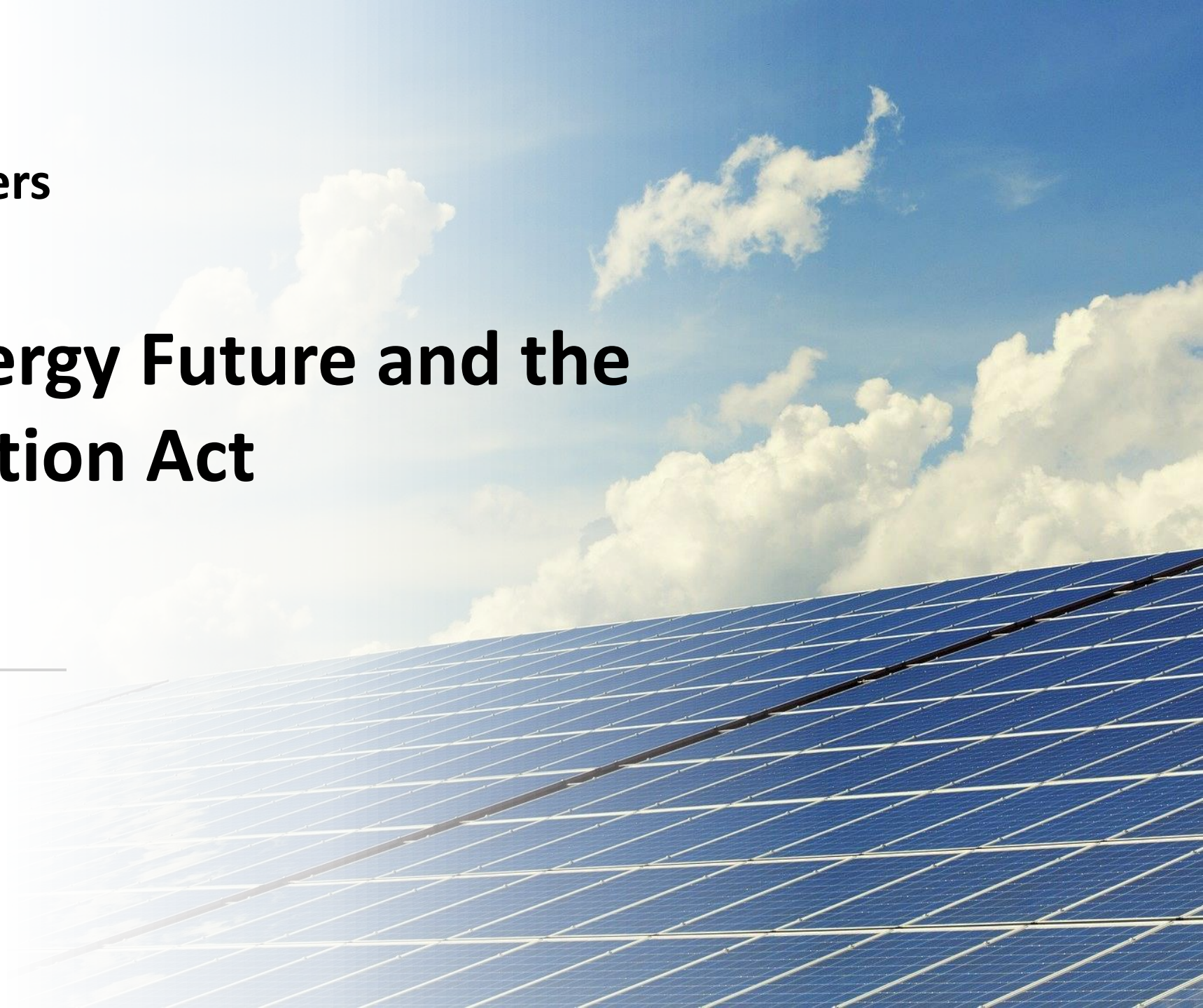
League of Women Voters

Wisconsin’s Energy Future and the Inflation Reduction Act

Nick Hylla

4/11/24



Nick Hylla, MREA Executive Director

- B.S. In Geology
- M.S In International Resource Management from UWSP
- Returned Peace Corps Volunteer
- 15 Years Leading Non-Profit Orgs
- Associate Lecturer at the University of Wisconsin-Stevens Point
- Principal Investigator for 6 Cooperative Agreements with the US Dept. of Energy

mrea

midwest renewable energy association

- Founded in 1990
- 1,700+ Members
- Demonstration Campus
- Professional Training
- Grow Solar
- The Energy Fair
- Solar on Schools
- Rise Up Midwest!

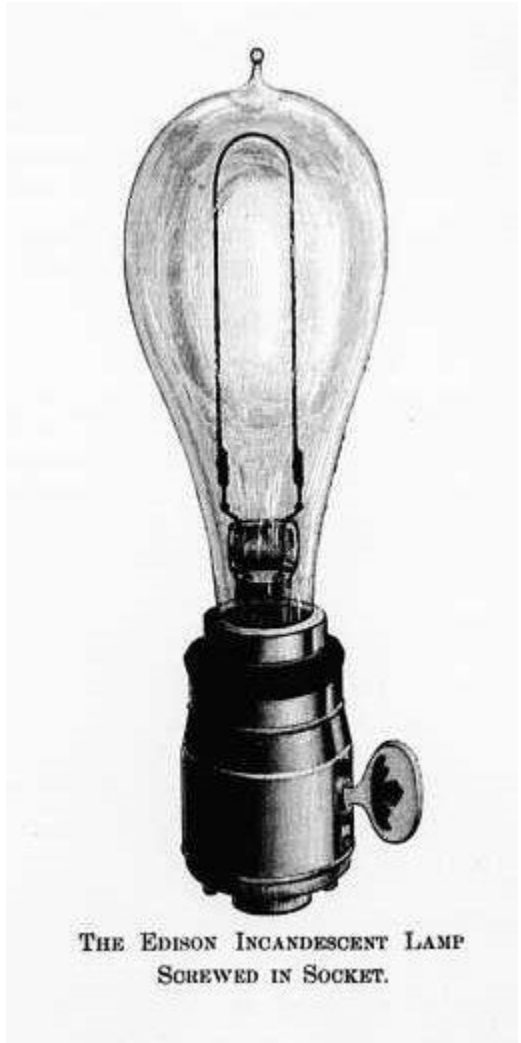
Source: https://www.midwestrenew.org

The Electricity Privilege We Enjoy Today Is a Direct Result of Historic Public Policy Intervention in Response to Disruptive Innovation and Economic Catastrophe.

The Biggest Machine on Earth

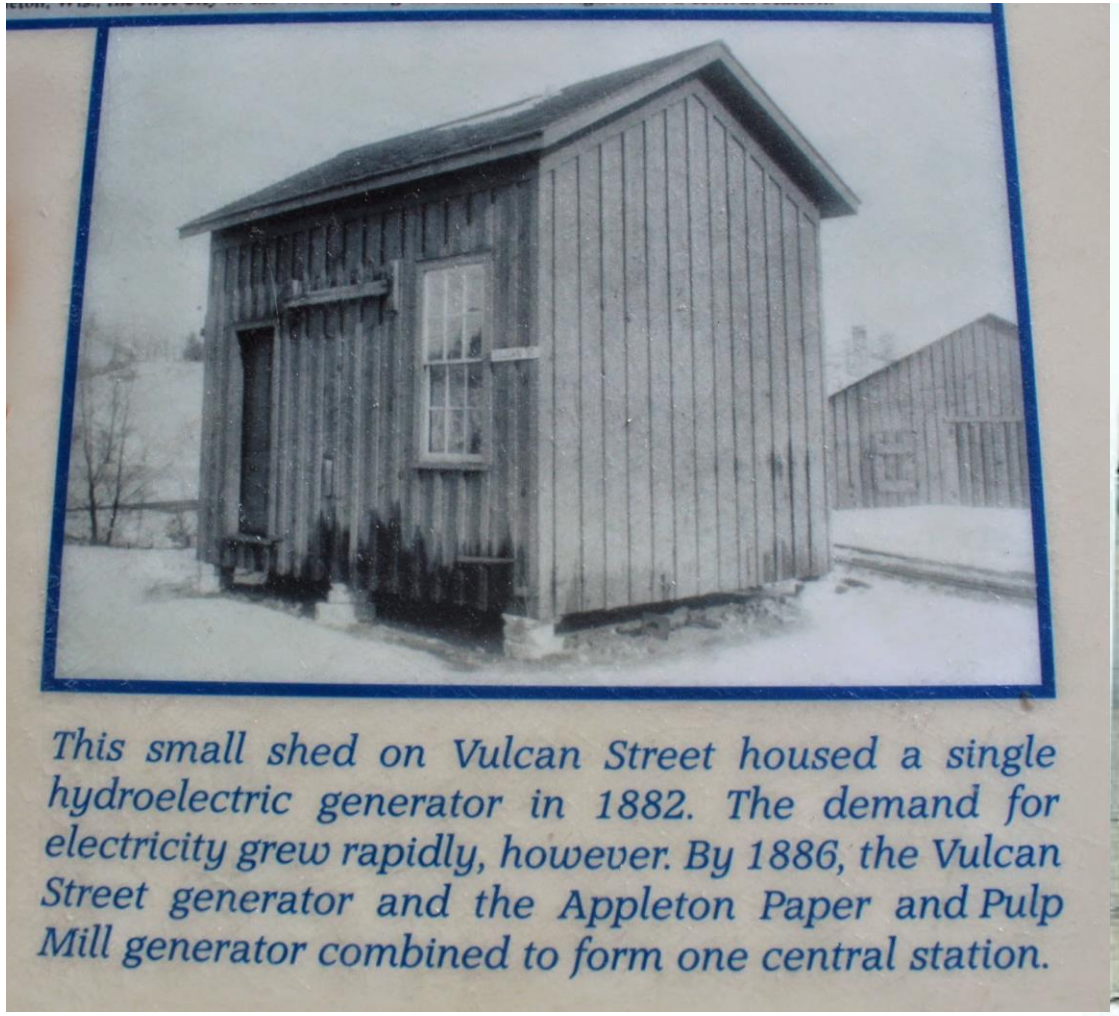
The US electricity system is the second largest in the world (China has the largest), serving approximately 150 million customers with over 3,859 terawatt-hours (TWh) of electricity from over 1,190 gigawatts (GW) of generating capacity, routed through 476,000 miles of transmission lines, 55,000 substations and 6.3 million miles of distribution lines.

The Light, 1879

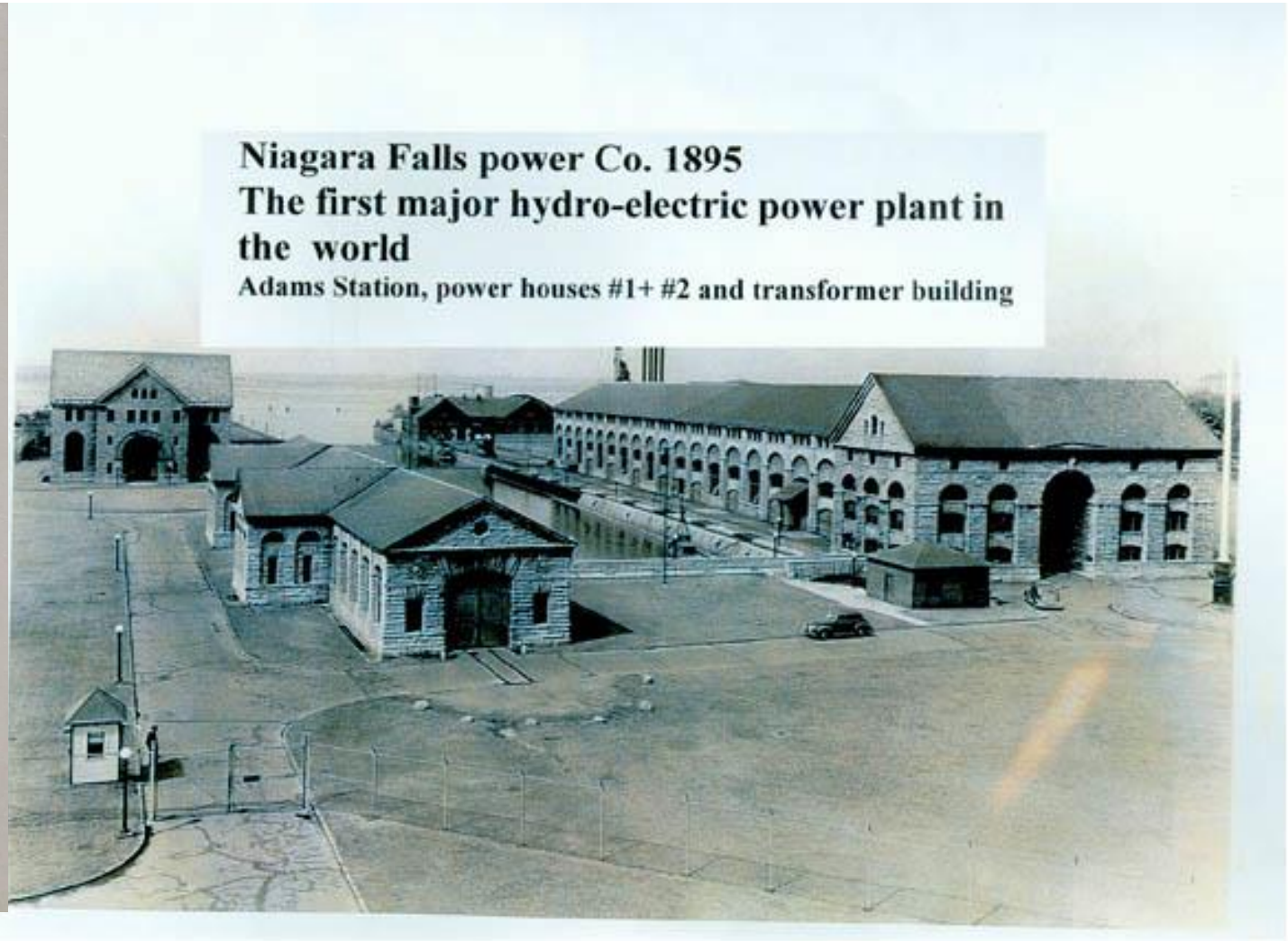


THE EDISON INCANDESCENT LAMP
SCREWED IN SOCKET.

