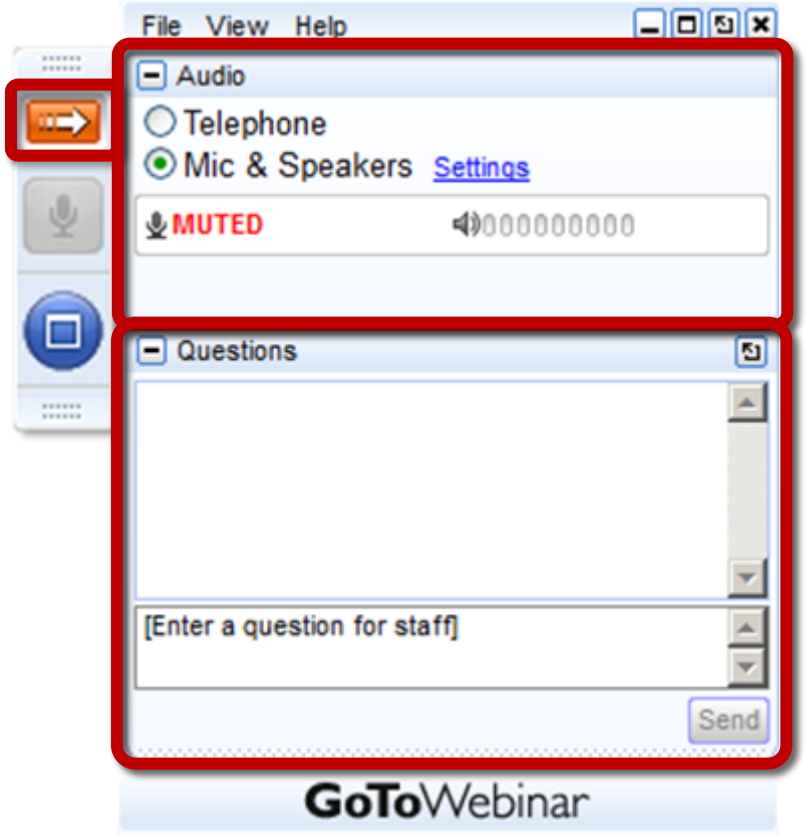
Visualizing Equitable Energy Transitions with SLOPE

April 26, 2022

CleanEnergy States Alliance

Webinar Logistics



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Webinar Speakers

Megan Day
National Renewable Energy Laboratory

Daren Zigich
New Mexico Energy, Minerals, and Natural Resources Department

Abbe Ramanan
Clean Energy States Alliance (moderator)

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

NEW MEXICO
emnrd
Energy, Minerals and Natural Resources Department

CleanEnergy States Alliance

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April 26, 2022 Webinar

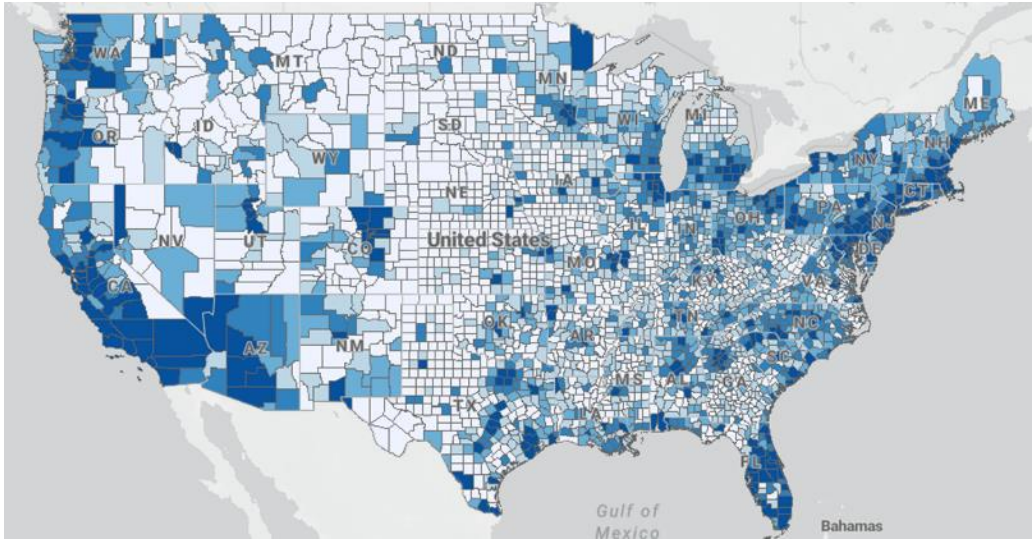
Megan Day – National Renewable Energy Laboratory

Daren Zigich – New Mexico Energy, Minerals and Natural Resources Department

State and Local Planning for Energy (SLOPE)

A free and easy-to-access online platform that helps energy planners at state and local levels make data-driven decisions to achieve their communities' energy goals.

- **Scenario Planner:** Explore the impacts of different energy transition scenarios on the energy consumption, CO_2 emissions, and system costs at county, state, and national scales.
- **Data Viewer:** Dive into city, county, and state data on renewable energy, energy efficiency, and sustainable transportation potential and projections.



Data Viewer: Personally Owned Light Duty Vehicle Stock - High Electrification Scenario (2020)

