June 2, 2021

MEMORANDUM

TO: **Council Members**

FROM: **Kevin Smit**

SUBJECT: **End-Use Load Research and the Impacts of COVID**

BACKGROUND:

Presenters: David Clement, Northwest Energy Efficiency Alliance

Summary: The End-Use Load Research (EULR) project is a region-wide effort to collect detailed electricity consumption by end-use from homes and businesses. The project was started in 2016 and metering of individual homes began in 2018 and commercial building metering began in 2019. The metering collects consumption data at the 1-minute level which provides a detailed look and when and how much electricity is being consumed. These data will enable planners and evaluators to estimate the impacts of energy efficiency and demand response measures and programs more accurately.

Since the metering was initiated pre-COVID, and continued during 2020 and now into 2021, we now have data that show some of the impacts on our consumption habits. The presentation will highlight these findings.

Funding for this effort is provided primarily by northwest utilities and the project is managed by the Northwest Energy Efficiency Alliance (NEEA).

Relevance: The EULR project will result in a substantial new data set that shows how Northwest homes and businesses use their electricity. The Council utilizes

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these data numerous ways including the development of our energy efficiency potential estimates for the Power Plan.

Workplan: B.1.1 Conservation – Continue coordinating with NEEA and other regional entities to improve our end-use data. Also B.1.4 – enhance our understanding of the capacity impacts of EE.
B.2.2 Demand Response – Coordinate with regional entities regarding the impacts of DR.
B.3.3 Load Forecasting – continued enhancement of the council's forecasting models.

Background: The region last conduced an end-use load study in 1980. The Council has been and continues to use the load shape data from that study in its load forecasting and energy efficiency estimates for power planning. About ten years ago, Council and Council staff began encouraging the region to develop and implement another end-use metering study. This led to the current study that is being funded by a dozen regional utilities plus the National Renewable Energy Laboratory and the Department of Energy and managed by NEEA.

Northwest End Use Load Research Project

Northwest Power & Conservation Council
June 9, 2021

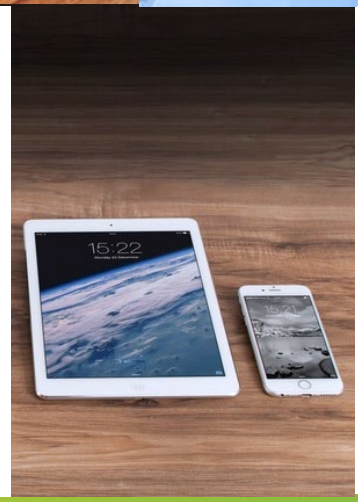
David Clement
Senior Program Manager, NEEA

Introduction

Background

ELCAP, the last large end-use load study was conducted in the late 1980s.

Since then, end use technologies and the ways we use energy have changed dramatically.



Project Sponsors

Metering Studies

Home Energy Metering Study (HEMS)

400 homes, targeting high-priority HVAC end uses

Over 200 installed and metering today

Commercial Energy Metering Study (CEMS)

100 buildings, targeting office and retail

Installations were just getting started when COVID-19 arrived

A Building Stock Assessment Information Base

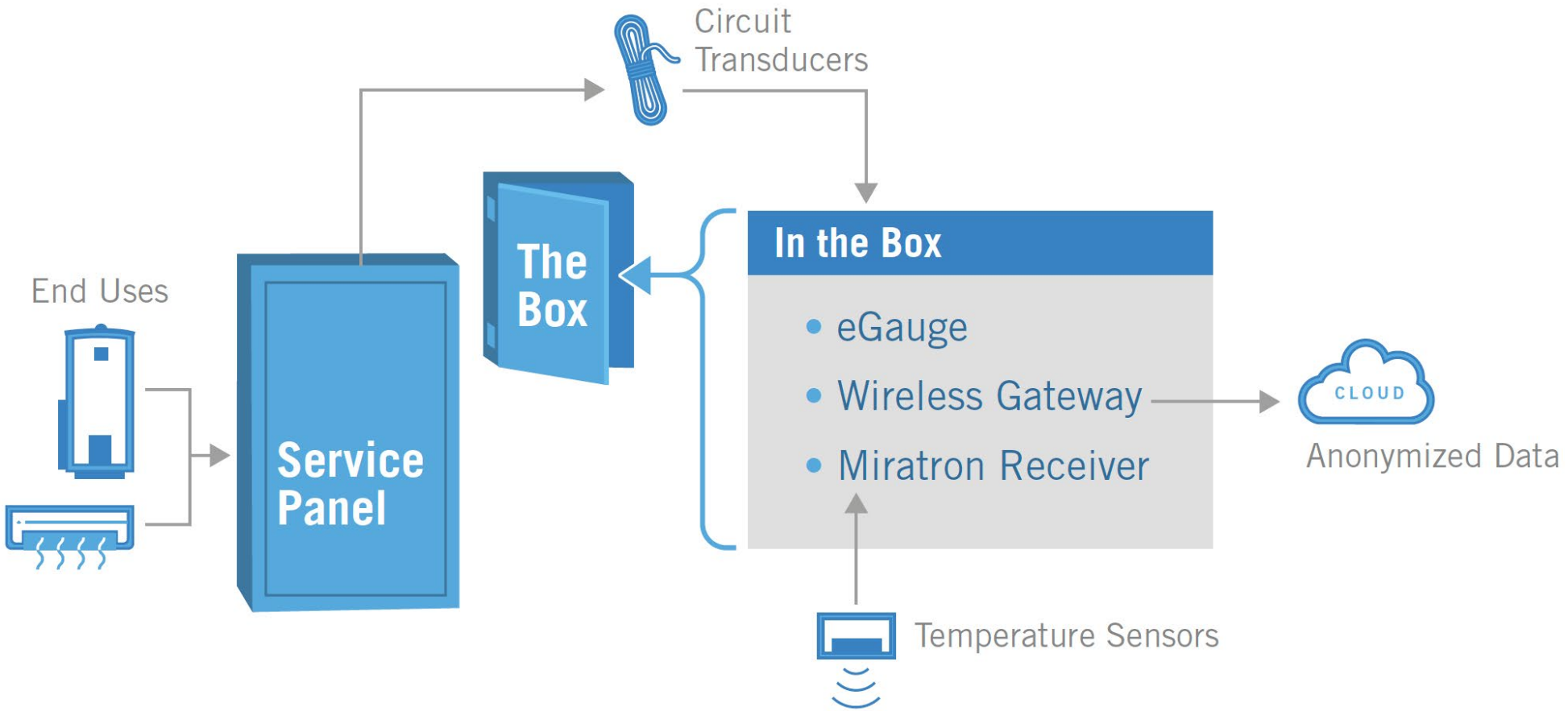
Residential (RBSA)

