



MAKING THE MOST OF CLEAN ENERGY IN NEW MEXICO

CRIS MOORE, SANTA FE INSTITUTE

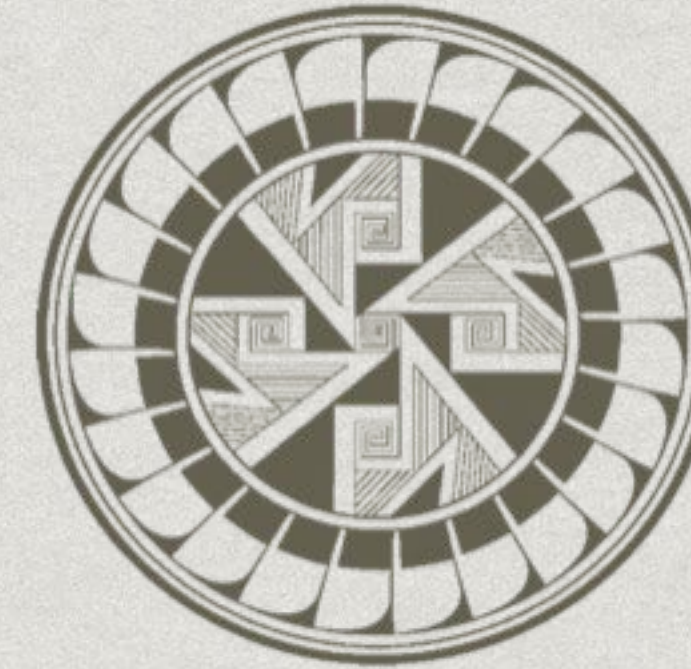
JESSIKA TRANCIK, SANTA FE INSTITUTE & MIT

PAUL HINES, SANTA FE INSTITUTE & U. VERMONT & PACKETIZED ENERGY

SETH BLUMSACK, SANTA FE INSTITUTE & PENN STATE

Who are we and how did we get here?

Santa Fe Institute Workshop Feb. 26-28, 2020



**SANTA FE
INSTITUTE**

Local and international experts:

Sandia, Los Alamos, New Mexico Tech, Santa Fe Institute

MIT, Penn State, Vermont, Duke, Stanford, UCSB, Boise State...

Follow-up discussions with New Mexico educators, industry, advocates

Report released October 16

<https://www.santafe.edu/news-center/news/report-path-decarbonization>

Water and Natural Resources Committee, November 9

Public Regulation Commission, November 18

Public and Private Commitments to Decarbonization

Executive Order 2019-003: 45% reduction by 2030 economy-wide

Energy Transition Act:

- 50% carbon-free by 2030

- 80% by 2040

- 100% by 2045 for investor-owned utilities, 2050 for coops

PNM: 100% carbon-free by 2040 (five years ahead of the ETA)

Xcel, Tucson Electric Power, Arizona Public Service, Kit Carson...

Local governments: Albuquerque, Las Cruces, Santa Fe

Neighboring states: Colorado, Arizona, Nevada...

WITH COMMITMENTS COME OPPORTUNITIES

PRC APPROVED REPLACEMENT FOR SAN JUAN GENERATING STATION: 650 MW SOLAR, 300 MW BATTERY STORAGE

\$447M IN CENTRAL CONSOLIDATED SCHOOL DISTRICT, \$430M IN MCKINLEY COUNTY AND JICARILLA

APACHE NATION IN RIO ARRIBA

JICARILLA APACHE NATION: 50 MW SOLAR, 20 MW STORAGE FOR

ALBUQUERQUE, 100 MW SOLAR

FARM

ENERGY TRANSITION ACT (ETA) ADVISORY COMMITTEE PROPOSALS:

NAVAJO NATION: KAYENTA 111 55 MW

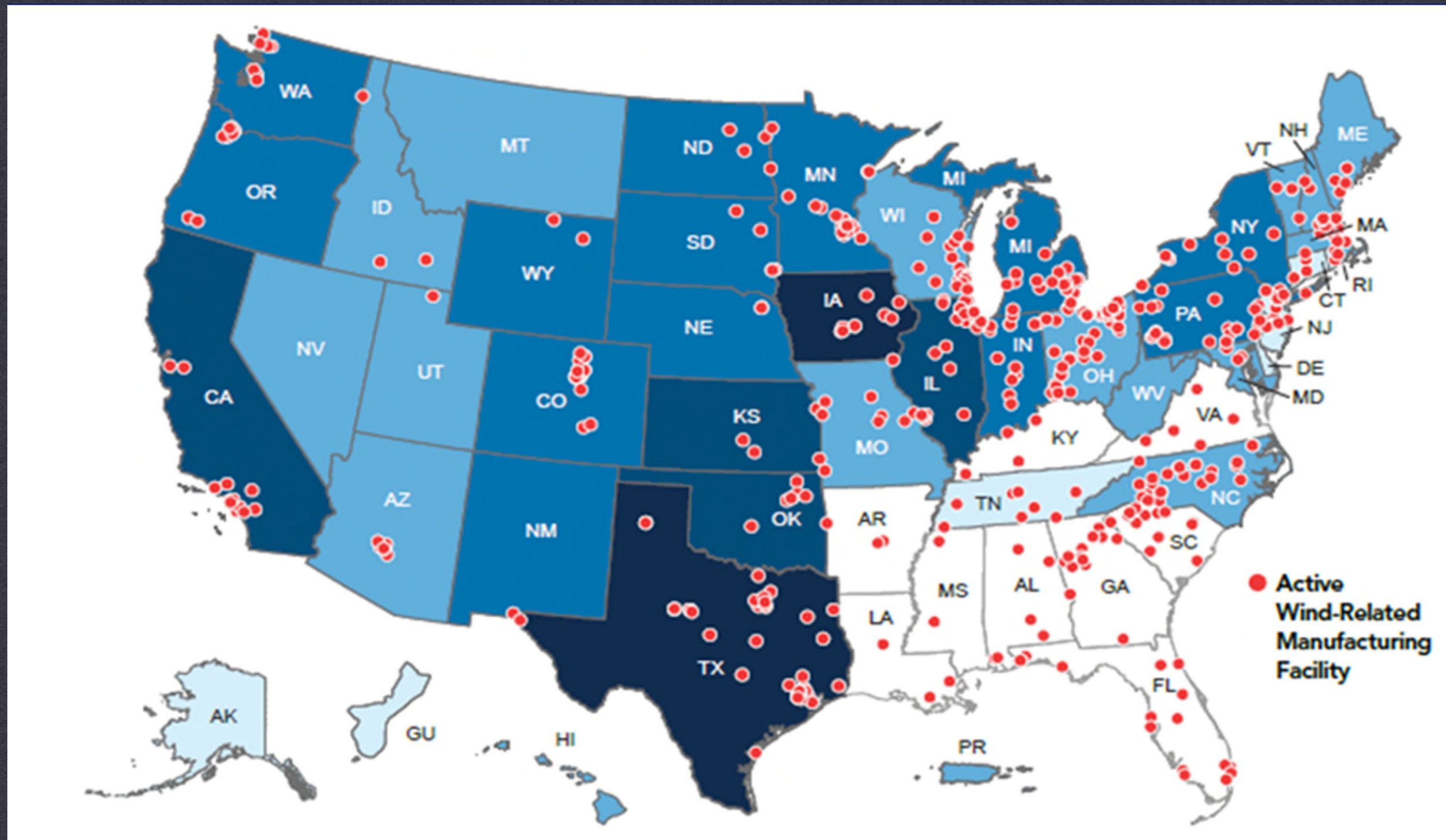
PUMPED HYDROPOWER [E.G. BECLABITO, 70 HOURS SEASONAL SOLAR STORAGE]