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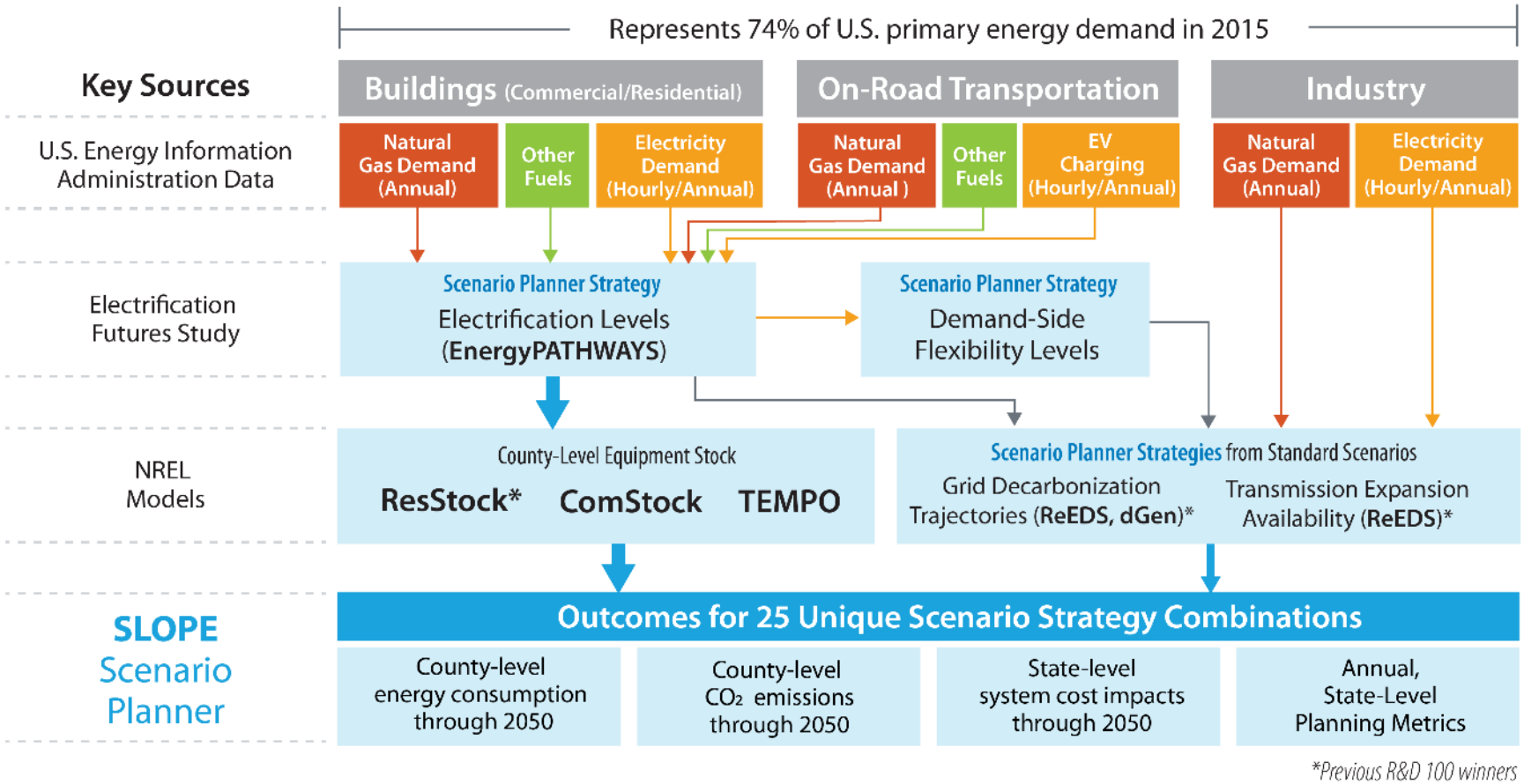
Scenario Planner: Analysis Architecture



Localized Energy System Scenarios

To deliver county-level scenario results, the SLOPE team integrated results from five of NREL's flagship models, along with scenarios from two of NREL's innovative energy sector analyses:

ReEDS

Regional Energy Deployment System (ReEDS)

dGen

Distributed Generation Market Demand (dGen™)

ResStock

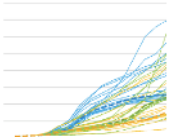
ResStock™

ComStock

ComStock™

Transportation Energy & Mobillity Pathway Options™ (TEMPO)

Electrification Futures Study



2021 Standard Scenarios

New Mexico
Clean Energy Transition Goals

New Mexico is developing a grid modernization plan for 100% zero-carbon electricity resources by mid-century in accordance with the Energy Transition Act

Economy-wide carbon reduction goal: 45% by 2030 driving accelerated adoption of:

- Energy efficiency measures in buildings
- Distributed energy resources including storage
- Electric vehicles

Renewable Energy Goals:

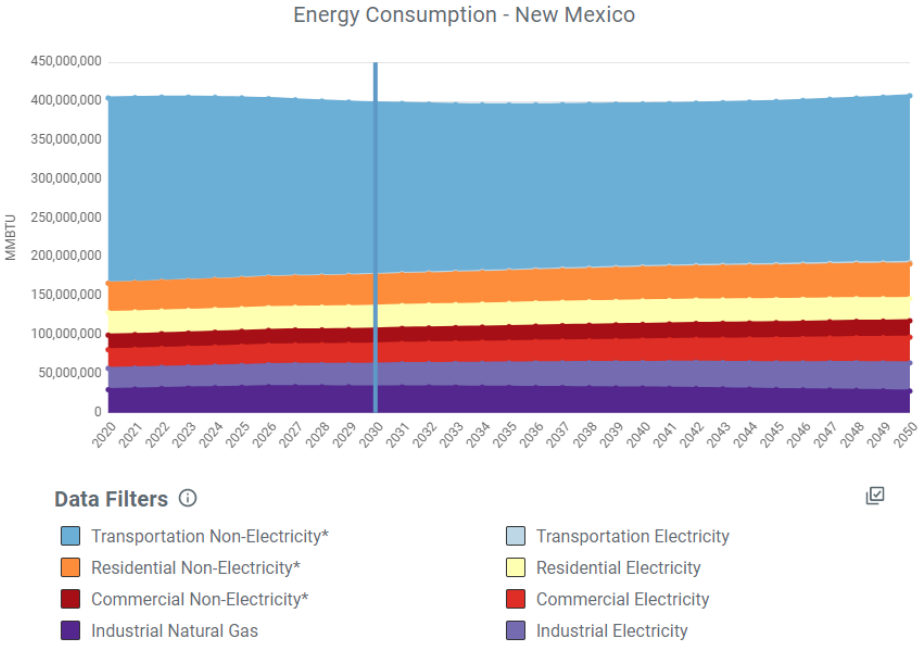
- Investor-Owned Utilities – 100% by 2045
- Rural Electric Coops – 100% by 2050

New Mexico's Energy Planning Questions:

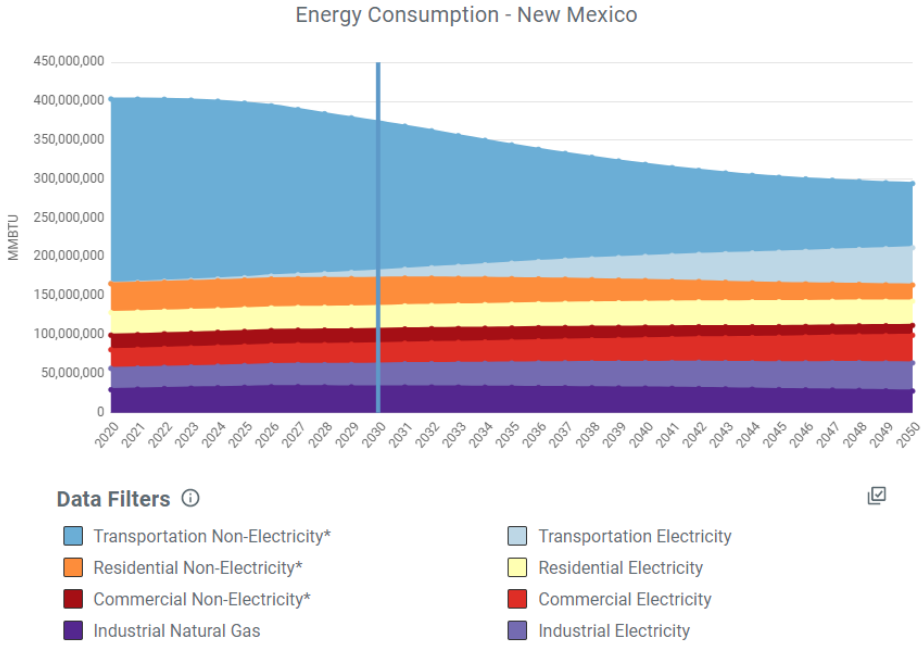
- Does electrification of buildings and transportation result in energy savings?
  - Electrification versus energy efficiency
- Does building efficiency or building electrification result in greater greenhouse gas emissions reductions?
- New low-income energy efficiency grant program:
  - How can SLOPE and the Scenario Planner help prioritize communities in need and measures that provide the best results?

