# NEEP Regional Electrification Survey Results

## Paving the Pathway to Electrification: What Tools and Data are Available and What's Needed

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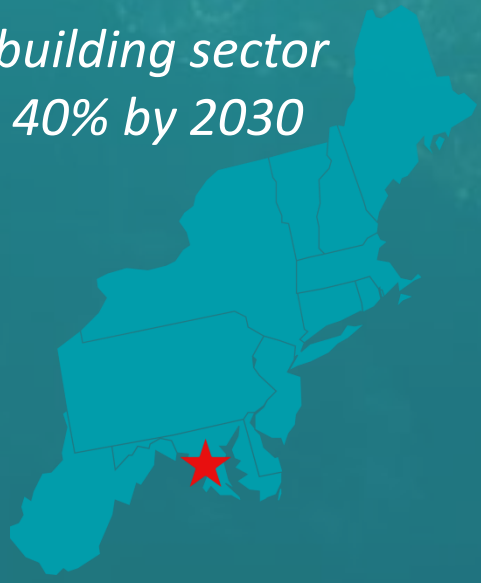
This slide deck was developed based upon funding from the Alliance for Sustainable Energy, LLC, Managing and Operating Contractor for the National Renewable Energy Laboratory for the U.S. Department of Energy.

- NREL technical experts provide unbiased information on energy efficiency and renewable energy for state, local, and tribal decision-makers—and often partner with the most regionally-efficient organizations to accomplish this mission.
- Stakeholder information gathered in collaboration with NEEP informs the NREL, national lab, and DOE research portfolio.

# Northeast Energy Efficiency Partnerships

*"Assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption 3% per year and carbon emissions 40% by 2030 (relative to 2001)"*



## Mission

We seek to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities.

## Vision

We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work, and play.

## Approach

Drive market transformation regionally by fostering collaboration and innovation, developing tools, and disseminating knowledge.

# The Survey grows out of NEEP's Strategic Electrification research on state policies, pathway elements, and potential next steps. (Regional Assessment and Action Plan)

Three critical elements to a strategic electrification pathway that can benefit consumers, businesses, and the environment:


| Heat pumps, EVs | Thermal improvements | Flexible use of electricity |
|---|---|---|

# Synapse Energy Economics

- Founded in 1996 by CEO Bruce Biewald
- Leader for public interest and government clients in providing rigorous analysis of the electric power sector
- Staff of 30 includes experts in energy and environmental economics and environmental compliance

# Objectives of this webinar

- Introduce the strategic electrification survey funded by U.S. Department of Energy/NREL, carried out through NEEP, and delivered by Synapse Energy Economics
- Provide the survey results and share key findings
- Seek further feedback on valuable tools and resources
- Facilitate resource sharing on strategic electrification activities

# Survey Objective and Scope

# Objectives and goals of the regional electrification survey

- Identify useful tools, resources, and databases that regional stakeholders:
  a) are currently using to promote or assess impacts of strategic electrification, and
  b) would like to have to further their current work directly or indirectly concerning strategic electrification.
- Allow interested states to accelerate strategic electrification by:
  - Fostering effective resource sharing
  - Finding gaps in resources
  - Identifying new research needs and areas regarding strategic electrification

# Survey response overview

Survey process:

- Sent to about 80 stakeholders
- Focus on New England and New York
- Received responses from 20 entities or agencies

Survey responses by stakeholder type:

- State energy offices (7)
- State consumer advocate offices (1)
- State air regulators (0)
- State utility regulators (1)
- Utilities and program administrators (4)
- Local governments (3)
- Others: Consultants, U.S. EPA, Belmont Light (4)

# Current Electrification Activities

# Activities are diverse and still developing

- Developing strategies to reach state or local GHG emission reduction goals
- Promoting electrification through state, utility, and local programs and codes (e.g., incentives, metrics, milestones, new framework)
- Evaluating various impacts of electrification (e.g., penetration, performance, energy sales, emissions, costs, economics)
- Exploring best practices and developing tools/models to assess electrification
- Considering development of regulatory framework and new tariff designs to spur the development of EV charging stations and encourage adoption of EVs
- Analyzing market characteristics for heat pumps (market segments, potential customers, and availability of contractors)
- Working on contractor training, supply chain, and manufacturer engagement
- Investigating building and transportation electrification for city buildings and fleets