HYDROGEN [E.G. LIBERTAD] FROM METHANE WITH CARBON CAPTURE



[Source: Navajo Times]

LOCAL MANUFACTURING OPPORTUNITIES



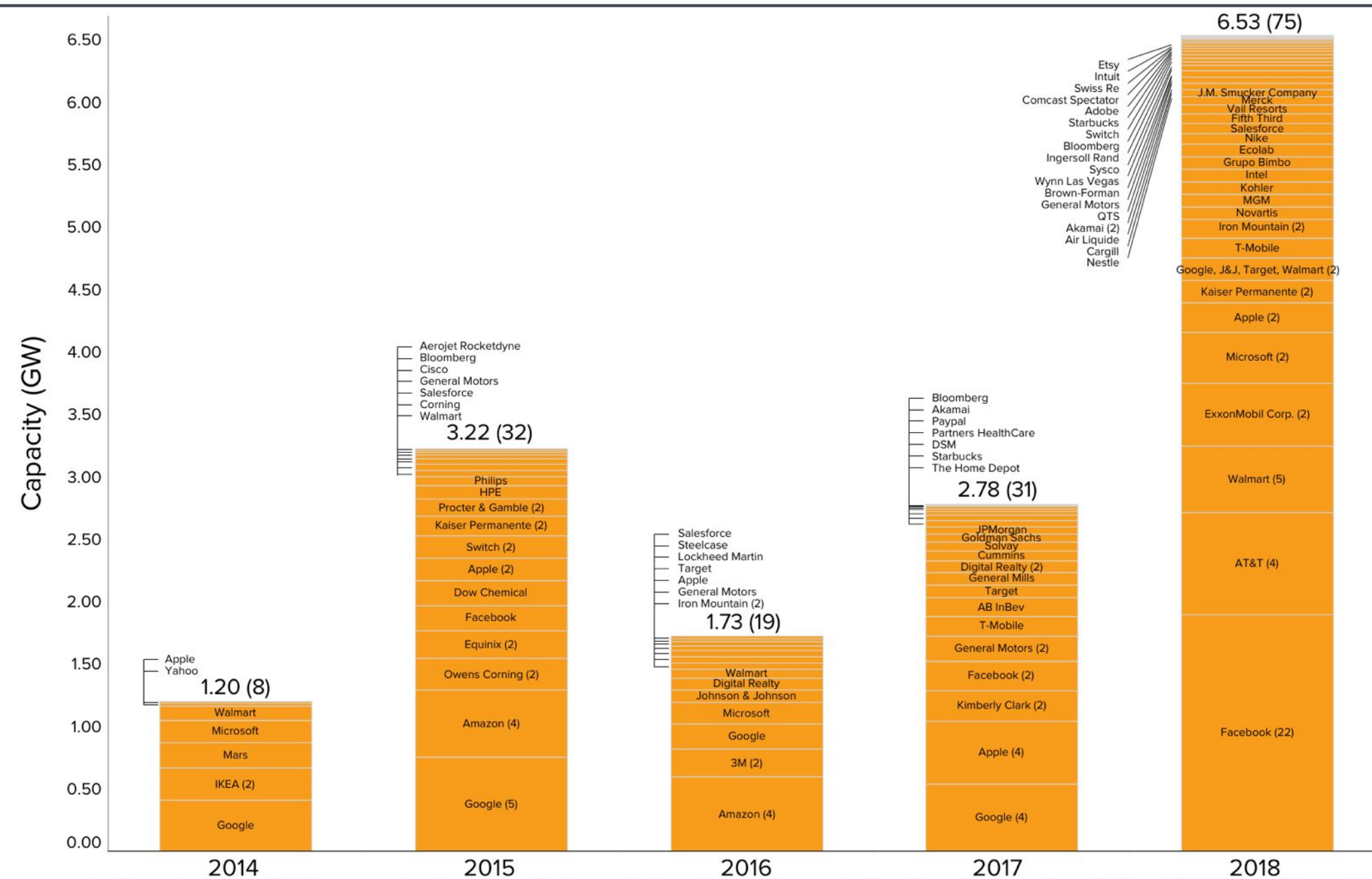
[Source: Lawrence Berkeley National Laboratory]