SLOPE Scenario Planner: Electrification vs. Energy Efficiency

Scenario 1: Reference Case



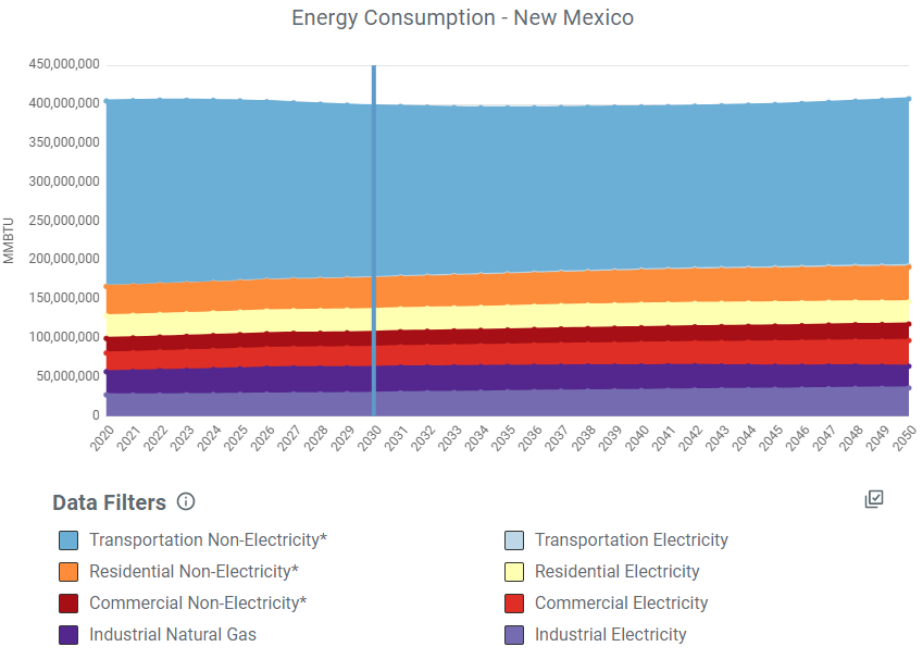
Scenario 2: Widespread Electrification



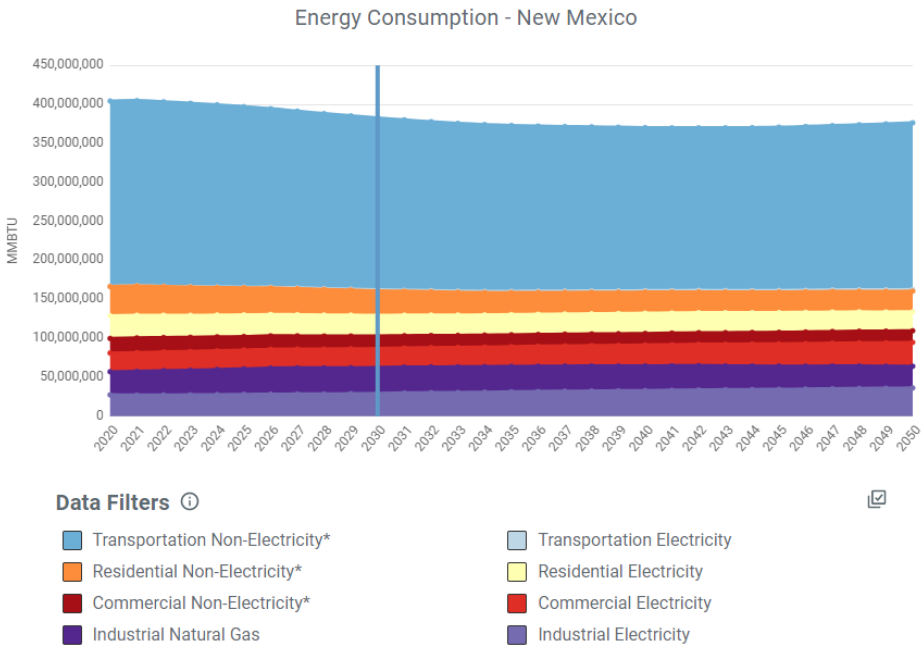
Compared to a reference case, widespread electrification reduces energy consumption 6% by 2030 and 28% by 2050 in New Mexico.

SLOPE Scenario Planner: Electrification vs. Energy Efficiency

Scenario 1: Reference Case



Scenario 2: Best-Available Energy Efficiency in Buildings



Compared to a reference case, best-available energy efficiency in buildings reduces energy consumption 4% by 2030 and 8% by 2050 in New Mexico.

Energy savings: electrification vs. energy efficiency

Scenario 1: Widespread Electrification

Energy Consumption - New Mexico

Details for Year 2030

	Residential	Commercial	Industrial	Transportation	Total
Electricity - MMBTU	2.943e+7	2.617e+7	2.931e+7	9.541e+6	9.445e+7
Non-Electricity - MMBTU	3.617e+7	1.844e+7	3.306e+7	1.913e+8	2.790e+8
Total - MMBTU	6.560e+7	4.461e+7	6.236e+7	2.009e+8	3.734e+8

Planning Metrics

23.31%	27.02%	63.32%	49.87%	$6.159
Share of Space Heating Services Supplied by Electricity (%)	BEV and PHEV Share of Light-Duty Vehicles (%)	Share of Electricity Provided by Renewable Energy (%)	Reduction in Energy-Related CO2 Emissions from 2005 (%)	Net Change in System Cost from Reference Scenario (Billions 2020 $)

Scenario 2: Best-Available Energy Efficiency in Buildings

Energy Consumption - New Mexico

Details for Year 2030

	Residential	Commercial	Industrial	Transportation	Total
Electricity - MMBTU	2.658e+7	2.451e+7	2.931e+7	1.249e+6	8.165e+7
Non-Electricity - MMBTU	3.138e+7	1.597e+7	3.306e+7	2.205e+8	3.009e+8
Total - MMBTU	5.796e+7	4.048e+7	6.236e+7	2.217e+8	3.825e+8

Planning Metrics

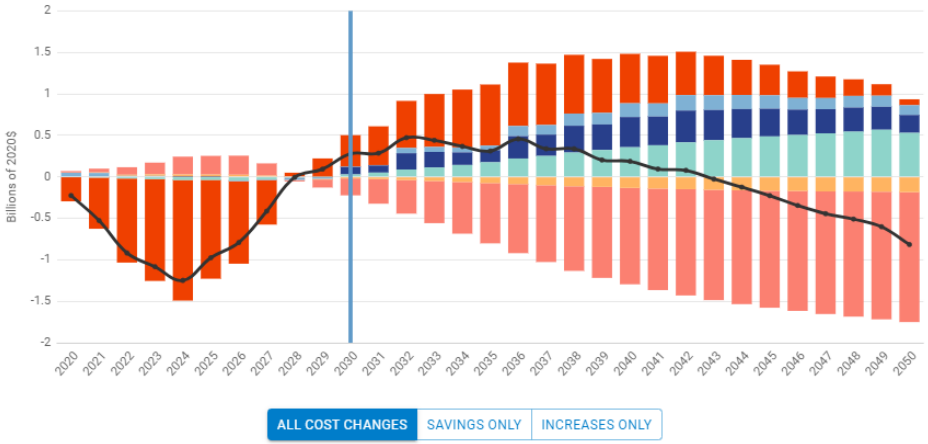
13.08%	6.715%	71.50%	47.64%	$0.5369
Share of Space Heating Services Supplied by Electricity (%)	BEV and PHEV Share of Light-Duty Vehicles (%)	Share of Electricity Provided by Renewable Energy (%)	Reduction in Energy-Related CO2 Emissions from 2005 (%)	Net Change in System Cost from Reference Scenario (Billions 2020 $)

In New Mexico, a building energy efficiency scenario has a lower total system cost than a widespread electrification scenario.

