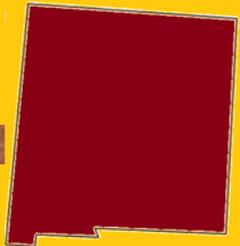




How New Mexico Can Accelerate the Clean Energy Transition



Findings from the Roosevelt Project New Mexico Case Study
October 8, 2021



New Mexico's energy transition is already underway

- NM is a large producer of both conventional and renewable energy, and will face both challenges and opportunities in a transition.

- NM is a minority-majority state: 48.5% of population identify as Hispanic/Latino, 8.6% as Native American

- NM has a significant innovation infrastructure including two national labs, multiple research universities, and startup hubs/incubators.

- NM is a relatively poor state: in 2016, 20.9% of the population lived in poverty (15.1% nationwide).

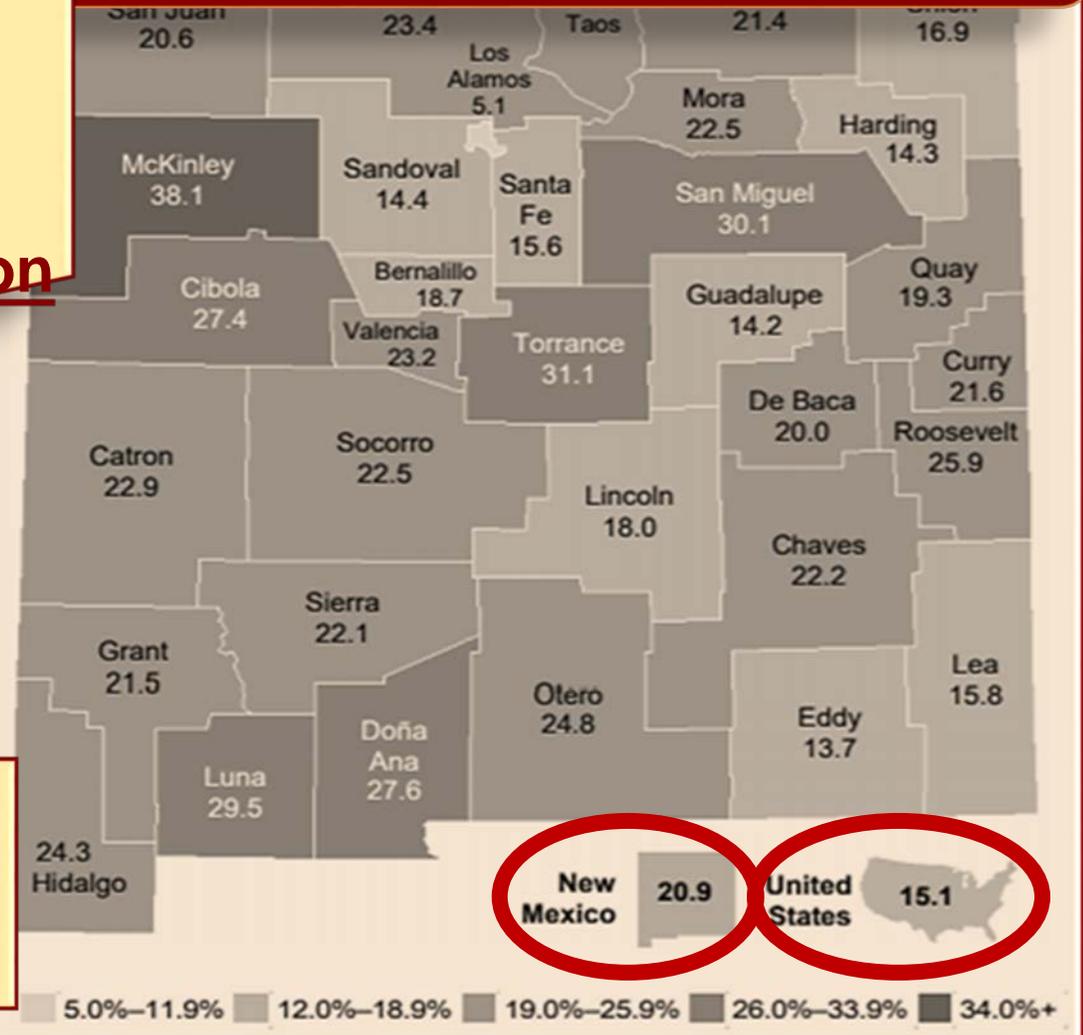
- New Mexico's state budget is heavily supported by fossil fuels. By some estimates, oil and gas revenues support about 39% of the state's annual budget.

FY 2018 revenue from mineral production
Taxes: \$427 million
Rent and royalty payments: \$547 million