- 1,100 homes
- Detailed electronics, appliances, lighting, insulation

Commercial (CBSA)

- 860 buildings
- 12 building types
- Detailed lighting, water heating, refrigeration

How We Capture Residential End Use Data



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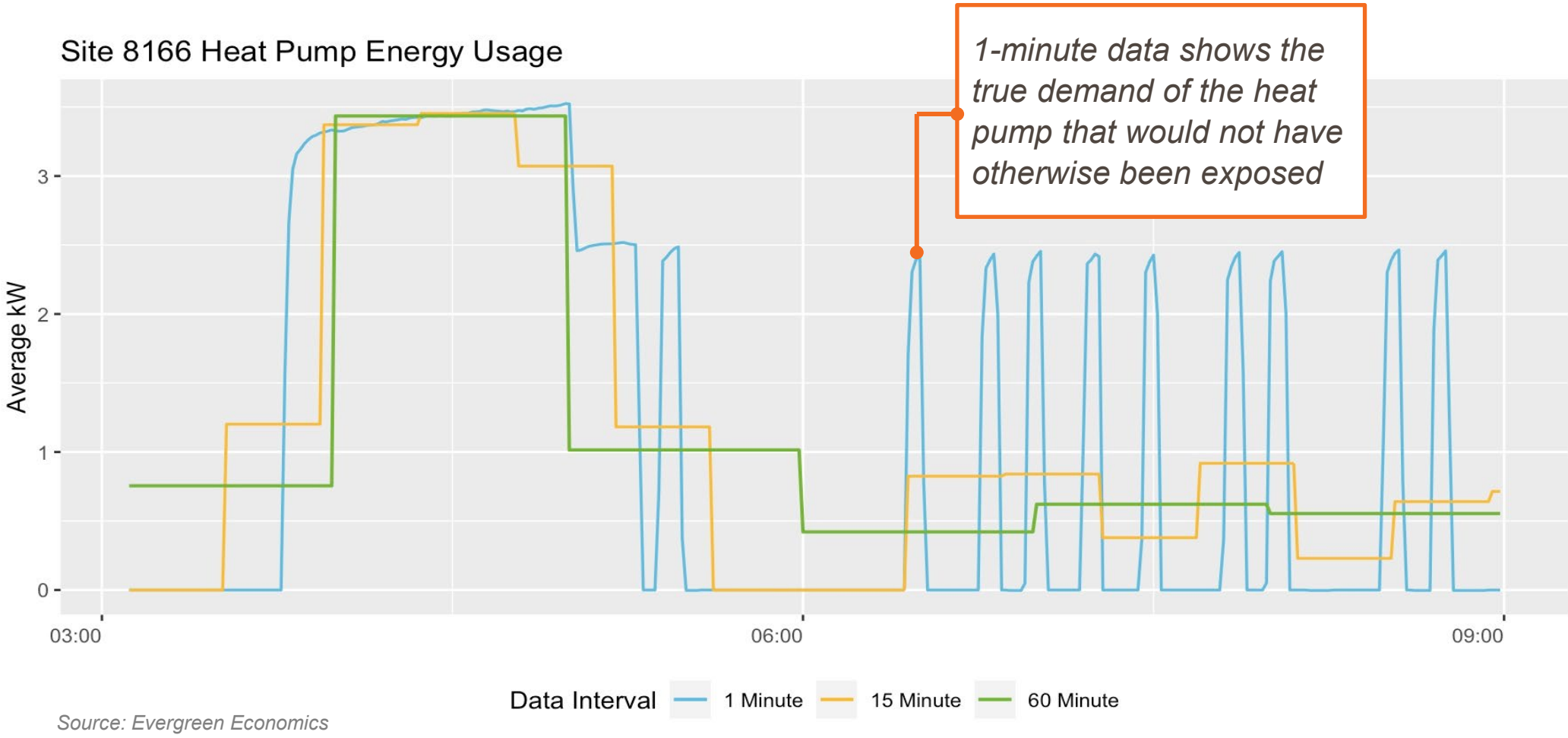
1-Minute Data Provides Acute Insight Into Residential Electricity Use



Source: Evergreen Economics

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Research Value to the Region Identified by the Project Working Group

