Clean Renewable Electricity for New Mexico

FIGHTING CLIMATE CHANGE
350 NEW MEXICO

Nov 13, 2017

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350.Org New Mexico

Interim committee on Water and Natural Resources, Santa Fe

The Renewable Portfolio Standard (RPS) *is the* ***% of electricity produced from renewables*** *such as wind, solar and geothermal*

Clean Renewable Energy Means Economic Growth for New Mexico

- New Mexico needs to **revive our economy**, help preserve a **livable climate** and make the state **healthier** for our families.
- How? A bold new Renewable Portfolio Standard (**RPS**) so we convert to **clean renewable energy**
  - Current RPS maxes at 20% by 2020. Extend to 80%
- An electricity RPS has **NO IMPACT on oil** jobs or oil revenue, since **oil is not used** in NM to generate **electricity**. <7% NM nat. gas for electricity.

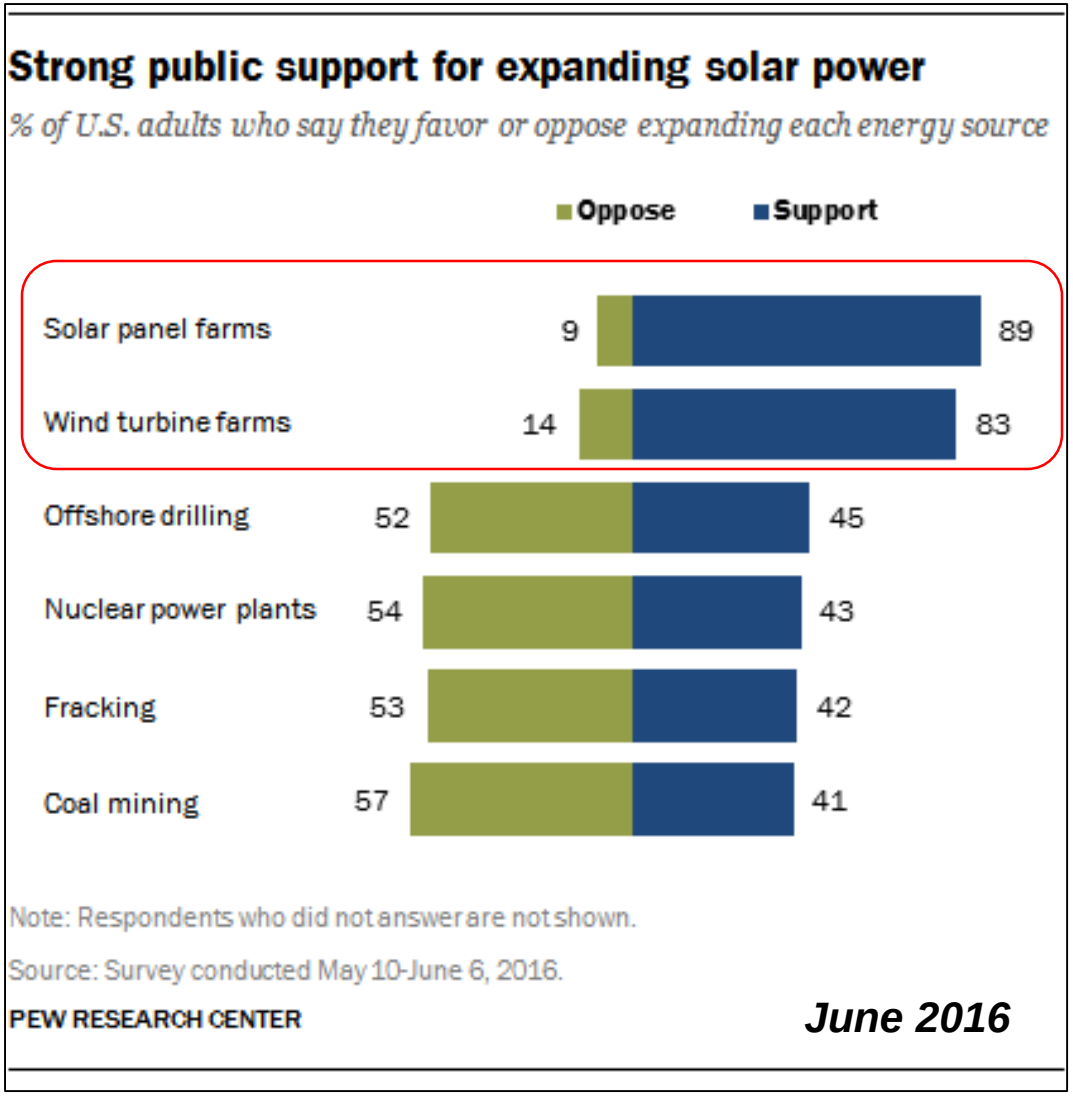
Why

Clean Renewable Energy?

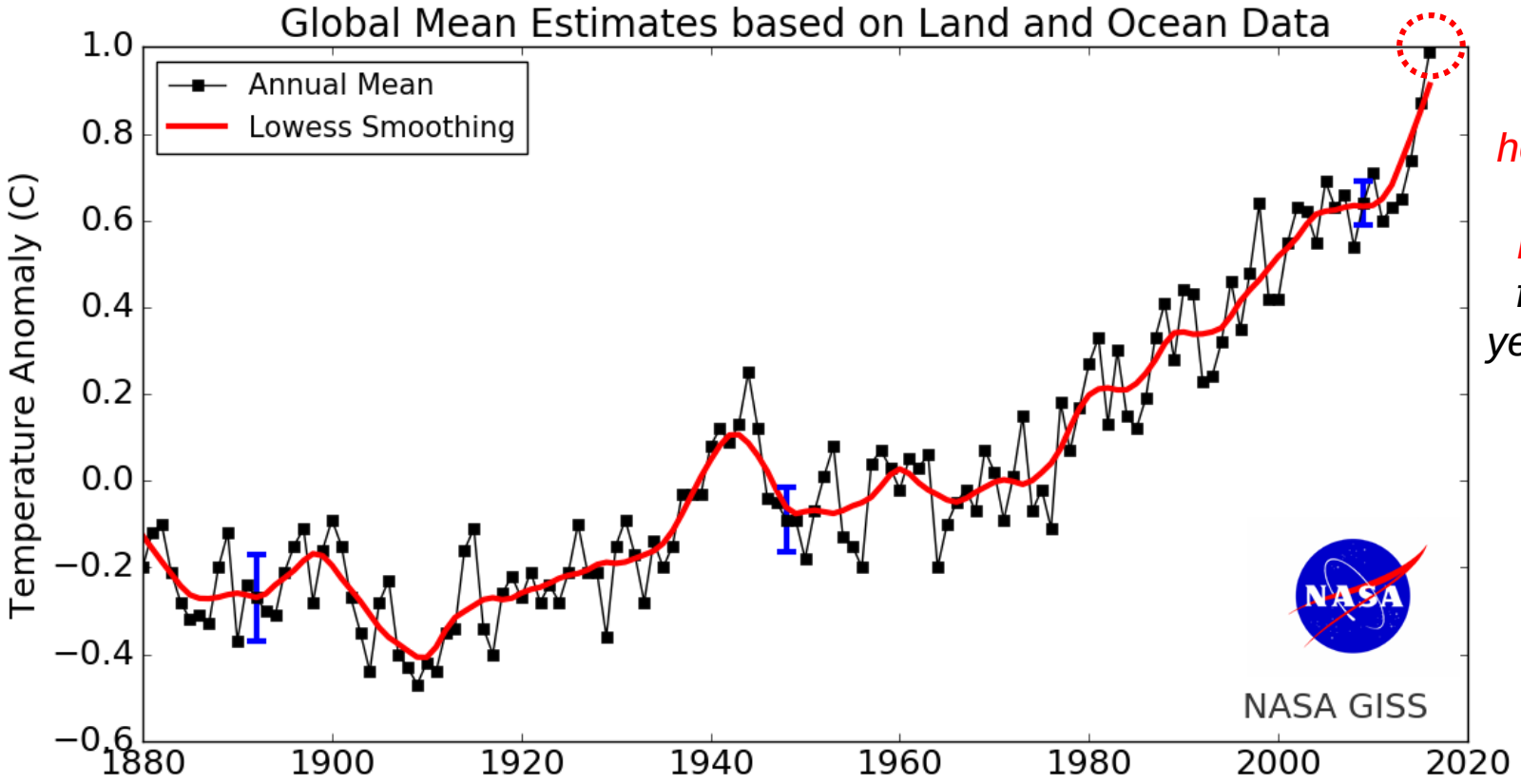
86% Support More Clean Energy

- **HUGE** majorities support more **Solar** and **Wind** energy, **by 7:1**

- Strong **bipartisan** support



Warming is Happening Now



2016:

The new hottest year ever recorded, for the 3rd year in a row

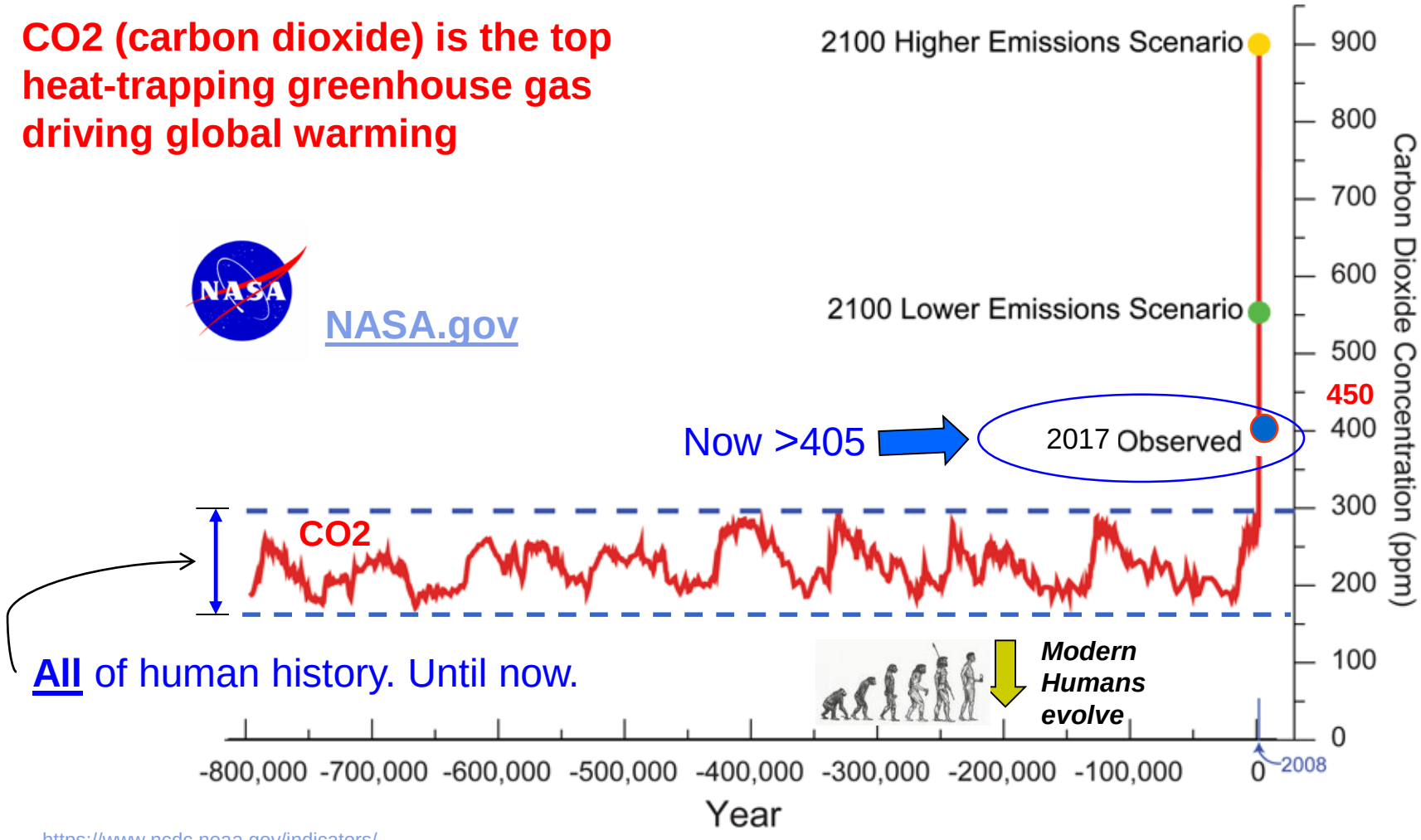
- **2016 – The warmest year on record, by far**
  - https://www.sciencedaily.com/releases/2017/01/170118112554.htm/

http://data.giss.nasa.gov/gistemp/graphs/

CO2 Levels: Higher Now Than Any Time in Human History

CO2 (carbon dioxide) is the top heat-trapping greenhouse gas driving global warming

NASA.gov



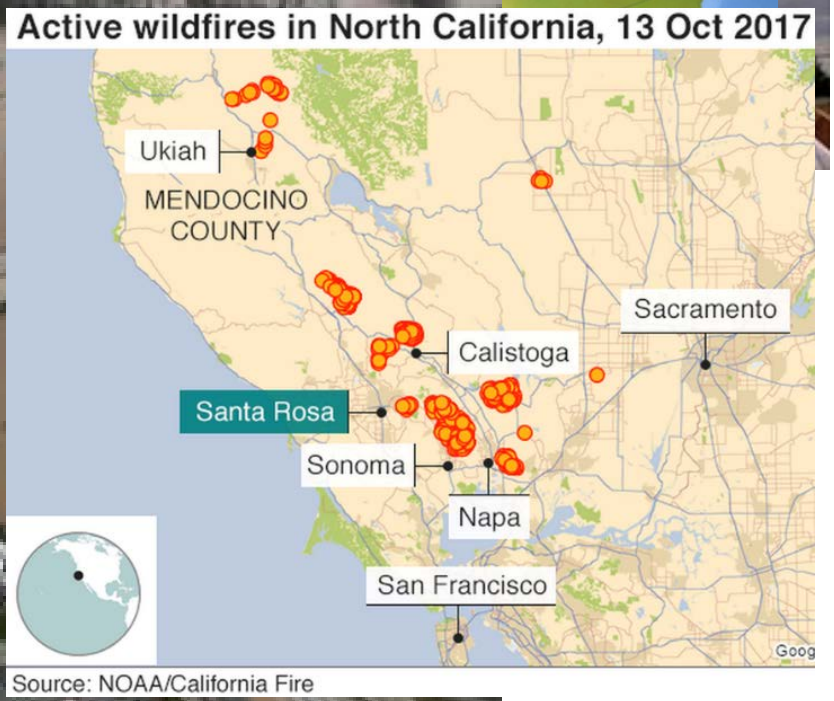
https://www.ncdc.noaa.gov/indicators/

http://climate.nasa.gov/key_indicators
https://scripps.ucsd.edu/programs/keelingcurve/

Impacts Are Being Felt Now:

drought, heat waves, wildfires, superstorms

Disaster	Damage Est.
Hurricane Harvey	$180B
Hurricane Irma	$100B
Hurricane Maria	$95B
California wildfires	$85B



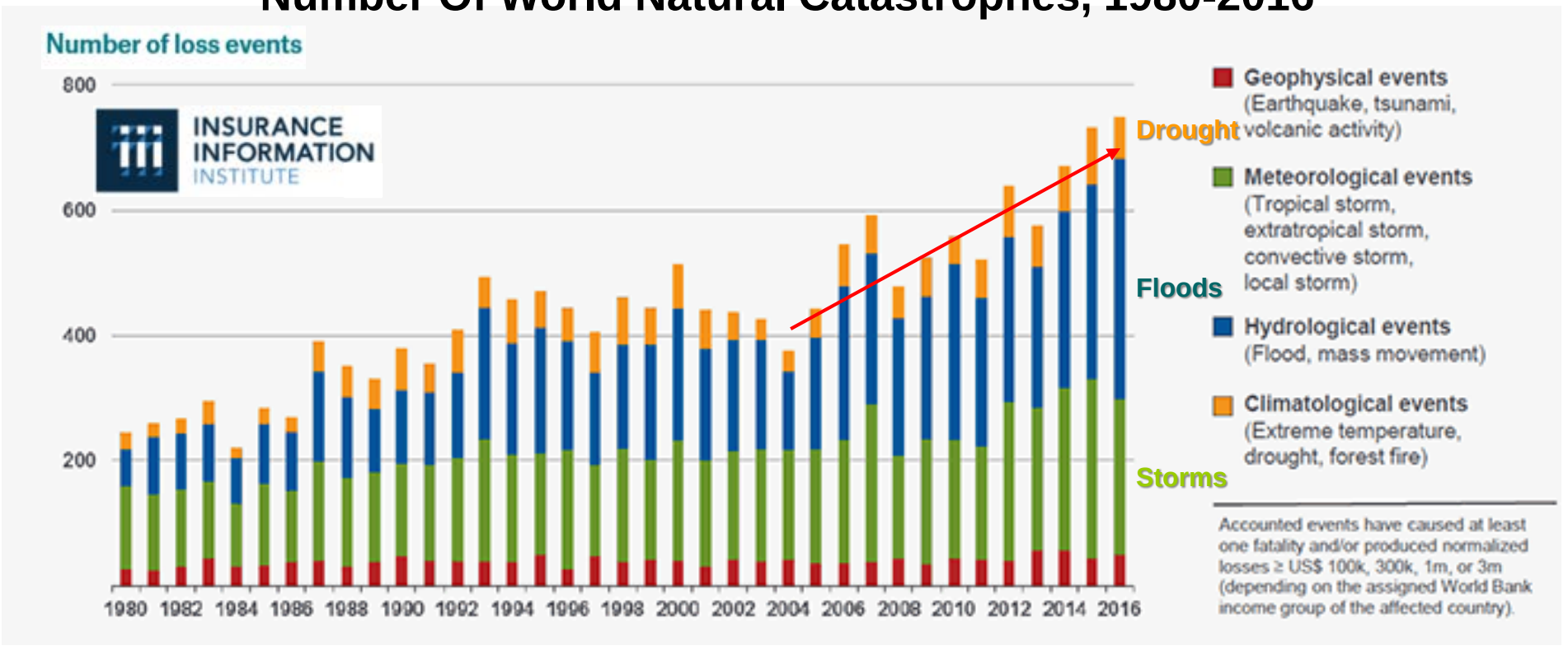
http://climate.nasa.gov/interactives/climate-time-machine