Cost savings potential: electrification vs. energy efficiency

Scenario 1: Widespread Electrification

Change in System Costs Relative to Reference Scenario (Billions of 2020$) - New Mexico



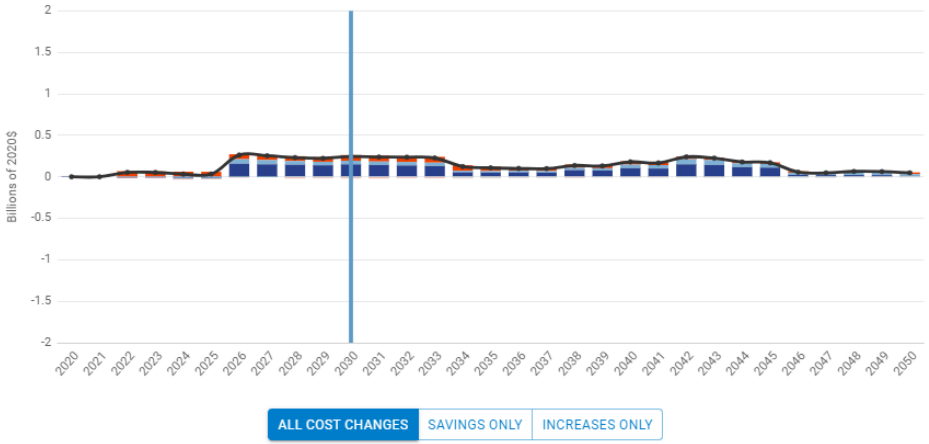
ALL COST CHANGES | SAVINGS ONLY | INCREASES ONLY

Data Filters

- Demand: Equipment Capital
- Demand: Fuel Consumption and O&M
- Demand: Fuel Infrastructure
- Electricity Supply: Fuel and O&M
- Electricity Supply: Generation and Storage
- Electricity Supply: T&D (Wires)
- Net System Cost

Scenario 2: Best-Available Energy Efficiency in Buildings

Change in System Costs Relative to Reference Scenario (Billions of 2020$) - New Mexico



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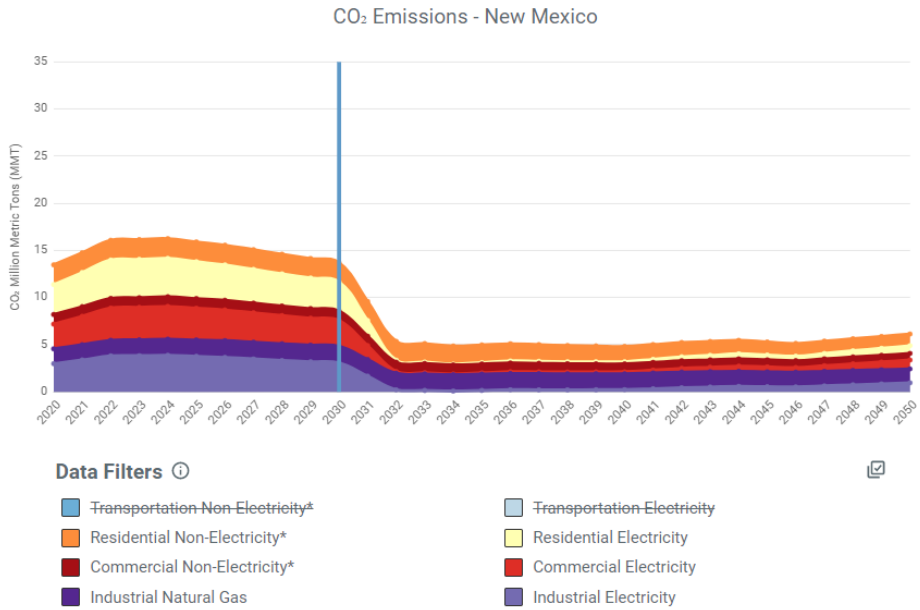
- Net System Cost

In 2030, net change in system costs for building energy efficiency relative to business-as-usual is roughly **$32.3 million (12%) less** than the net change in costs for widespread electrification

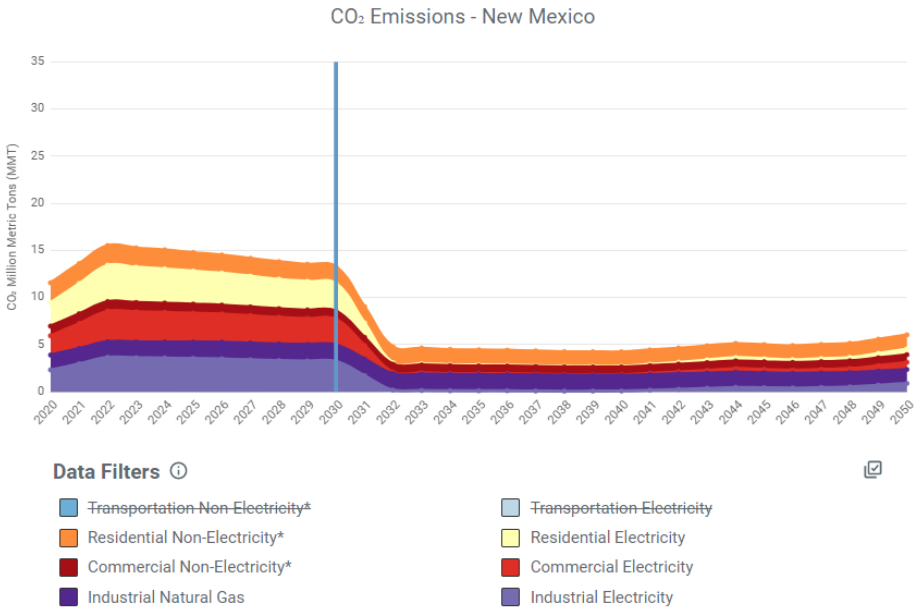
GHG reductions: electrification vs. efficiency

Scenario 1: Widespread Electrification



* Non-electric energy demand includes solid, liquid, and gaseous fuels and steam consumed within the buildings, industrial, and transportation sectors

Scenario 2: Best-Available Energy Efficiency in Buildings



* Non-electric energy demand includes solid, liquid, and gaseous fuels and steam consumed within the buildings, industrial, and transportation sectors

In New Mexico, best-available building energy efficiency strategies could achieve **8% lower emissions in residential sector** and **5% lower emissions in commercial sector** in 2030 compared to strategies for building electrification.