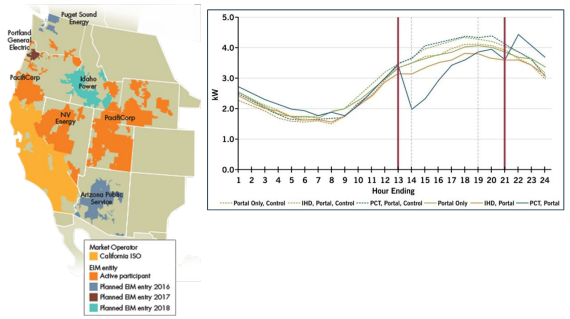
Energy Efficiency

Money Isn't All You're Saving

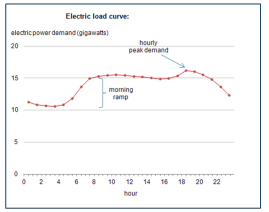
$350,000,000

Average annual utility spending on energy efficiency in the Pacific Northwest

Demand Response

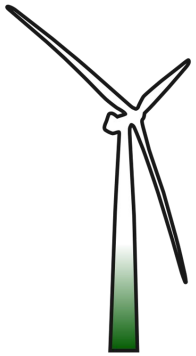


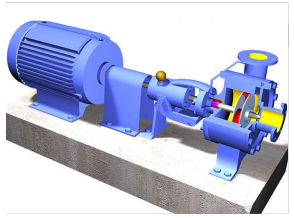
Load Forecasting



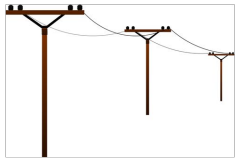
- Daily Generation Planning
- Power Marketing
- Short-term Peaking Capacity
- Integrated Resource Planning
- Revenue Forecasting
- Transmission & Distribution Planning

Integrated Resource Planning





Transmission and Distribution Planning



Financial Planning and Rate-making

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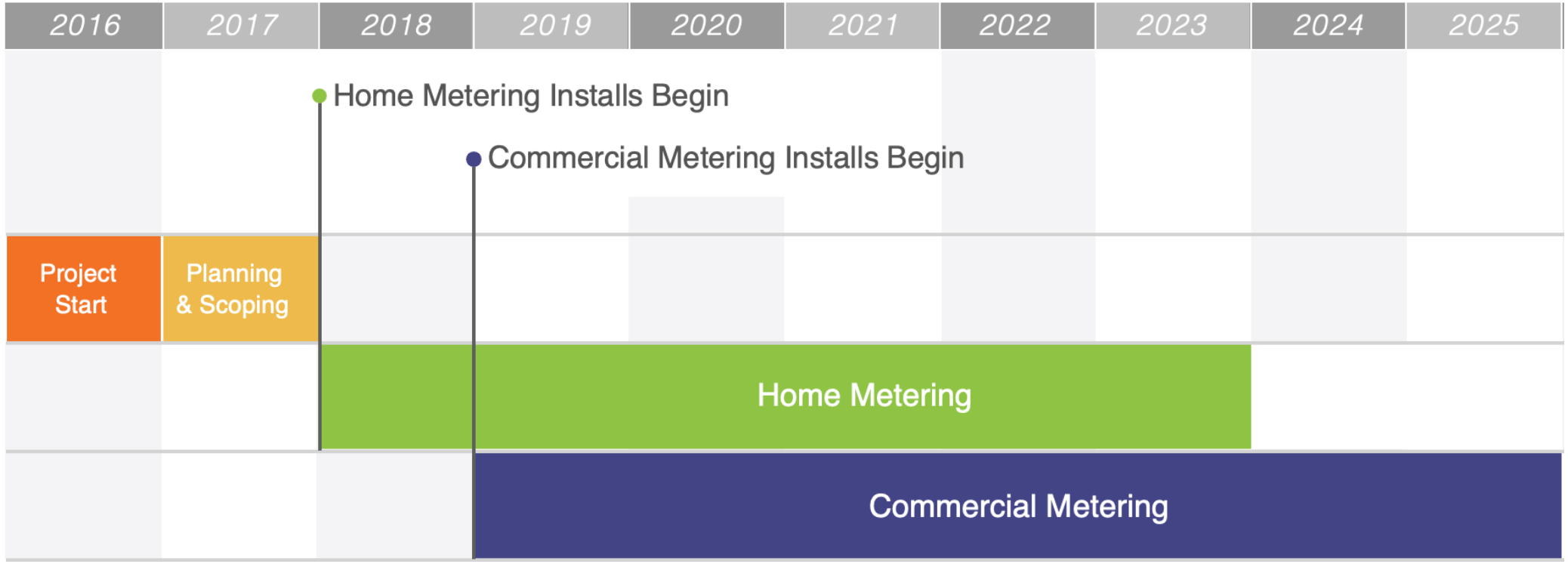
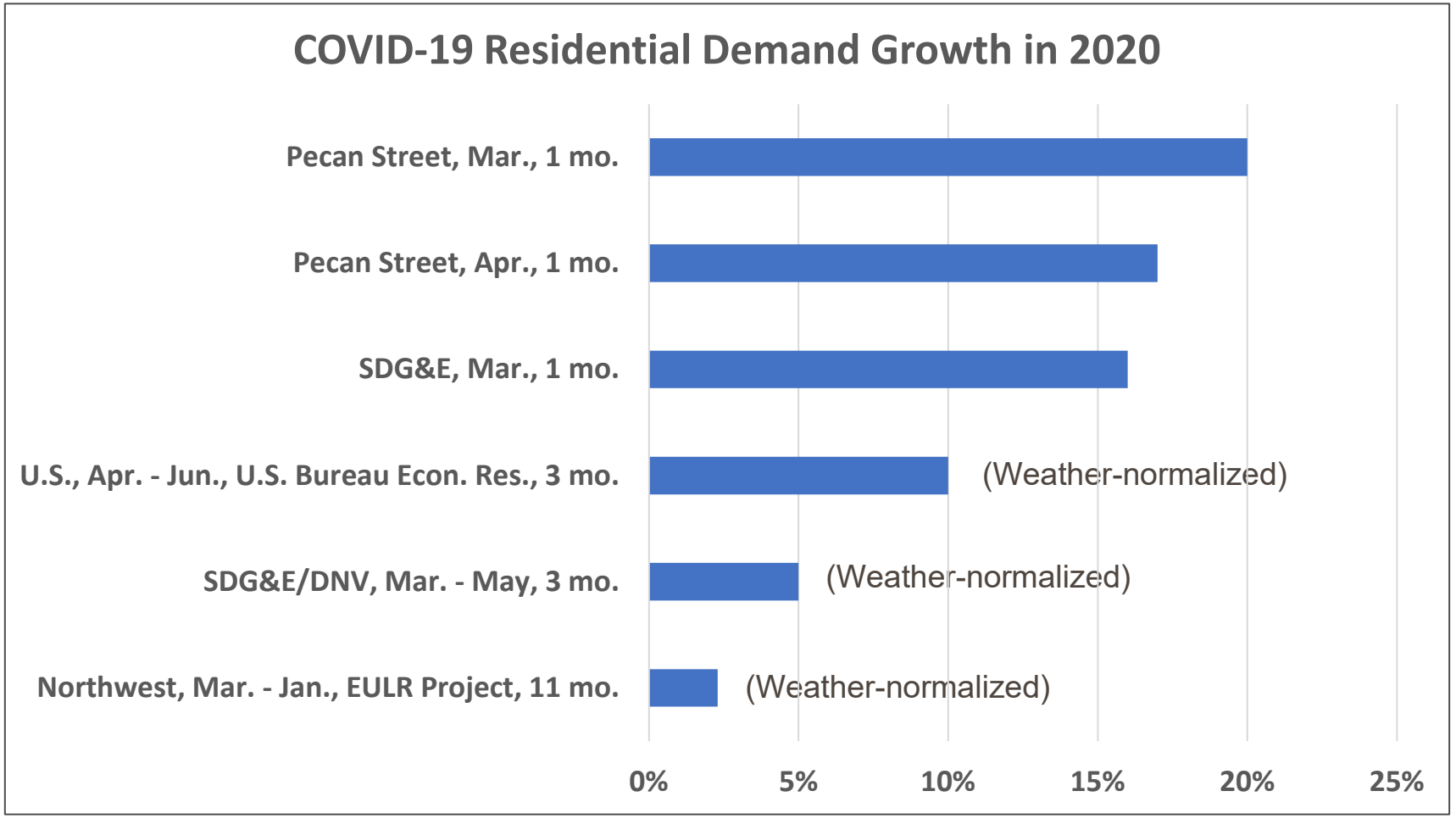
Project Timeline Lengthens a Year With COVID-19