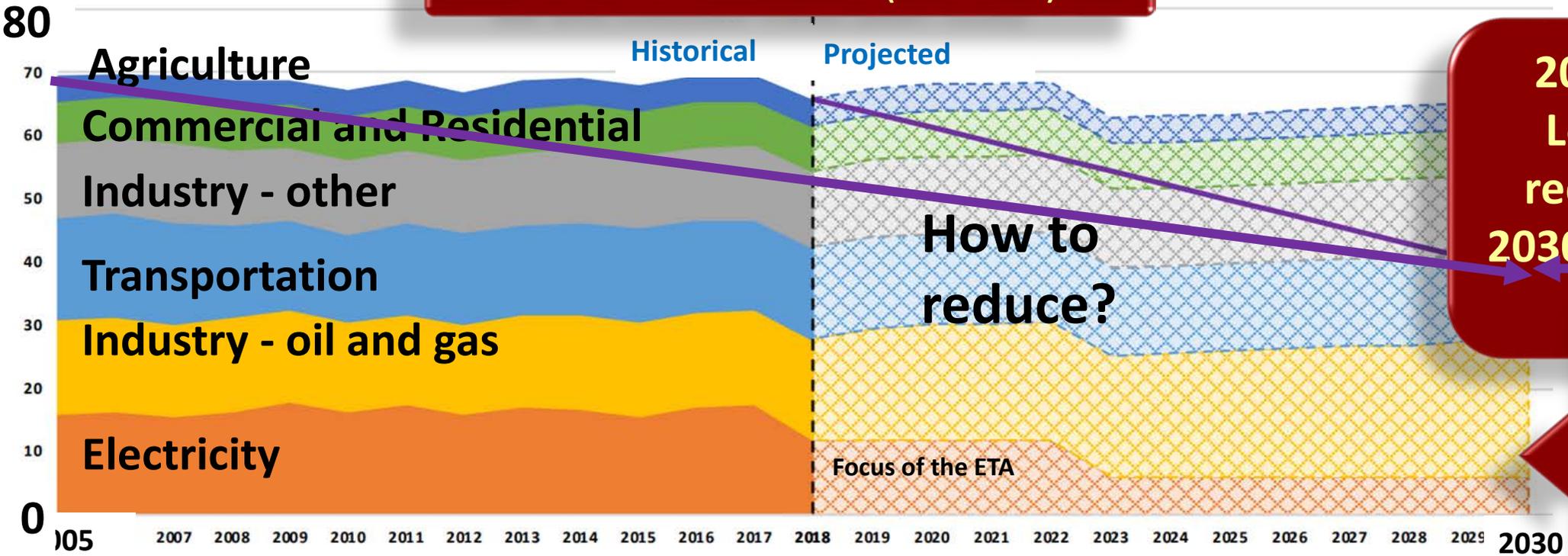
OF THE TOP 7 OIL PRODUCING COUNTIES IN THE COUNTRY...

Population Living in Poverty, 2016 (% of total)



Challenges/Opportunities for the Clean Energy Transition in NM

NM GHG Emissions Trends (MMT CO₂e)



2030 Target Level, 45% reduction by 2030, from 2005

Reductions needed between 2005-2030: approx. 30 MMT CO₂e. Electricity decarbonization only gets around 8 MMTCO₂e of reductions in that period

How to reduce?

Focus of the ETA

Our case study considered energy opportunities/challenges in six areas:

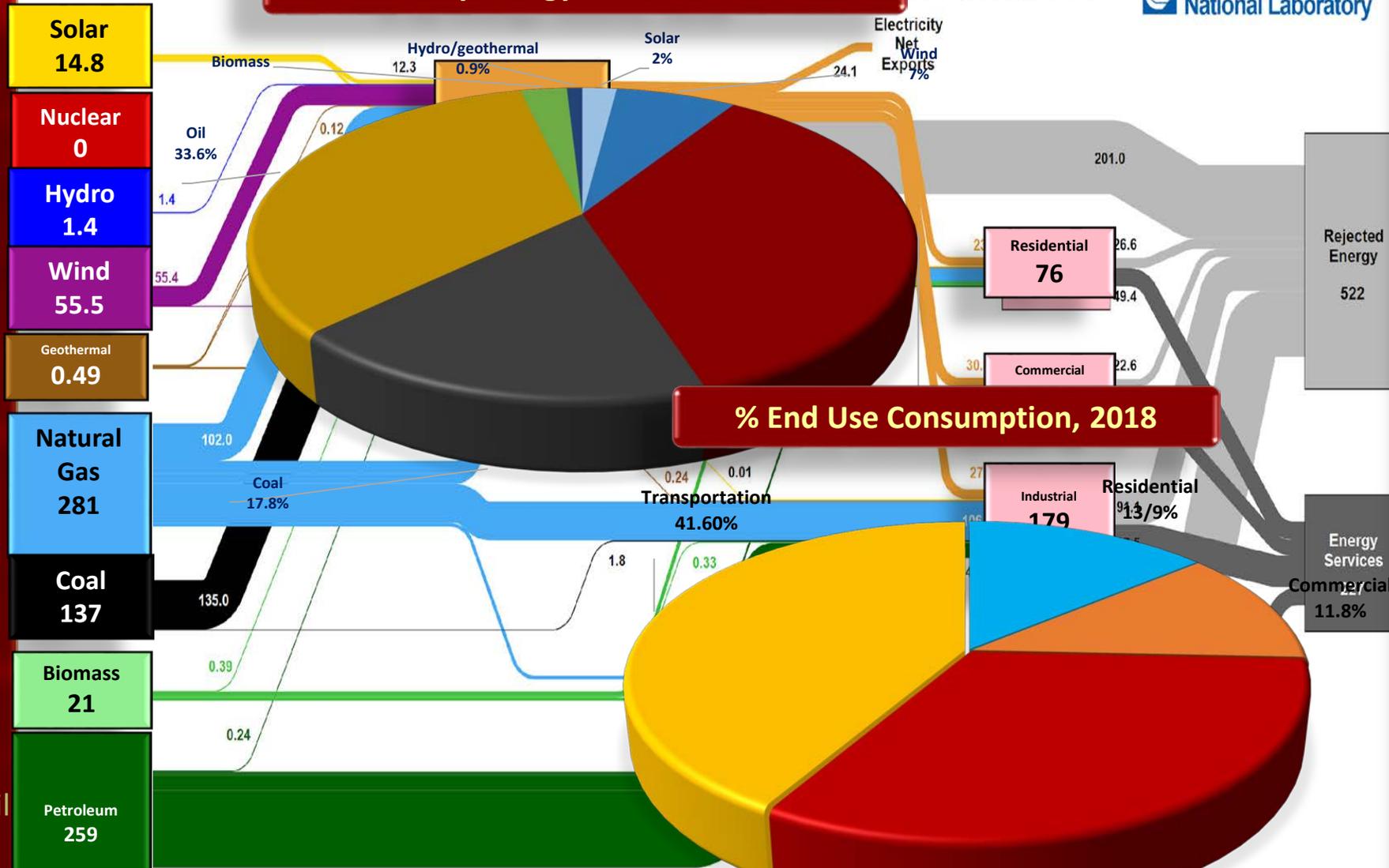
- Economic efficiency
- Job creation
- Equity across groups
- Complexity of change