The Electric Utility, 1882/1895

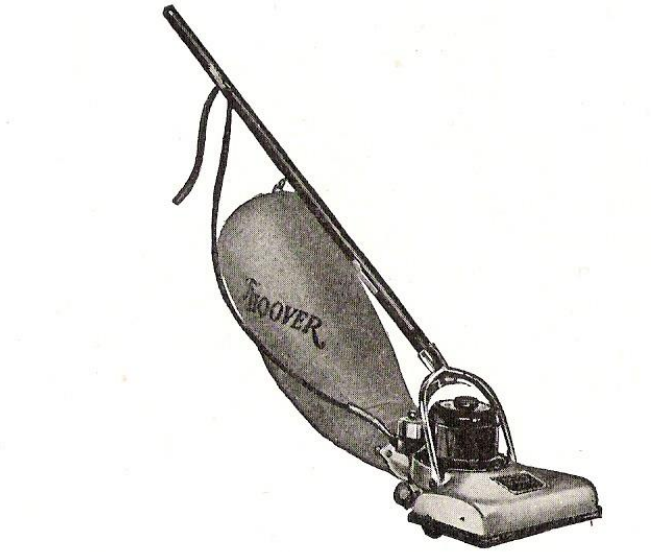


This small shed on Vulcan Street housed a single hydroelectric generator in 1882. The demand for electricity grew rapidly, however. By 1886, the Vulcan Street generator and the Appleton Paper and Pulp Mill generator combined to form one central station.



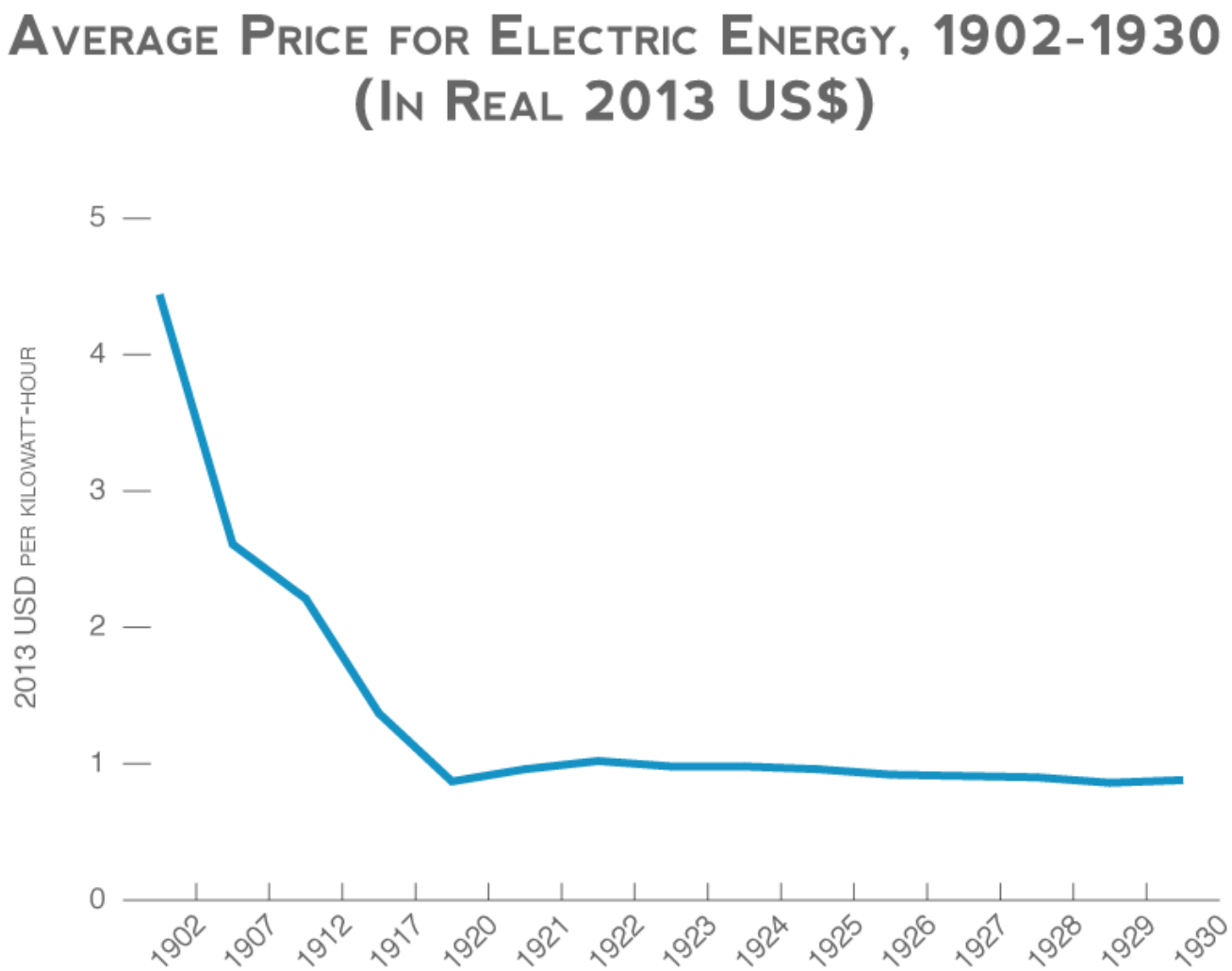
The Appliances

- Power washing machine (1907)
- Vacuum cleaner (1908)
- Household refrigerators (1912)



SUCTION SWEEPER WITH MOTOR DRIVEN BRUSH.

The Price



Source: Historical statistics of the United States: colonial times to 1970. U.S. Dept. of Commerce, Bureau of the Census

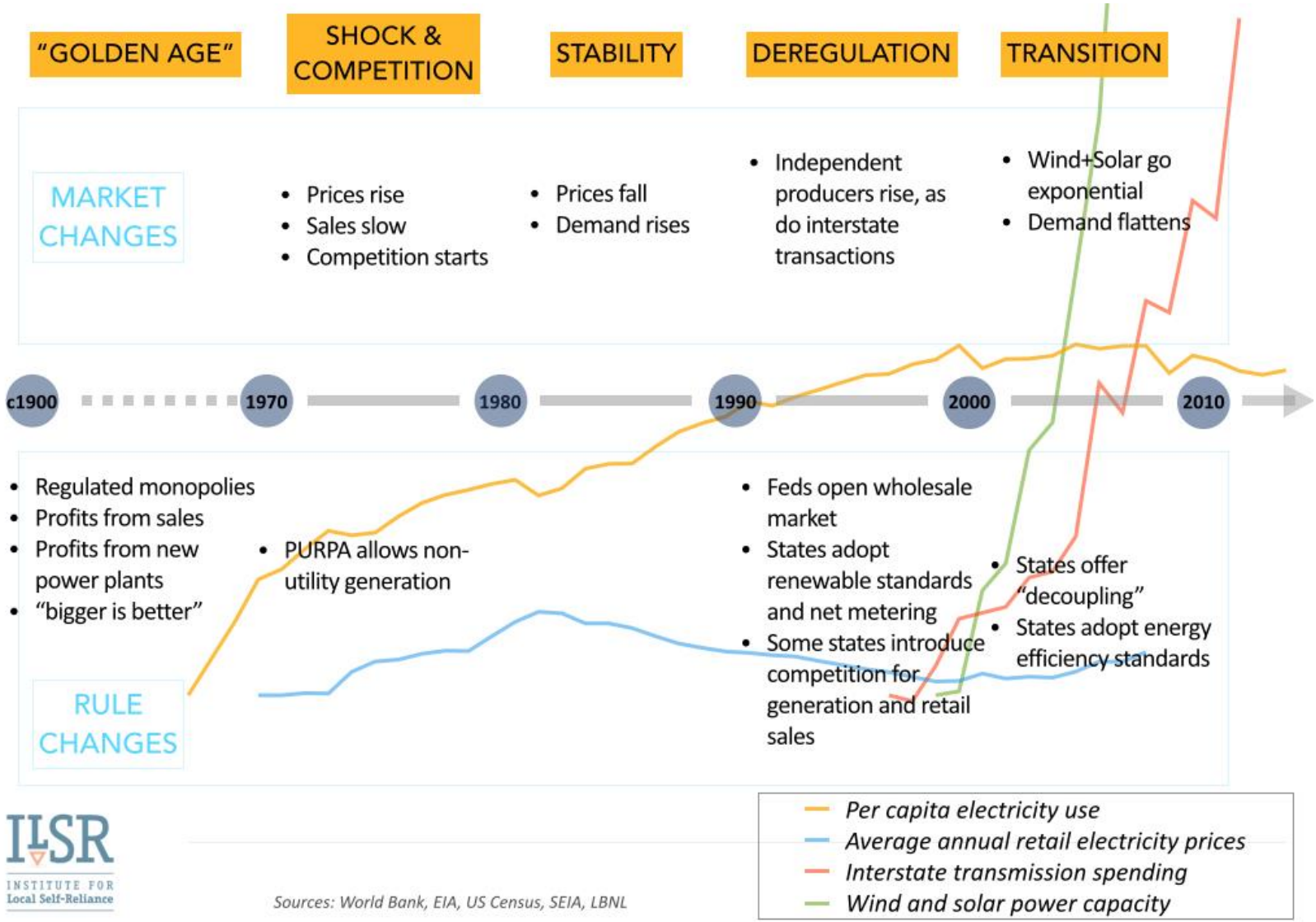
IER INSTITUTE FOR ENERGY RESEARCH

150 Years of Energy Crisis

- John Stuart Mill “The Natural Monopoly,” (1848)
- U.S. Supreme Court, Munn v. Illinois, 94 USC 113, 126 (1877)

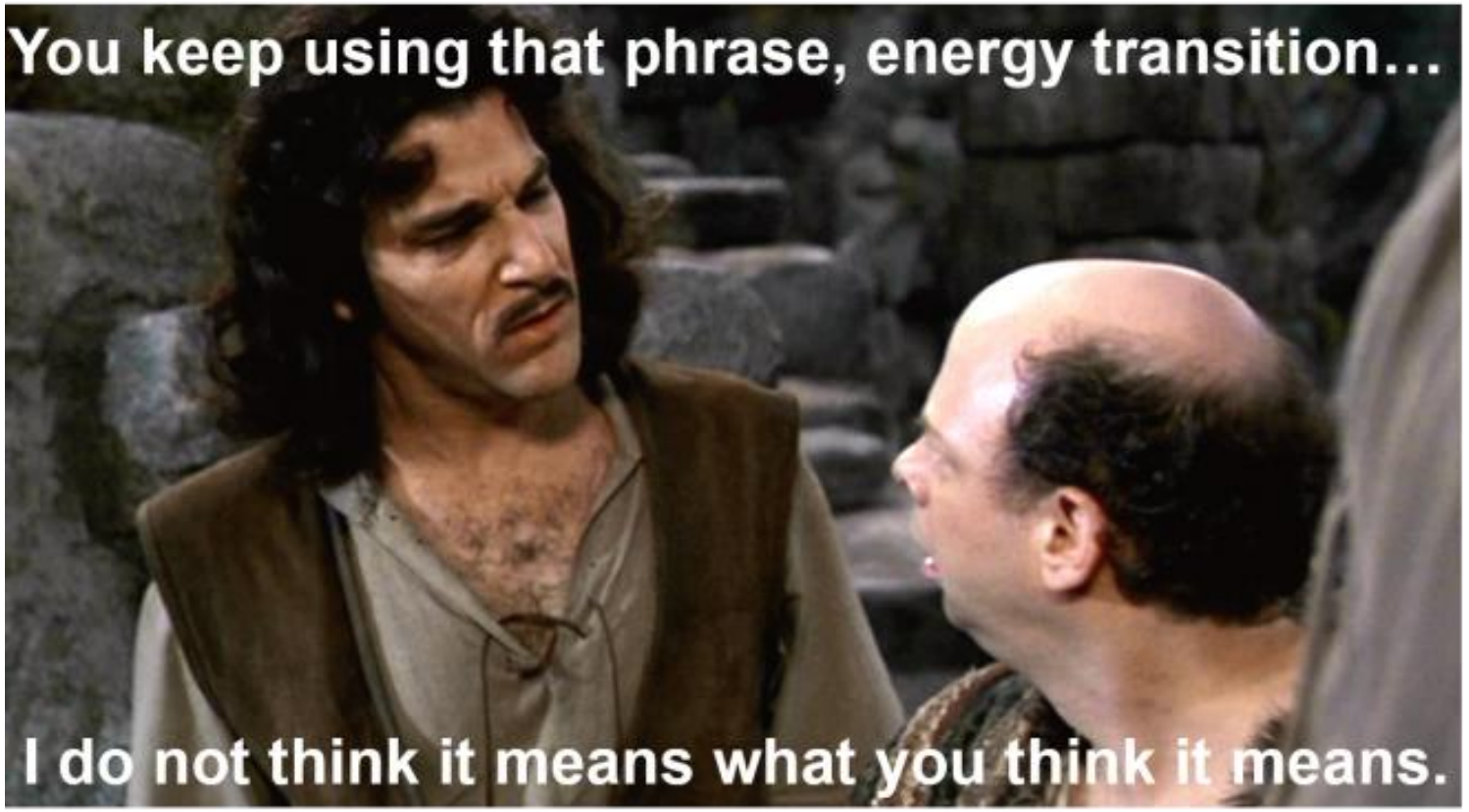
  “When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use and must submit to be controlled by the public for the common good ...”
- The Edison Light Bulb (1879)
- The Current Wars… Edison paper *Competing Interests* (1889)
- Private capital takeover of municipal utilities: Samuel Insull speech to the National Electric Association (1898)
- WI establishes first state utility regulatory commission (1907)
- **The Great Depression (1929 to 1938)**
  - The Public Utility Holding Company Act
  - Federal Power Commission – Now FERC
  - New Deal and Rural Electrification through the USDA RUS