Note: Timeline subject to change pending COVID impacts.

COVID-19 Impacts to Residential Electricity Demand

COVID-19: Higher Residential Demand Reported



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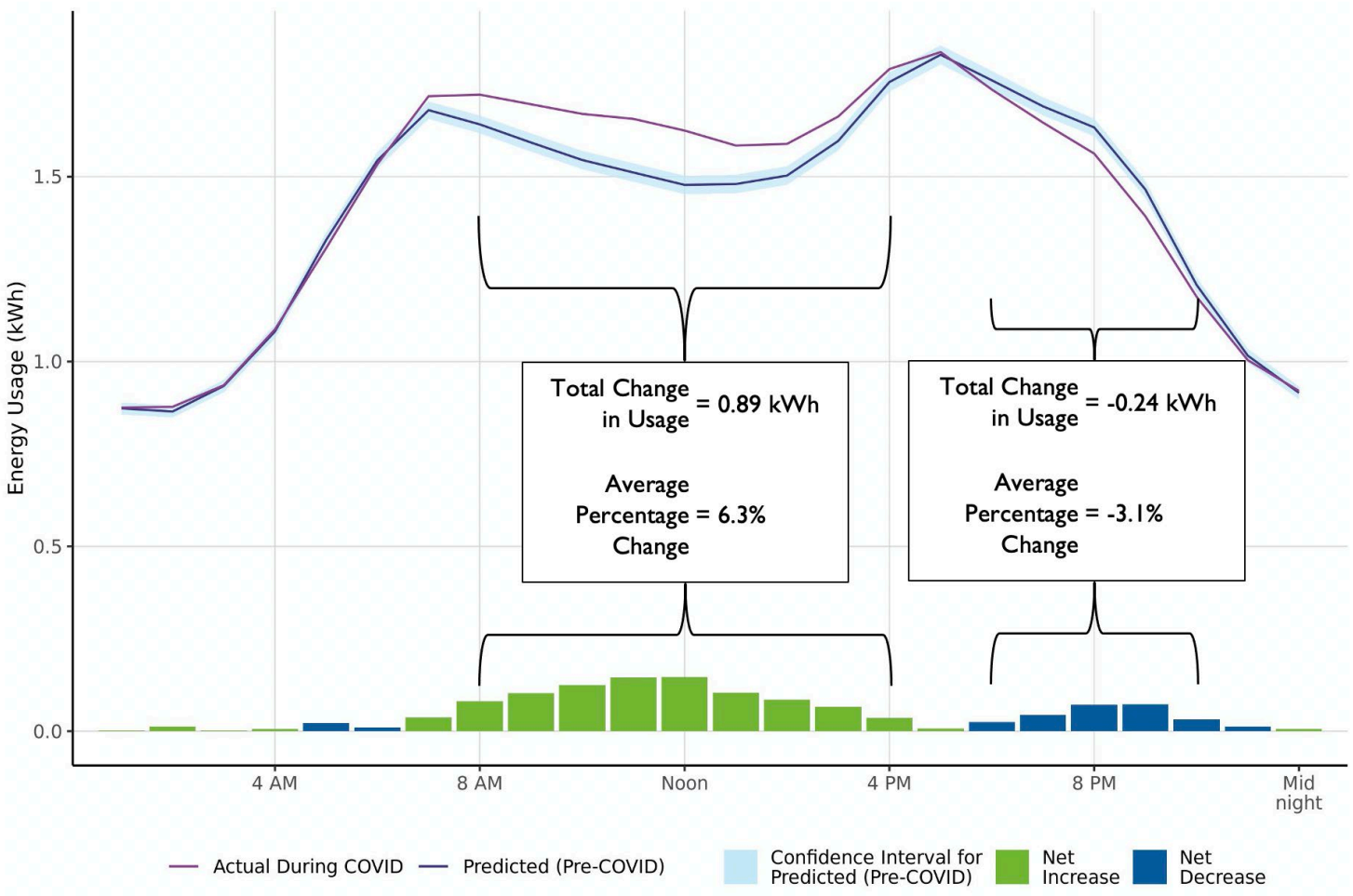
Northwest Residential Load Shape During COVID-19
From March 2020 Through January 2021