New Mexico's Energy System, 2018

Lawrence Livermore National Laboratory

% by Energy Source, 2018

773 Trillion BTU



% End Use Consumption, 2018

Energy

- 45% of electricity generated from coal, 23% from renewables
- Natural gas is a major contributor to electricity, residential & industrial uses
- NM covers its natural gas and petroleum needs with local production
- NM exports large volumes of both oil and natural gas

GHGs

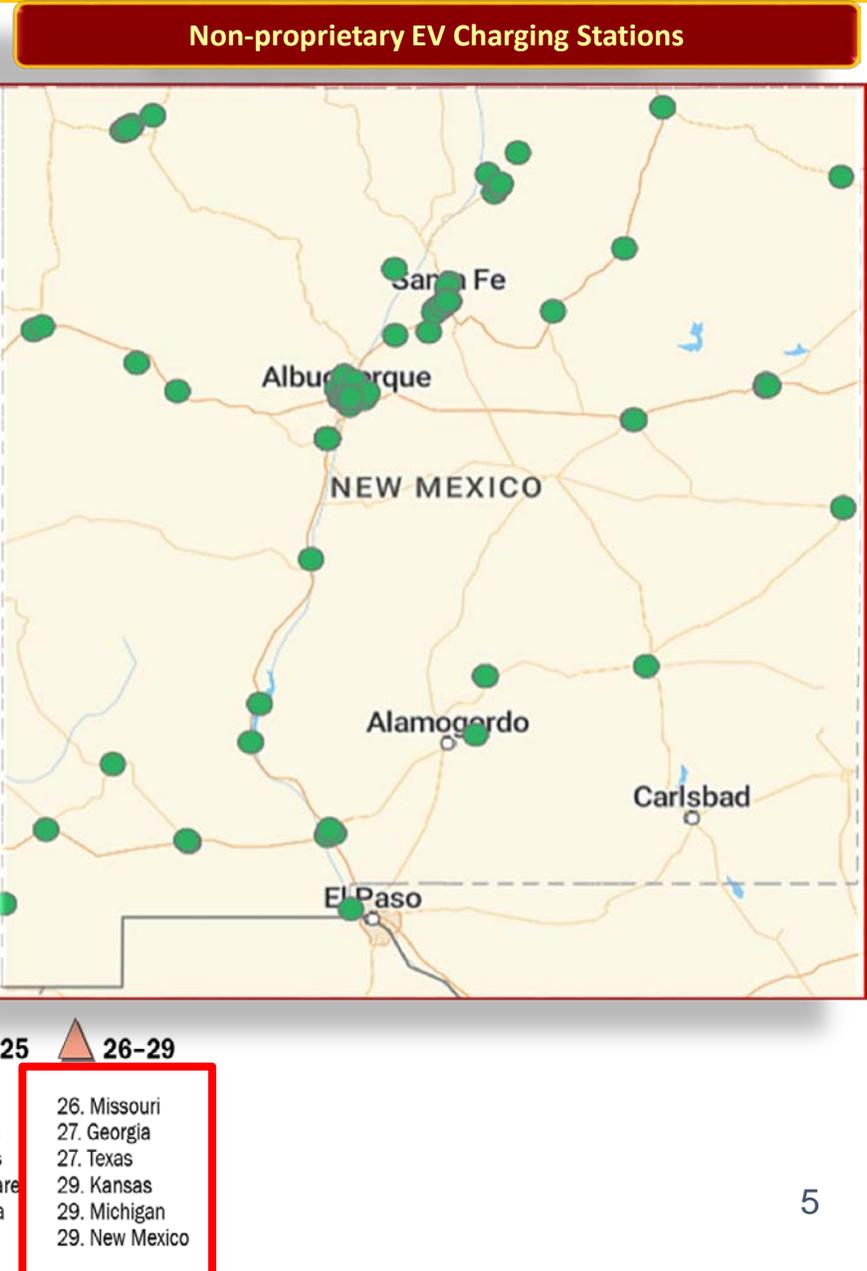
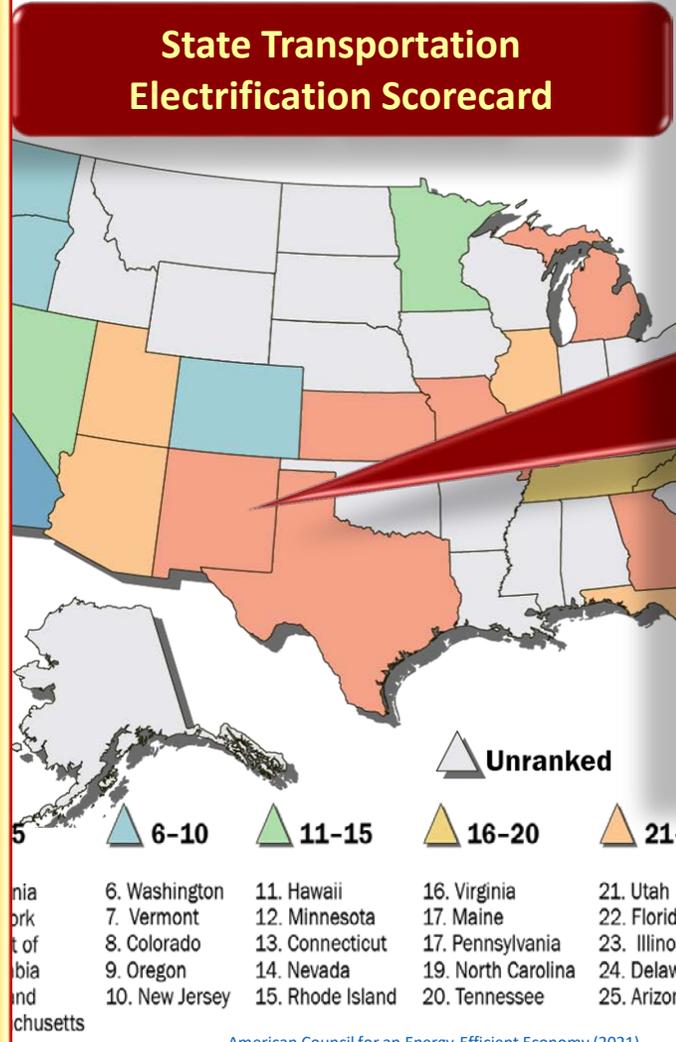
- CO₂ emissions: electricity (40%), transportation (34%), industrial (17%), residential (5%), and commercial (4%)
- Power CO₂ declining but oil and gas, transportation CO₂ rising – exports large
- Methane releases from agriculture and oil and gas also contribute substantially to GHGs