Continued Public Policy Intervention



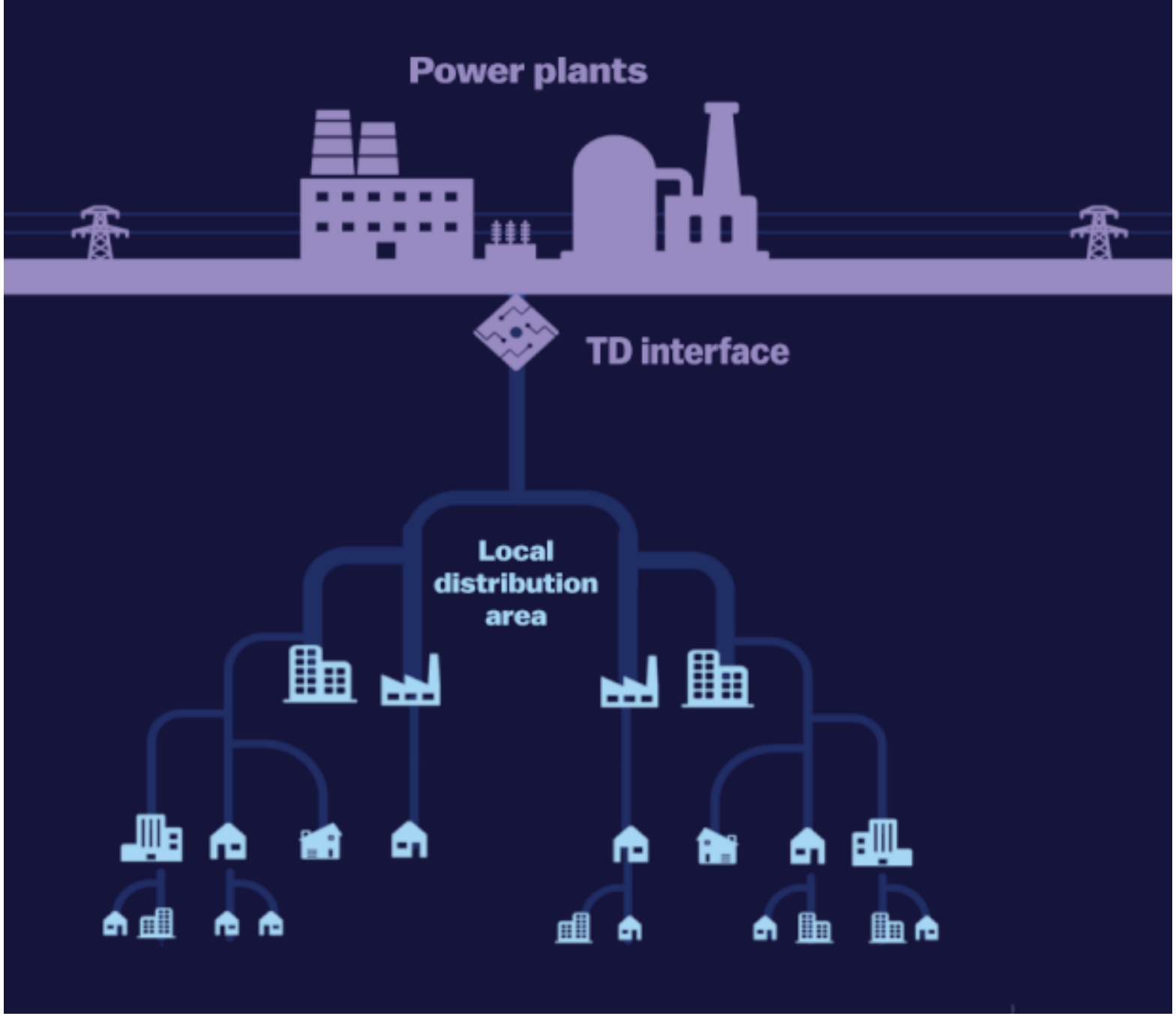
Our Energy Future Is Being Decided Now

- Fiscal Policy
- Dark Money in Politics
- Utility Regulation
- Climate Change
- Climate Engineering
- De-Globalization
- Supply Chain Disruption
- Electrification
- Workforce Readiness and Automation
- Energy Poverty and Inclusive Financing



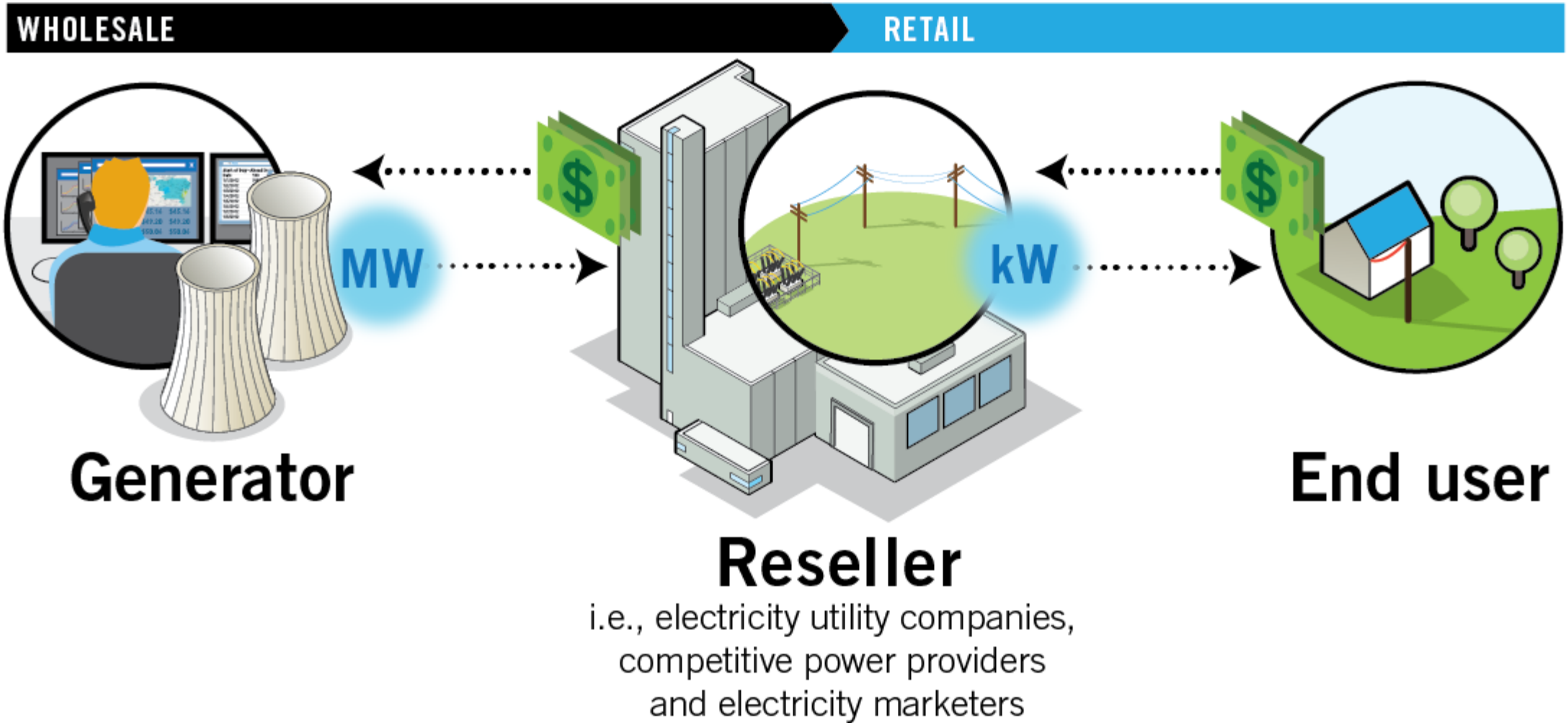
The Grid As We Have Known It:

Built and maintained by electric utility monopolies and their affiliated electrical unions.



https://www.vox.com/energy-and-environment/2018/11/30/17868620/renewable-energy-power-grid-architecture

Wholesale and Retail Markets

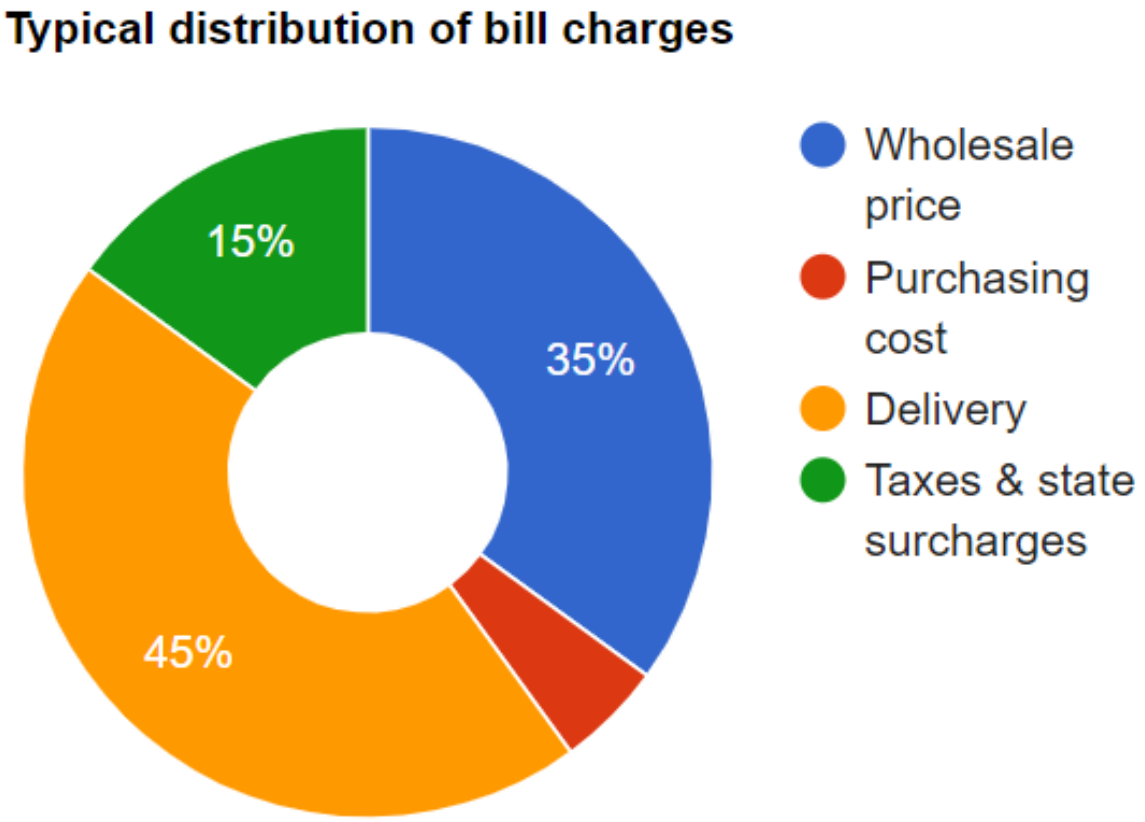


https://learn.pjm.com/electricity-basics/market-for-electricity.aspx

Wholesale and Retail Prices

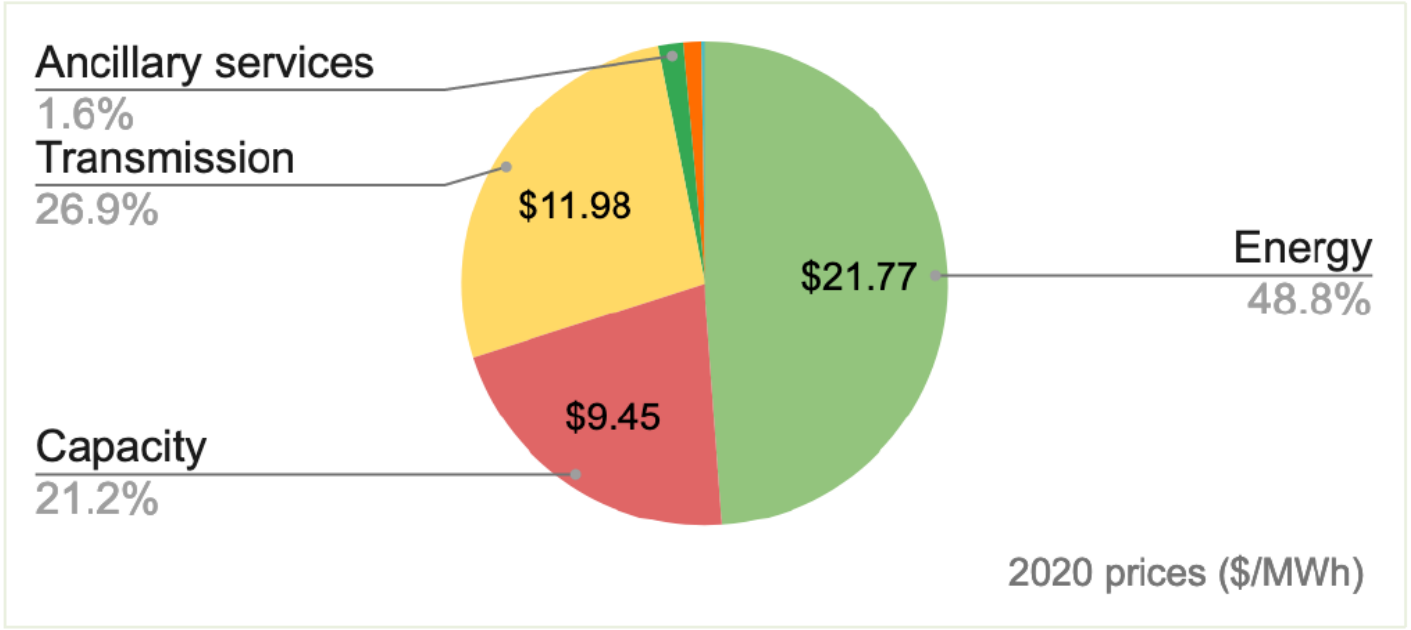
The price of wholesale electricity is usually lower than the price of retail electricity.

This is because the retail price of electricity includes the costs of delivering electricity.



Wholesale Power Markets: Products

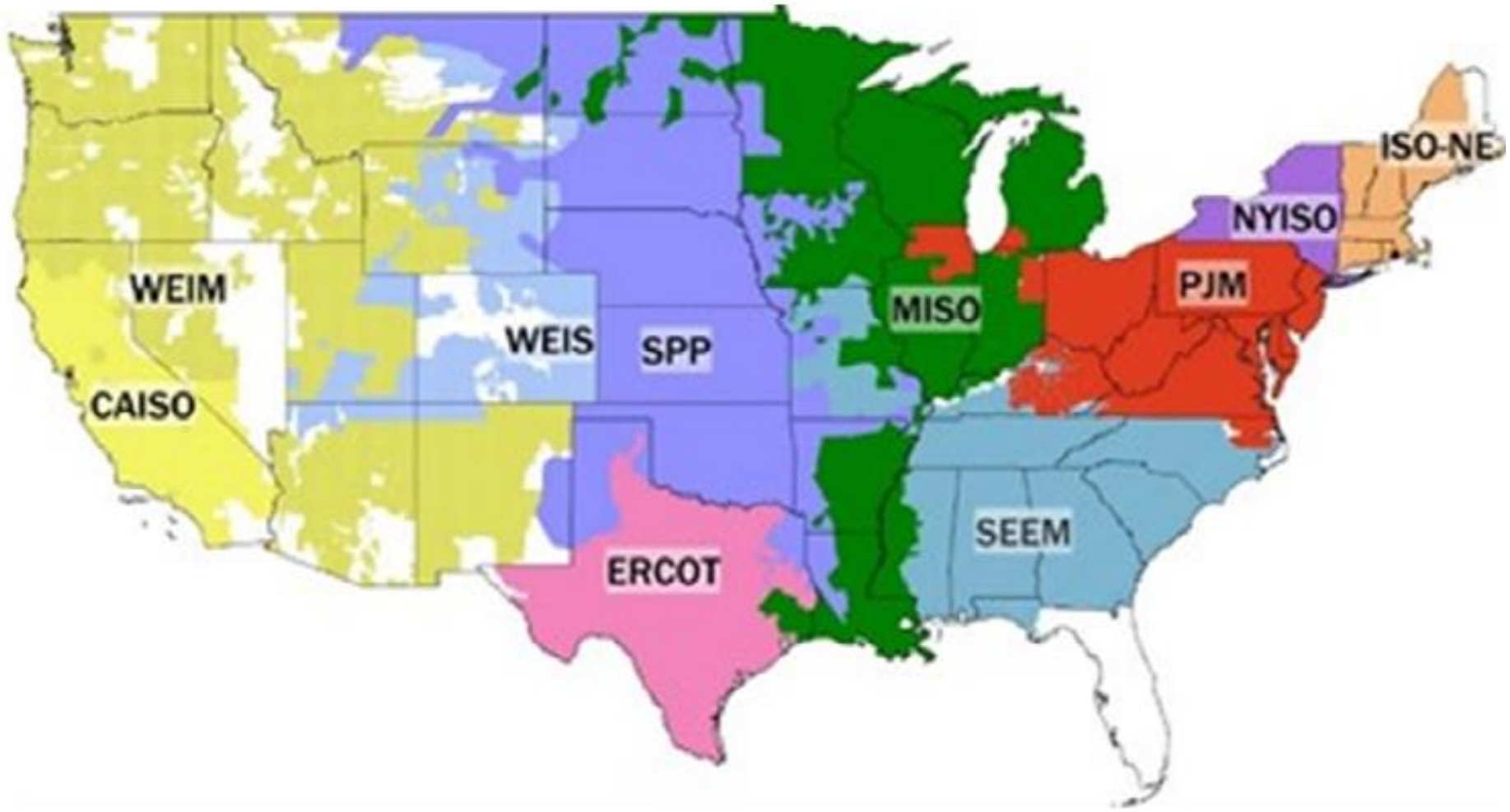
- **Energy:** measured in megawatt-hours.
- **Transmission:** Fees to deliver energy from the generator to customers.
- **Capacity:** Ensuring there is enough generation capacity available to meet demand at all times. Some regions require capacity to be purchased for up to three years in advance.
- **Ancillary Services:** Supplemental services that support grid operations, such as voltage and frequency regulation.
- **Renewable energy certificates (RECs):** RECs prove that electricity was generated from an eligible renewable source, and they are used for compliance with state laws or to verify a “green power” purchase.