Climate Disasters Up 3X Since 1980

Report: Cost of US climate disasters will ***increase 50% to $360B per year*** *in the next decade*

https://phys.org/news/2017-09-climate-disasters-growth-decade.html

Number Of World Natural Catastrophes, 1980-2016



Source: © 2017 Munich Re, Geo Risks Research, NatCatSERVICE.
Insurance Information Institute *http://www.iii.org/fact-statistic/catastrophes-global*

Global Food Shortages, Then Famine

Worst Case Timing

Year / °C warming	% Loss in Crop Yields
2020's / 1°C	-10%
2040's / 2°C	-30%
2050's / 3°C	-40%
2060's / 4°C	-60%

Tyndal says 4C by 2050

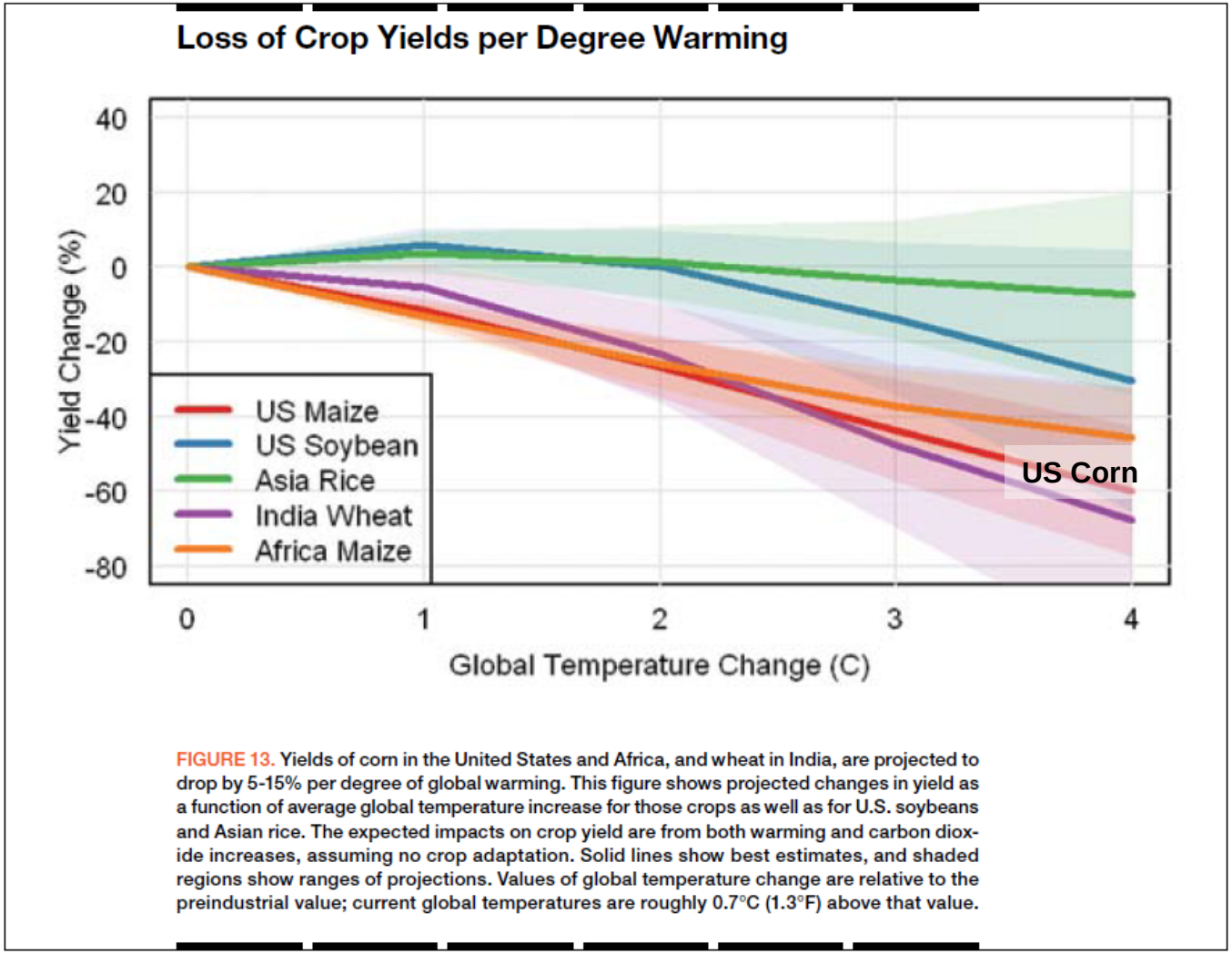


FIGURE 13. Yields of corn in the United States and Africa, and wheat in India, are projected to drop by 5-15% per degree of global warming. This figure shows projected changes in yield as a function of average global temperature increase for those crops as well as for U.S. soybeans and Asian rice. The expected impacts on crop yield are from both warming and carbon dioxide increases, assuming no crop adaptation. Solid lines show best estimates, and shaded regions show ranges of projections. Values of global temperature change are relative to the preindustrial value; current global temperatures are roughly 0.7°C (1.3°F) above that value.

***Source* The National Academy of Sciences – *Warming World: Impacts by Degree* 2011**

Dangerous Future Warming

Worst case, if we don't rapidly change course

Decade	Warm-ing °C	% Loss in Crop Yields	Commentary
2020's	**+1°C**	-10%	2x-4x worse wildfires, drought in SW, coastal flooding
2030's	**+1-2°C**	-20%	Major food shortages (corn, wheat); coral reefs dying; increasing extreme weather. **Miami 1m underwater.**
2040's	**+2°C**	-30%	Most summers hotter than 2003 EU **heat wave**. 30% species risk extinction. Mountain **ecosystems dying**. 4x-8x worse **wildfires**. Pervasive drought in sub-tropics. **Extensive starvation**.
2050's	**+3°C**	**-40%**	40%-70% species extinction. Amazon & boreal forest dieback. Decline in all cereal crop yields in Africa. Release of CO2 and methane from permafrost, tripling from 1.5C. **Wars. Mass starvation.**
2060's	**+4°C**	**-60%**	**Game over**. Ecosystem supports **<1 billion people**. Climate likely past tipping points for further warming.

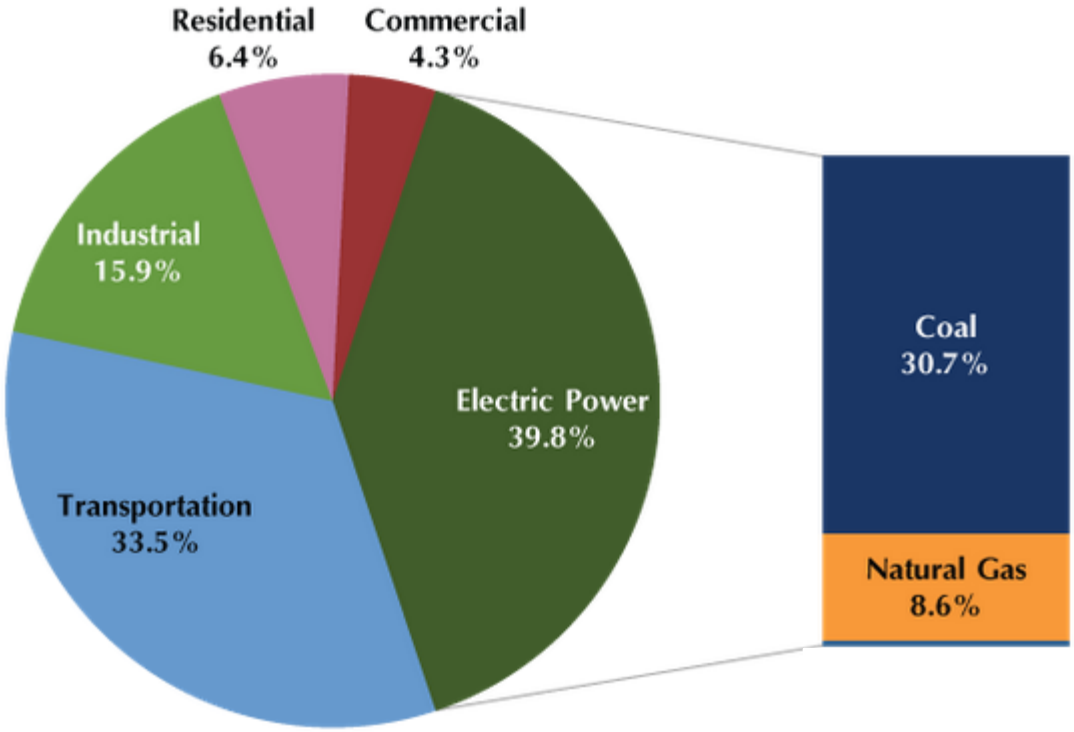
Read more in New York Magazine, July 9, 2017. **The Uninhabitable Earth**

From: National Academy of Sciences, 2011, the US National Climate Assessment, 2014 & UK Met office

http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/warming_world_final.pdf (2011)
* http://news.nationalgeographic.com/2015/07/150721-james-hansen-sea-level-rise-climate-change-global-warming-science/

#1: Cut CO2 Emissions from Electricity

Figure 1: 2013 U.S. CO2 Emissions



Electricity is the #1 source of CO2 emissions, from burning **coal & natural gas**