# Key findings

- Interested states and stakeholders are at different stages of assessing or promoting impacts of electrification
  - A few jurisdictions do not yet have policies or activities to promote electrification, but want to understand electrification and its impacts
  - Many stakeholders/jurisdictions are at the early stage of promoting electrification and are seeking new tools and resources
  - A few stakeholders/jurisdictions have developed tools and resources they need while exploring improvements to the tools or resources (e.g., New York, Massachusetts)

# Tools, Resources, & Data: Currently Used

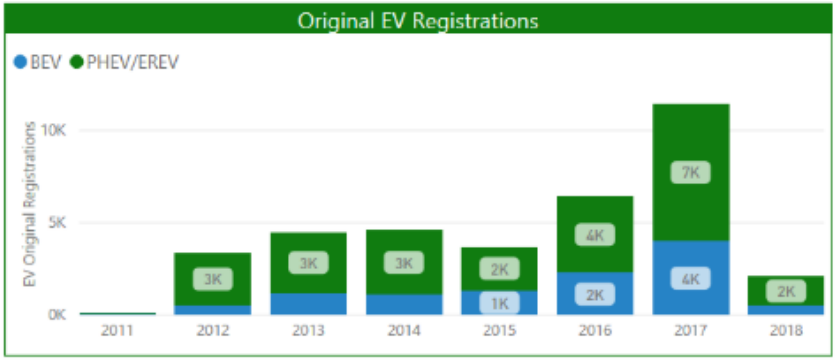
# Common approaches across respondents

- Analysis tools or studies to evaluate various impacts of electrification (e.g., spreadsheet tools to evaluate cost-effectiveness of building electrification measures)
- Reports and guidelines from NEEP (e.g., NEEP ccASHP specifications)
- Electrification-specific and general decarbonization studies, whitepapers, and published research from diverse sources

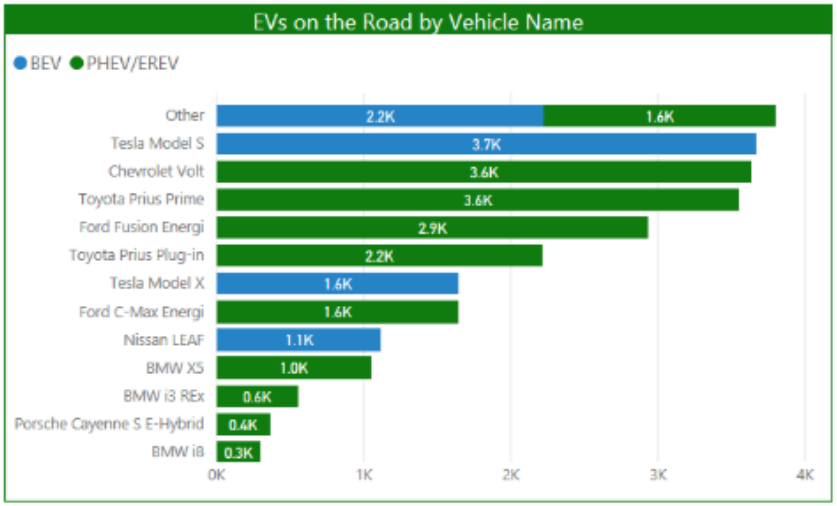
# Energy Office Responses - Particular tools and resources

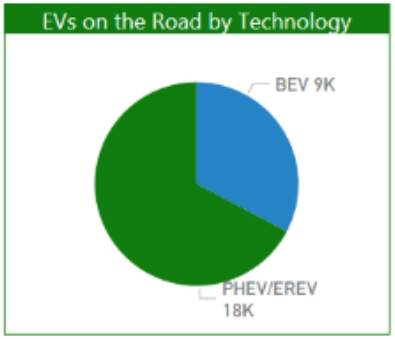
- State energy strategies and plans; state climate change action plans
- Scenario analysis (e.g., VT Total Energy Study, MA Comprehensive Energy Plan, RI Renewable Thermal Market Analysis)
- Analytical modeling tools to estimate heat pump market scenarios and benefit-costs (New York, Massachusetts, Connecticut)
- Tools and resources on transportation (New York, Massachusetts)
  - EV calculator
  - The EValuateNY - Electric vehicle market analysis tool
  - Electric vehicle registration map
  - Charging station locator (by US DOE Alternative Fuels Data Center)
  - Multistate ZEV Memorandum of Understanding and Action Plan