Source: Monitoring Analytics, LLC, Independent Market Monitor for PJM

https://www.cesa.org/resource-library/resource/how-wholesale-power-markets-work/

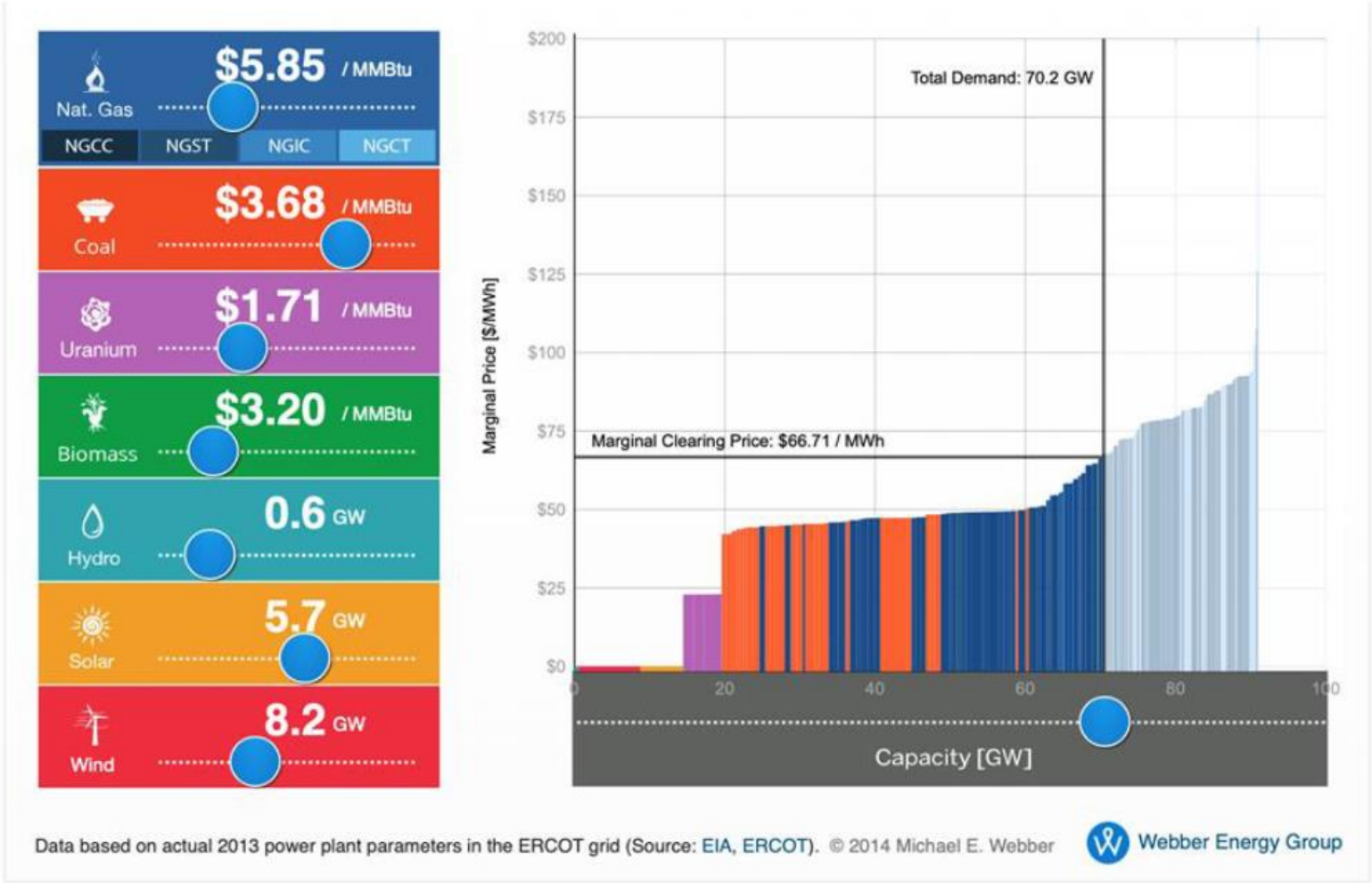
US Wholesale Electricity Markets



Source: https://www.ferc.gov/reports-analyses

Wholesale Power Markets: Auctions

Figure 3 - Merit Order Calculator

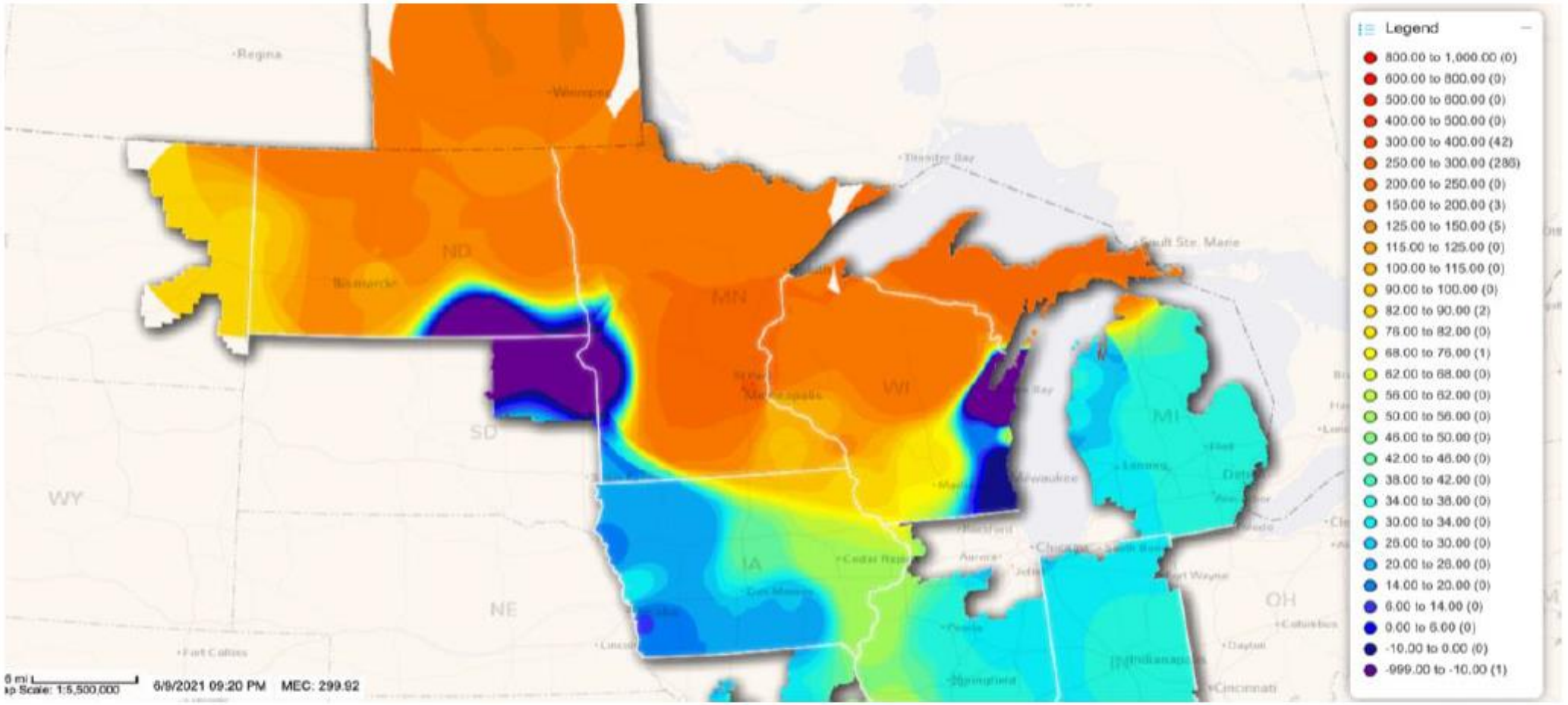


Source: Webber Energy Group

https://www.cesa.org/resource-library/resource/how-wholesale-power-markets-work/

Wholesale Power Markets: Prices

Figure 5 - Locational marginal prices in MISO, June 9, 2021 at 9:20 pm

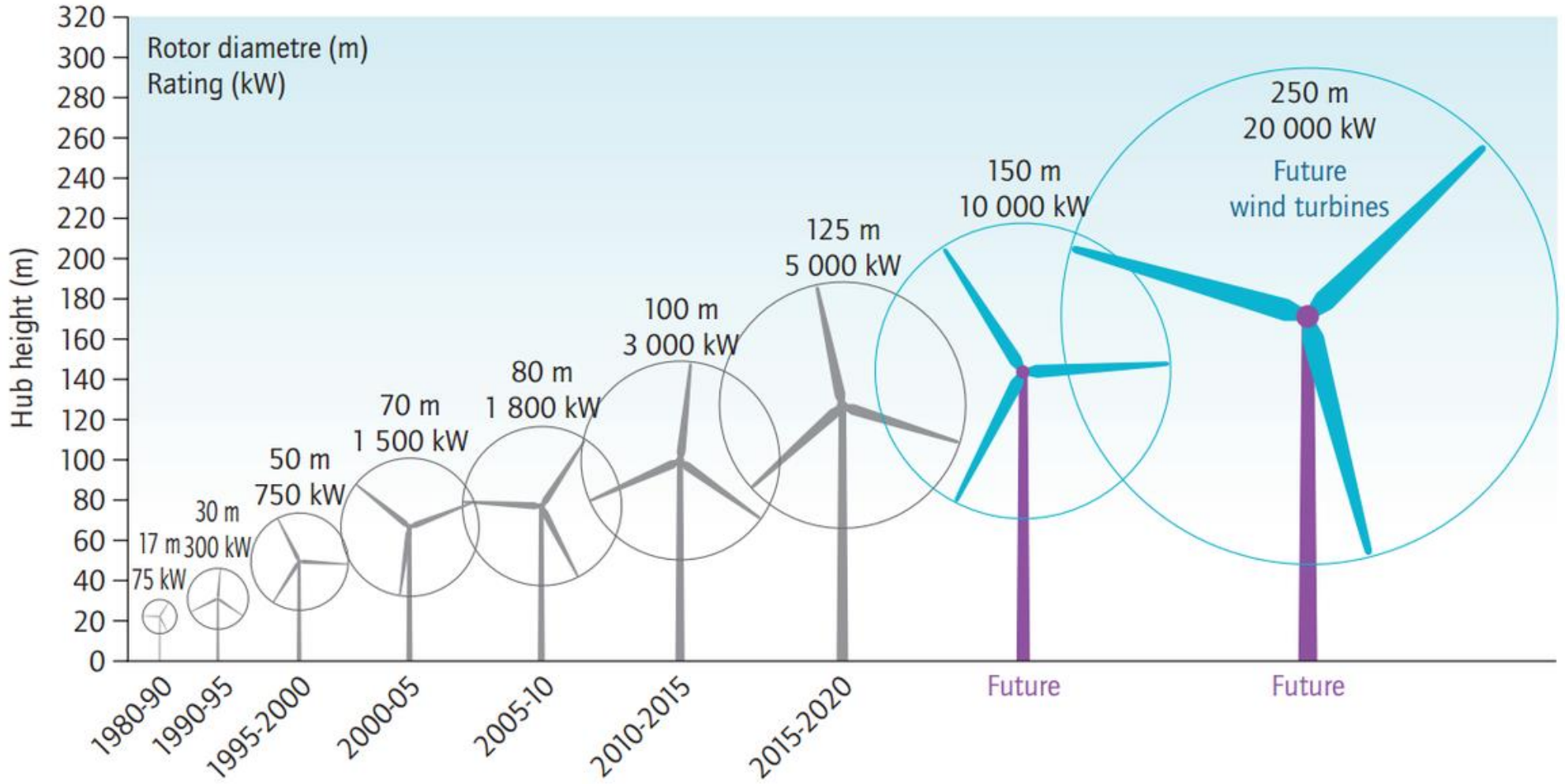


Source: MISO

https://www.cesa.org/resource-library/resource/how-wholesale-power-markets-work/

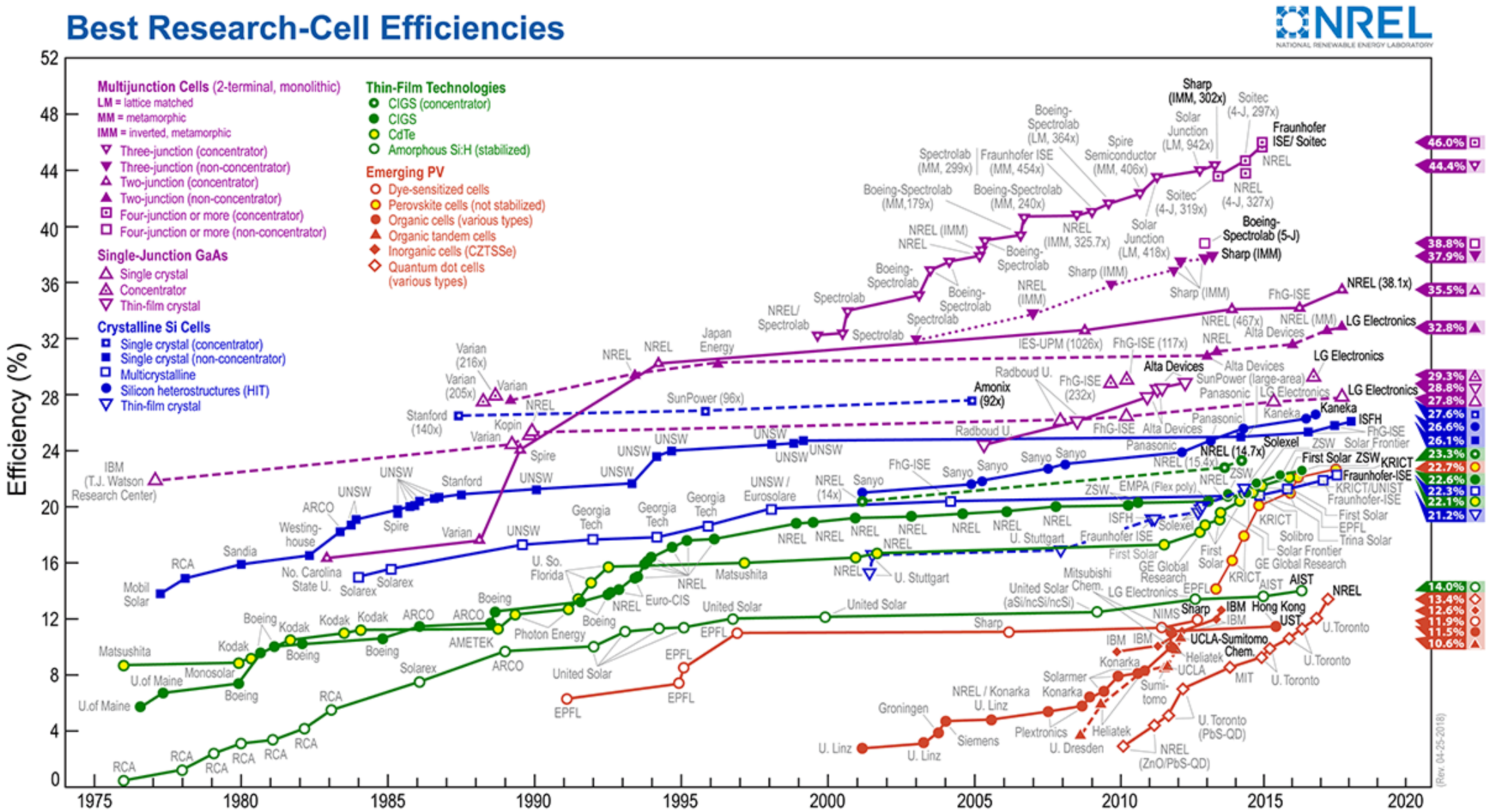
Technology Efficiency Continues to Increase