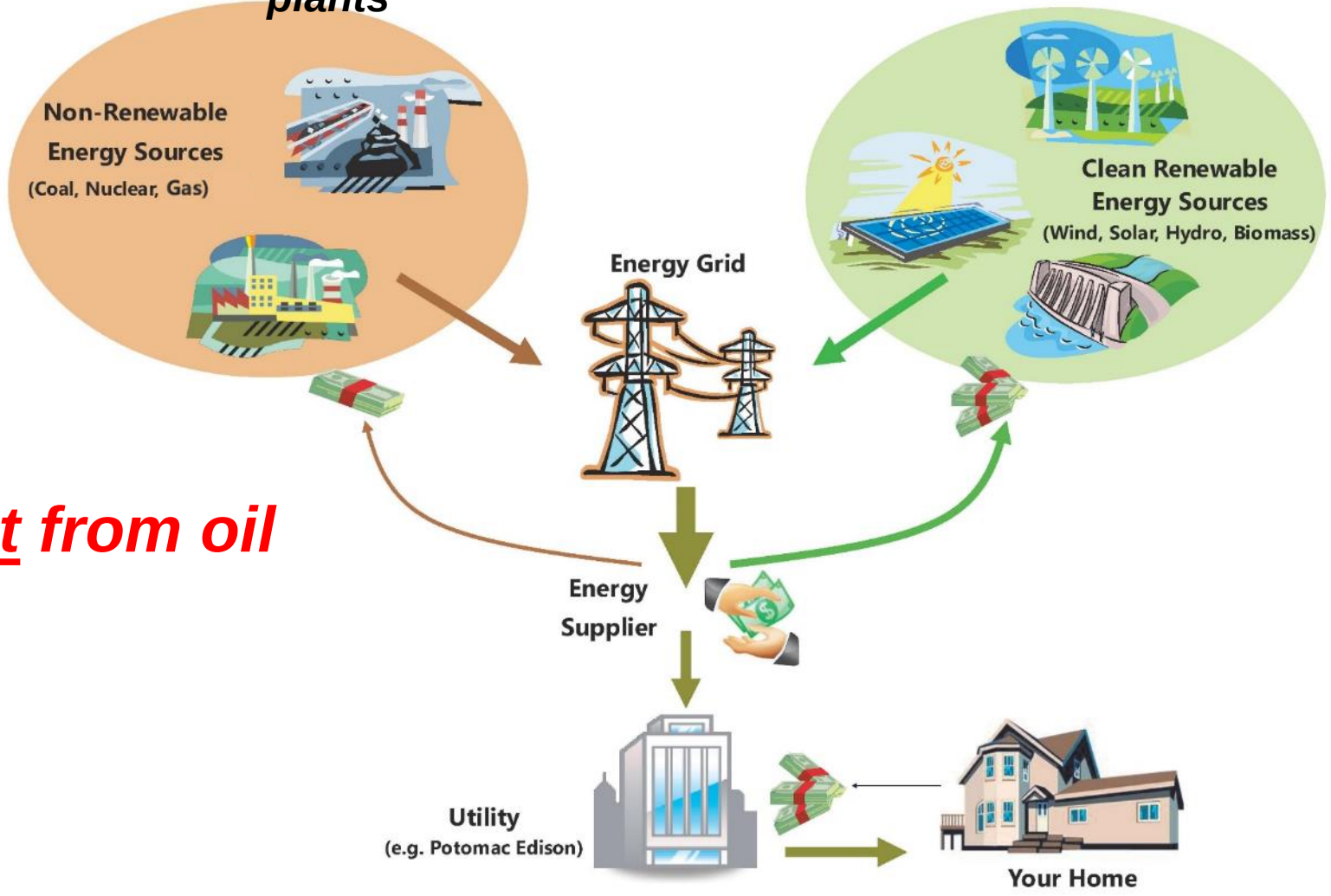
Source:
US Energy Information Administration

CO2 is the top heat-trapping greenhouse gas

Where Does Electricity Come From?