GHG reductions: electrification vs. efficiency

Scenario 1: Widespread Electrification

CO_2 Emissions - New Mexico

Details for Year 2030

	Residential	Commercial	Industrial	Transportation	Total
Electricity - CO_2 Million Metric Tons (MMT)	3.084	2.742	3.071	0.9996	9.896
Non-Electricity - CO_2 Million Metric Tons (MMT)	2.050	1.008	1.754	13.76	18.57
Total - CO_2 Million Metric Tons (MMT)	5.134	3.750	4.825	14.76	28.47

Planning Metrics

23.31%	27.02%	63.32%	49.87%	$6.159
Share of Space Heating Services Supplied by Electricity (%)	BEV and PHEV Share of Light-Duty Vehicles (%)	Share of Electricity Provided by Renewable Energy (%)	Reduction in Energy-Related CO2 Emissions from 2005 (%)	Net Change in System Cost from Reference Scenario (Billions 2020 $)

Scenario 2: Best-Available Energy Efficiency in Buildings

CO_2 Emissions - New Mexico

Details for Year 2030

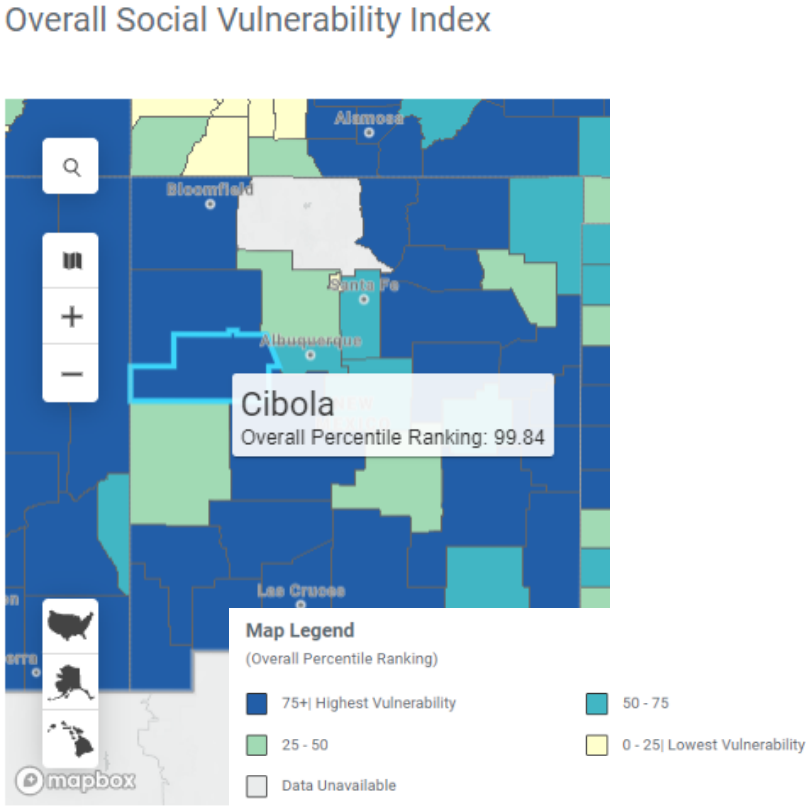
	Residential	Commercial	Industrial	Transportation	Total
Electricity - CO_2 Million Metric Tons (MMT)	2.933	2.705	3.235	0.1378	9.011
Non-Electricity - CO_2 Million Metric Tons (MMT)	1.773	0.8722	1.754	15.85	20.25
Total - CO_2 Million Metric Tons (MMT)	4.707	3.578	4.989	15.99	29.26

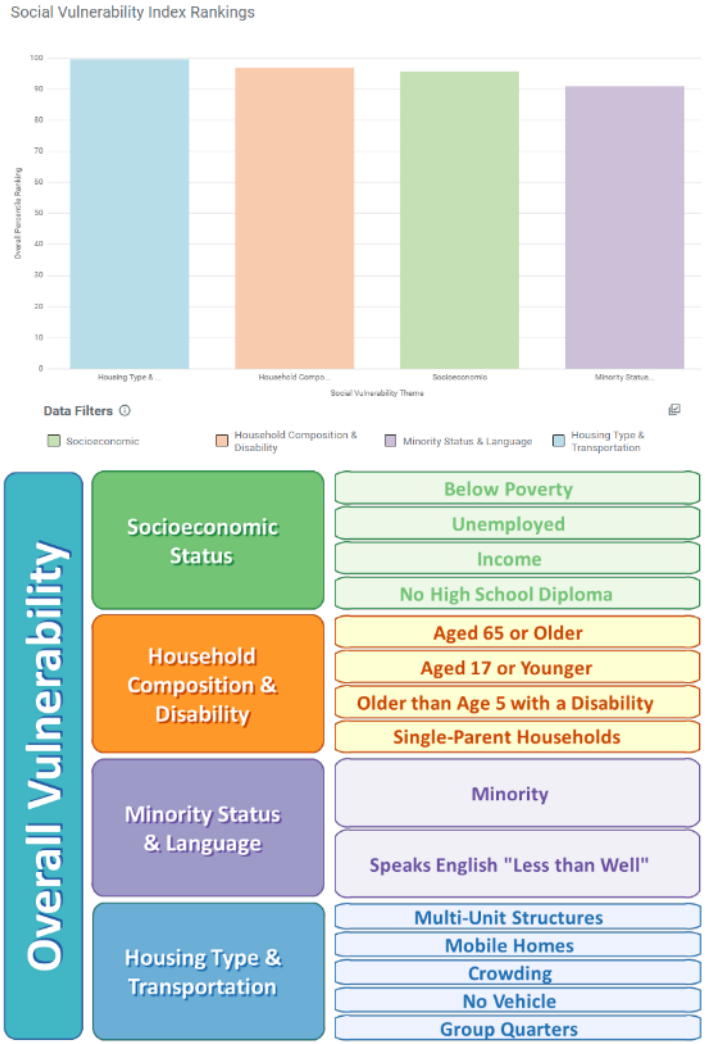
Planning Metrics

13.08%	6.715%	71.50%	47.64%	$0.5369
Share of Space Heating Services Supplied by Electricity (%)	BEV and PHEV Share of Light-Duty Vehicles (%)	Share of Electricity Provided by Renewable Energy (%)	Reduction in Energy-Related CO2 Emissions from 2005 (%)	Net Change in System Cost from Reference Scenario (Billions 2020 $)

Emissions are reduced 2% more in a widespread electrification scenario than a building efficiency scenario by 2030 and 13% more by 2050

How can we identify and prioritize communities in need of energy efficiency grants and assistance, and which measures provide the best results?