Source: LBNL June, 2019. Data is based on EIA/DOE EENS (2018). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of noncombustible resources (i.e., hydro, wind, geothermal, and solar) for electricity in Btu-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. Heat rate efficiency is set at 38% for the residential sector, 45% for the commercial sector, 48% for the industrial sector, and 28% for the transportation sector. These may not equal sum of components due to independent rounding. LBNL-EE-019127

Industry
32.70%

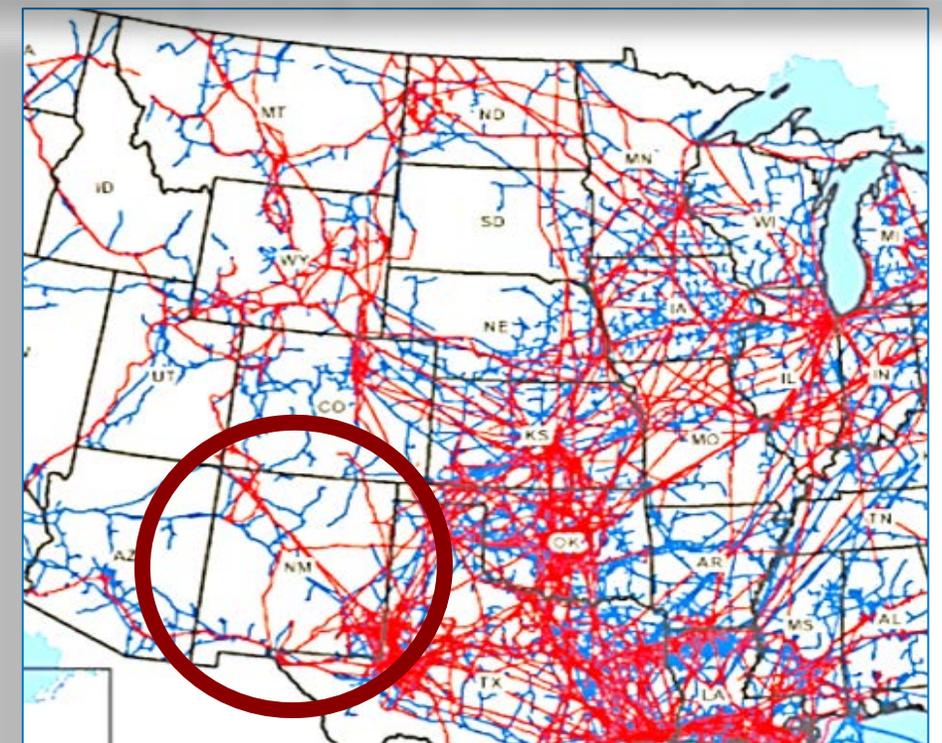
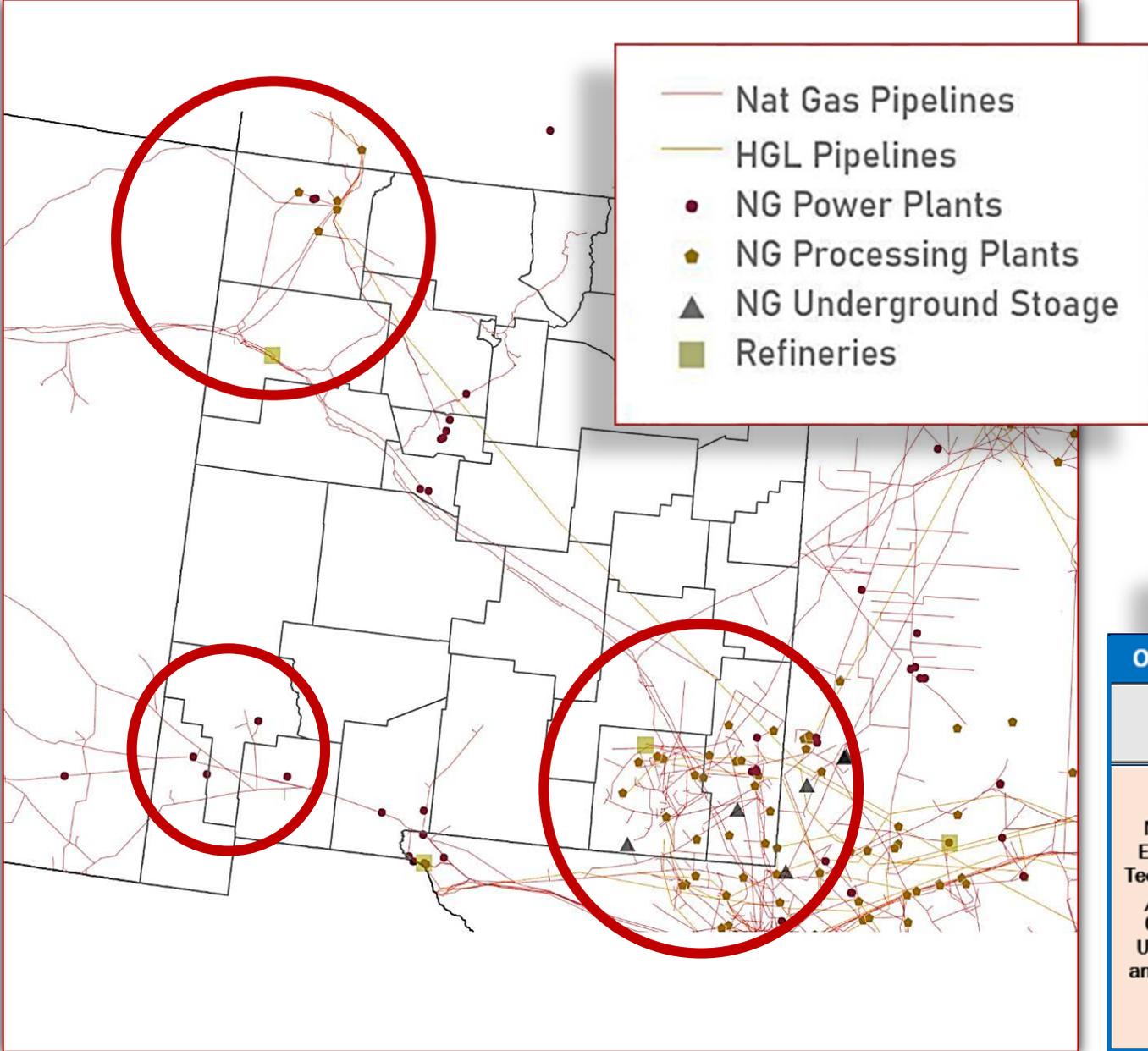
Pathways for decarbonizing transportation