Coal, natural gas & nuclear plants

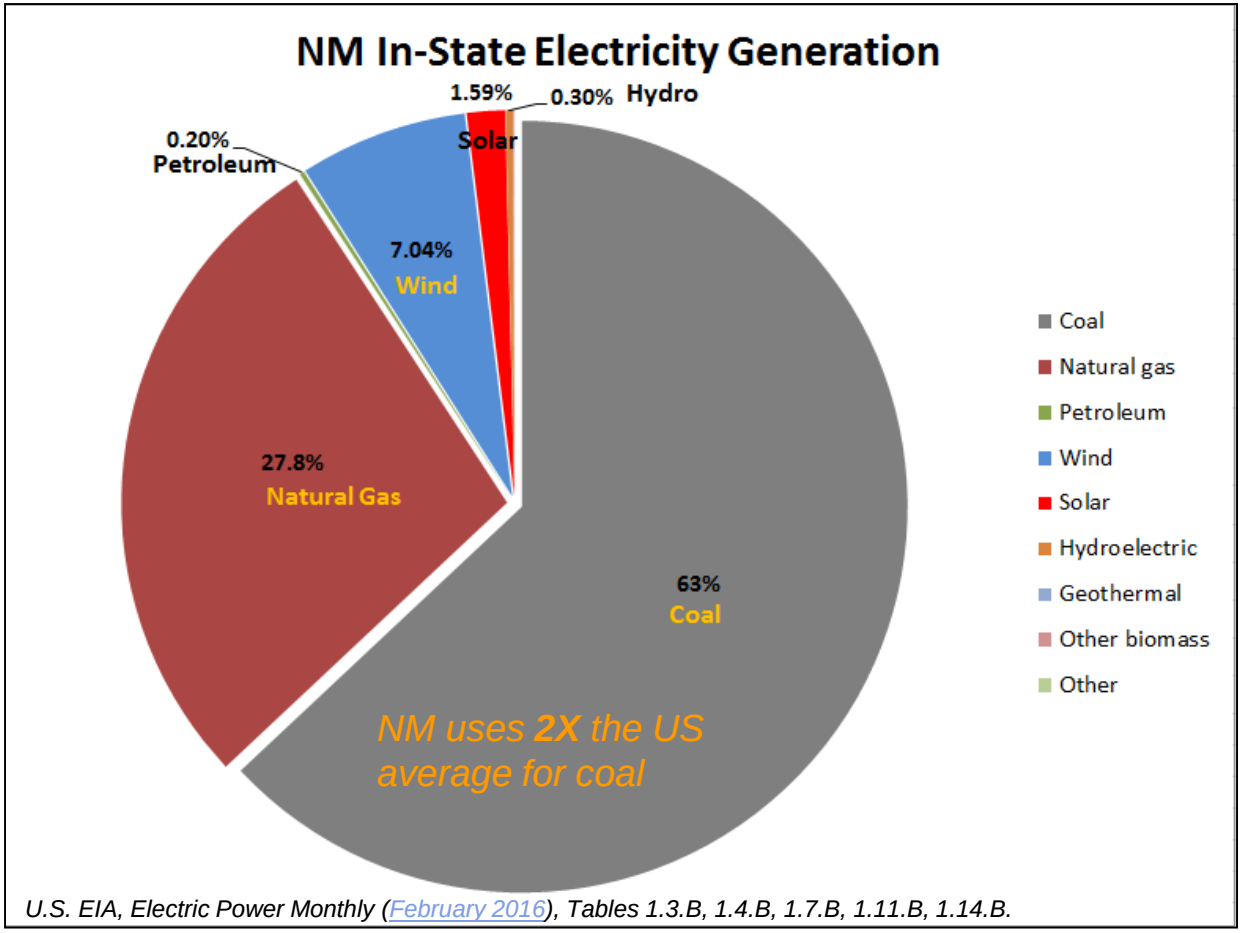
Wind, solar, hydro-dams



Not from oil

https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

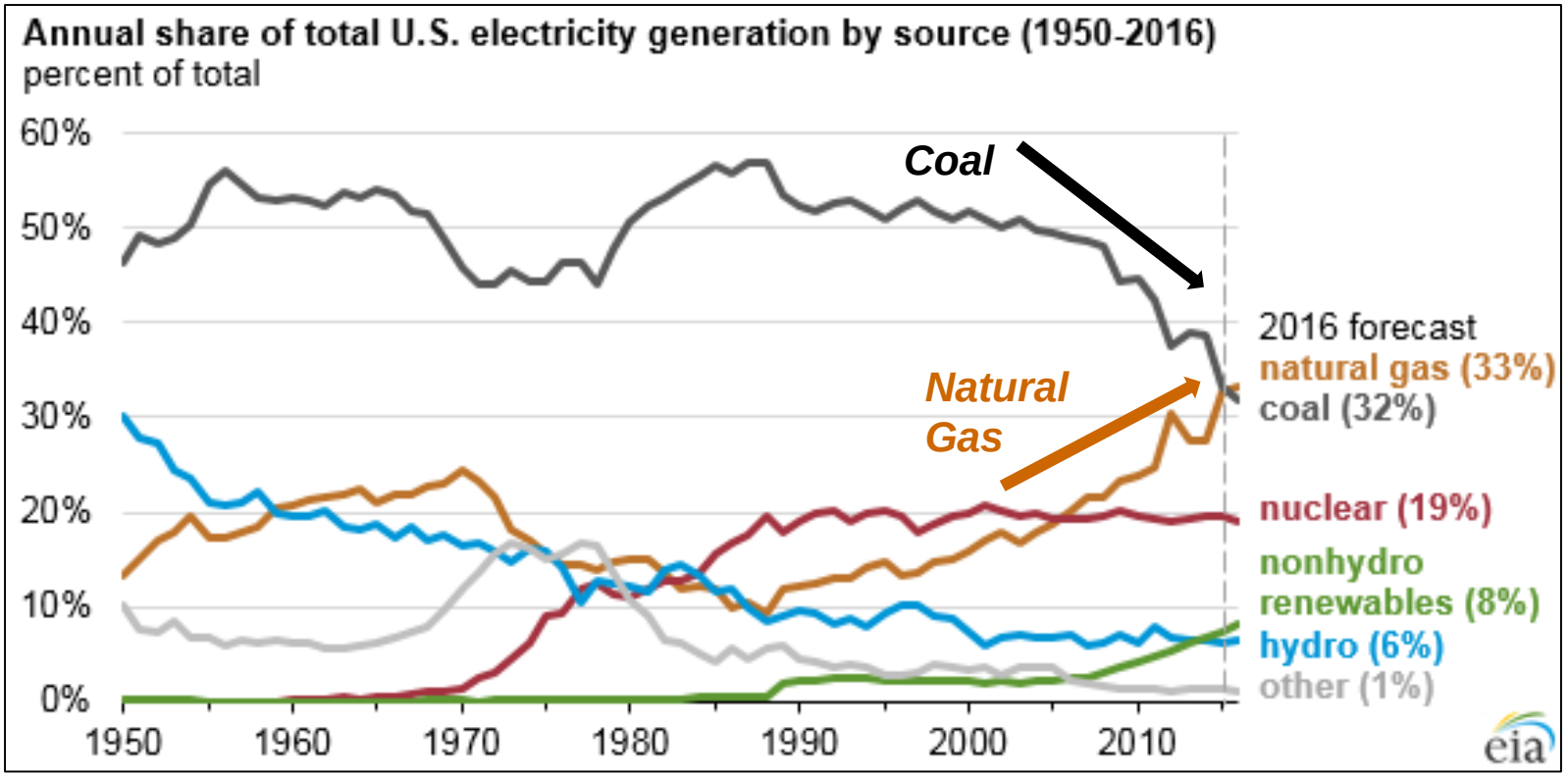
63% of NM Electricity Is from Coal



U.S. EIA, Electric Power Monthly (February 2016), Tables 1.3.B, 1.4.B, 1.7.B, 1.11.B, 1.14.B.

- **63% coal**, **28% natural gas**. US avg = 30% coal
- 0.20% from petroleum

Economic Pressure is Causing Coal Plants to Close Nationwide



AlbuquerqueJournal

PNM plan calls for eliminating coal generation

By Kevin Robinson-Avila / Journal Staff Writer
Friday, April 21st, 2017 at 12:05am

https://www.pnm.com/irp

Move To Renewable Electricity With a Strong RPS

- Current clean energy requirements max at 20% by 2020
- The schedule proposed in SB312 keeps increasing renewables to reach **50% by 2030** and **80% by 2040**.

Renewable Portfolio Standard (RPS) *is the % of electricity from renewable sources such as wind, solar, geothermal*

Current law

Year	RPS
2020	20%
2025	35%
2030	**50%**
2035	65%
2040	**80%**

3% per year

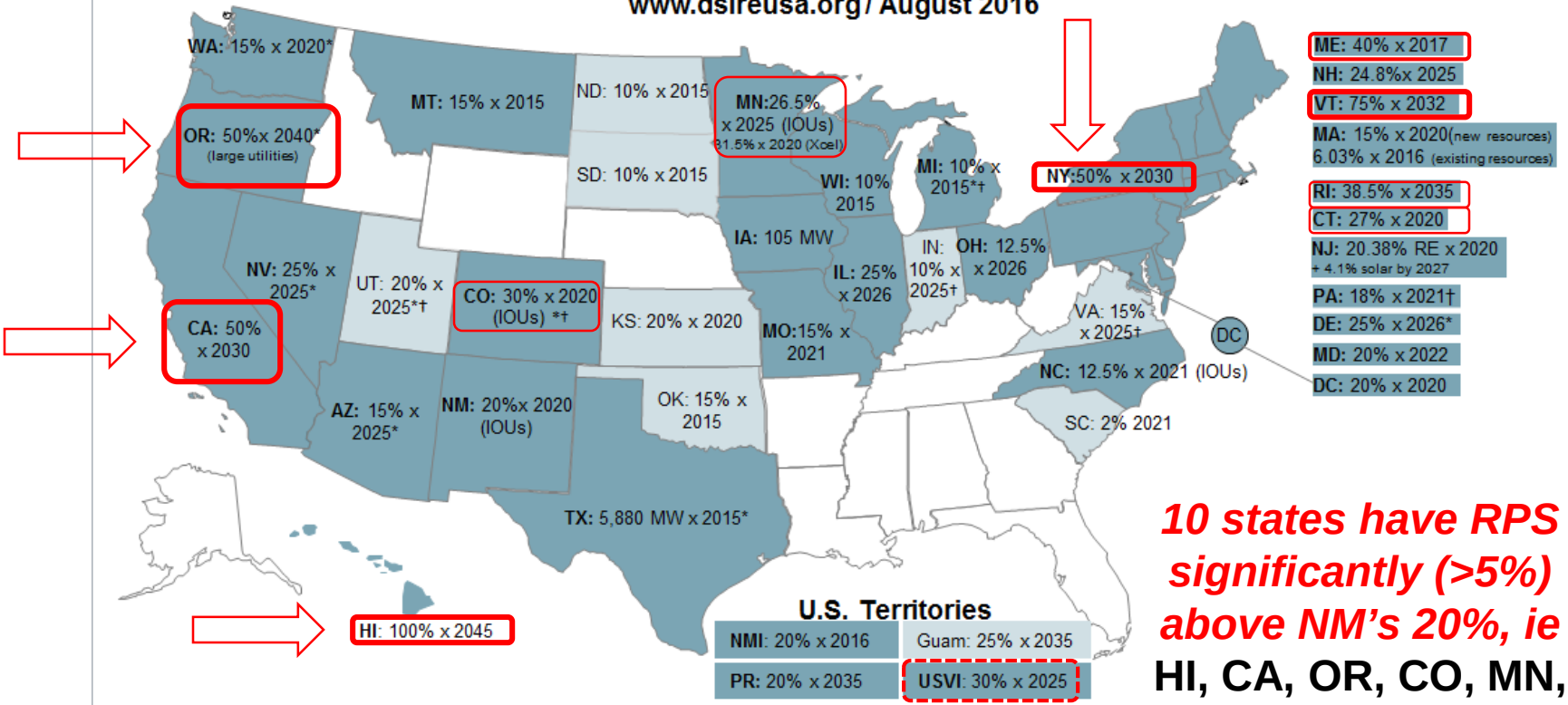
- SB312 passed the Senate Conservation comm.

Ten States Have Stronger RPS Policy

DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER | U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

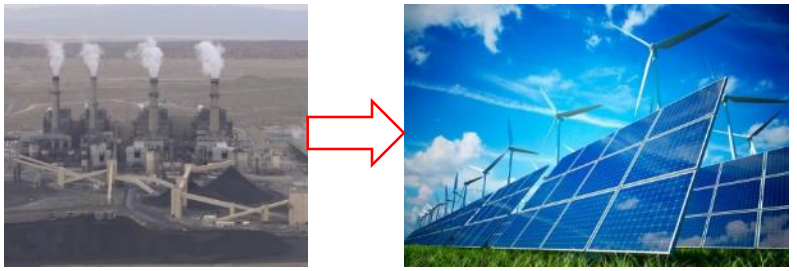
Renewable Portfolio Standard Policies

www.dsireusa.org / August 2016



10 states have RPS significantly (>5%) above NM's 20%, ie **HI, CA, OR, CO, MN, NY, ME, VT, RI, CT.** Plus USVI

