

EPRI's US National Electrification Assessment: Key Insights

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U.S. National Electrification Assessment (USNEA)



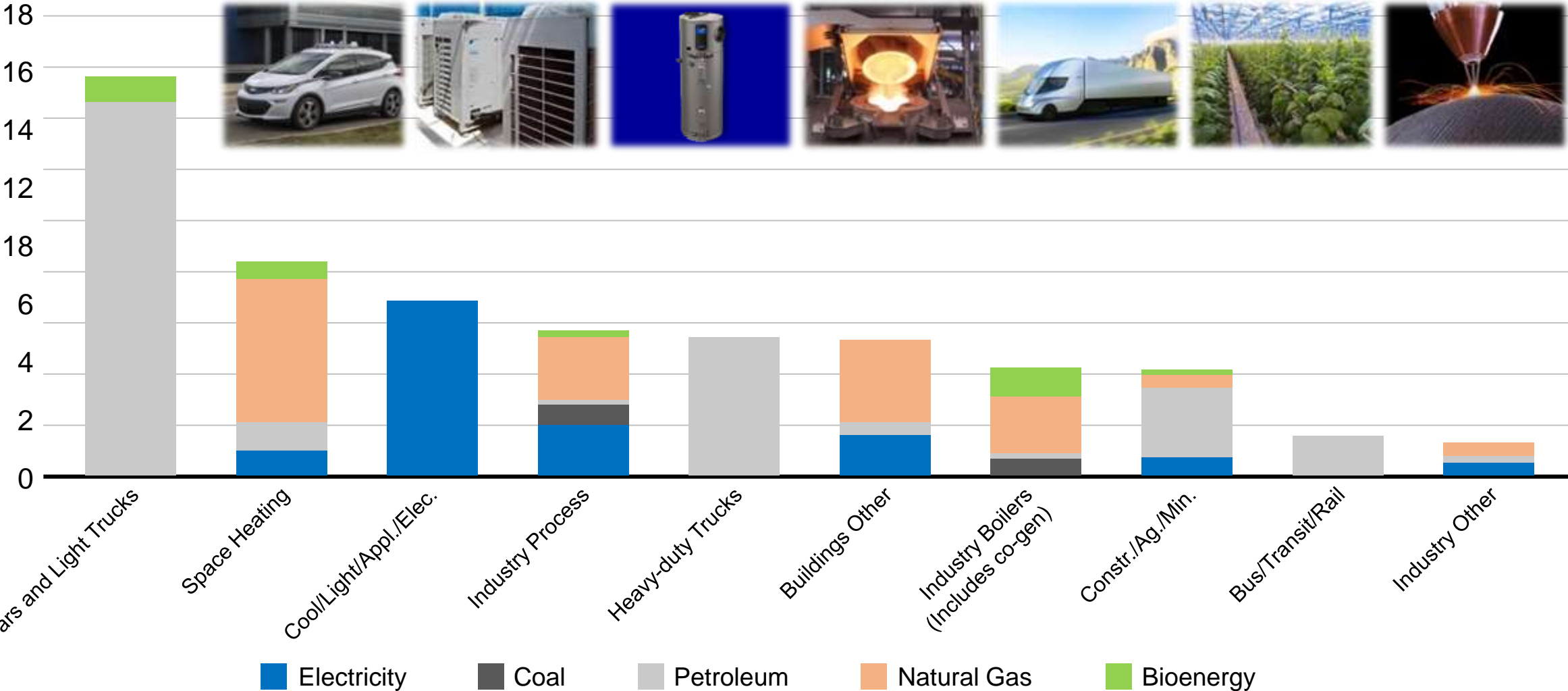
- Economy-wide assessment:
 - Residential, commercial, industrial and transport
- Customers have broad technology choices and control
- Customer decisions integrated with detailed electricity supply model

- Just the beginning ... kickoff to EPRI's Electrification Initiative

For more information on EPRI's Efficient Electrification Initiative:
<https://www.epri.com/#/pages/sa/efficientelectrification>