Figure 14: Growth in size of wind turbines since 1980 and prospects

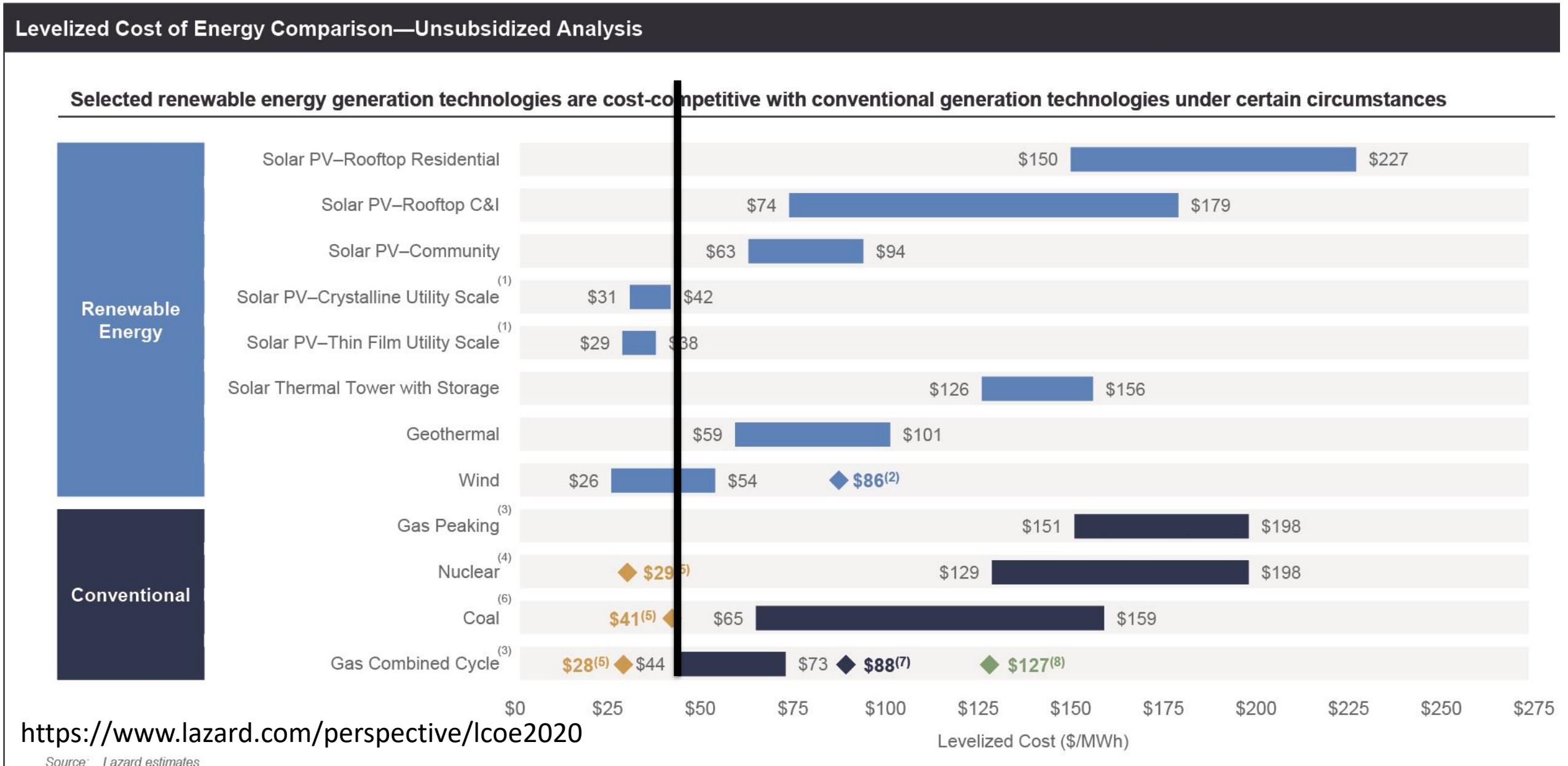


Source: adapted from EWEA, 2009.

Technology Efficiency Continues to Increase

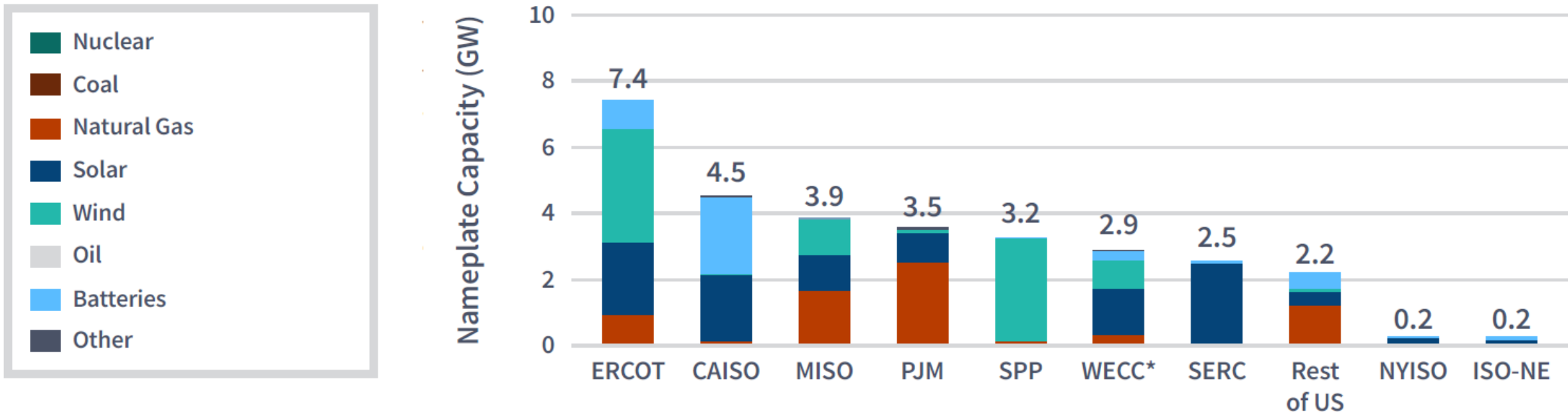


PV and Wind Are Winning on Price



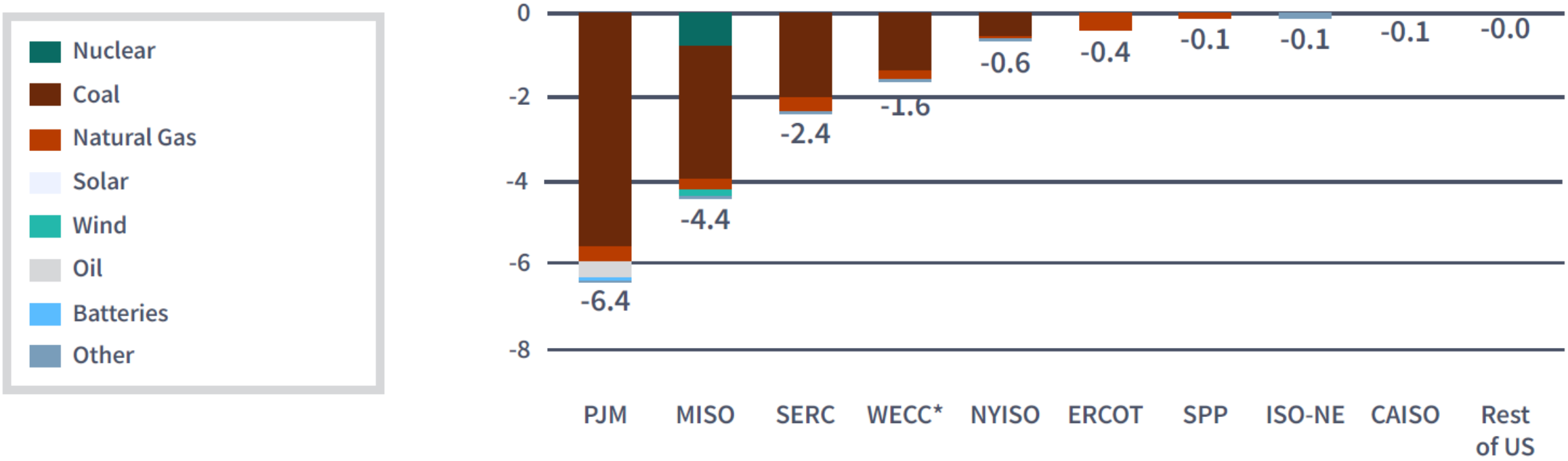
https://www.lazard.com/perspective/lcoe2020

Figure 16: 2022 Nameplate Capacity Additions by Resource Type across the United States



23_State-of-the-market_0323.pdf

Figure 18: 2022 Nameplate Capacity Retirements by Resource Type across the United States

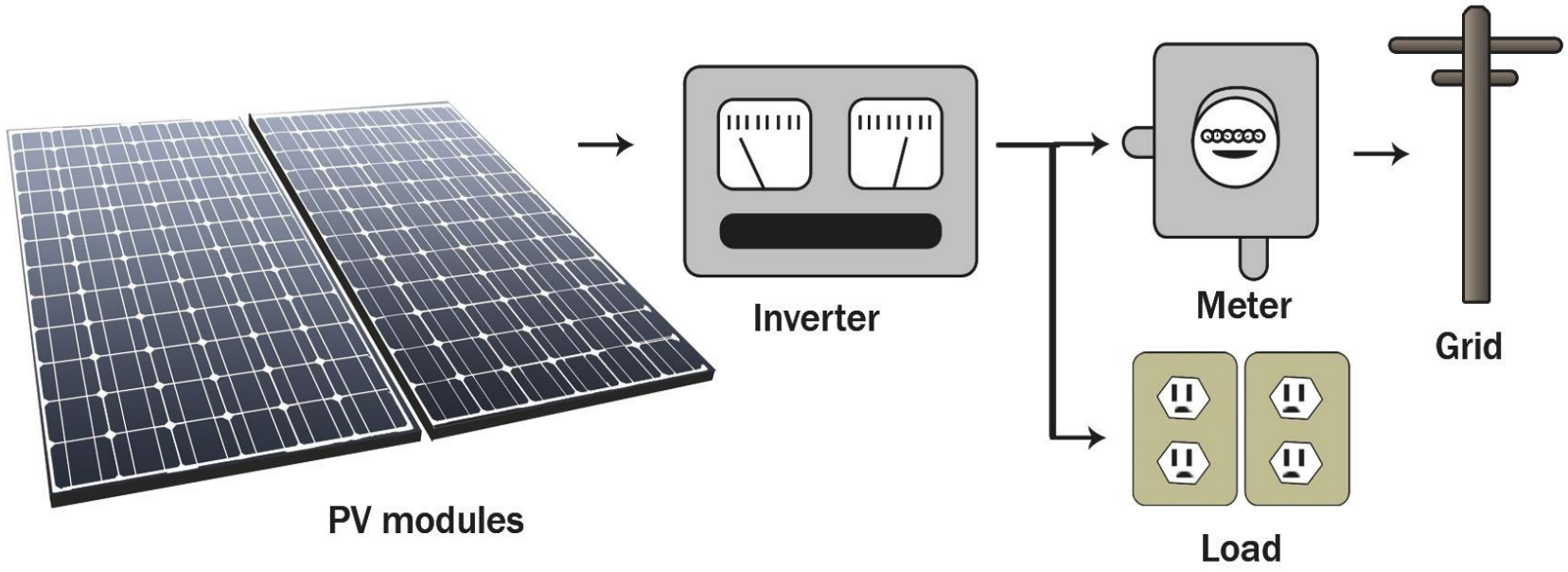


NOTE: Expected and Actual Additions and Retirements from January 2022 through December 2022. Data exclude Alaska and Hawaii. WECC* refers to WECC without CAISO.

Source: U.S. EIA Form -860M, January 2023 Release.