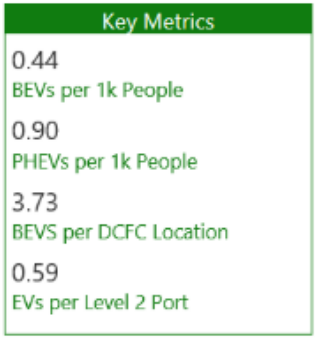
# Tool example - EValuateNY

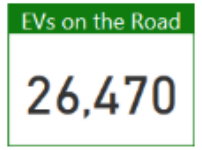




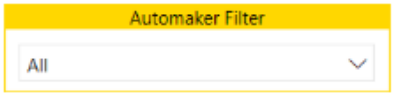


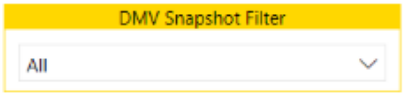



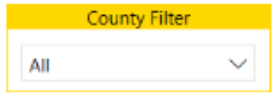







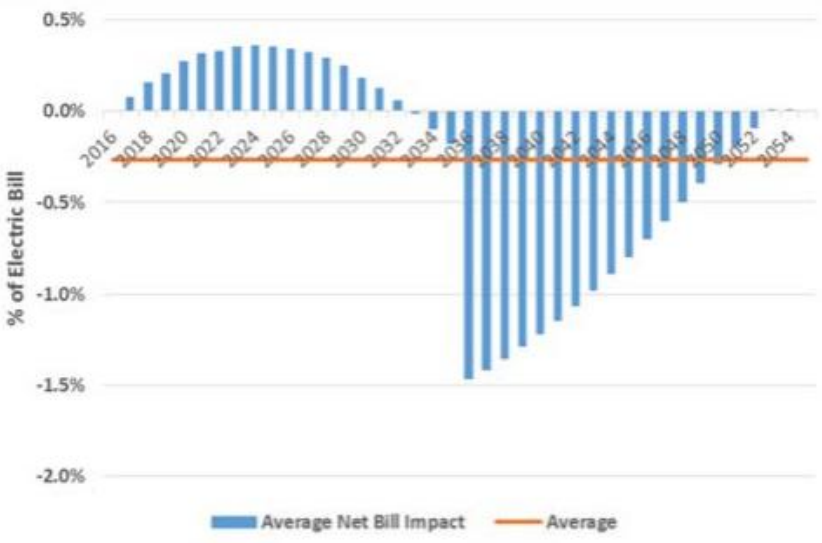


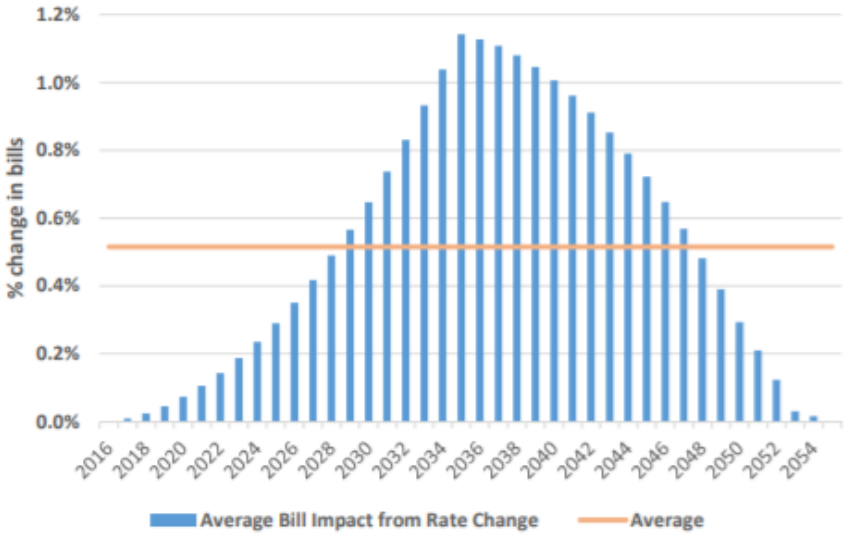



# Study example – RI Renewable Thermal Strategy

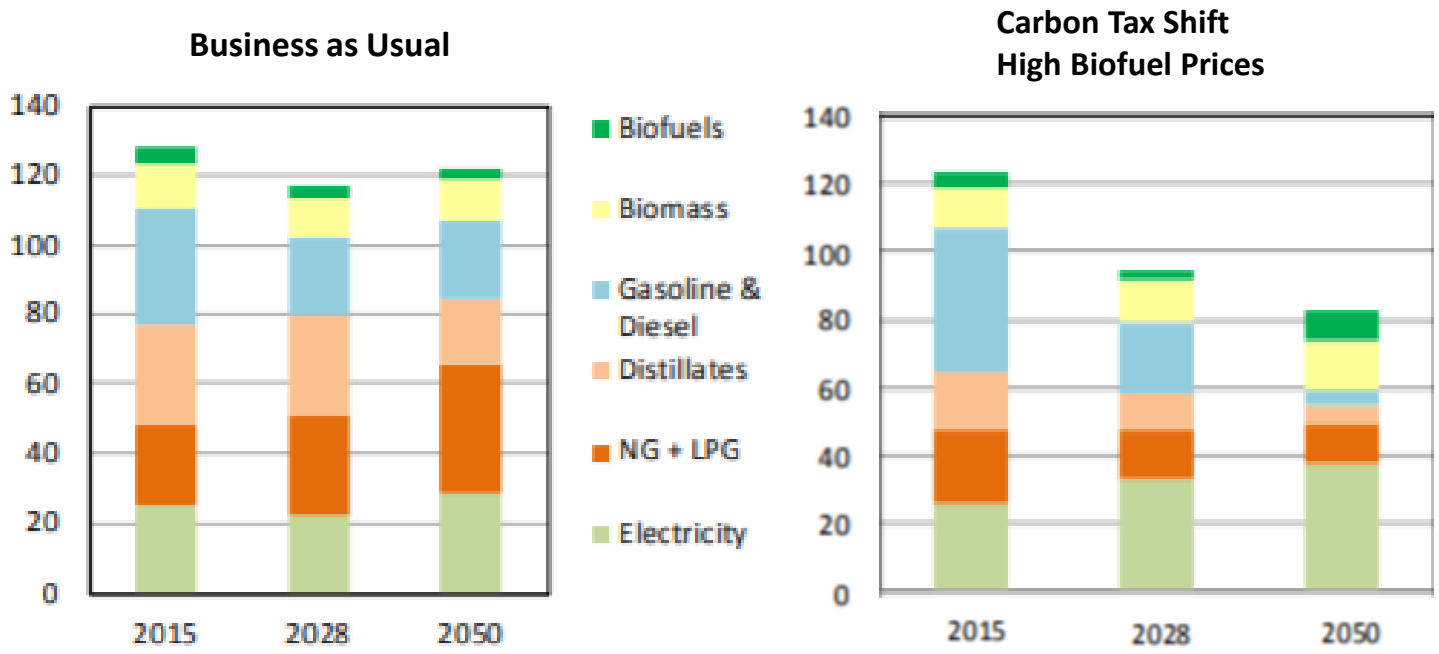
**Energy bill impacts from a renewable thermal strategy scenario:**

Electric bill impacts (left) and gas bill impacts (right) for residential customers



# Study example – Vermont Total Energy Study



# Local Government Responses - Particular tools and resources

- Scenario analysis (Providence, NYC)
- Market segmentation analysis of residential buildings (NYC)
- Utility efficiency programs and grants from the state (Boston)
- Experiences of projects implemented by other cities in comparable geographic and climate areas (Boston)

# EE Administrator Responses - Particular tools and resources

- Economic analysis tools (e.g., cost-effectiveness, customer payback, Cape Light Compact's scenario analysis)
- Modeling and forecasting tools (Efficiency VT)
- Technical reference manuals and program evaluation studies (e.g., Massachusetts studies on minisplit costs/performance)