- Transportation accounts for 34% of the state's CO₂ emissions.
- Rural and low income households spend a disproportionate share of their income on transportation.
- Efforts to roll out EVs and develop a Low Carbon Fuel Standard should consider how to address these inequities.
- Options are needed for generating revenue that can



CCS/Hydrogen Hubs

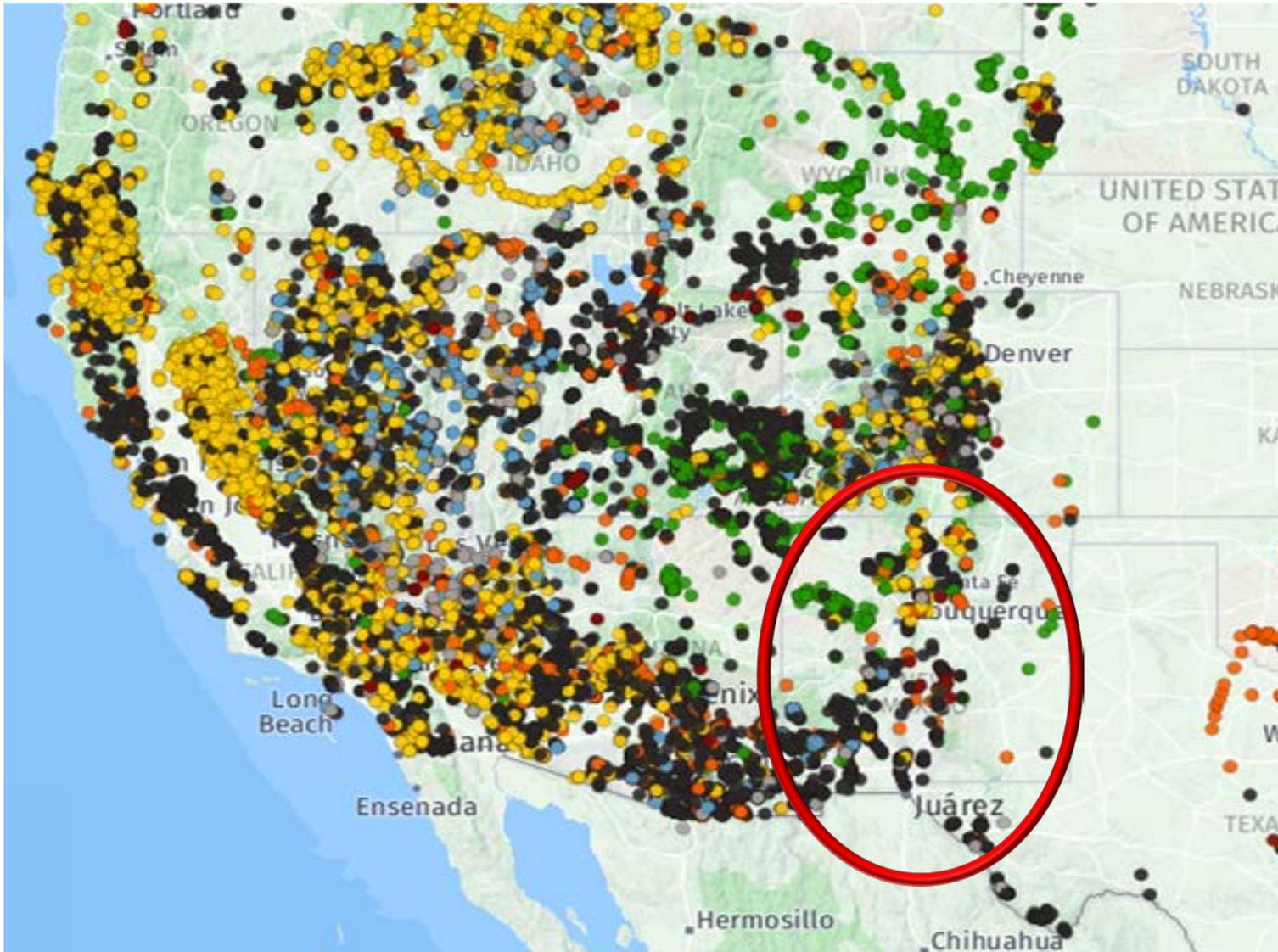
Using/Repurposing Existing Oil/Gas Infrastructure and ROWs



