments and then multiplied this by the percentage that were ccHPs. This allowed for a growing share of ccHPs over time, whereas the prior version kept a steady percentage of ccHPs as a percentage of total HP shipments. In Cadmus's revised calculation, Cadmus assumes a maximum market penetration of ccHPs at 73% of total HP shipments.

To calculate a forecasted growth rate, NYSERDA used HARDI data from 2017 to 2021 to identify growth in total shipments as well as the percentage that are cold climate (following NEEP specifications). Using this data, NYSERDA calculated a year-over-year growth rate of 23%, which NYSERDA opted to not use due to the lack of confidence that this growth rate could continue. Instead, NYSERDA used a more conservative 10% year-over-year growth rate across the forecast period (2023-2030), which Cadmus found to be a reasonable estimate in the absence of forecasted data. As noted below, Cadmus

recommends NYSERDA incorporate heat pump growth forecast data from a reputable source in a future iteration of this indirect benefits forecast.

Next, Cadmus noted that NYSERDA assumed naturally occurring marked adoption (NOMAD) at a constant 50% across the period, whereas Cadmus typically sees NOMAD grow slowly over time. In the absence of a full study to calculate NOMAD, Cadmus applied a 1%-point increase over the forecast period, starting at 50% in 2020 and ending at 60% in 2030. As noted below, Cadmus recommends NYSERDA conduct a study to measure NOMAD to improve the accuracy of this forecast.

Finally, Cadmus applied a heat pump tonnage correction to merge the HARDI data with the savings values provided by the 2022 Heat Pump Impact Evaluation Report (2022 Impact Report).⁴ As calculated by Cadmus using data from the 2022 Impact Report, the estimated average tonnage (based on the mean conditioned square footage of homes included in the impact evaluation sample) was 3.73. However, the average tonnage of HP shipments to NY state from the HARDI data was 1.93. Thus, Cadmus applied a factor of 51.7% to scale the HARDI data to match the estimated tonnage from the 2022 Impact Report. In other words, this factor assumes that the total tonnage from both sources is equal, allowing the usage of the 2022 Impact Report savings value.

Recommendations

Through its review, Cadmus generated the following overall recommendations (all recommendations have been addressed and incorporated into forecast by NYSERDA). Cadmus provided several other minor recommendations to NYSERDA resulting in slight clarifications or corrections to the forecast analysis.

1. Include details describing the specifics of the market, parties impacting this market, technologies included in the forecast, and narrative of how indirect benefits are generated (i.e., additional stocking by distributors, marketing/lead generation, etc.) to ensure reviewers have clarity regarding the scope of the forecast.
 - a. *NYSERDA addressed this recommendation by incorporating additional language into the forecast and delivering this memo with the forecast.*
2. If needed, ensure that savings are available by fuel type to match NYSERDA reporting needs.
 - a. *NYSERDA will review and update, as needed, its data formats to align with its established reporting template.*
3. Modify the NOMAD assumption to show a slow increase over time. For increased accuracy, conduct a study to estimate NOMAD rather than using an assumption.
 - a. *NYSERDA revised the calculation taking increasing NOMAD into account beginning at 50% in 2020 and growing by 1%-point per year. NYSERDA was also in agreement from the start at a general growth rate should be applied to the NOMAD ,but clarity was needed on the rate to apply.*

⁴ New York State Energy Research and Development Authority (NYSERDA). 2022. Heat Pump Impact Evaluation. Prepared by DNV, Katy, Texas. <https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/PPSER/Program-Evaluation/Heat-Pump-Impact-Evaluation-Report-August-2022.pdf>.

4. Modify the growth rate assumption to be steady 10% year-over-year growth while holding the percentage of ccHP at a constant 73%. For increased growth rate accuracy, consider incorporating forecasted HP data from another source, as HARDI only includes historical data.
 - a. *NYSERDA revised the calculation to incorporate these revisions.*
5. Scale the HARDI data to match the estimated tonnage values in the 2022 Heat Pump Impact Evaluation Report to ensure accuracy of savings calculations.

In addition, NYSERDA will also pursue the “additionality” analyses, as outlined in the July 2023 PSC Order and NYSERDA’s November 1, 2023 CEF 2.0 proposal, to better understand the impact of NYSERDA’s heat pump market support on heat pump uptake and indirect savings

Findings

Key findings from the Heat Pumps Phase 2 Indirect Impacts Analysis and review by Cadmus include:

- Acquired indirect energy savings of nearly 1.0 TBTU for the time period 2020-2022. This significantly exceeds the originally forecasted indirect energy savings of 0.2 TBTU for the same period.
- Forecasted future indirect energy savings of 1.2 TBTU for the period 2023-2025, rising to 4.0 TBTU for the period 2023-2030.