End Use (Final) Energy Use By Sector

Quad BTUs



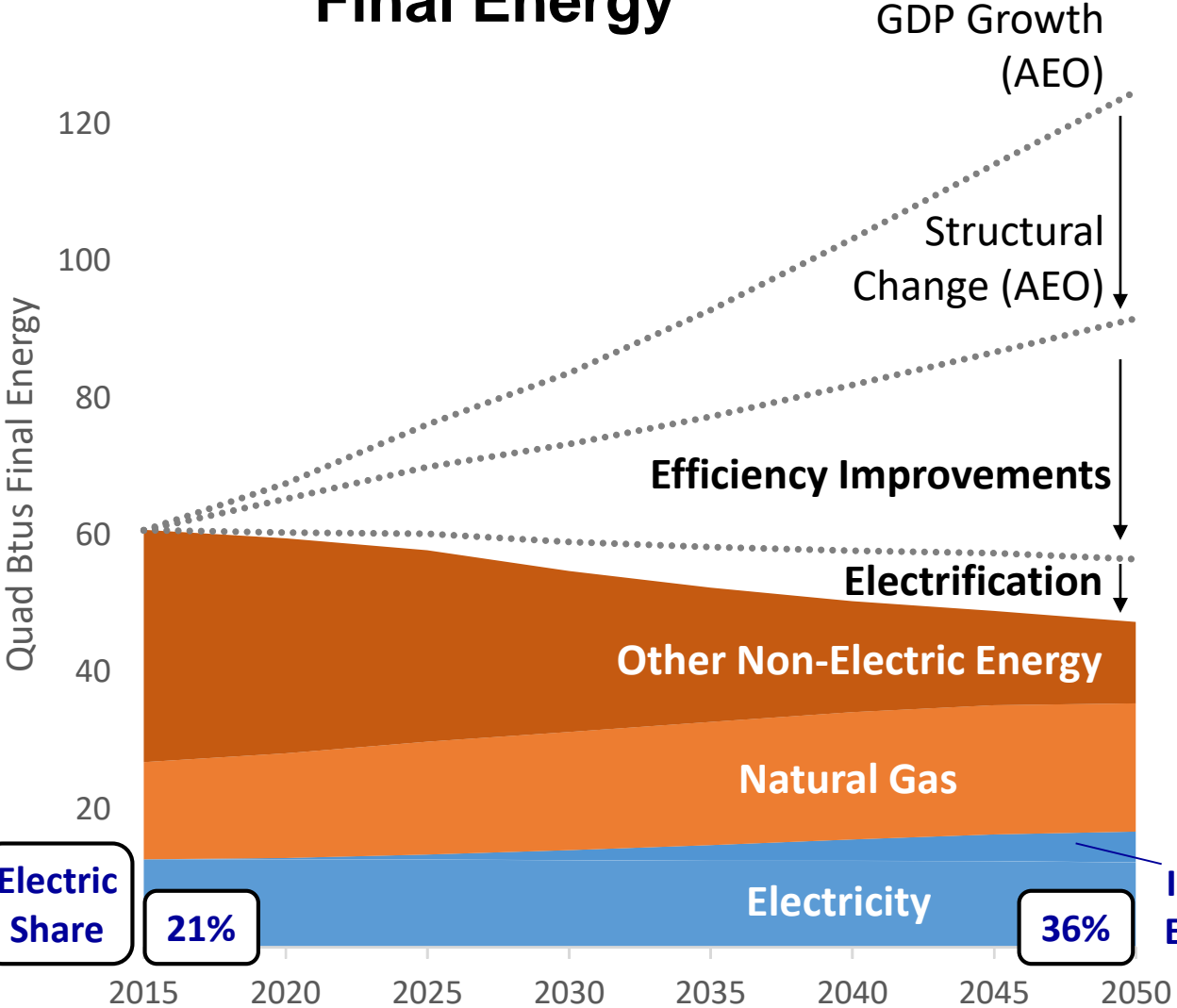
* Excludes upstream and midstream energy use, e.g., power generation, oil and gas extraction, refining, and pipelines

EPRI's US National Electrification Assessment Scenarios

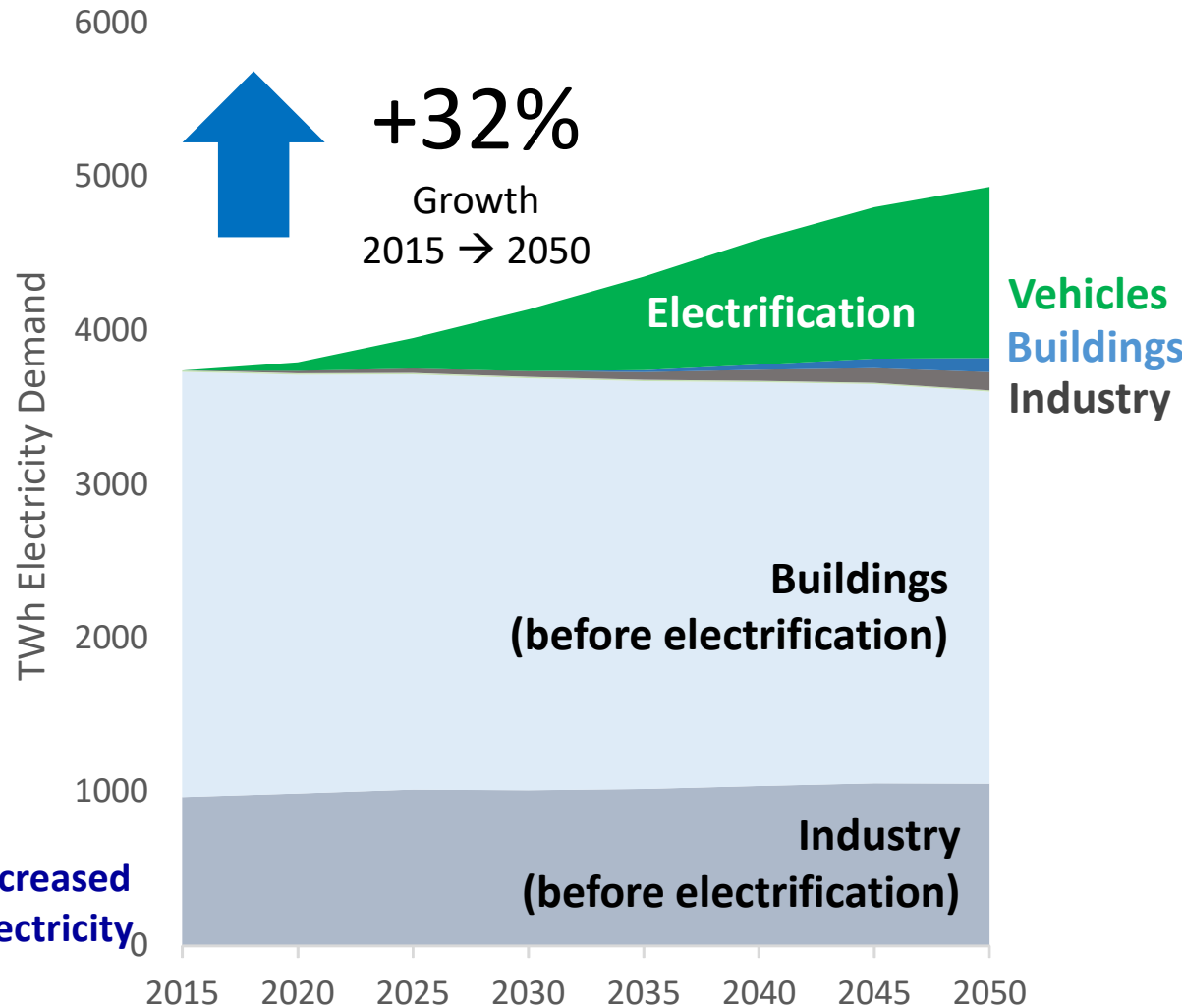
CONSERVATIVE	Slower Technology Change	<ul style="list-style-type: none">• AEO 2017 growth path for GDP and service demands, and primary fuel prices• EPRI assumptions for cost and performance of technologies and energy efficiency over time• Existing state-level policies and targets
REFERENCE	Reference Technology	
PROGRESSIVE	Reference Technology + Moderate Carbon Price	
TRANSFORMATION	Reference Technology + Stringent Carbon Price	