23_State-of-the-market_0323.pdf

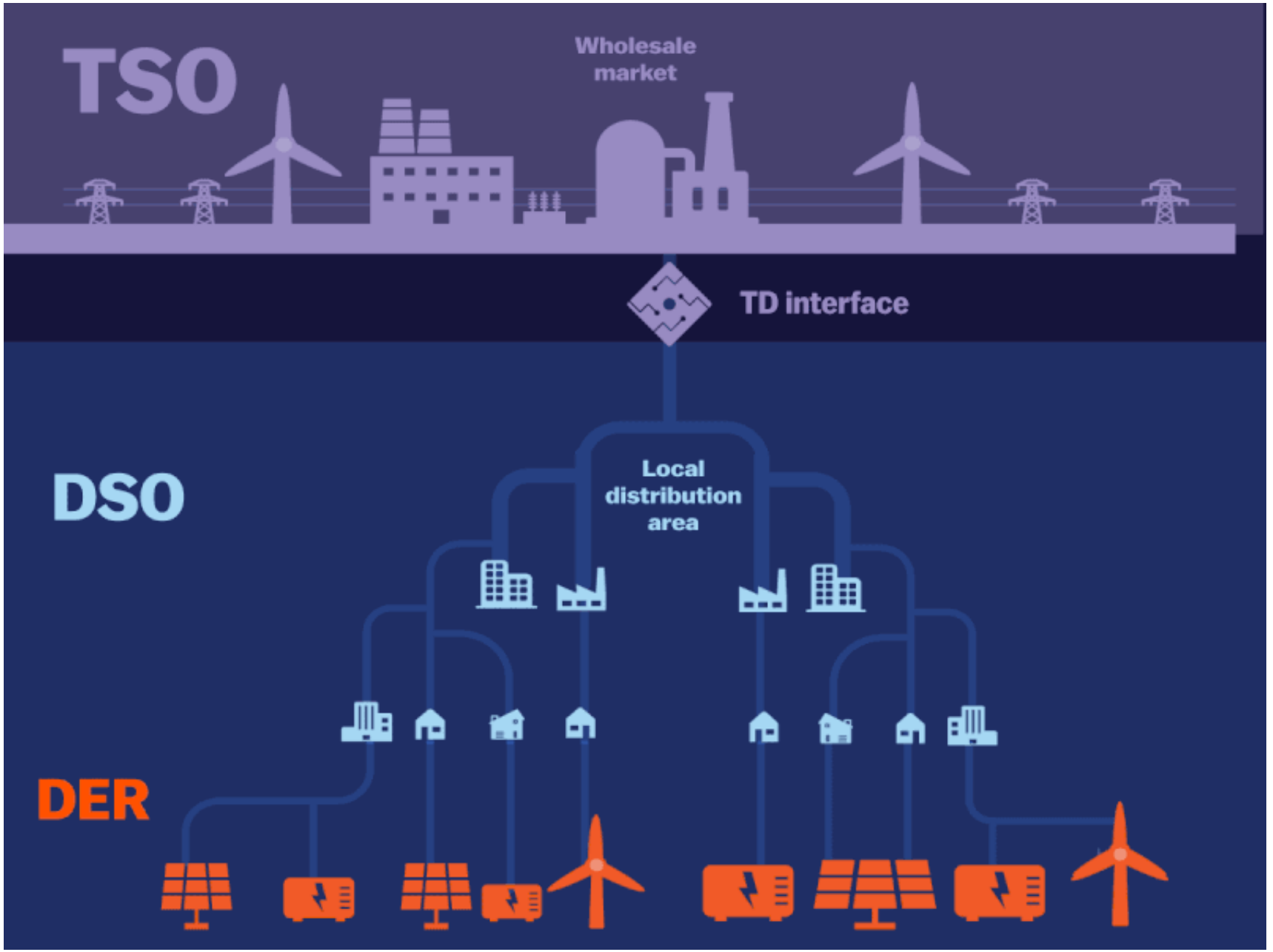
Basic Solar Interconnection



Source: Midwest Renewable Energy Association.

The Transition Grid of Today (DER Optimized)

Grid connected distributed energy resources are mostly built by myriad independent contractors.



https://www.vox.com/energy-and-environment/2018/11/30/17868620/renewable-energy-power-grid-architecture

What Are Distributed Energy Resources (DER)?

1. Solar Photovoltaics (PV)
2. Energy Storage (Li-based, fuel cells, flywheels, etc.)
3. Electric Vehicles and Vehicle to Grid (V2G)
4. Demand response for load reduction (smart meters, smart inverters, building energy management)
5. Demand destruction (energy efficiency)

https://www.sunrun.com/ev-charging/ford-f150-lightning

Electrification Increases Land Use Needs

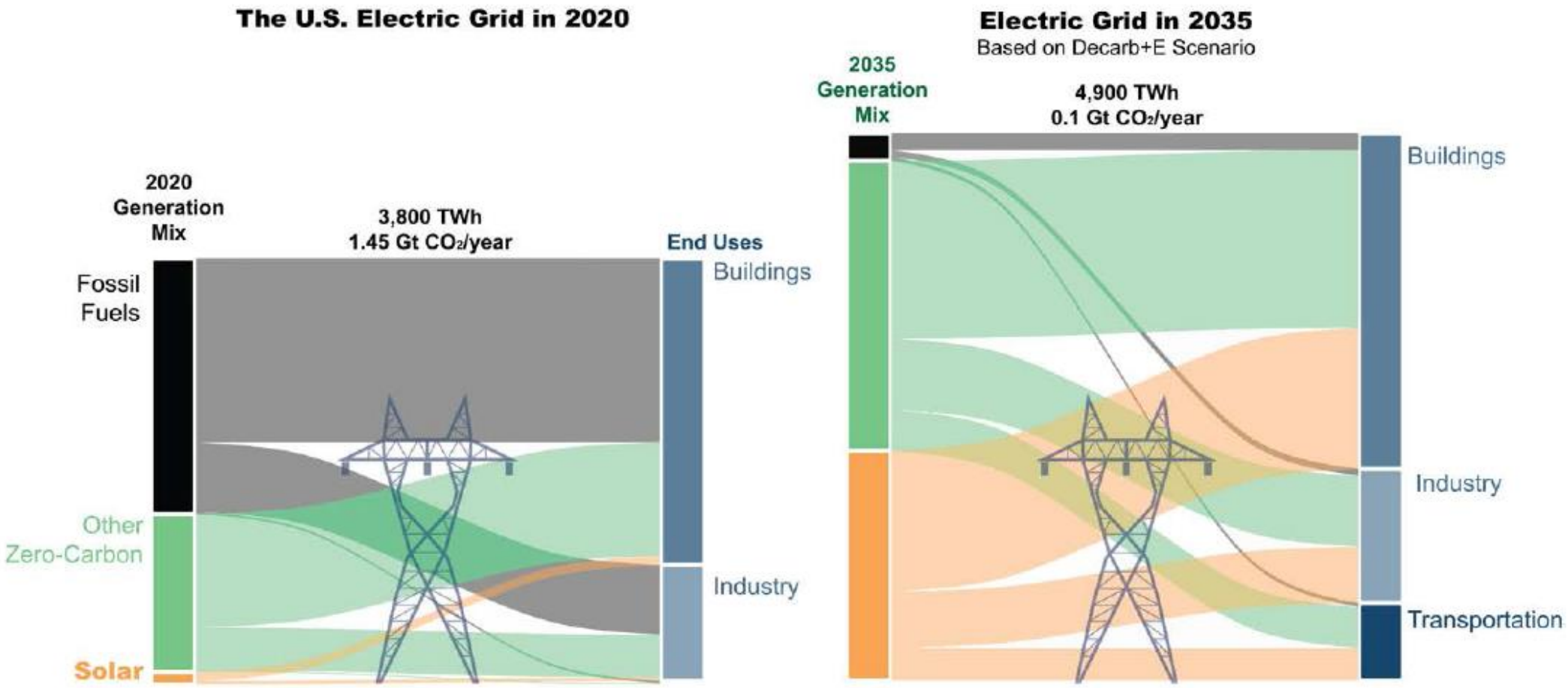
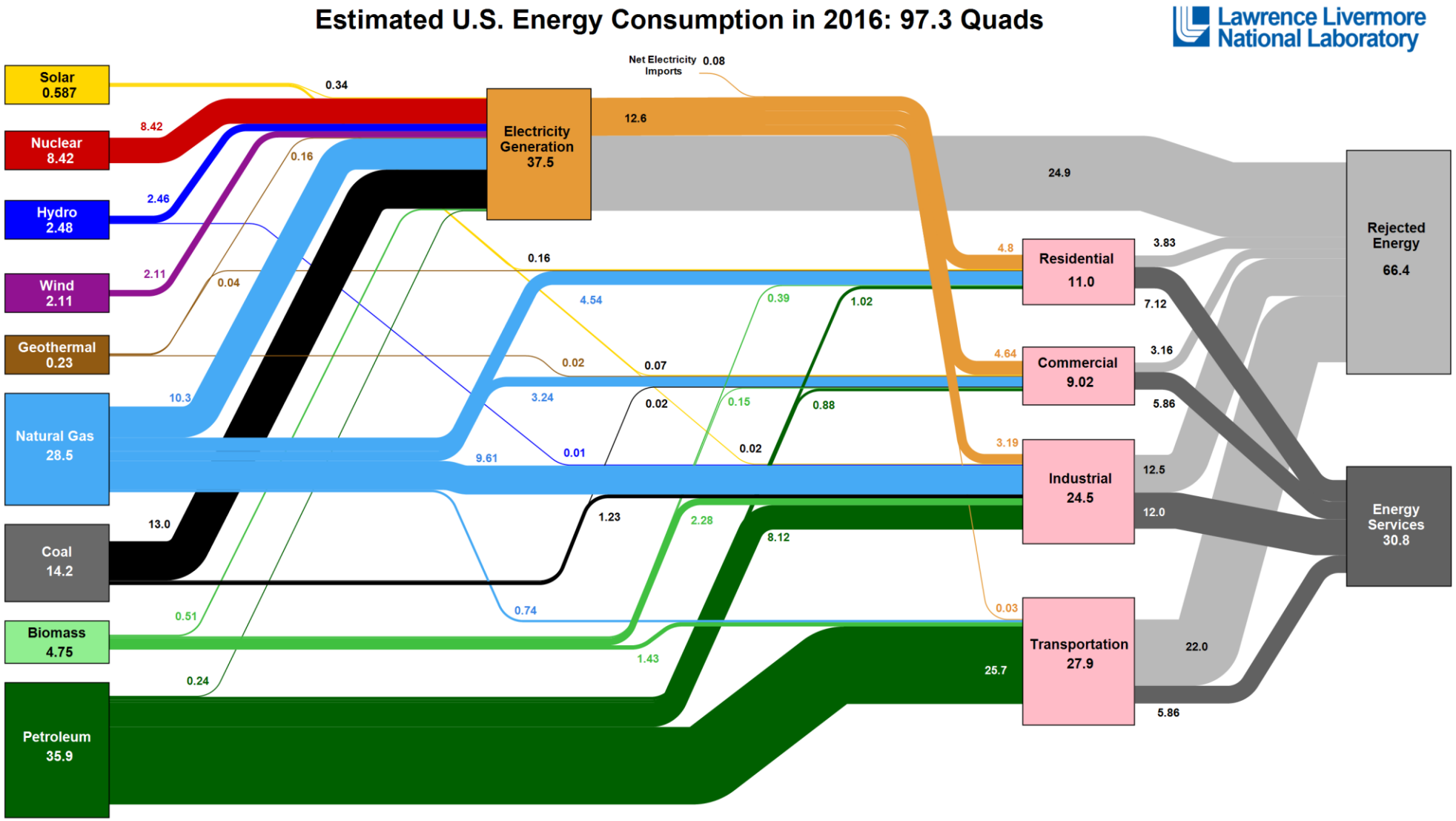


Figure 1 - 4. Grid mixes and energy flows in 2020 and 2035 under the Decarb+E scenario

Source: DOE SETO Solar Futures Study https://www.energy.gov/eere/solar/solar-futures-study

The Waste (67%)



Source: https://flowcharts.llnl.gov/

The Energy (and Cost) Savings

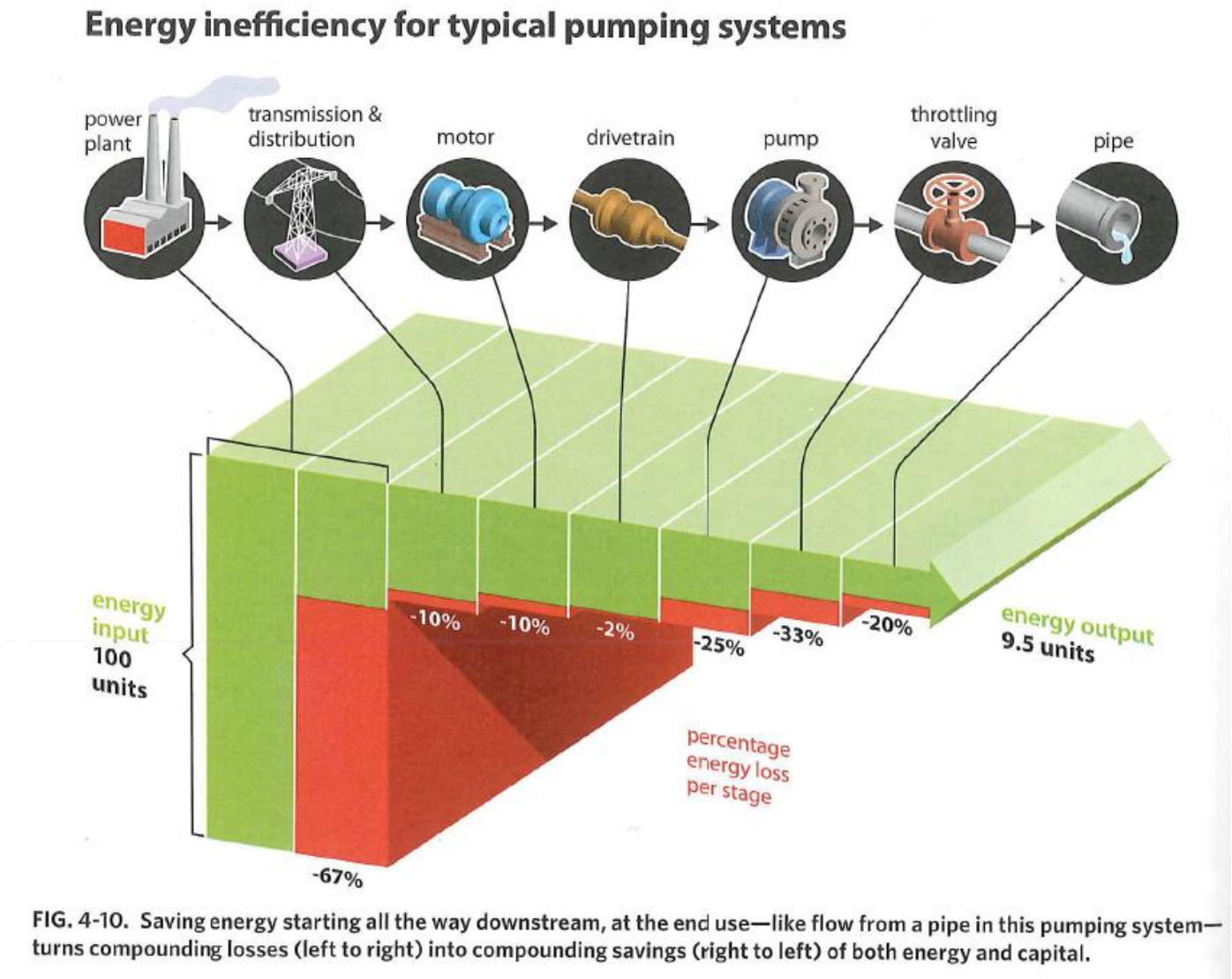


FIG. 4-10. Saving energy starting all the way downstream, at the end use—like flow from a pipe in this pumping system—turns compounding losses (left to right) into compounding savings (right to left) of both energy and capital.