Translating Oil and Gas Skill Sets to CCS Industry Jobs

Opportunities for Using Existing Carbon Infrastructure for Decarbonization					
	Oil Refineries & Gas Processing	Natural Gas Generation	Oil & Gas Pipelines	Waterborne Transportation & Ports	Storage
Negative Emissions Technologies /Carbon Capture, Utilization, and Storage (CCUS)	<ul style="list-style-type: none"> Applying industry expertise to CCUS technologies for direct-air capture (DAC) and bioenergy with carbon capture and storage (BECCS) 	<ul style="list-style-type: none"> Applying industry expertise: CCUS technologies for DAC and BECCS 	<ul style="list-style-type: none"> Using compression technologies similar to those in NG infrastructure for CO₂ Rail and roadway = existing infrastructure Leveraging pipeline rights-of-way 	<ul style="list-style-type: none"> Using industry expertise in liquefaction and transport of LPG/LNG for liquid CO₂ Marine vessels for CO₂ using the same technology as existing LPG or LNG tankers Port infrastructure for loading Offshore facilities for subsea injection 	<ul style="list-style-type: none"> Using saline formations, depleted O&G reservoirs, unmineable coal seams, basalt formations Using industry expertise in large-scale CO₂ separation and sequestration Applying technologies for drilling and injection, subsurface characterization, and site monitoring, same as in the O&G sector Leveraging similarities with NG storage, acid gas disposal, and CO₂-EOR

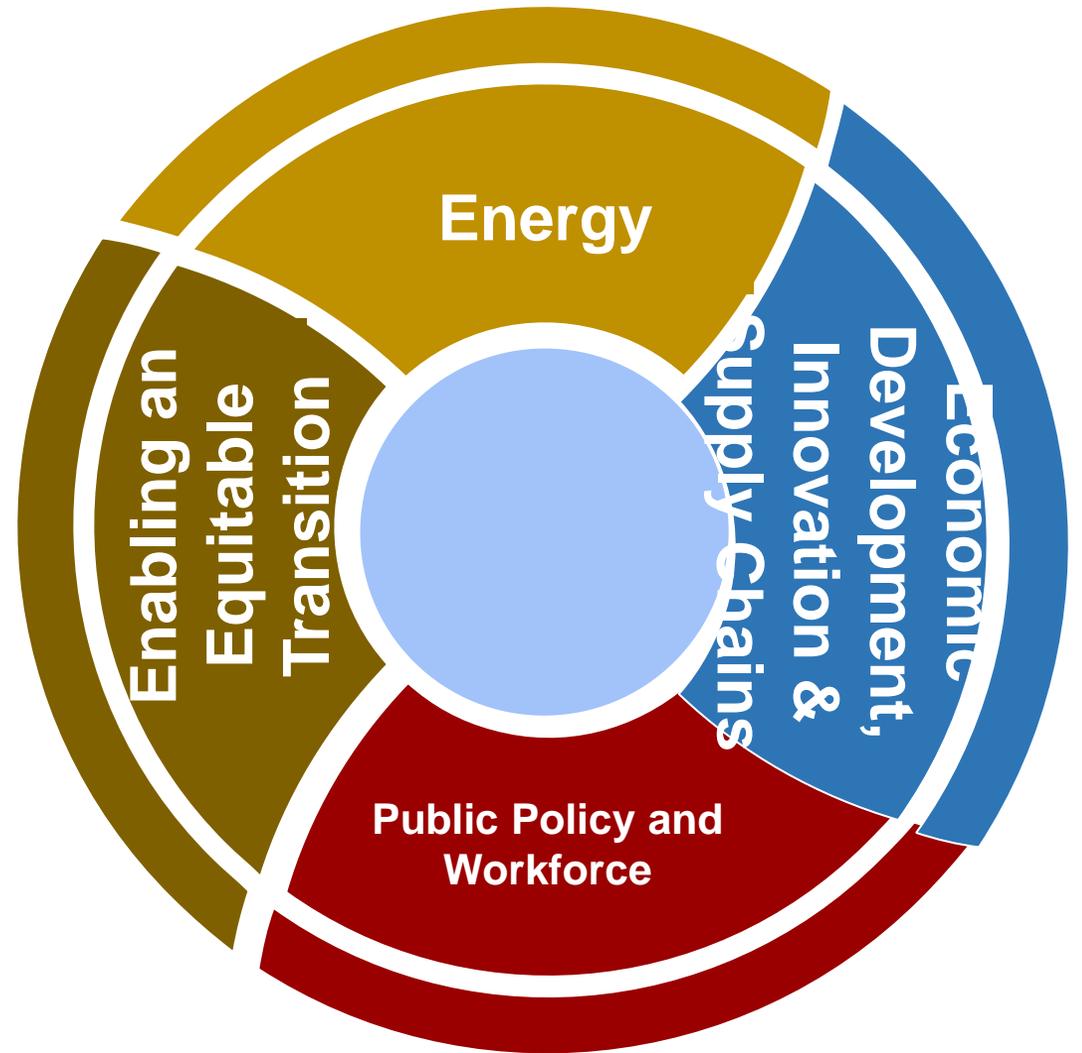
Opportunity to tap NM inactive mines in clean energy supply chains?