Source: Evergreen Economics

COVID-19 Impacts Not Consistent Over Time

Defining COVID-19 Phases

- **Phase 1: Start of the Pandemic**

  Starts when “mobility” begins to decline (early March 2020) and ends when stay-at-home orders are issued (late March 2020)

- **Phase 2: Shelter-in-Place**

  Ends at the first stage of reopening (June 2020)

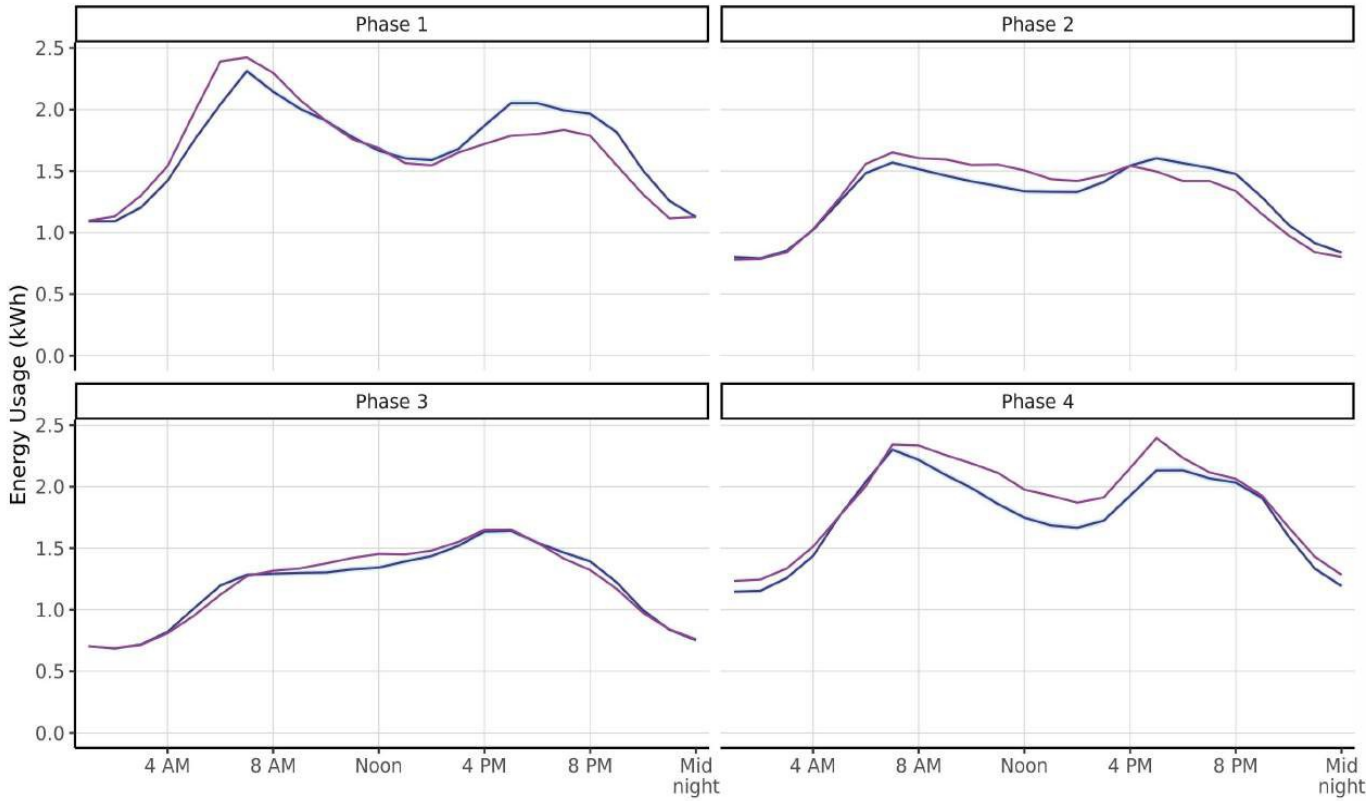
- **Phase 3: Summer Re-Opening**

  Ends when the first lifted restriction is reissued (mid-November 2020)