Efficient Electrification: Reference Scenario

Final Energy

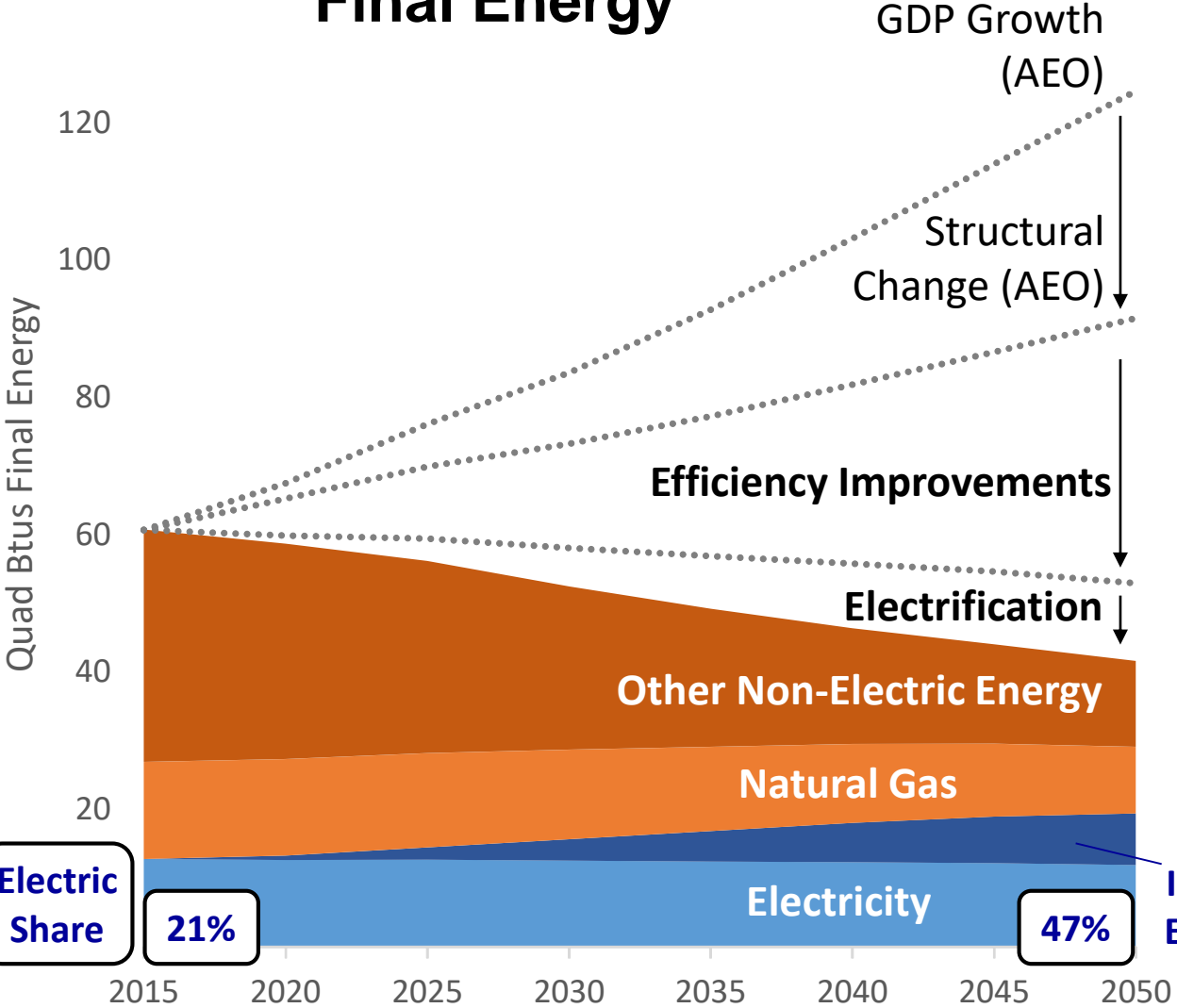


Electricity Generation

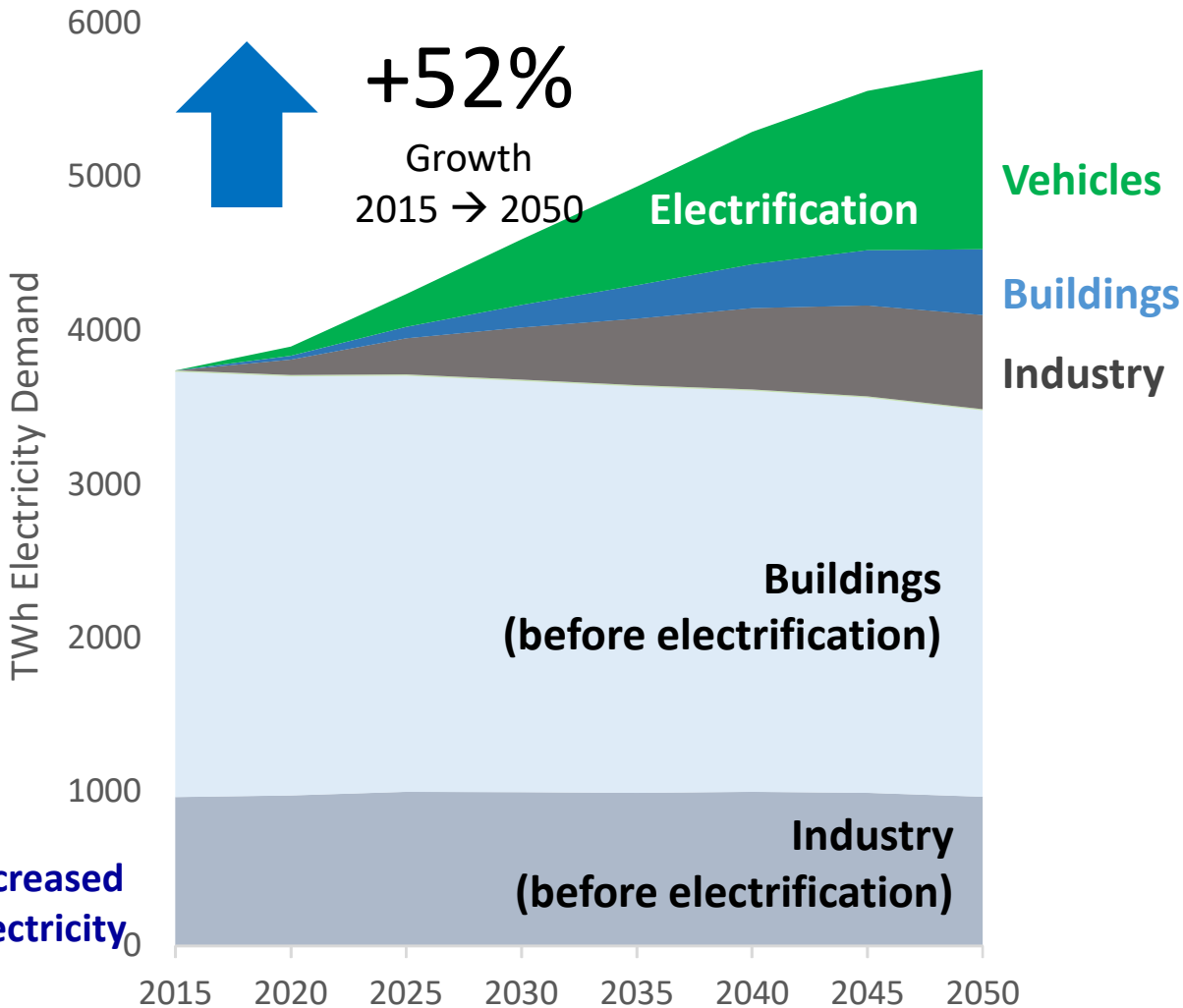


Efficient Electrification: Transformation (tight carbon target)