Why it will work



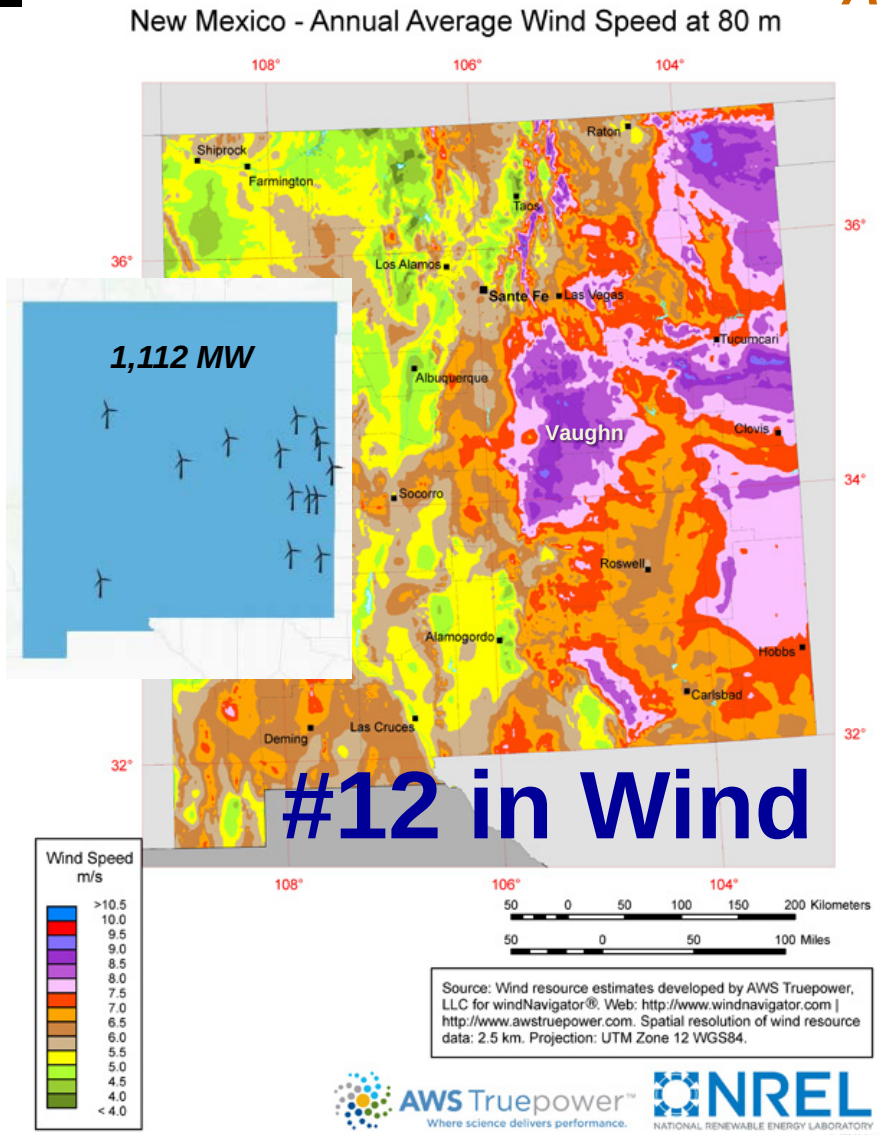
- Old power plants must be replaced as they age. NM's coal plants average **40 yrs old**.
- PNM has announced plans to **exit coal by 2031**, closing **San Juan GS** in 2022 and exiting **Four Corners GS** by 2031.
- A strong RPS helps NM be pro-active, replacing coal with clean renewables like solar and wind at zero fuel cost
  - Utilities will do the major investment, plus cities, businesses & homeowners. Renters too, if we pass 'community solar'.
  - Electricity costs will ultimately drop due to zero-fuel electricity
  - Known, **predictable, electricity costs** help companies moving into NM, ie no fuel price increases. And **modern companies (Facebook) want clean energy**.
- We leverage NM's **natural advantages**: available **land, wind, sun, geothermal**, and an underemployed **workforce**

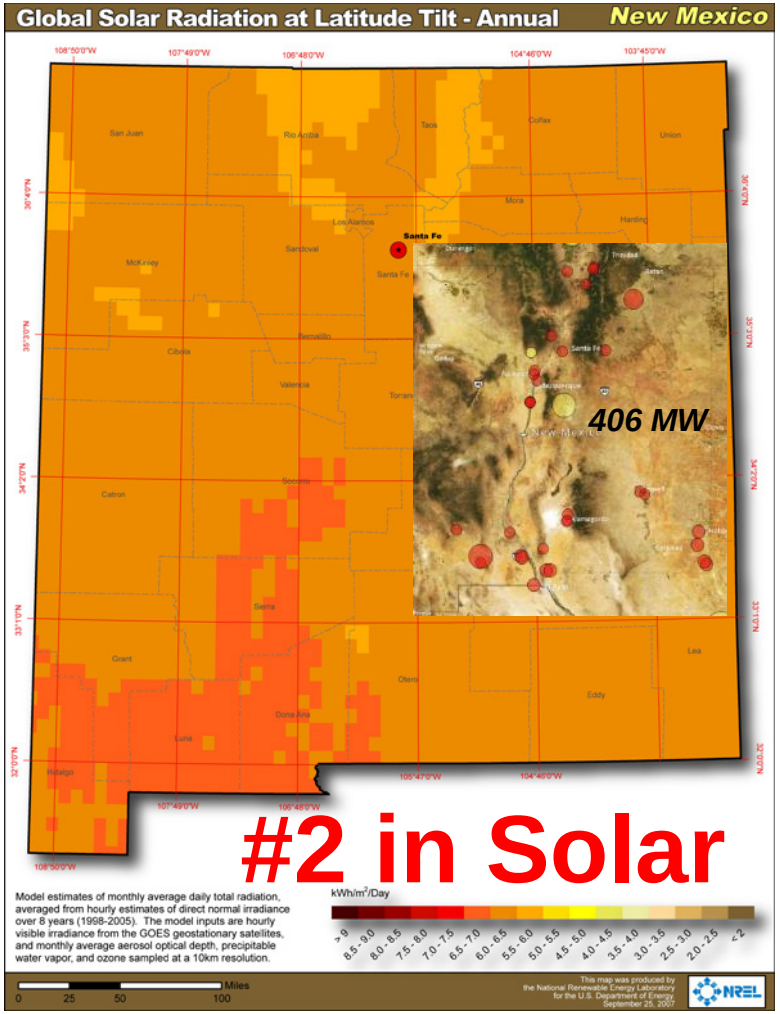
The Benefits It Will Bring

- **Jobs of the future** in a growing economic sector
- Plus:
  - Cleaner air & water
  - Less water consumption
  - Healthier New Mexicans (less emphysema, asthma, etc), with fewer deaths and lower health care spending. Medicaid is ~31% of the NM state budget
  - Helps stop climate change

New Mexico Has Great Wind & Solar

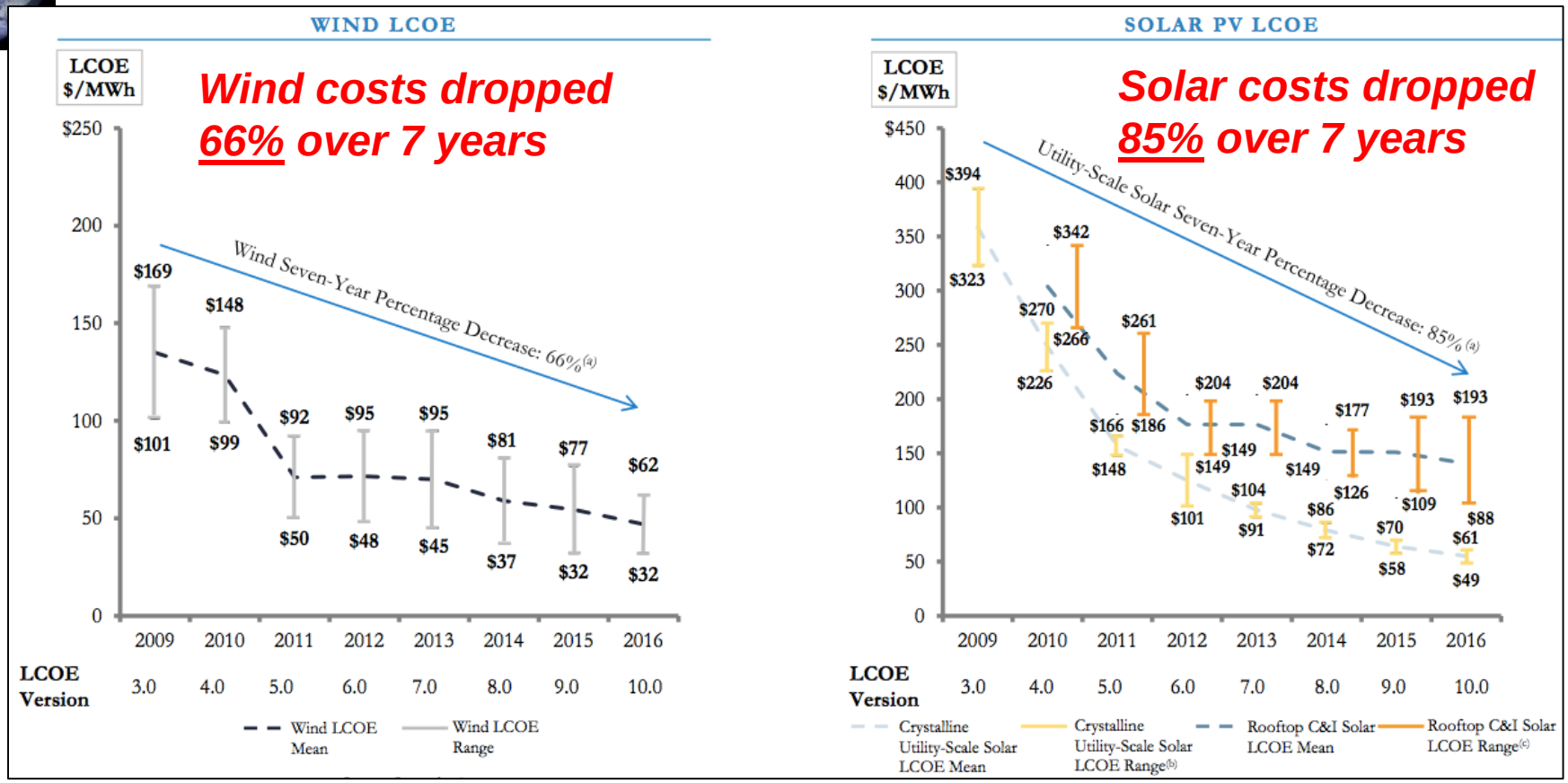
And in the top-10 in geothermal





http://www.seia.org/map/majorprojectsmap.php
http://www.seia.org/state-solar-policy/new-mexico