- **Phase 4: Late Fall / Winter Surge**

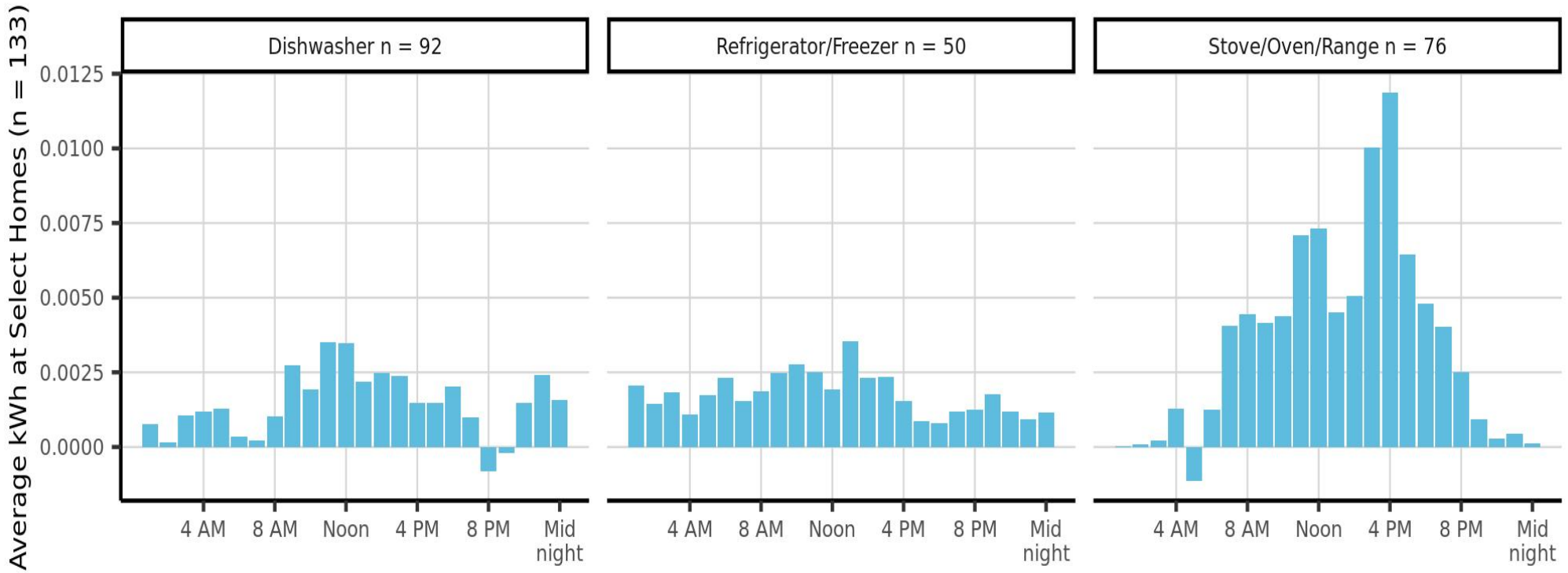
  Ends at the end of our analysis (January 31, 2021)