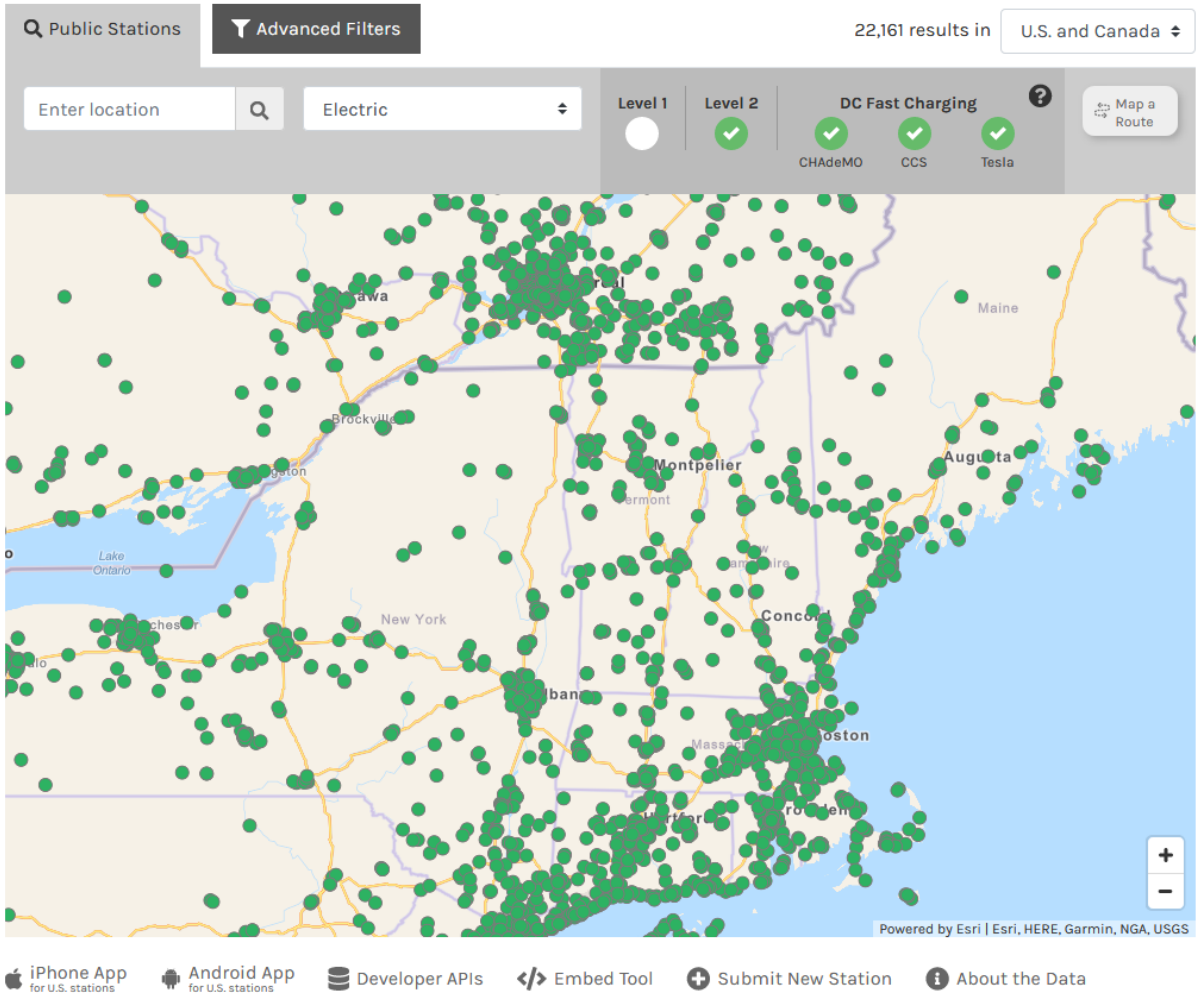
# Other interesting tools and resources mentioned

- Meter data management and billing systems (Belmont Light)
- Developing load shape tools to bridge the MOVES (MOtor Vehicle Emission Simulator) model with Integrated Planning Model and other energy models (U.S. EPA)
- AVERT model for emissions impacts and COBRA for health impacts (Regulatory Assistance Project (RAP) and U.S. EPA)
- Relevant proceedings, including in Vermont, Rhode Island, New York, and California
  - Respondents are looking to learn from proceedings in their own state and others

# Data and data sources

- Sales data
- Cost of installed equipment
- State-collected energy and cost data for heat pumps (MA CEC and NYSERDA)
- DMV vehicle registration data, EV usage data, EV rebate program data (including consumer surveys)
- U.S. DOE's Alternative Fuel Data Center website and EV Project
- U.S. EIA, ISO-NE, and utility energy statistics
- Load shape data from AMI (Vermont, Belmont Light)
- Avoided costs