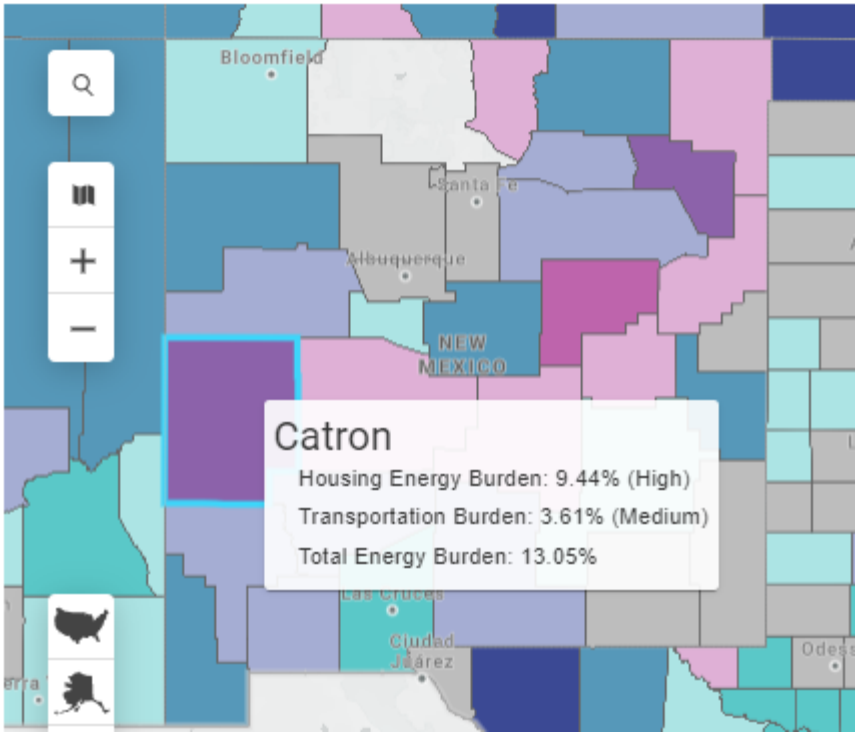


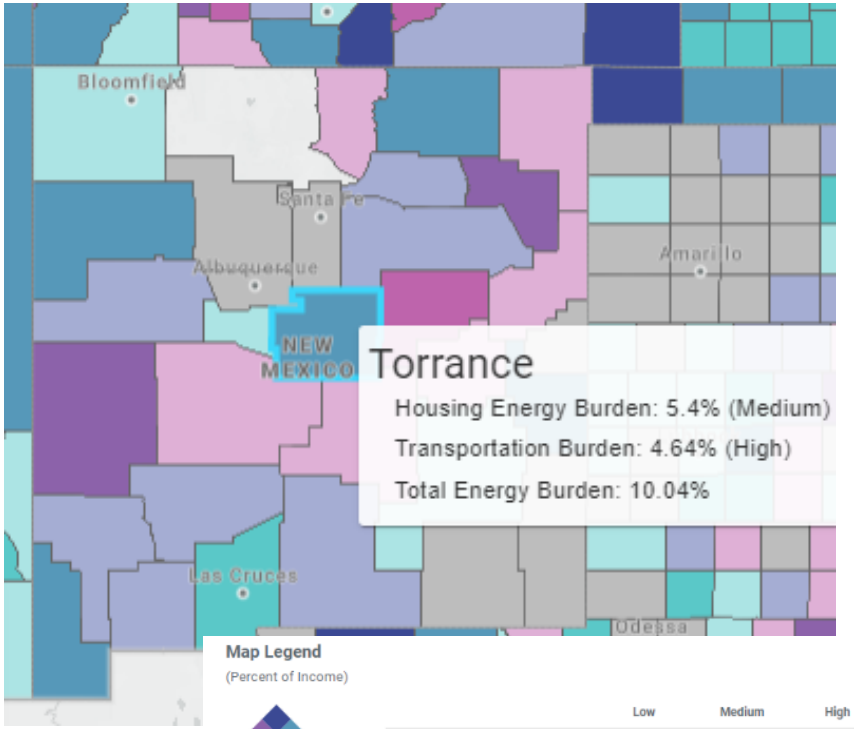


https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

How can we identify and prioritize communities in need of energy efficiency grants and assistance, and which measures provide the best results?

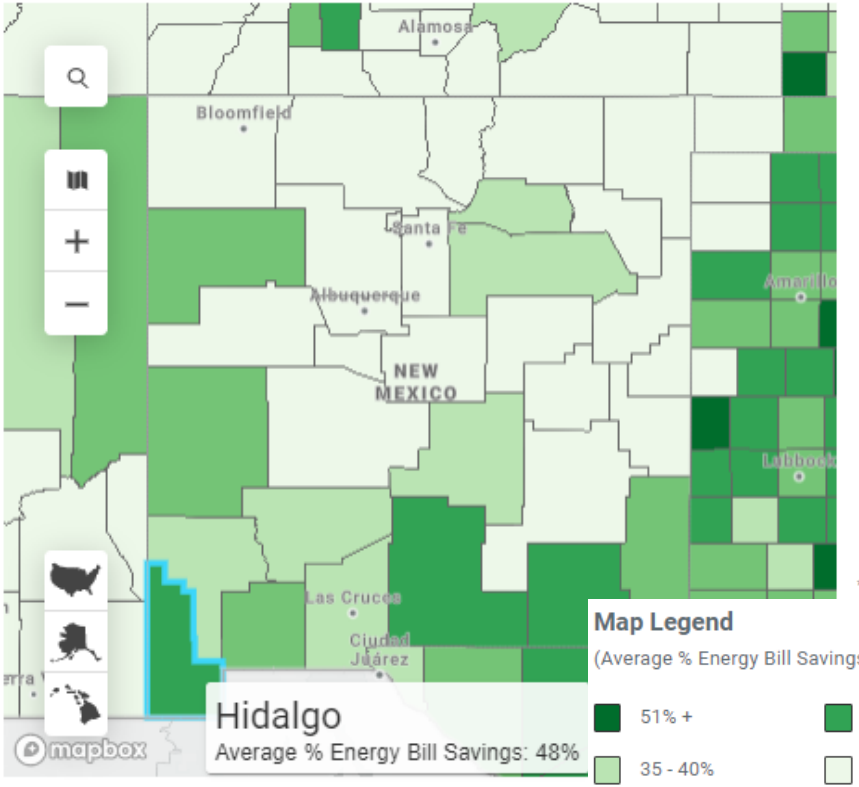
Household Energy and Transportation Burden