Wind & Solar Is Now Cheaper



Source: Lazard

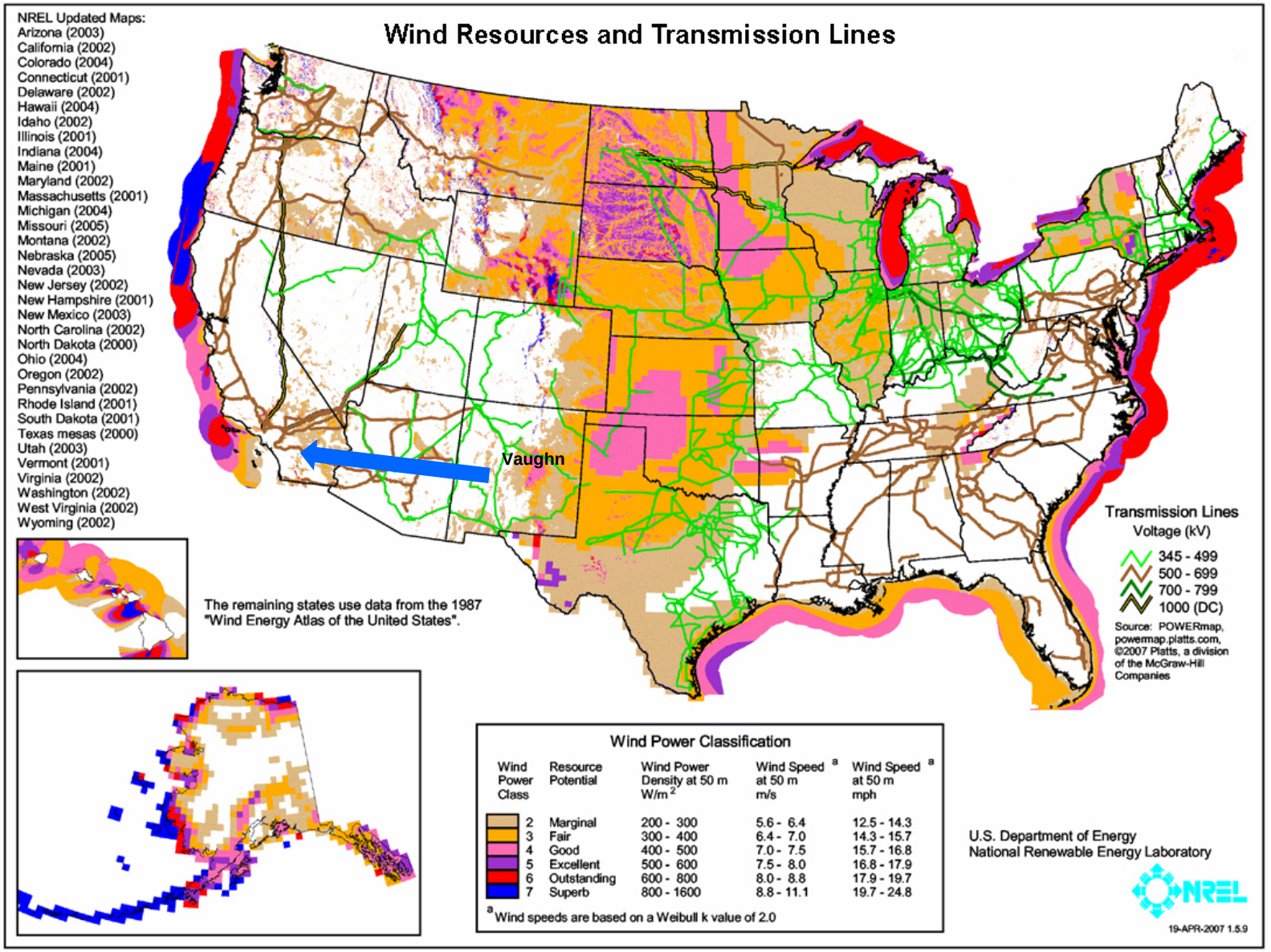
- "**Onshore wind is the cheapest form of electricity**; utility **solar PV is the second cheapest.**"
  – Lazard Investments & Banking

https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-100/ **LCOE = levelized cost of energy*

New Mexico Exports Wind Power

NM is the closest windy state to California

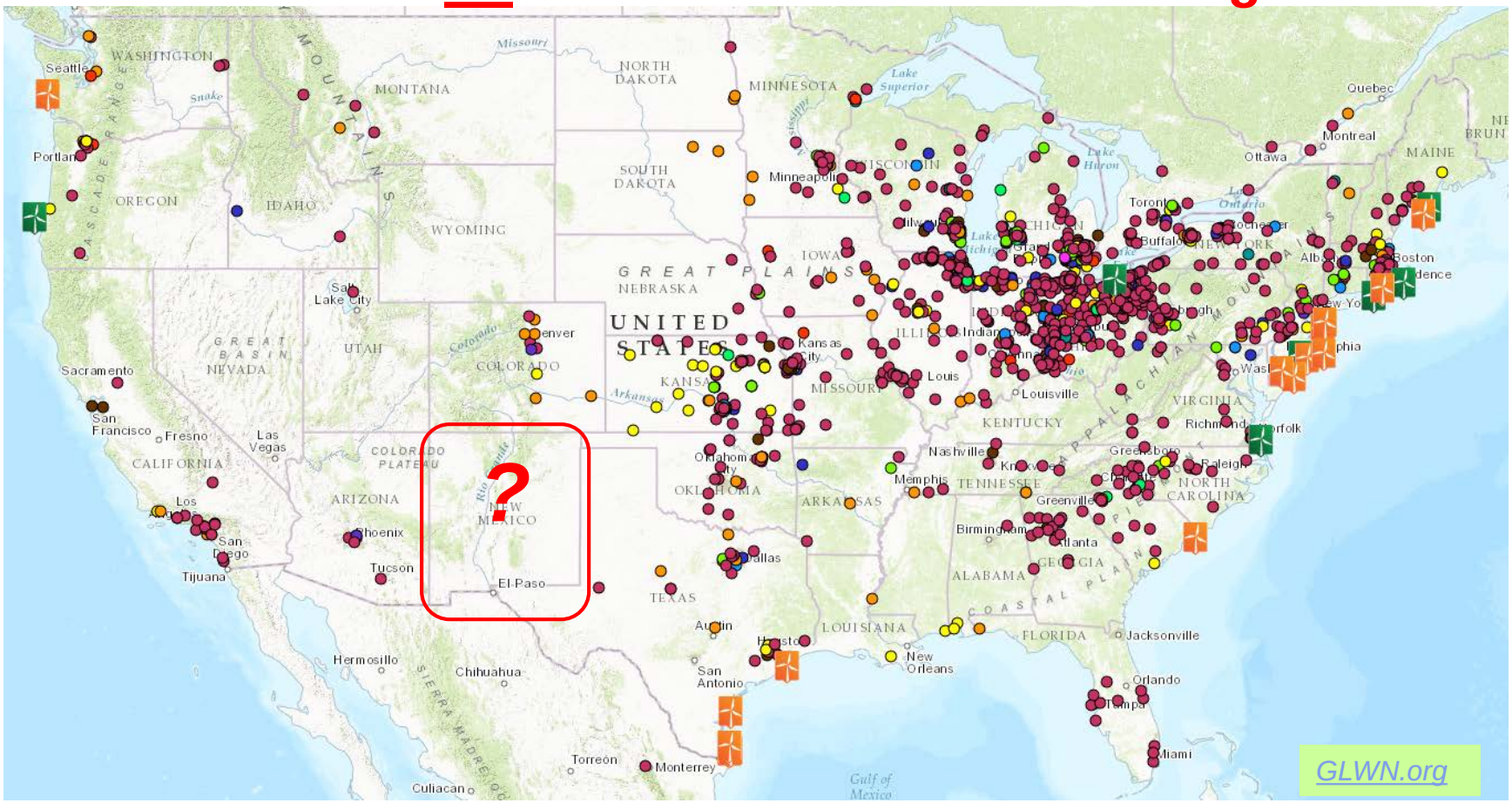
CA needs more wind but will have to import it.



http://www.nrel.gov/gis/wind.html *http://apps2.eere.energy.gov/wind/windexchange/windmaps/resource_potential.asp*

US Wind Turbine Manufacturing

But New Mexico is <u>one of only three states</u> with <u>no</u> wind turbine manufacturing.