GREENSHORING

ATTRACT COMPANIES THAT WANT TO SWITCH TO



Corporate Renewable Deals 2014 – 2018



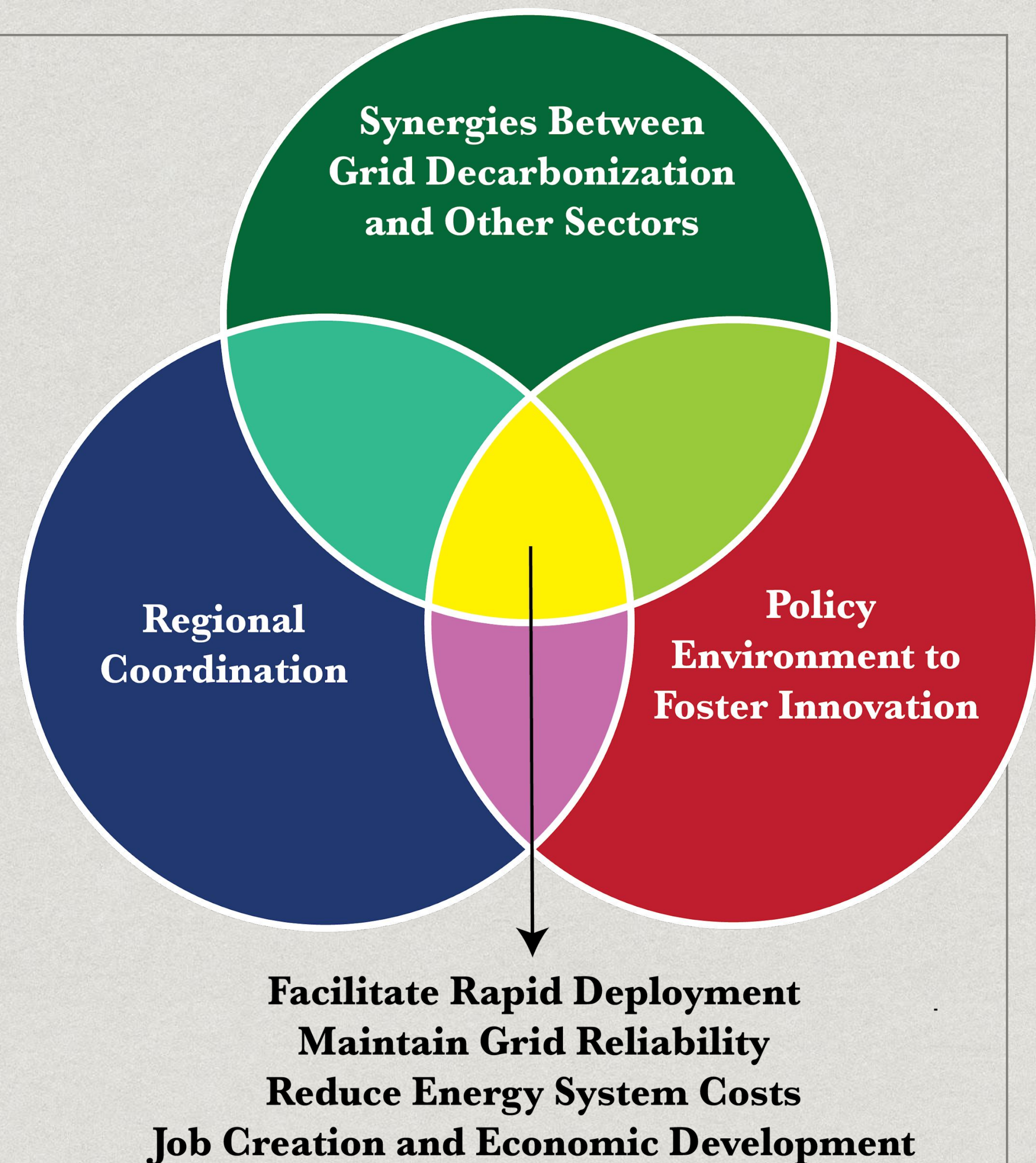
As of December 31, 2018. Publicly announced contracted capacity of corporate Power Purchase Agreements, Green Power Purchases, Green Tariffs, and Outright Project Ownership in the US, 2014 – 2018. Excludes on-site generation (e.g., rooftop solar PV) and deals with operating plants. (#) indicates number of deals each year by individual companies. Copyright 2018 by Rocky Mountain Institute.



NEW MEXICO: LOWEST COST 50/50 MIX OF SOLAR AND WIND ENERGY

[Source: KiloNewton LLC]

How do we achieve these goals while creating high-quality jobs and economic growth?



Three strategies



1. Create a policy environment to foster innovation
2. Cross-sector synergies: use the grid to look beyond the grid
3. Regional coordination

1. Foster innovation

Renewable energy technologies are getting cheaper and more efficient

Can smooth out variations in solar and wind with storage, demand response, and regional coordination

All this infrastructure needs to be built!