- ✓ Copper
- ✓ Gold
- ✓ Iron
- ✓ Lead &/or Zinc
- ✓ Silver
- ✓ Uranium
- ? Others

Case Recommendations

1. Energy
2. Economic Development, Innovation, and Supply Chains
3. Public Policy and Workforce
4. Enabling an Equitable Transition



Focus on Energy: Recommendations 1 & 2

Renewables like wind and solar are variable energy sources that require energy storage and balancing. Current grid configurations/battery storage cannot accommodate the variability and bidirectionality of current flow needed.

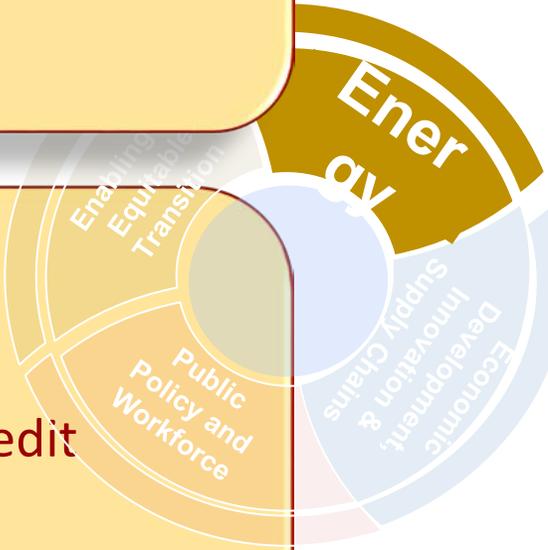
The vast majority of New Mexico has high quality wind and solar resources, but historically, transmission projects take many years to be sited and built.

Recommendation 1: Address the need for firm power generation to balance intermittency of wind and solar to meet renewable power goals

Natural Gas with CCS, Hydrogen, BECCS, Renewable Natural Gas, and Geothermal

Recommendation 2: Support efforts to expand distributed energy

- Solar Market Development Income Tax Credit (Senate Bill 29), Senate Memorial 63
- Expand local participation and need for in-state manufacturing and installation/maintenance



Focus on Energy: Recommendations 3 & 4

New Mexico has disproportionately high electricity carbon intensity, and heavily relies on fossil fuels for revenues and jobs. New Mexico also has infrastructure and geological sites favorable for CCS

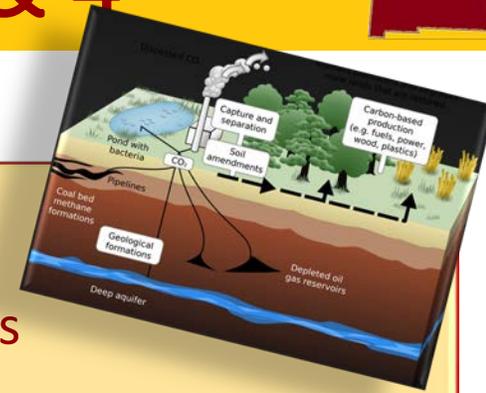
Rural communities drive twice as much as their urban counterparts and high paying professional service and technical jobs are concentrated in metropolitan areas

Recommendation 3: Continue to phase out coal with provisions to address dislocation of jobs loss of public revenues

- Investigate retrofitting remaining coal with CCS; holistic consideration of displaced workers; further consider current subsidies to tax revenue on existing coal plants

Recommendation 4: Low carbon transportation fuel roadmap
Equity considerations for EV implementation and VMT reductions; define near- and long-term opportunities and investments

- Low Carbon Fuel Standard is a good starting point, need to consider how to mitigate impacts on low-income households
- Synergies with hydrogen hubs and biofuels recommendations



Ener
gy

Economic
Development

Focus on Energy: Recommendations 5, 6 & 7

Hydrogen is a flexible fuel source that can be blended with natural gas in pipelines without significant modifications

Recommendation 5: Support and accelerate clean Hydrogen Hubs

- Blue Hydrogen; Hubs in San Juan/Four Corners and Texas-NM Border; holistic roadmap; utilize existing resources

Deadwood can be turned into feedstock for BECCS and commercial husbandry practice compatible with biofuel generation

Recommendation 6: Feasibility study on Agriculture and Bioenergy decarbonization pathways

- Rural participation in clean energy economy; BECCS could reduce forest fire hazards

New Mexico already is a major energy exporter with extensive experience and infrastructure

Recommendation 7: Further regional collaborations

- Hydrogen and CCS hubs; grid modernization; repurposing existing rights of ways



Economic Development, Innovation, & Supply Chains

New Mexico is 5th largest mineral producing state in the US with high volumes of copper – a vital metal for EVs, batteries, wind turbines

Fugitive emissions from methane flaring, venting and leaking lead to approximately \$43 million in missed revenues annually

New Mexico has extensive innovation assets -- including community colleges, universities, national labs, and entrepreneurship hubs

Recommendation 8: Environmentally-responsible mining

- RE and battery implementation; analyze Canadian, Australian, and other sustainable mining policies to inform NM approach

Recommendation 9: Fugitive methane emissions

Agriculture; oil and gas wells

Recommendation 10: Encourage Entrepreneurship

- Partnership across entrepreneurial ecosystems; energy, non-energy and workforce efforts; new metrics for IT-enabled energy systems; encourage existing economic diversification efforts with minority and rural emphasis; renewable natural gas