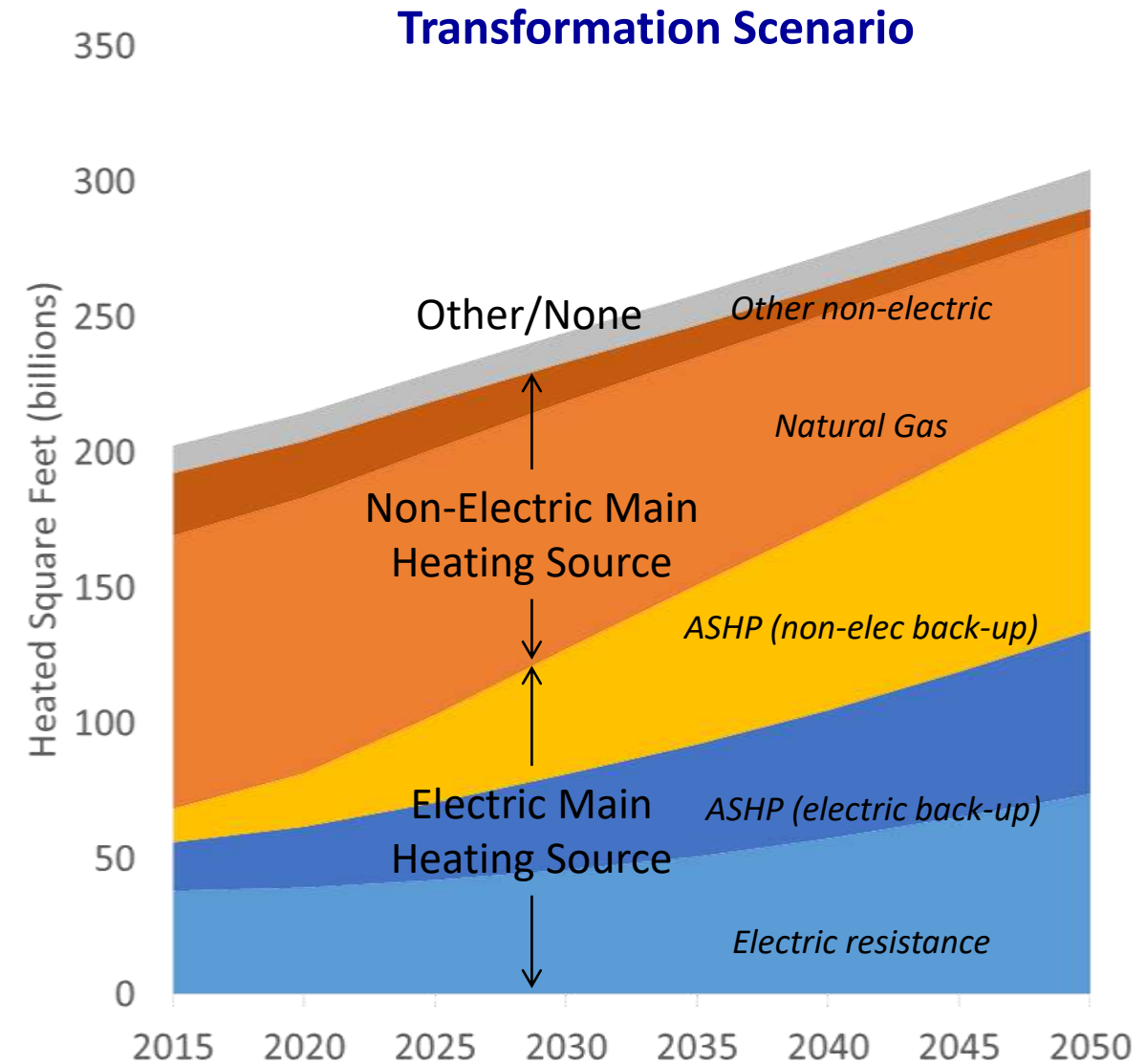
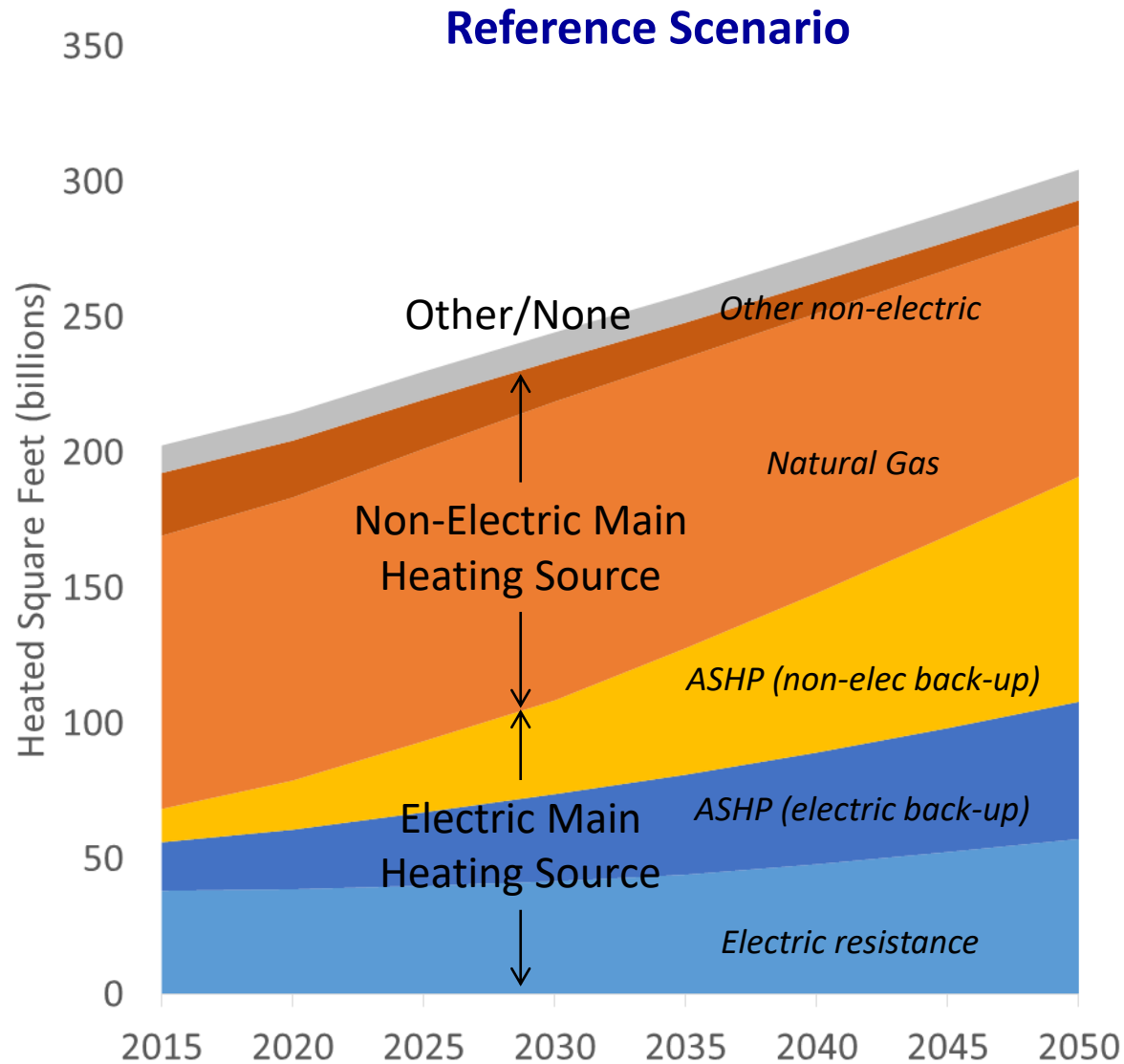
Final Energy