Opportunities in:

- Local manufacturing

- Building trades, retrofitting homes and businesses

- Rural areas, Pueblos, Tribes, and Nations

- Locally-based innovation to create sustained jobs and community economic growth opportunities





1. Create a policy environment to foster innovation

Fast-track innovation through an environment that supports experimentation: e.g. testbeds, public-private partnerships

Factor technological innovation trends into regulatory decision-making

Measure regulatory decisions against ETA and other climate goals

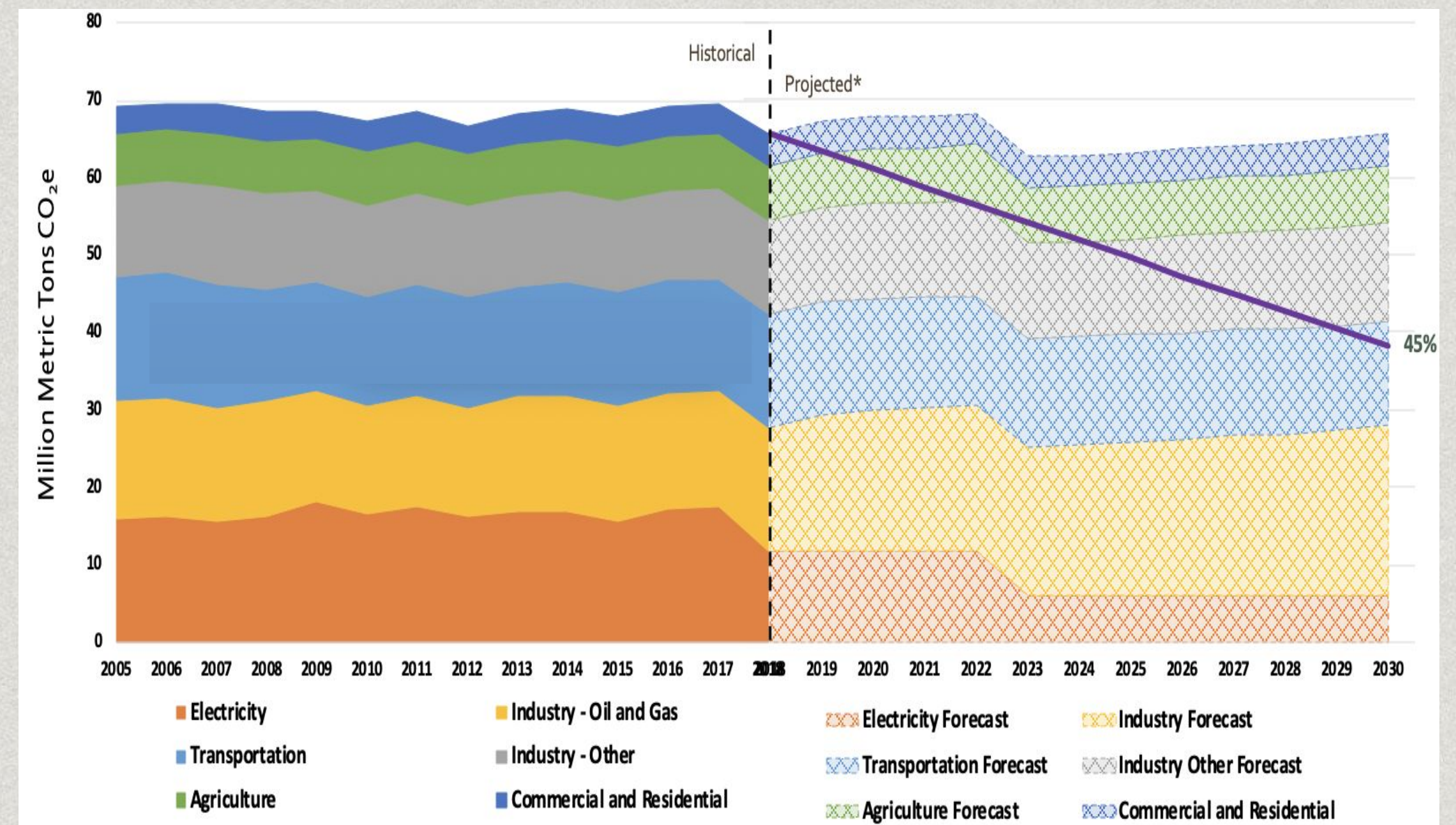
2. Cross-sector synergies: use the grid to look beyond the grid