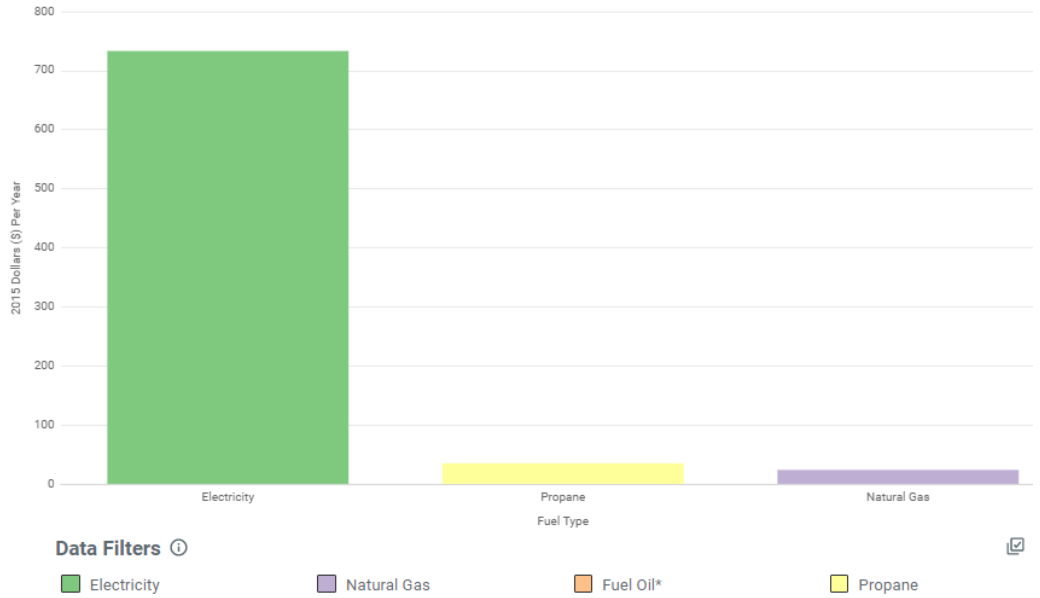


How can we identify and prioritize communities in need of energy efficiency grants and assistance, and which measures provide the best results?

Average % Bill Savings from Efficiency Upgrade Package for LMI Households

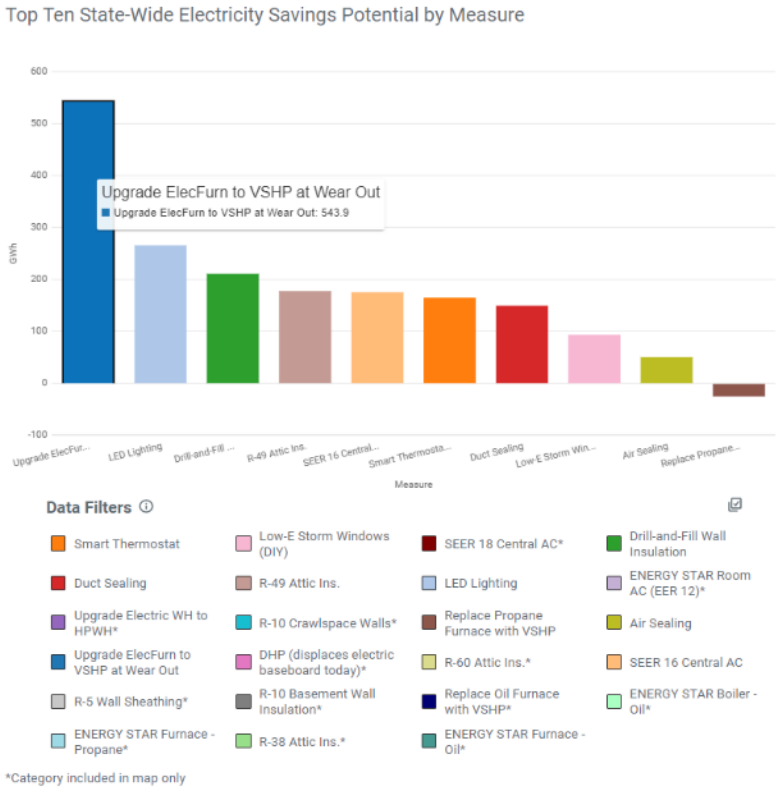


Average Annual Energy Bill Savings Per LMI Single Family Home

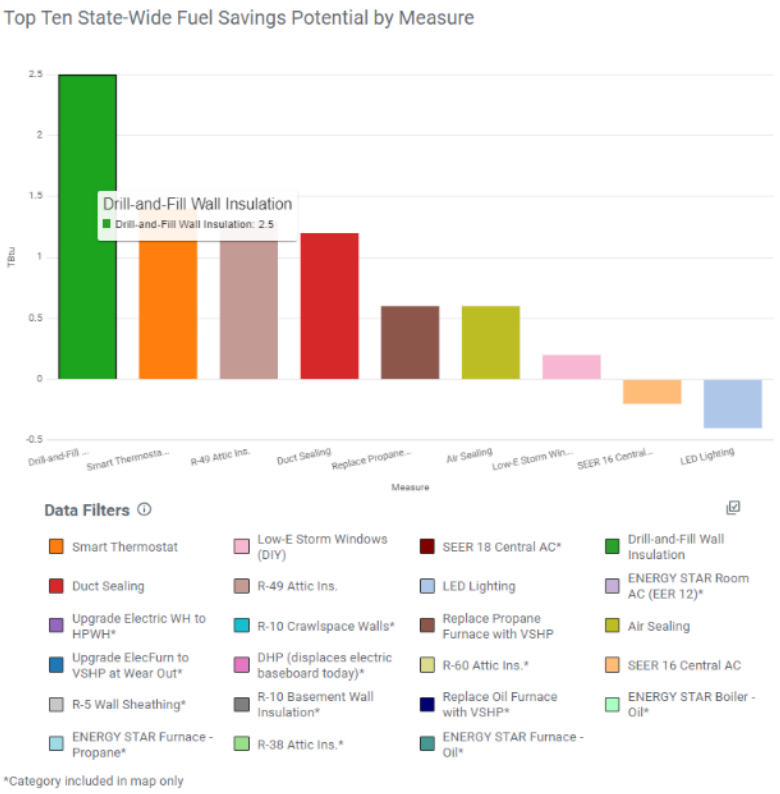


How can we identify and prioritize communities in need of energy efficiency grants and assistance, and which measures provide the best results?