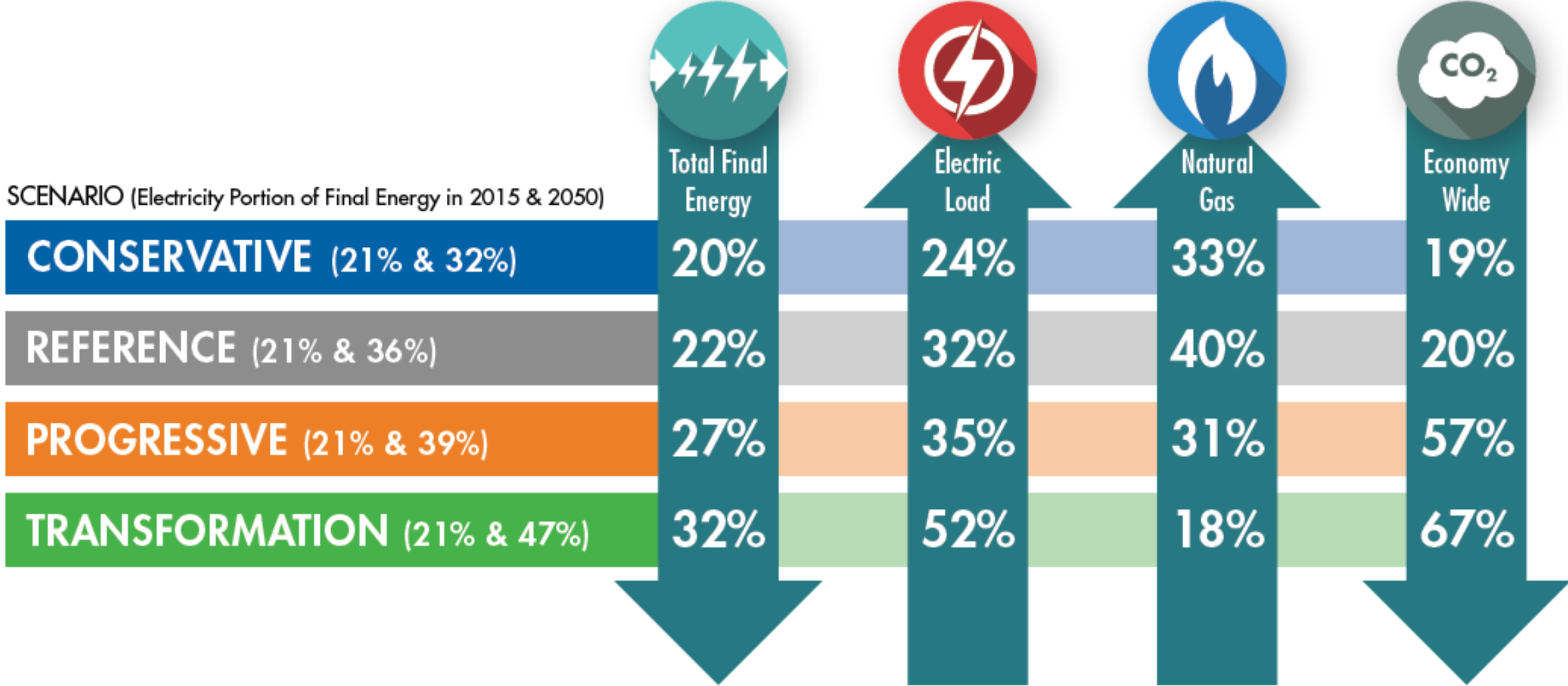
Electricity Generation



Projections for US Residential Space Heating Services



U.S. National Electrification Assessment (USNEA) - Results



Key Take Away Messages from National Electrification Assessment

Electrification Trend Continues

Driven by technological change and consumer choice, further bolstered by policy

Efficiency Increases Emissions Decrease

Efficient electrification + end-use efficiency lead to falling final energy use

Natural Gas Use Grows

Remains a key fuel for end-use and electric generation

System Impacts

Changing load shapes and new flexible loads create challenges and opportunities

BUT...

The full potential may not be realized without deliberate and integrated decisions

EPRI's Efficient Electrification Initiative



ANALYTICS