3. Regional coordination

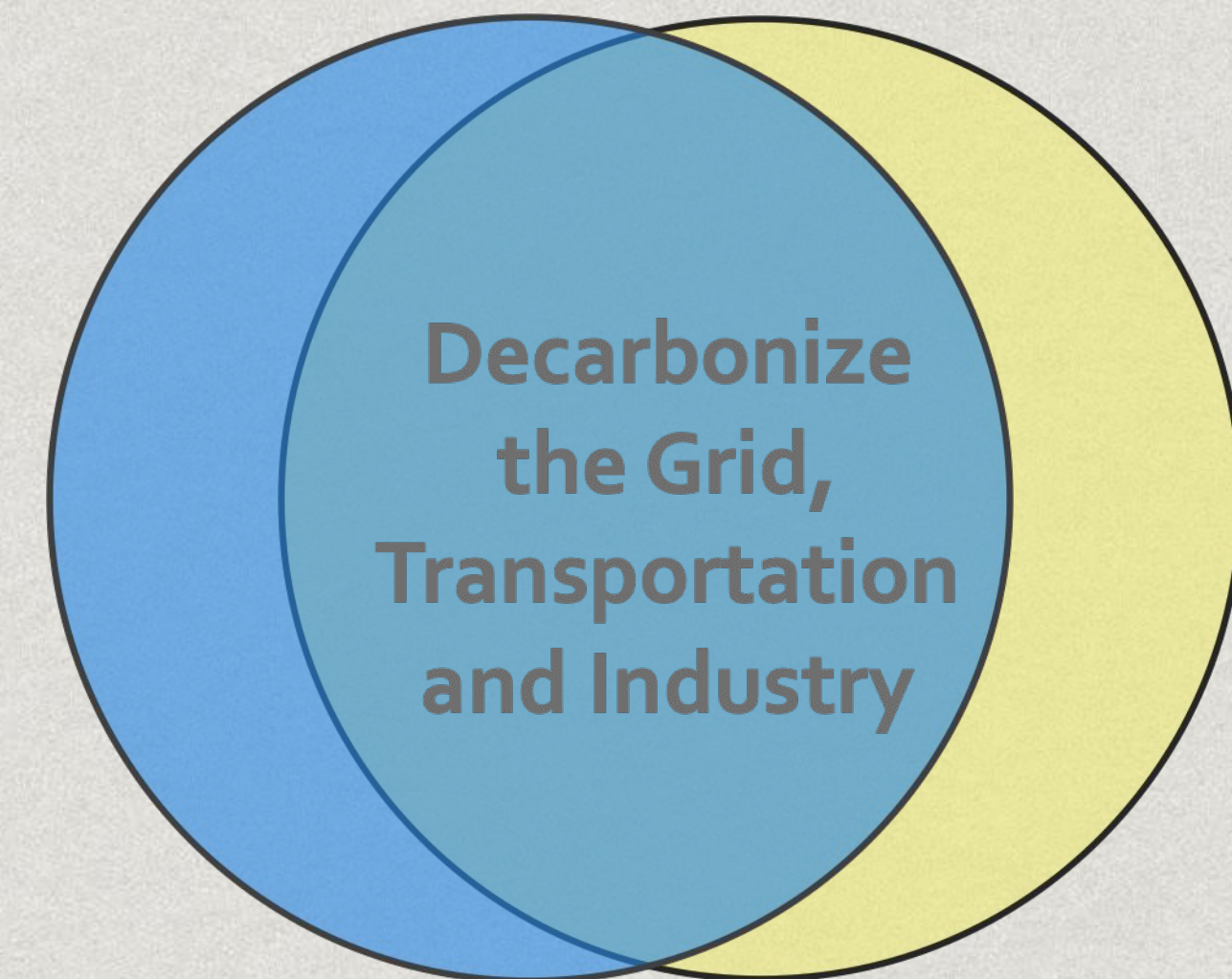
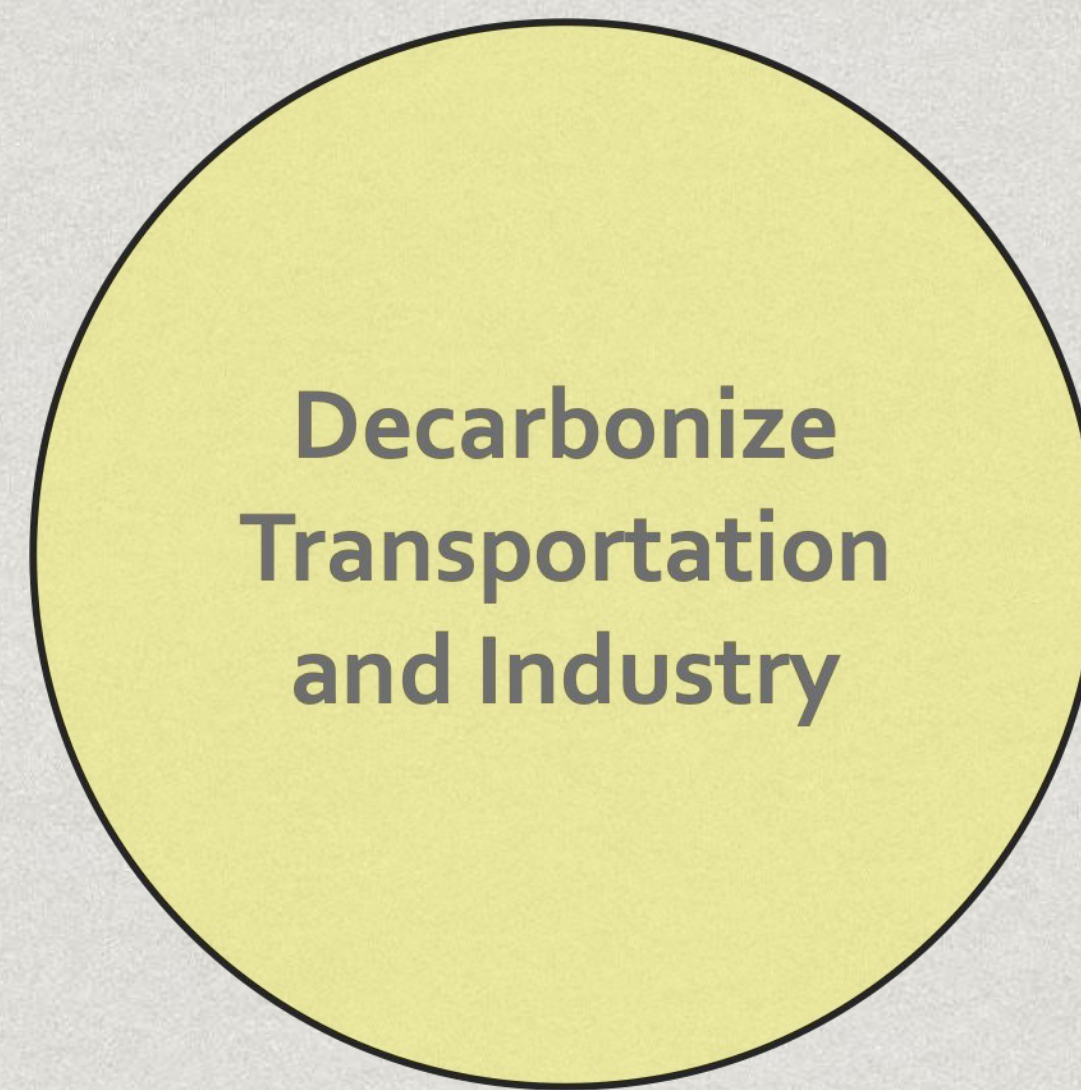