Electricity savings potential for single-family homes

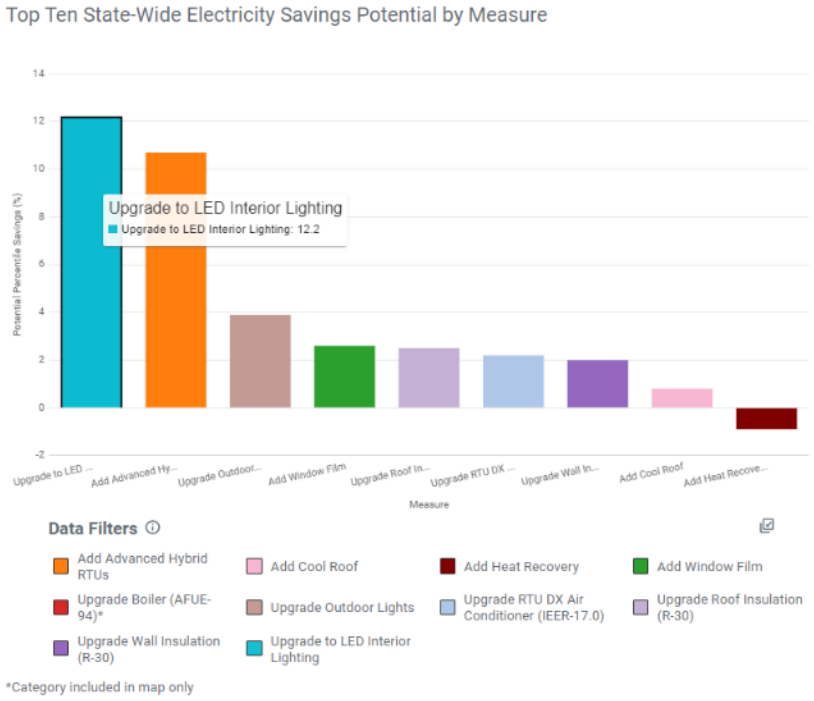


Fuel savings potential for single-family homes



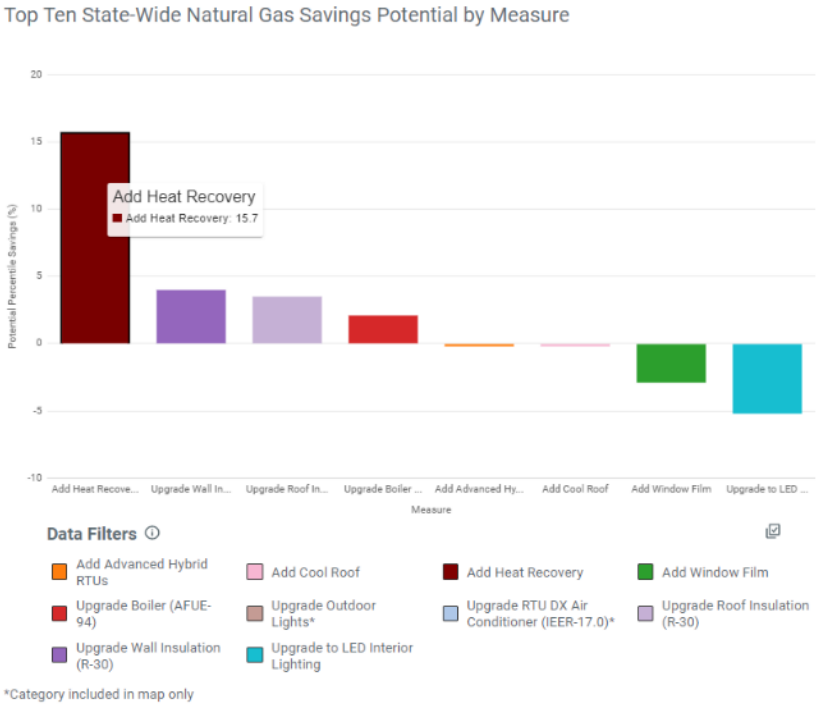
How can we identify and prioritize communities in need of energy efficiency grants and assistance, and which measures provide the best results?

Electricity savings potential for commercial buildings



*Category included in map only

Fuel savings potential for commercial buildings



*Category included in map only

Aggregate cost-effective commercial building electricity savings potential in New Mexico: 36%
Aggregate cost-effective commercial building natural gas savings potential: 17%

Thank you

Presenter email

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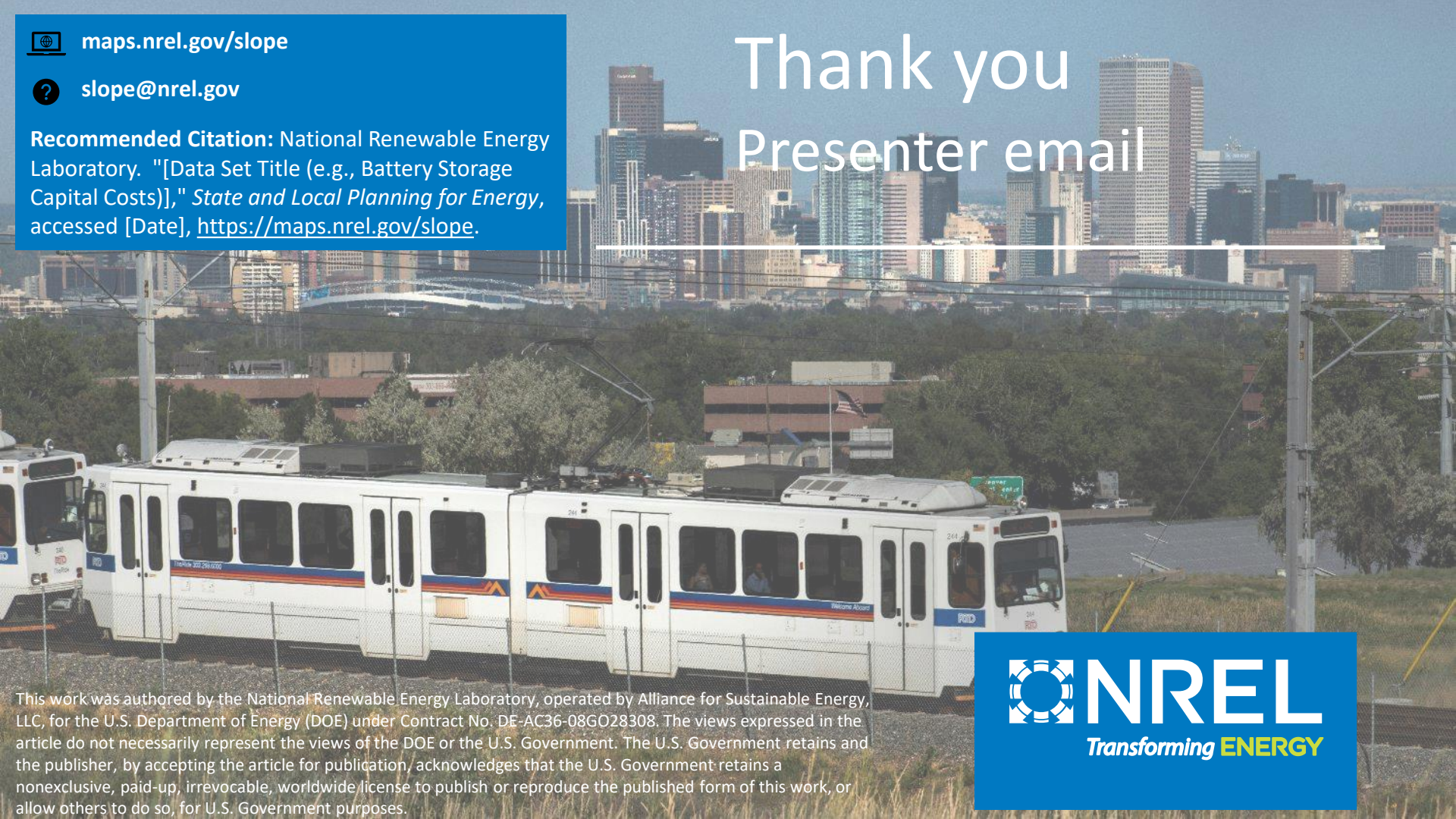

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