- **Conduct US National Electrification Assessment to Understand Benefits/Impacts to Society, Customers and Utilities**
- **Perform State/Utility/Specific Electrification Assessments Including Air Quality Assessment Impacts**
- **Establish Benefits/Costs Framework of Efficient Electrification to Inform Industry Stakeholders**



TECHNOLOGY PIPELINE

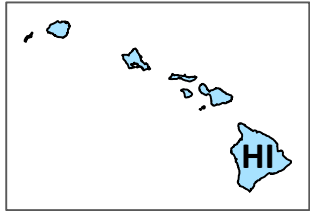
- **Develop Technology Pipeline and Launch Member Supported Demo Projects**
- **Initiate Virtual Centers of Excellence Leveraging Industry Specific Subject-Matter-Expert Interest Groups, Universities and Vendors**



R&D COLLABORATION

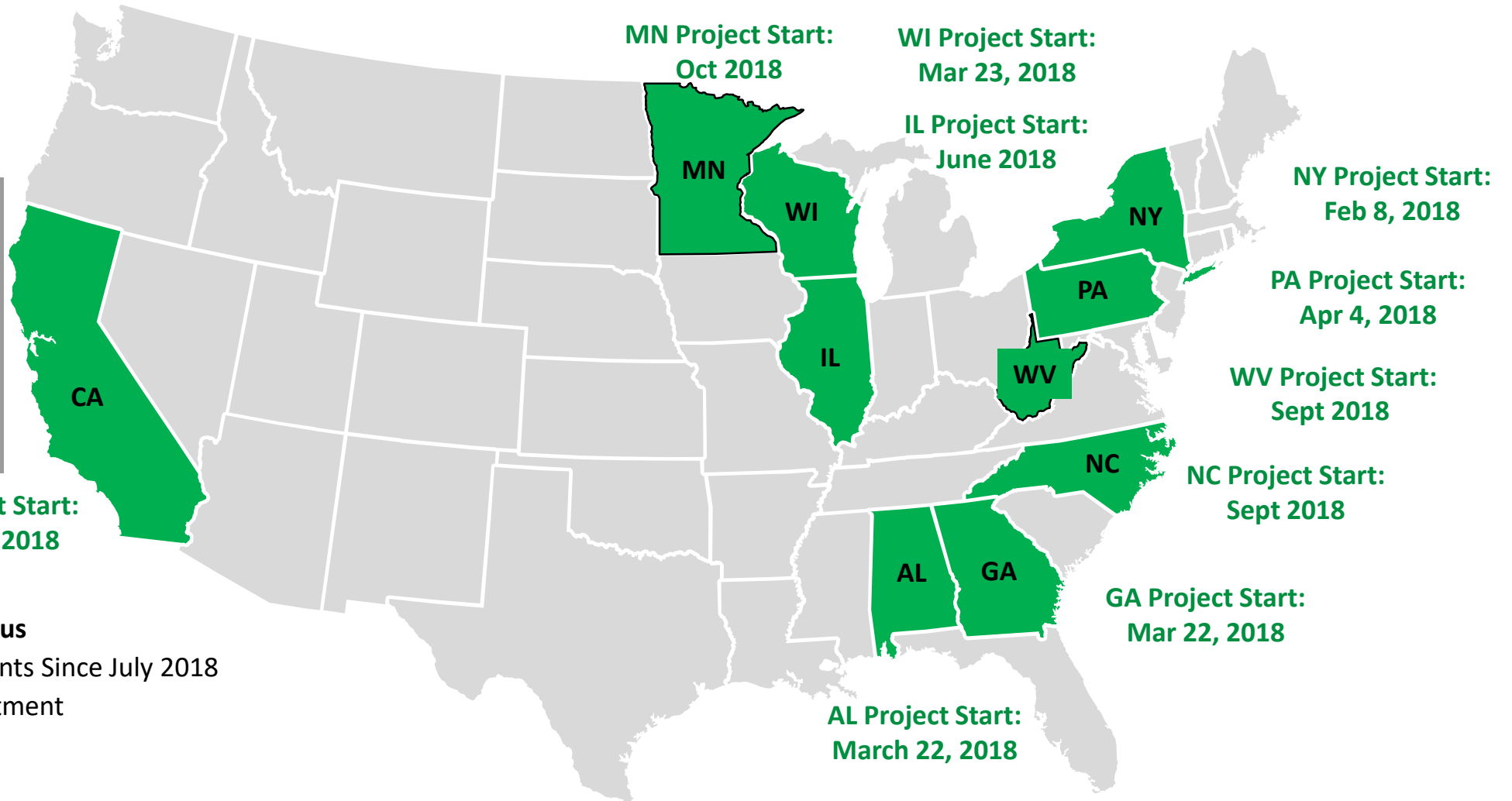
- **Develop Global Electrification Conference that Provides a Forum for Industry Stakeholders to Engage in Dialogue – Electrification 2018**
- **Develop Multi-Year Efficient Electrification Research Road-Map**