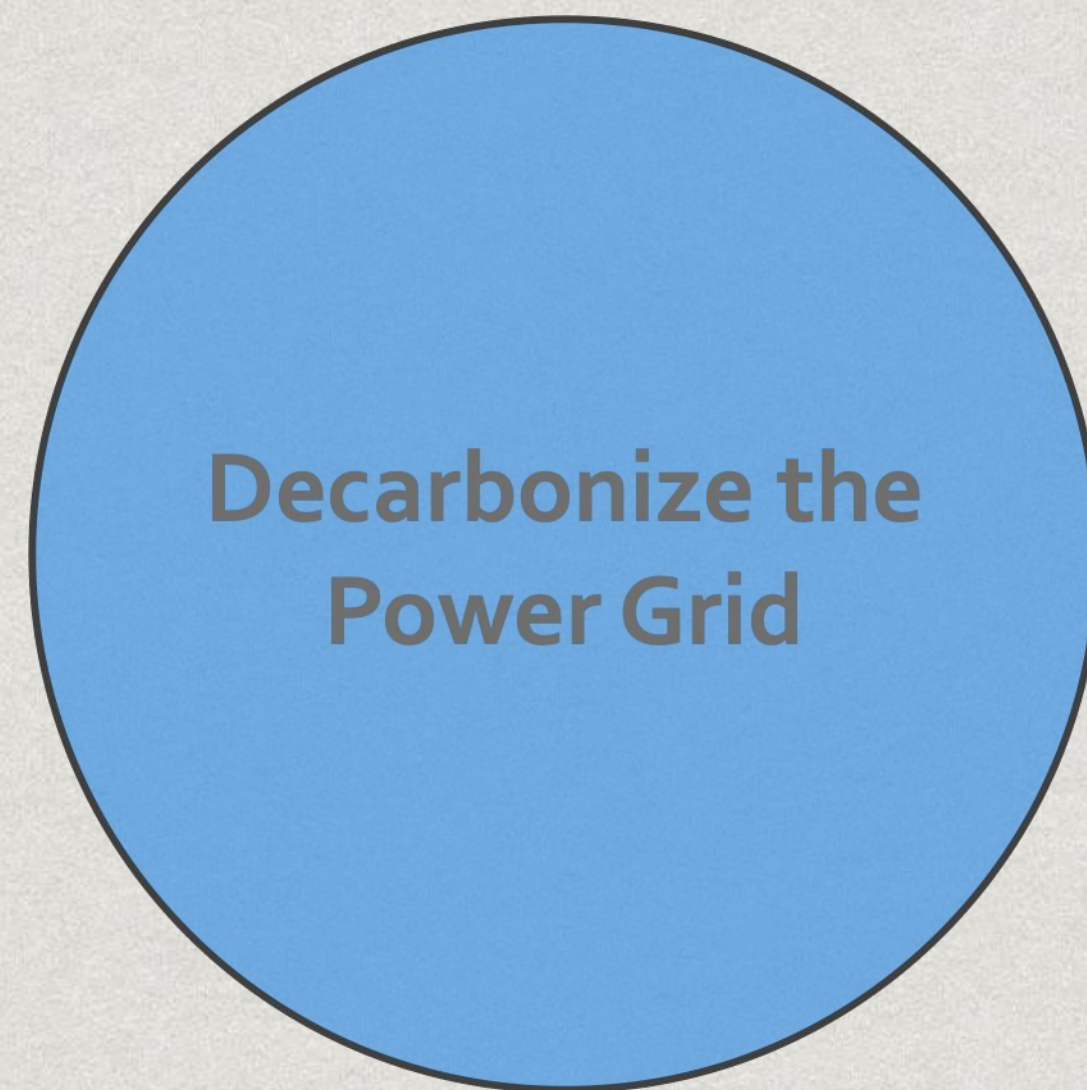
2. Cross-sector synergies: use the grid to look beyond the grid