Source: Reinventing Fire. Lovins and RMI. Chelsea Green. 2011

Rooftop Solar Market Potential

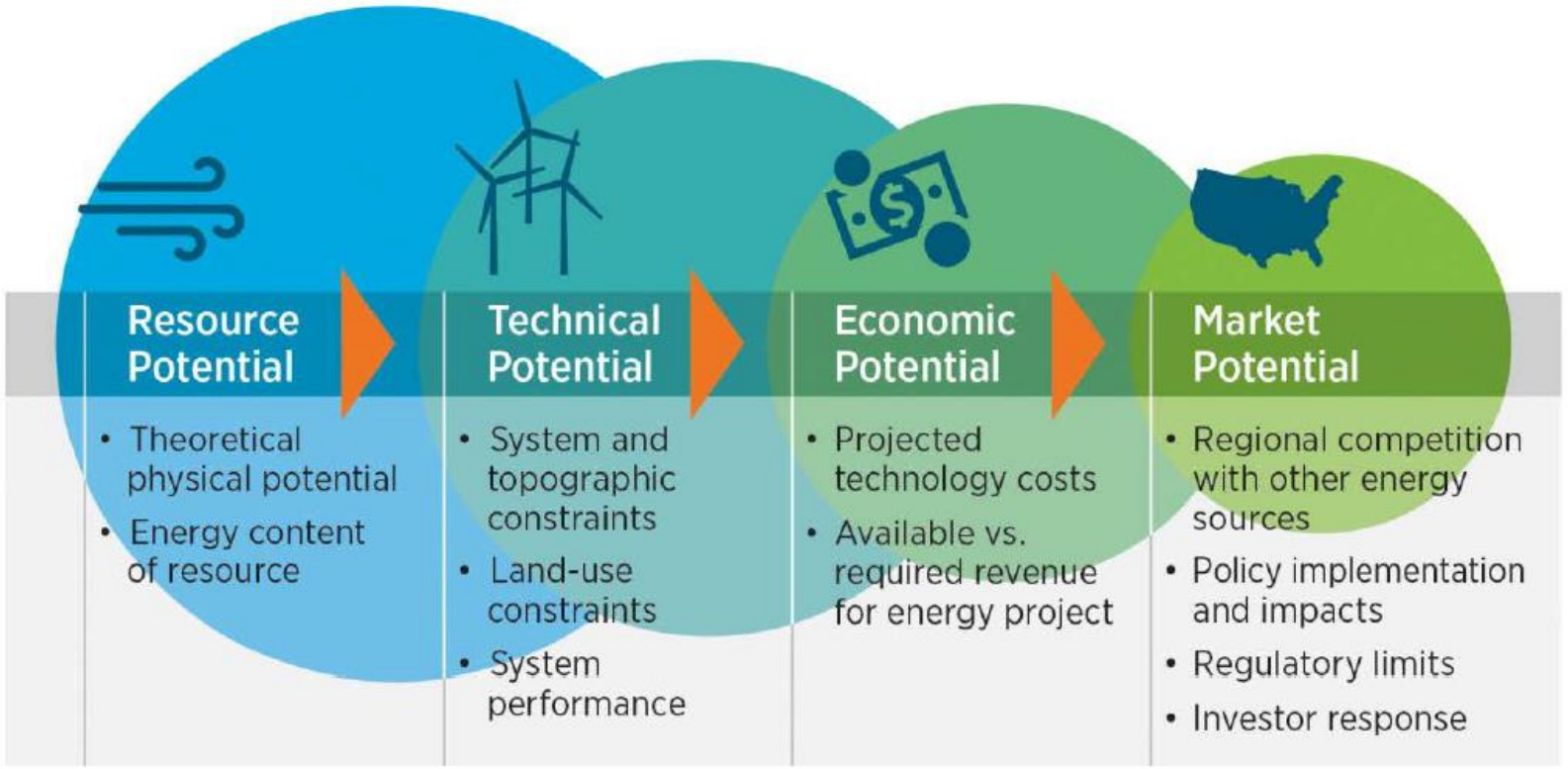


Figure 1. Types of renewable energy potentials

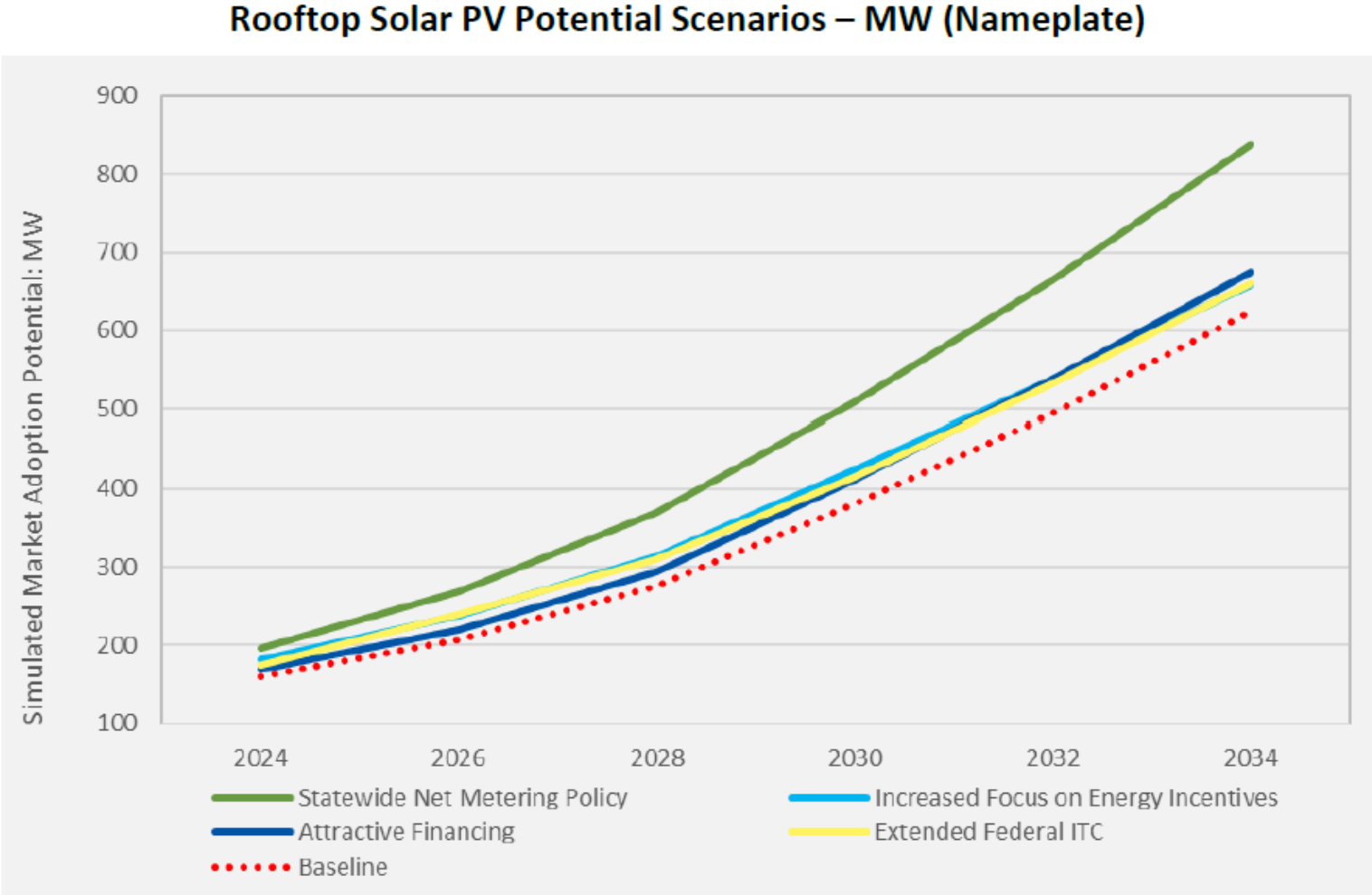
Source: Brown et al. 2015

Putting solar in existing building can greatly reduce the need for large scale wind and solar development. "Rooftop" solar development potential is estimated using both technical and market potential studies.

https://www.nrel.gov/docs/fy16osti/65298.pdf

Wisconsin Rooftop Solar Potential

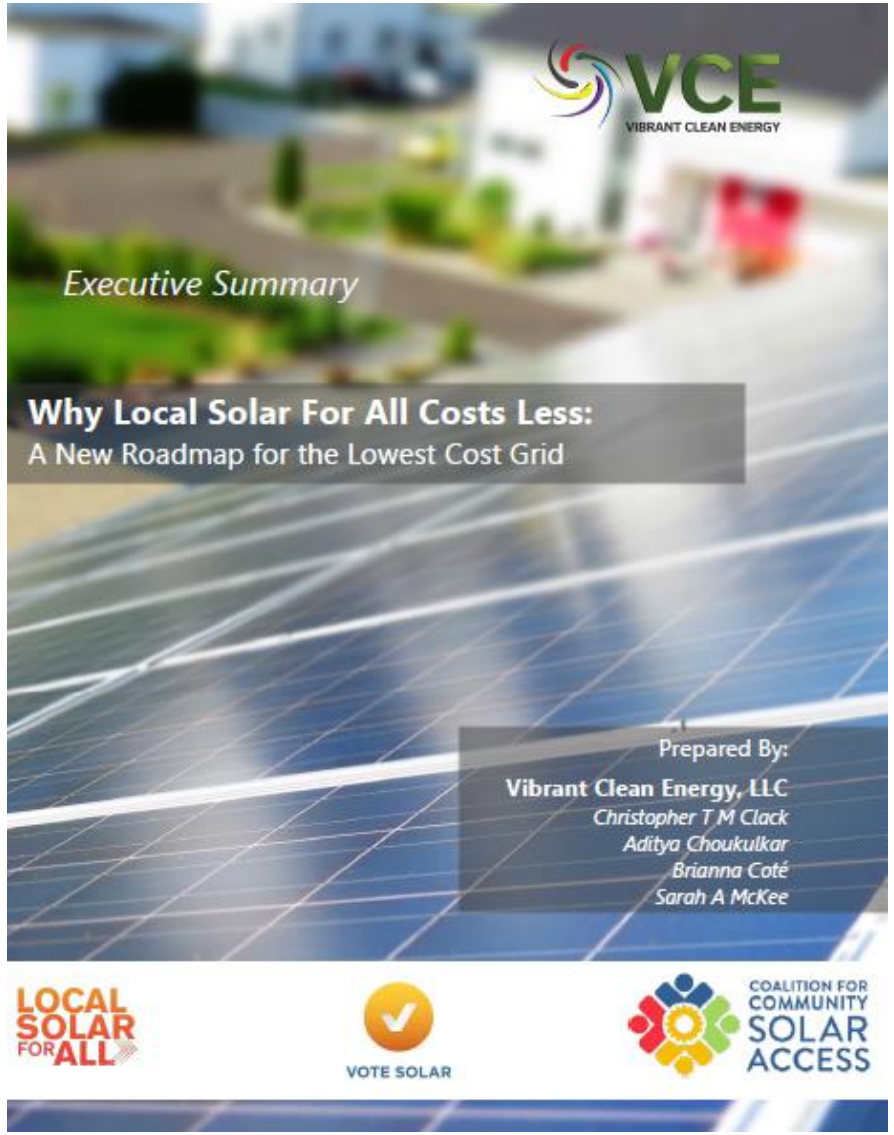
- Technical potential of up to 70% of Wisconsin's historical electricity use.
- Only 1.6% of the technical potential assumed to be adopted by 2034 under current market conditions.



Source: https://www.focusonenergy.com/about/2021-Potential-Study-Documents

Distributed Energy Can Decrease E Costs for All

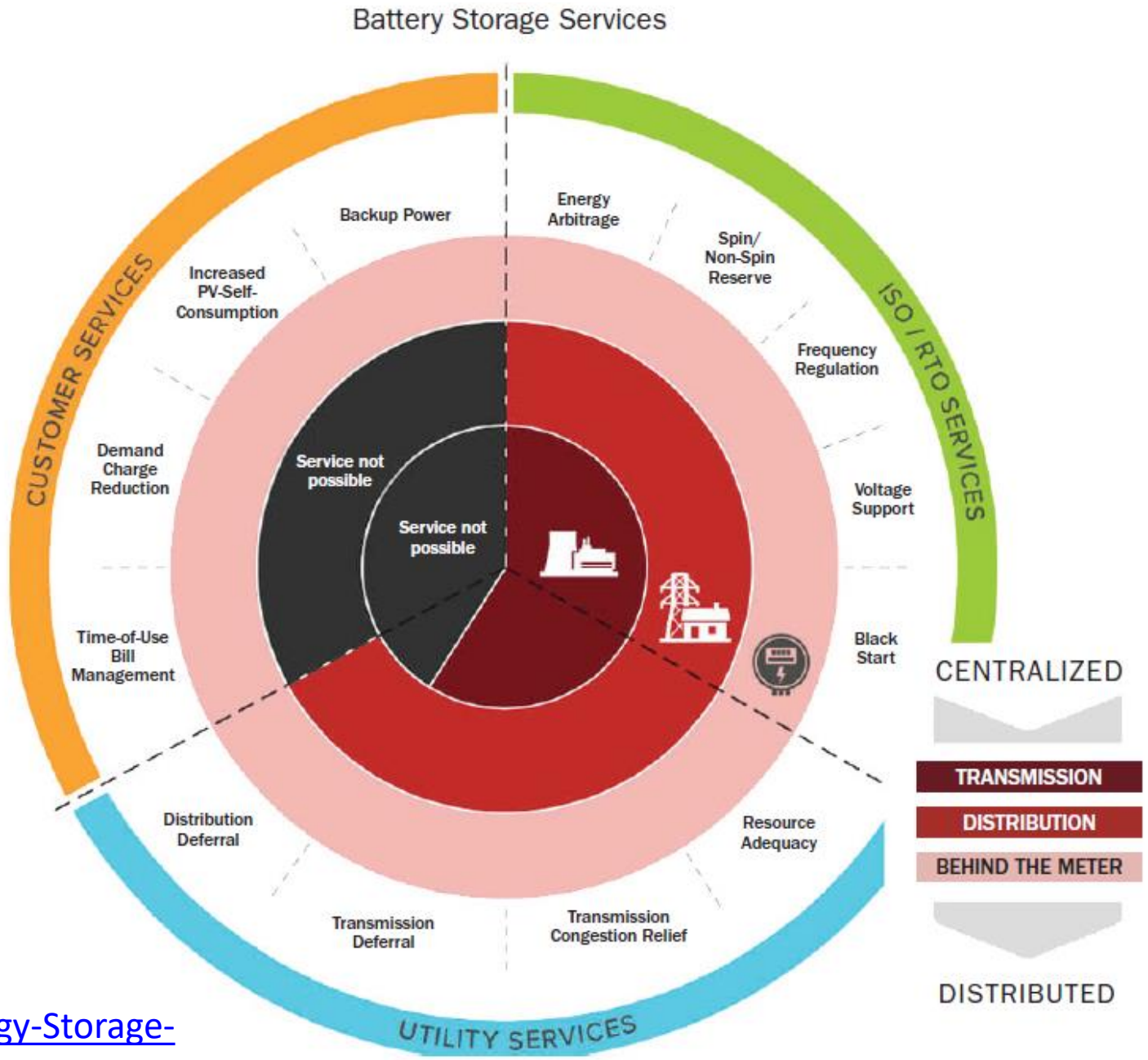
Deploying distributed energy resources in the US electricity system would save US ratepayers $115 billion by 2035.