State & Utility Electrification Assessments Underway



FOCUS:

- Economics
- Air Quality
- Grid Impact
- Implementation

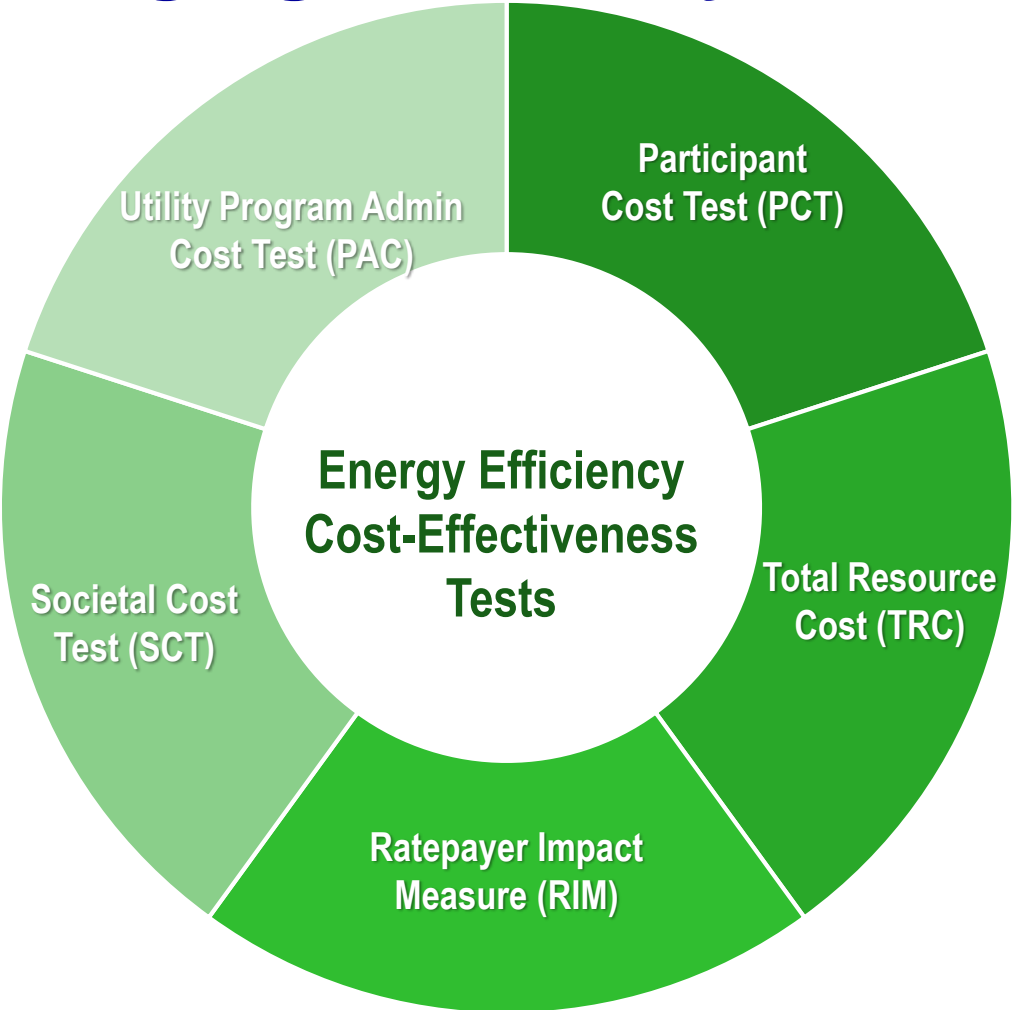


Key – State Project Status

- New Commitments Since July 2018
- Funding Commitment
- Interested
- Prospect

Current Participation: 10 States with 15 Members

Efficient Electrification Benefits/Cost Framework... Leveraging Efficiency Cost-Effectiveness Tests...



KEY QUESTIONS

- IS THE PARTICIPANT BETTER OFF? (PCT)
- IS RESOURCE EFFICIENCY IMPROVED? (TRC)
- ARE RATES LOWERED (RIM)
- ARE SOCIETAL COSTS LOWER? (SCT)
- ARE REVENUE REQUIREMENTS LOWERED? (PAC)

LEVERAGE EFFICIENCY COST EFFECTIVENESS TESTS...FOCUS ON REGULATORY SUPPORT