# Alt. Fuels Data Center EV station map



# Key findings continued

- Overall, states are still in early days of understanding electrification
- Common approaches exist, but it's too early to identify best practices
- Some states and entities stand out as leaders in developing tools and resources to promote strategic electrification (e.g., MA, VT, NY, RI)
- Heat pump-related analysis tools are more developed and used than EV tools

# Tools, Resources, & Data: Needs

# Needs of Energy Offices

- Benefit cost analyses of air-source heat pumps (ASHPs), ground-source heat pumps (GSHPs), and EV supply equipment (EVSE) (Rhode Island)
- Analysis of non-monetary barriers to heat pump and EV adoption (Massachusetts)
- Training resources and 3rd party inspections for ASHP installers (Rhode Island)
- Learning NREL's EVI-Pro for EVSE forecasting and talking to NREL about other modeling needs (New York)
- Forecasting tools and better data collection on registration data for EVs and renewable thermal installations (Connecticut)

# Local Government Needs

- Tools to compare lifecycle cost for heat pumps (esp. for large buildings) and/or EVs including first cost, O&M costs, and utility costs by geography (Boston)
- Tools and resources to assess: (Providence, RI)
  - Electric school bus availability and timing
  - Working with HVAC installers to promote heat pumps
  - Equitable access to electrification
- Research on: (NYC)
  - Case studies of ASHP retrofits
  - Alternative refrigerants
  - Customer preferences and value propositions for ASHPs
  - New contractor business models

# Other interesting tool and resource needs mentioned

- Tools for estimating the criteria pollutant/air quality impacts of EVs and heat pump deployment for integration with State Implementation Plan-ready models (RAP)
- Analysis of energy, air quality, and economic impacts associated with electrification actions by region (RAP, U.S. EPA, VT PUC, etc.)
  - e.g., energy cost reduction impacts from RES Tier 3 in Vermont
- Market research statistics on customers' willingness to adopt emerging technology that replaces fossil fuel-based equipment (Belmont Light)
- Analysis of electric rate impacts from vehicle electrification due to improved load factor

# Data and database needs

## Buildings/Heat Pumps

- Database for heat pump installations and installers (e.g., number of certified/active installers by state; which products are being installed; licenses/certifications needed to install the product by state)
- Penetration rates/customer adoption data by state and market segment
  - For both heat pumps and other heating systems
- Costs and performance of heat pumps and other heating systems at various sizes
- Building inventory and performance data

## Electric Vehicles

- EV data (e.g., market penetration rates, in-use performance, range, battery capacity, VIN string, make, model, year, vehicle availability, etc.)
- Infrastructure costs for Medium Duty/Heavy Duty EVs and for Direct Current Fast Chargers (DCFCs)
- Share info on EV incentives, rebates, and legislation (e.g. in DSIRE database)

# Data and database needs (continued)

**Grid**

- More and better information on end use metering or submetering
- Better information on the communications and other infrastructure needed for load controls
- Load shape data, in particular for controlled and uncontrolled loads, as well as electrified loads under different time and location-based incentives and rates
- Data on where electrification measures can be incorporated to the greatest extent while minimizing need for electric grid upgrades
- Marginal emissions from ISOs around the country to enable comparisons of electrification options

**Other**

- Database on nation-wide electrification-related program information and/or best practices

# Summary

# Summary key findings

**Key topics:**

- Economic impacts, market penetration, emission impacts, grid impacts
- Energy performance and installation costs of technologies

- Stakeholders share most interests and concerns, but some stakeholders presented unique areas of interests:
  - **Energy Offices**: Development of regulatory framework and new tariff designs
  - **Local government**: Assessment and installation of heat pump and EV charging stations for public buildings
  - **EE Administrators**: Analysis of cost-effectiveness, development of a framework to enable fuel switching and increased electrification
- AMI data analysis is limited, but appears important and promising
- Many stakeholders are in need of similar but diverse data and databases on electrification

# Recommendations

Sharing resources among stakeholders can accelerate strategic electrification.

- Share resources and data on key topics
- Conduct joint studies or coordinate studies to fill gaps
- Learn about and use existing resources (including from U.S. DOE and national labs)
- Work with existing efforts and organizations to address needs
- Reach out to other stakeholders to learn about their activities, resources, and needs about electrification

# Questions?