Building towers, blades, generators, gearboxes, hubs, nacelles, etc

http://energy.gov/eere/wind/wind-manufacturing-and-supply-chain
http://energy.gov/sites/prod/files/2014/09/f18/U.S.%20Wind%20Energy%20Manufacturing%20and%20Supply%20Chain%20Competitiveness%20Analysis_0.pdf

Kit Carson: Renewables Save $50M

Seeking more renewables, Kit Carson Co-op exits relationship with Tri-State G&T

June 2016 **“30% Solar by 2022”**

Renewable Taos Study

- Kit Carson Electric Cooperative in New Mexico paid $37M to **exit its agreement with Tri-State Generation** & Transmission Assoc. and entered a long-term deal w **Guzman Renewable Energy Partners** of Florida.
- Kit Carson Electric says the switch will **save its 30,000 customers $50 million** over the term of the 10-year agreement, including the $37M buyout.
- 30 MW of solar arrays to be built from May 2017-**2022**, when locally generated solar energy will supply around **30 percent of Kit Carson’s total electricity demand**, and 100 percent of its needs during daylight hours on sunny days. Land is also being set aside for battery storage.

http://www.kitcarson.com/content/kcec-solar-initiative

Summary

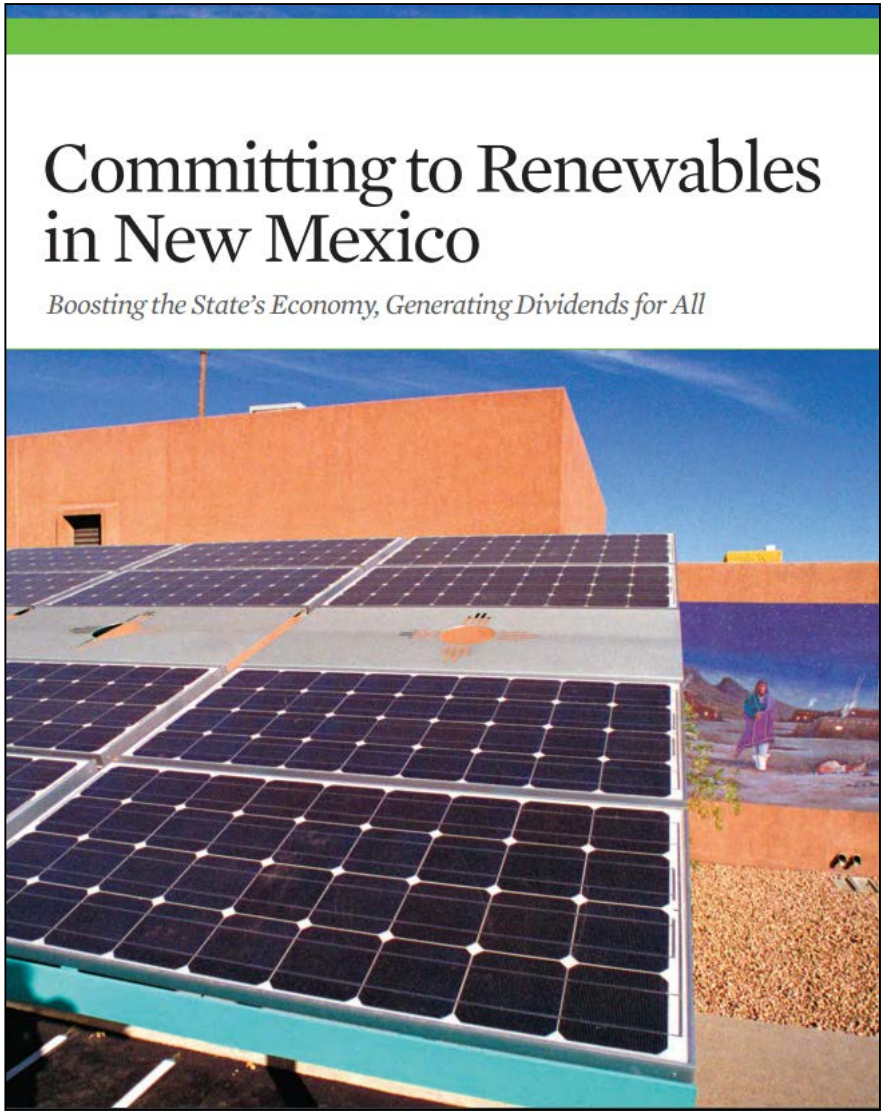
- The clean energy sector is booming worldwide as costs have dropped to make solar and wind the **cheapest sources of new electricity**.
- NM has **world-class** Solar, Wind & Geothermal resources ready to develop – but to win, **we must strengthen NM's RPS policy**.
- **Let's spark a NM investment boom in clean energy**, bringing **thousands of good jobs –** by committing our state to clean renewable electricity: 50% by 2030 & 80% by 2040.
  - And remember - electricity RPS has **NO IMPACT on oil** jobs or oil revenue. Oil is **not used** in NM to generate electricity; <7% uses nat. gas.

Backup

UCS Study for NM at 80% RPS

Report in Oct 2017 by the **Union of Concerned Scientists**, "Committing to Renewables in New Mexico"

- What is the economic impact to New Mexico of converting to 80% renewable electricity by 2040?
- Conclusions: replacing coal power with wind & solar
  - Saves $ money
  - Cuts carbon pollution 85%
  - Brings thousands of new jobs
  - Improves health, saving $305M
  - Drops electric gen water use by 90%
  - And lowers electricity rates



By UCS energy analyst Julie McNamara

Link: http://www.ucsusa.org/sites/default/files/attach/2017/10/Committing-to-renewables-in-new-Mexico-2017.pdf

PNM Announces Coal Plant Retirements

PNM's latest long-term plan proposes ending coal usage by 2031

Utility DIVE

April 21, 2017

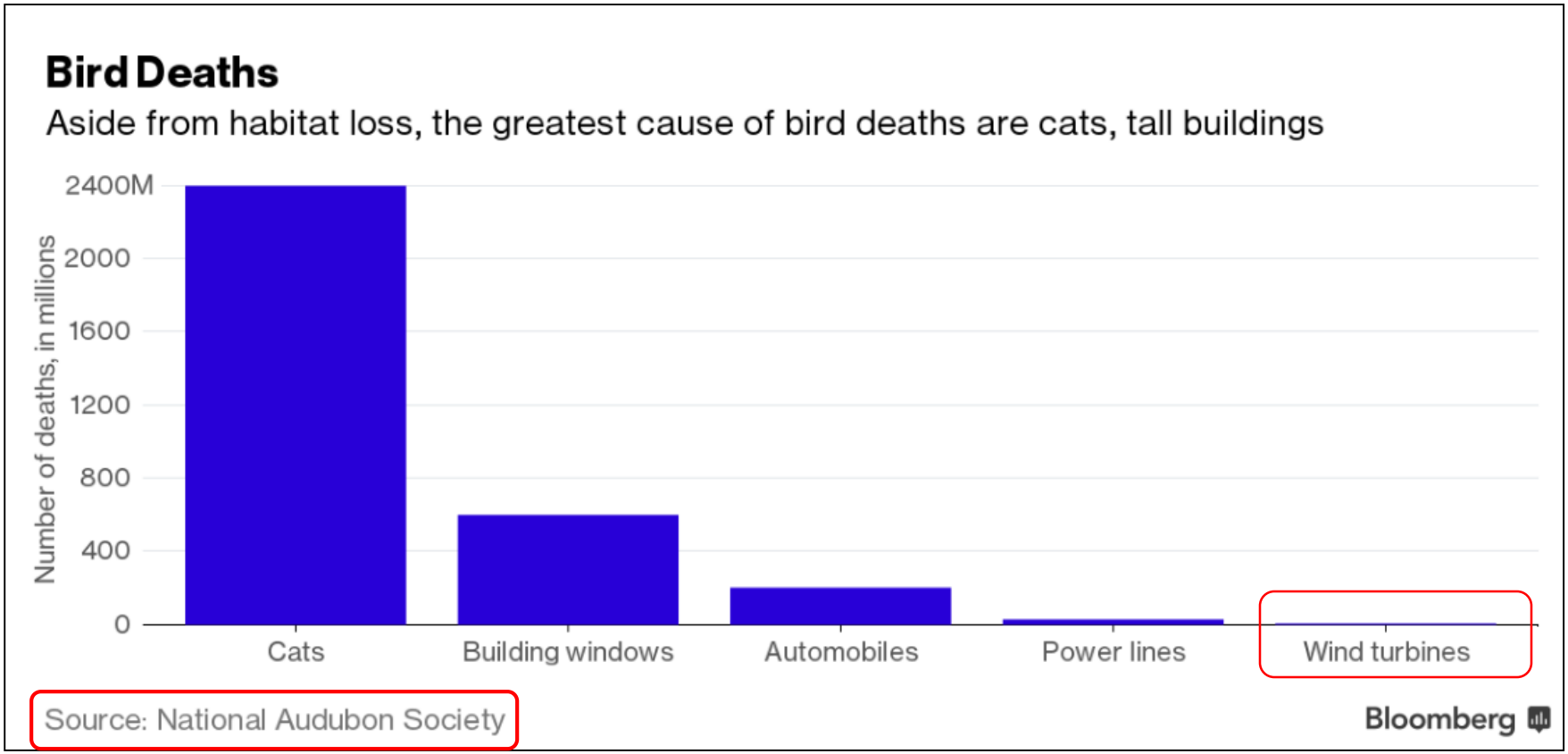
From PNM's web site: https://www.pnm.com/irp

- "PNM is proposing a future energy resource portfolio that would eliminate the company's use of coal-fired generation by the end of 2031. The proposal is explained in a very long and detailed report about the costs and benefits of changing our energy mix.
- The results presented in this report point strongly toward **shutting down San Juan** after the current coal supply agreement runs out **in 2022**, and also toward **exiting Four Corners Power Plant in 2031** when its coal supply agreement runs out. This will result in no coal in PNM's energy supply mix."

https://www.pnm.com/irp

Cats Kill 10,000x More Birds Than Wind

The answer to the most frequently asked question



- Study: fossil fuel power plants **kill 35 times more birds** per GWh than wind turbines