Decarbonize the Power Grid

Decarbonize Transportation and Industry



2. Cross-sector synergies: use the grid to look beyond the grid



Use a decarbonized grid to push energy transition in industry, buildings and transportation
Electrification, Hydrogen, Flexible and Smart Systems



1. Create a policy environment to foster innovation
2. Cross-sector synergies: use the grid to look beyond the grid
 - Set specific targets and timelines for each sector like ETA did for the grid
 - Opportunities for job creation and economic growth, e.g. electrification
 - Keep sectors in sync: e.g. if vehicle electrification lags too far behind grid decarbonization, we miss an opportunity to use EVs as grid storage
3. Regional coordination

3. Regional Coordination

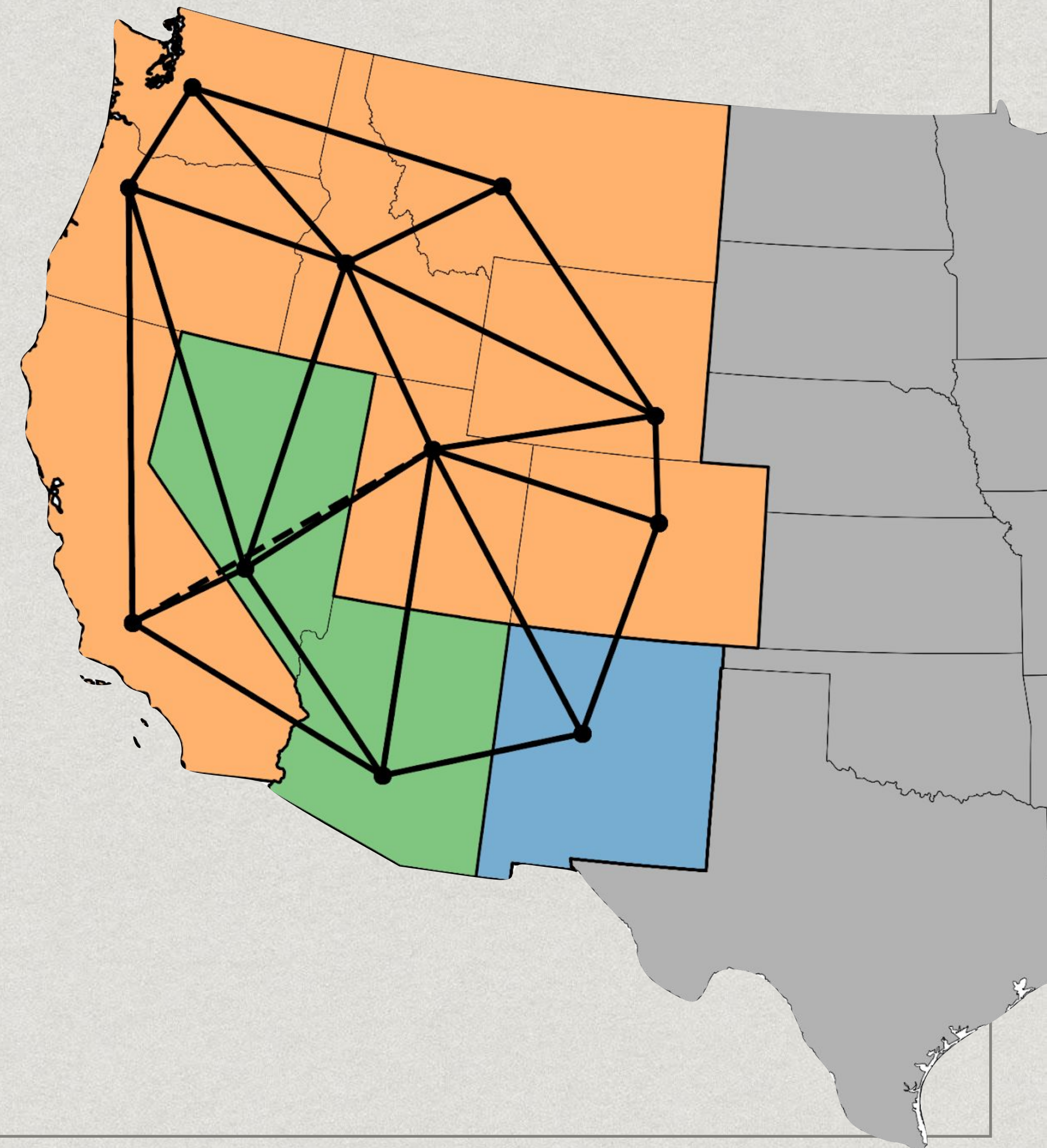
Let energy flow from where it's plentiful to where it's needed: supply and demand

New Mexico has a surplus of solar and wind: wind in Eastern NM, solar everywhere

Our wind “complements” solar elsewhere in the West: blows at night, October thru May

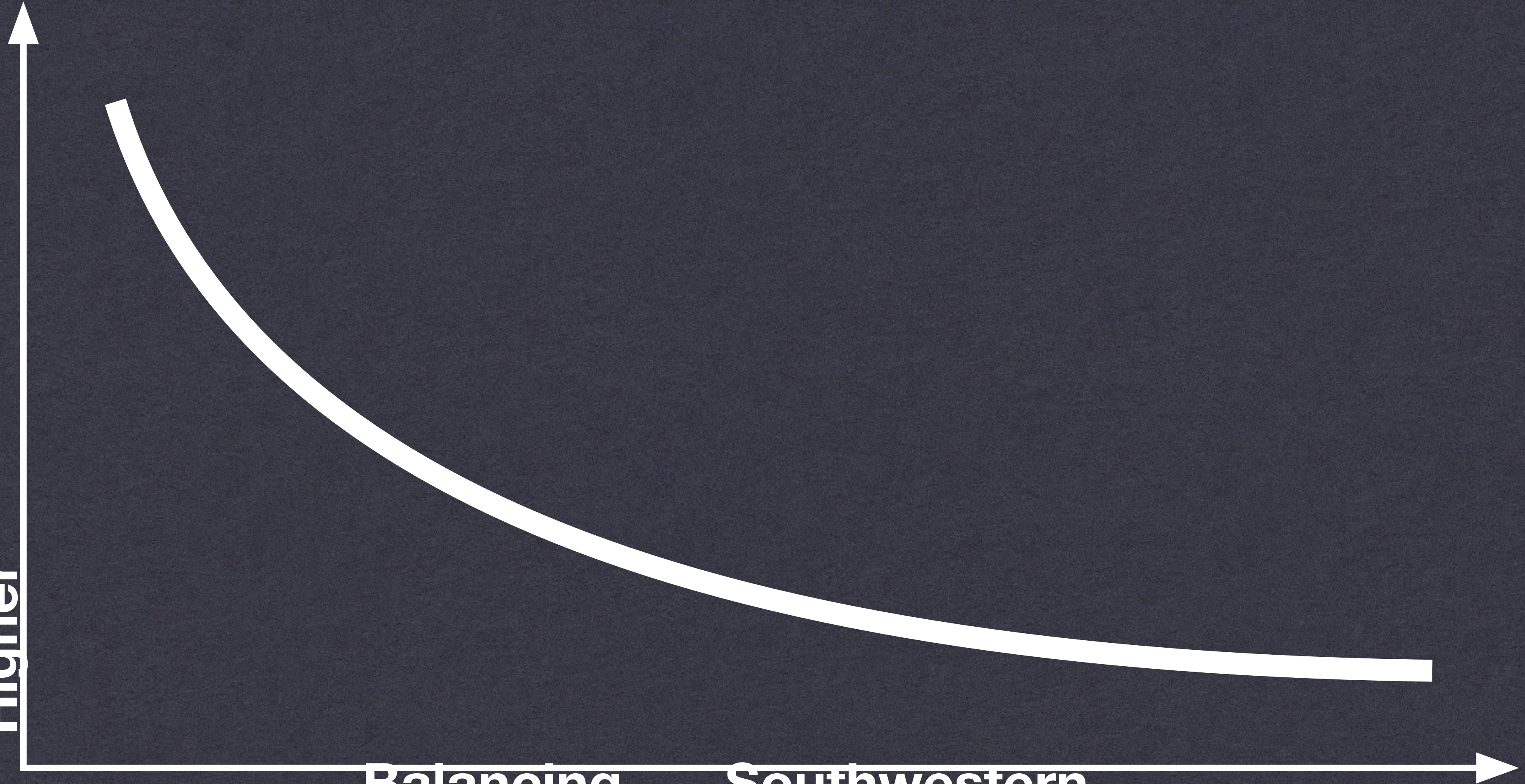
New Mexico can export more power...