Whole Home Load Shape Phases During COVID-19



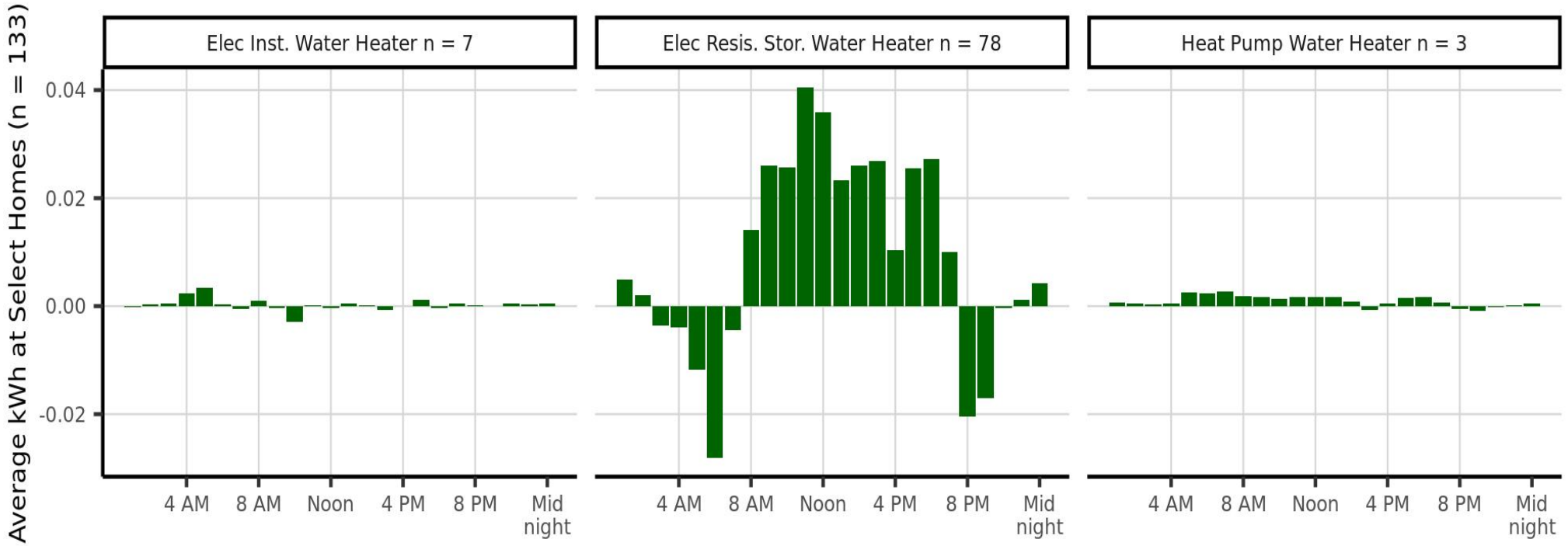
Source: Evergreen Economics

Changes in Kitchen Electricity Use During COVID-19



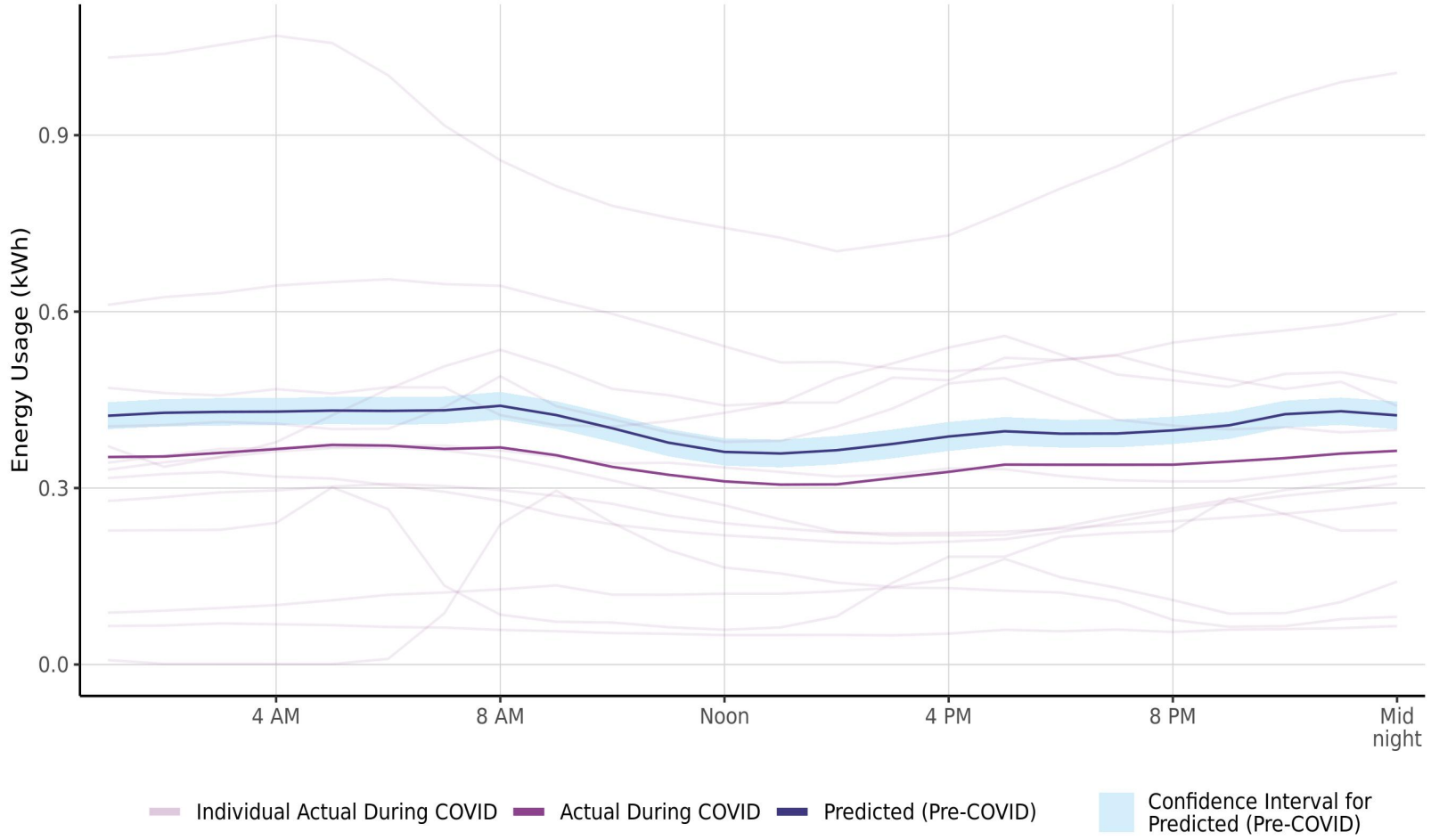
Source: Evergreen Economics

Kitchen and Laundry Increased Hot Water Demand



Source: Evergreen Economics

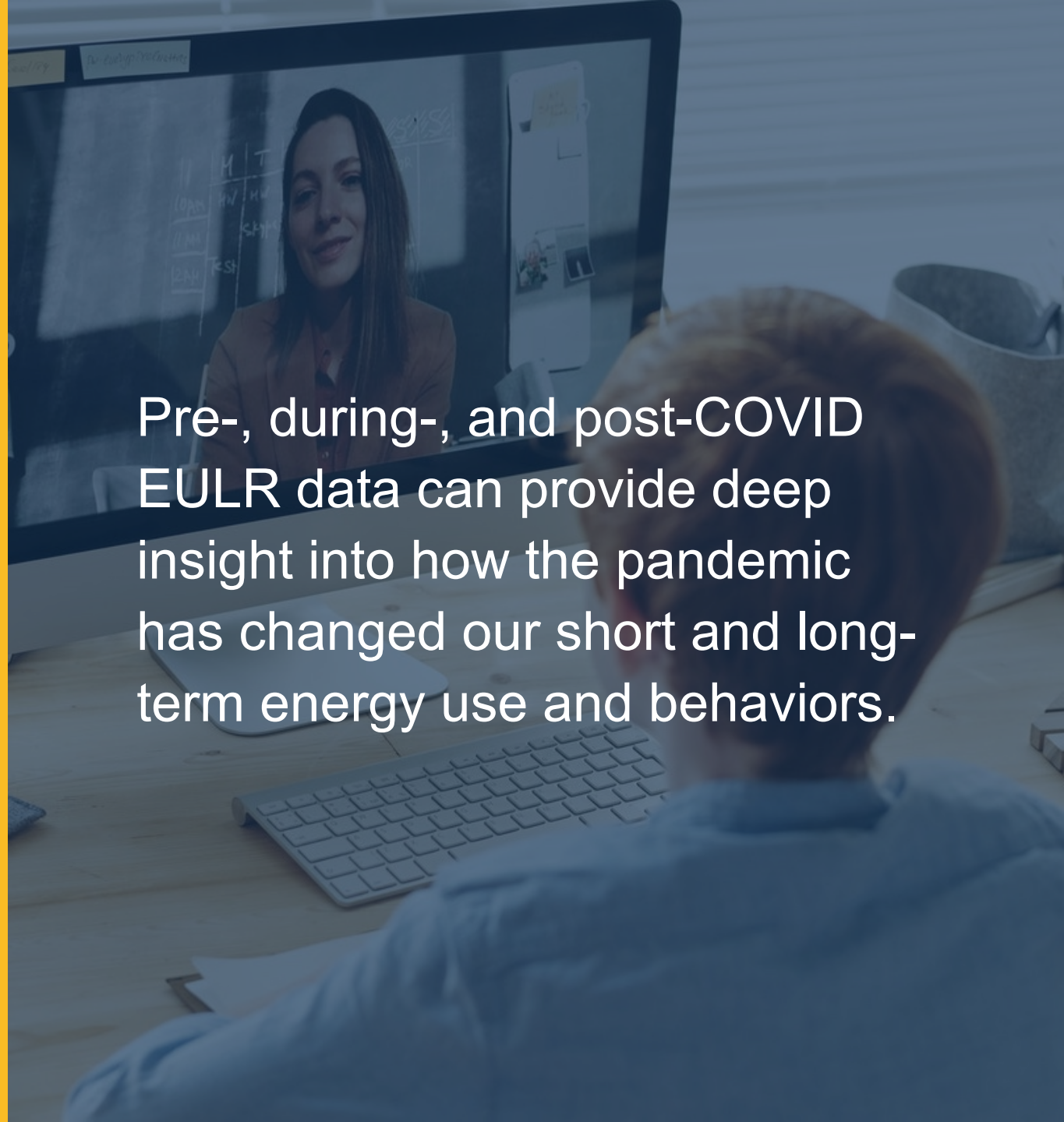
An Unexpected Impact: Ductless Heat Pumps