Energy

Economic
Development,
Innovation &
Supply Chains

Public Policy

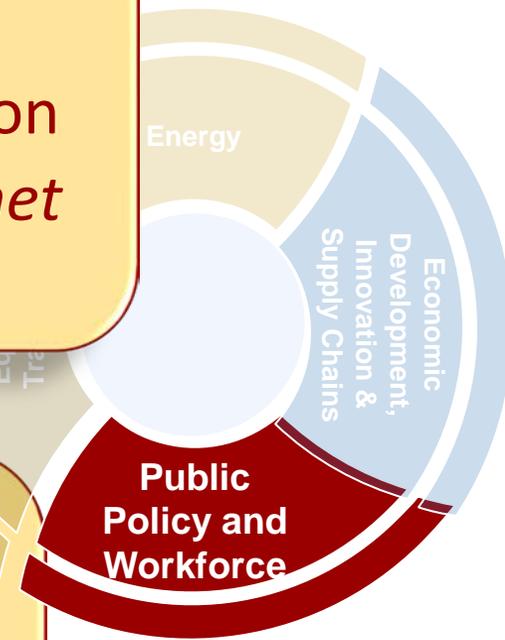
Public Policy and Workforce: Beyond the ETA

Decarbonization pathways to 2050 will demand greater resource flexibility and firm resources to balance the integration of renewables, as well as managing the costs of transition.

Recommendation 11: Adjust eligibility for ETA to include generation targets with carbon capture and sequestration as well as H2 generation to achieve *net* zero grid emissions by 2050.

Transportation, industry and agriculture remain significant contributors of GHG emissions and will require comprehensive policy and regulatory strategies moving forward.

Recommendation 12: Support new legislation and executive actions that will complement the state's ETA by reducing GHG emissions in non-power sectors, especially transportation, GHG-emissions-intensive industry (including oil and gas), and agriculture.



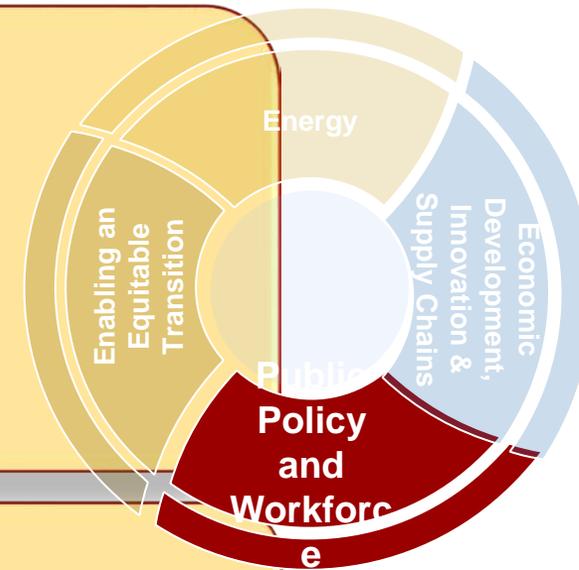
Focus on Jobs: Public Policy and Workforce

The clean energy transition will present challenges for NM's existing energy workforce, particularly in traditional fossil-related sectors, but will also provide opportunities to generate and sustain new job opportunities across a range of industries.

Recommendation 13: Form a strategic partnership among universities, national labs, labor, industry representatives, government, and civil society groups that can, among other functions, to demonstrate new technology, identifying long-term training needs, and support standard setting.

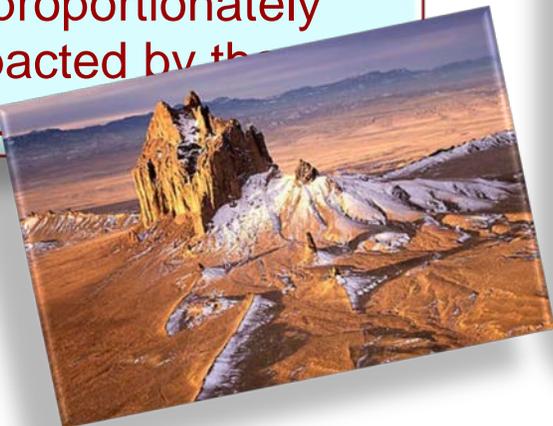
Recommendation 14: Conduct an ongoing state-sponsored survey to crosswalk traditional fossil energy jobs to low-carbon energy skill sets, including construction, renewable energy, energy efficiency, blue and green hydrogen, and CCS.

Recommendation 15: The NM State and Local Governments should enact and enforce laws and policies that ensure existing wages and benefit structures, apprenticeship opportunities, building standards, and worker safety requirements are expanded and improved.



Public Policy and Workforce

The state's public finances are reliant on fossil-related revenue and will need to find new sources as the state transitions. Certain communities, including low income and tribal groups, are disproportionately impacted by the state's



Recommendation 16: Reinforce efforts advanced in recent legislation to replace fossil energy revenue in the state budget.

- Focus in the near term on mitigating effects of transition on public revenue streams to low income communities.

Recommendation 17: Increase federal and state funding for clean energy projects on native lands, while encouraging tribal ownership and management whenever possible.

- Synergistic with, and goes beyond, Recommendation 2 on distributed energy.



Focus on Equity: Recommendations to Help Ensure an Equitable Transition

New Mexico should broaden participation and public input to inform the state's transition strategies.

Recommendation 18: New Mexico's Executive branch should instruct the Inter-agency Climate Change Task Force to assess the feasibility of proposals that have promise to improve the inclusiveness of decision-making processes for the next stages of the clean energy transition.

A People's Transition Assembly

Based on WA Climate Assembly; involves **citizens** and **proportionally represents all demographics in the state**.

Members learn, discuss, then **recommend** what should happen legislatively on transition policy

[More info: WA Climate Assembly 2021](#)

A Just Transition Commission

Modelled after Scotland's JTC; involves **workers, communities, business and industry leaders**.

Provides **independent technical and policy advice** on how to plan and implement transition to clean energy jobs and economies in NM.

[More info: Just Transition Commission](#)