...and reduce overall costs by coordinating transmission planning



**Engineering Cost to
Decarbonize the Grid**

**Lower
Higher**



FROM MARKETS TO POWER POOLS TO AN

Local Area

Balancing

Spot
Market

Southwestern

Power Pool or
RTO

Western

RTO

RTO



1. Create a policy environment to foster innovation
2. Cross-sector synergies: use the grid to look beyond the grid
3. Regional coordination
 - Lower the cost of decarbonization, improve grid stability
 - Export solar and wind power to neighboring states
 - Expand markets for successful innovations, create more jobs, more economic opportunity

Conclusions

New Mexico can **Lead** Decarbonization in the Southwest and **Create Economic Opportunities**

Policy Environment to Foster Innovation

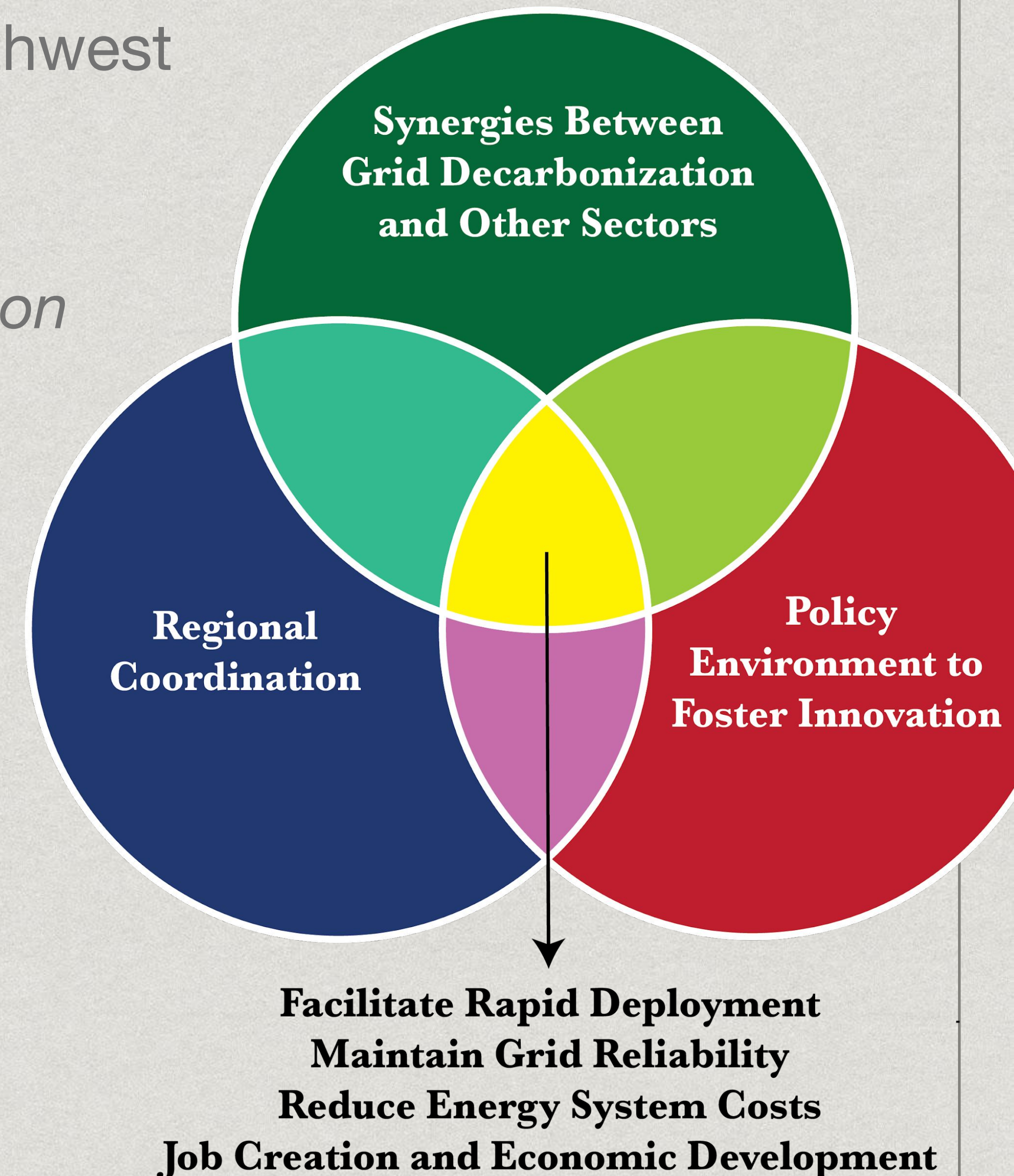
Support partnerships, experimentation and innovation
Use innovation trends to inform regulation
Keep decisions consistent with climate goals

Synergies Between the Grid and Other Sectors

Targets and timelines for broader decarbonization
Where can a green grid help other industries?

Regional Coordination

Expand markets for NM's green power
Lower the costs of meeting the ETA
Make a greener grid more reliable





QUESTIONS?

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