Source: Evergreen Economics

Summary

COVID-19 Impacts & Opportunities

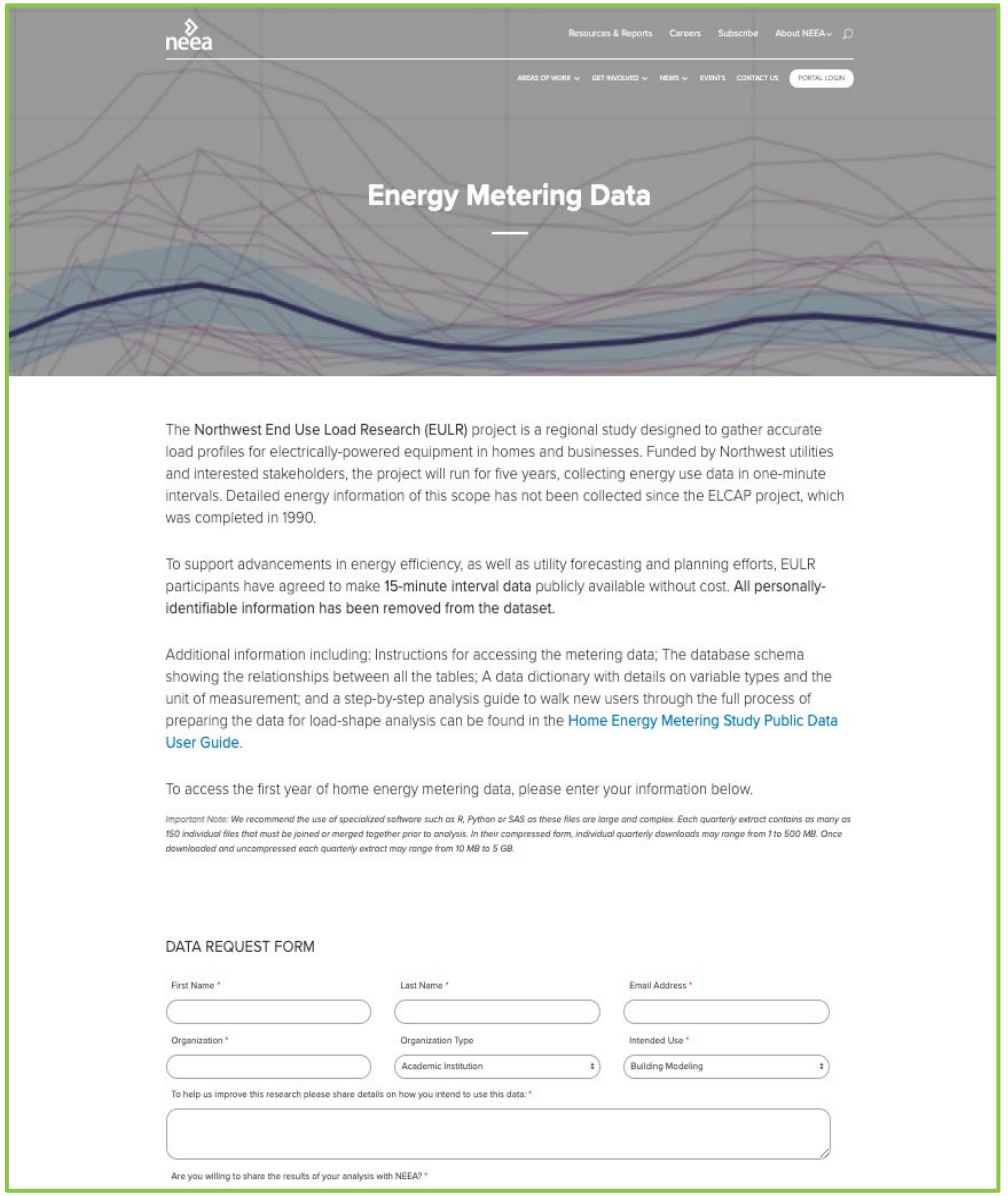


Pre-, during-, and post-COVID EULR data can provide deep insight into how the pandemic has changed our short and long-term energy use and behaviors.

Access Publicly Available Data

- 15-minute residential data is free to download
- Sharing of analyses and findings is encouraged

neea.org/EULRdata



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Northwest End Use Load Research Recap

Billions of data points & wide application

One-of-a-kind study, including pre-, during, & post-pandemic period

Data has extraordinary potential to inform and help in shaping our energy future

Questions?

neea.org/EULR

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David Clement

David is a Senior Program Manager with the Northwest Energy Efficiency Alliance (NEEA). He leads the Northwest End Use Load Research project, consisting of the Home Energy Metering Study (HEMS) and the Commercial Energy Metering Study (CEMS). In prior positions, David was Director of Resource Planning, Forecasting, & Analysis for Seattle City Light, where he led five integrated resource plans (IRPs). He also was Director of the Electric Transmission and Western Energy Services at Cambridge Energy Research Associates (CERA). At PacifiCorp, he managed Corporate Strategic Planning and was a Senior Analyst in the Economic Development and Load Forecasting Departments. He holds a Masters in Agricultural & Resource Economics from Oregon State University.