Source: https://www.vibrantcleanenergy.com/wp-content/uploads/2020/12/WhyDERs_ES_Final.pdf

Energy Storage Applications Provide a Variety of Services that Are Determined By Where They Are Connected in the Electricity System

Behind the Meter Storage Is The Best!



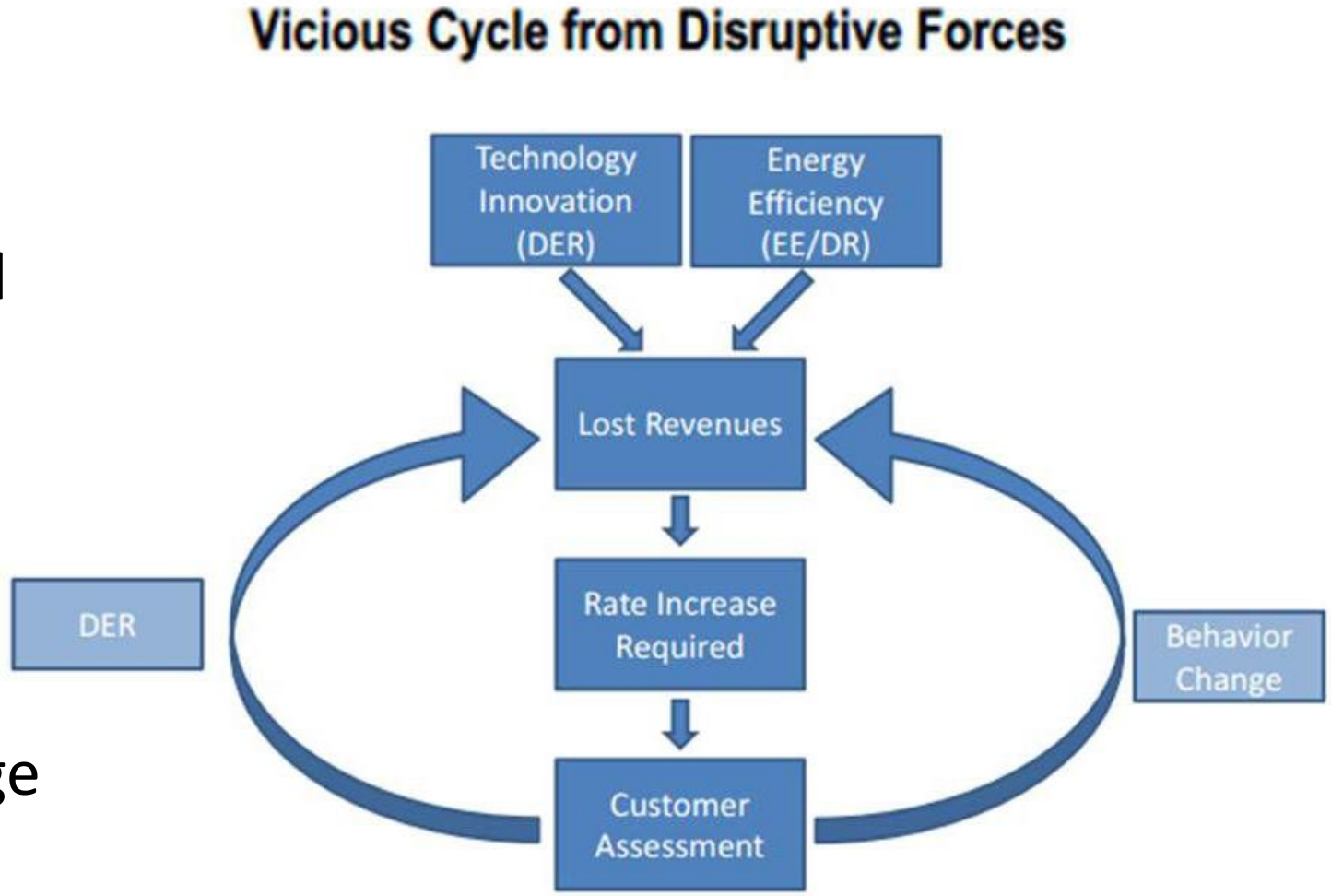
https://www.cesa.org/wp-content/uploads/Energy-Storage-Best-Practices-from-New-England.pdf

Policy Arguments for DER

1. Introduces Competition to a Monopolized Market
2. Protects Ratepayers from Energy Price Increases
3. More Cost-Effective than New Generation or Transmission
4. Increases Grid Resilience
5. Benefits of Energy Investments Are Realized Locally
6. Directs Investment to Local Building Stock
7. Creates Local, Good-Paying Jobs in Rural and Urban Areas
8. People Support It Regardless of Political Affiliation

Outdated Utility Business Model

- Prioritizes investor rate of return on capital investments
- Monopolies limits choice, competition, cost-control, and innovation
- Disincentivizes energy efficiency, DER, and energy conservation
- Monopoly control + capital intensity = resistance to change regardless of social benefit



Source: GTM https://www.greentechmedia.com/articles/read/the-edison-electric-institutes-internal-goals-for-2016-are-a-bellwether

WI Utilities Work to Capture DER Market

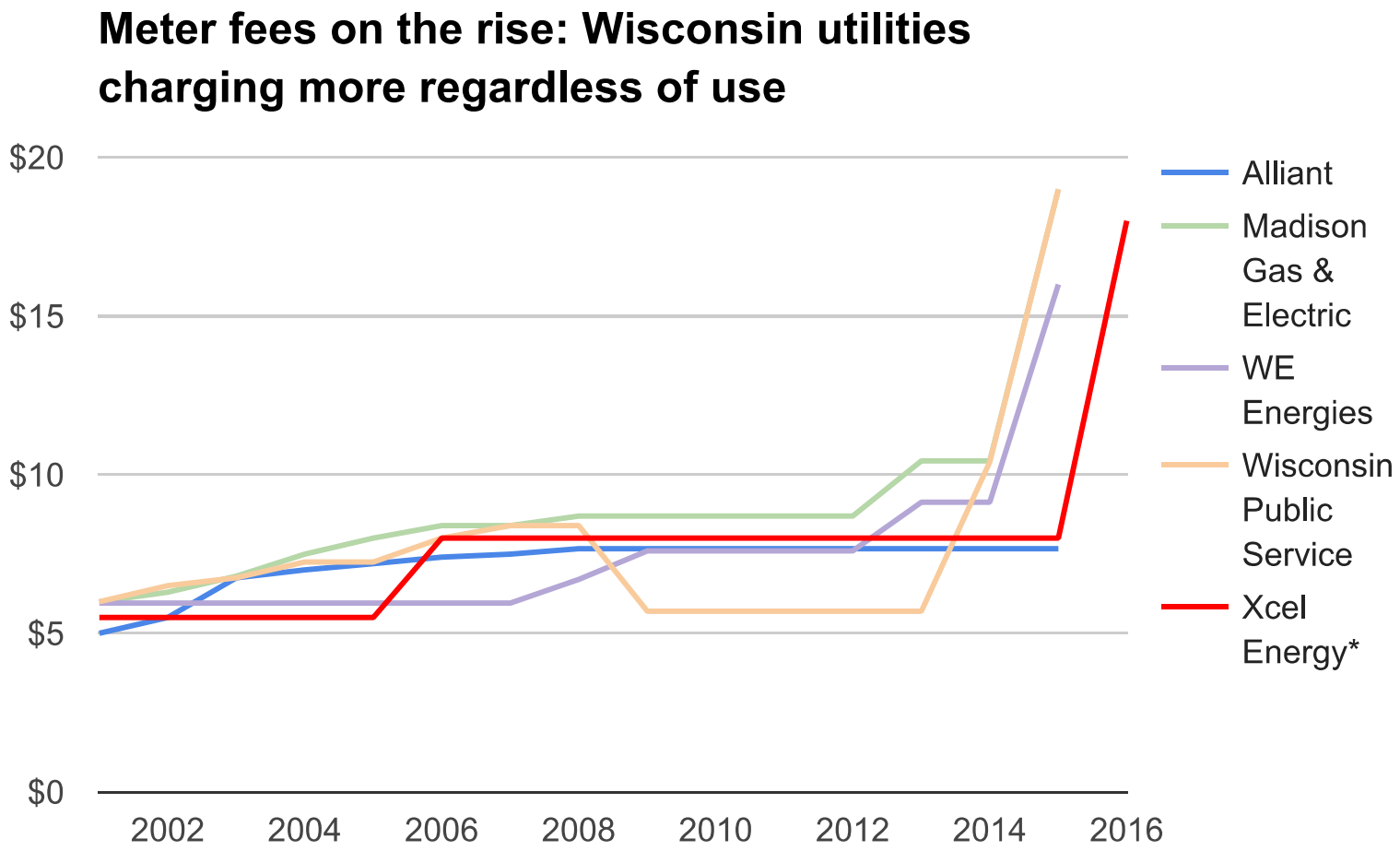
1. Increasing fixed charges
2. Eliminating net metering
3. Restricting financing options
4. Increasing interconnection time, cost, denials
5. Blocking private projects with utility projects
6. Resisting increases in energy efficiency spending

"This proposal is bad policy that will shift costs to customers across Wisconsin who can't afford or choose not to have solar panels."

Brendan Conway, WE Energies

Wisconsin bill would clear the air on third-party solar | Energy News Network

The Recent Past



*proposed change for 2016

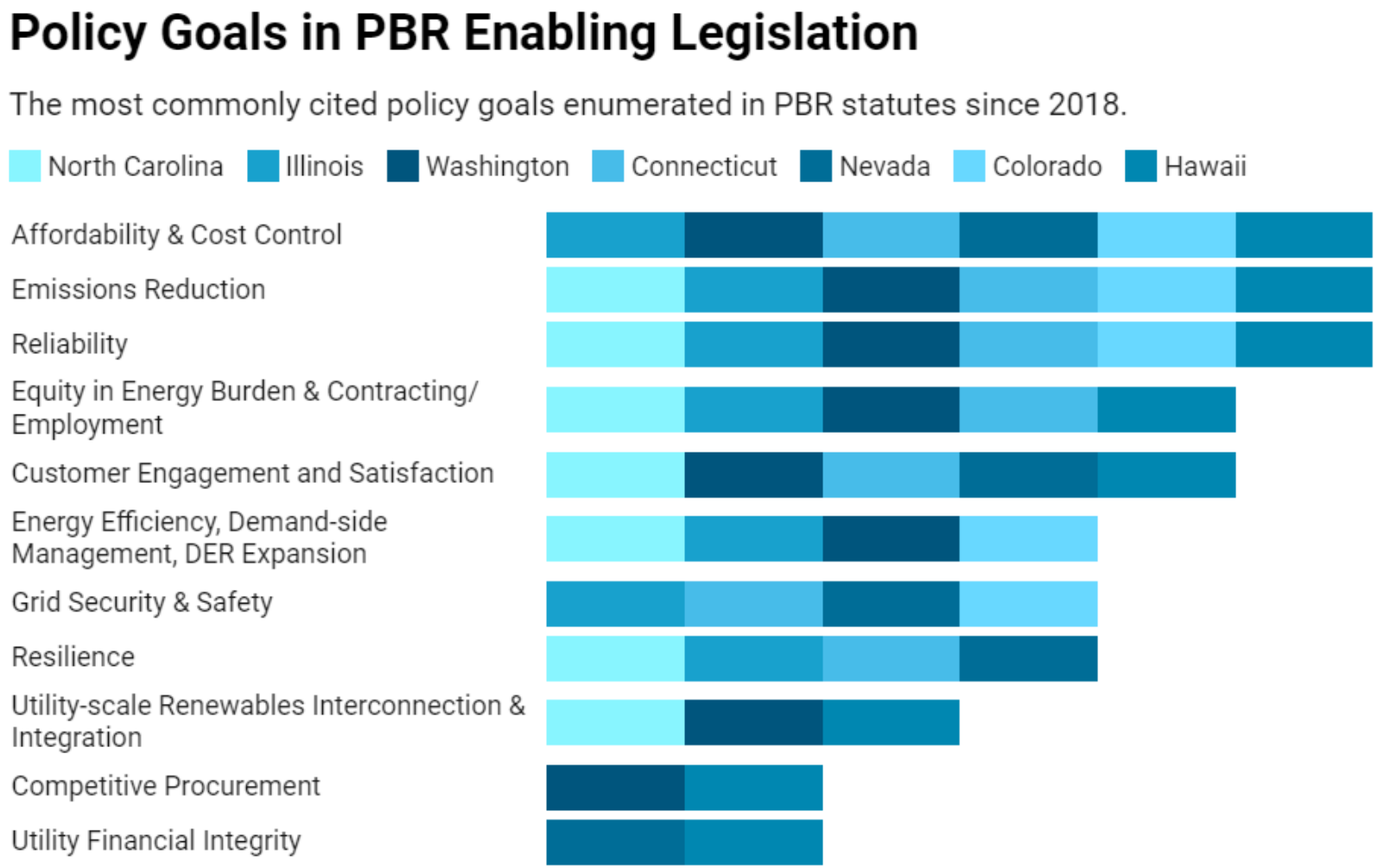
LaCrosse Tribune http://lacrossetribune.com/news/local/xcel-seeks-to-raise-fixed-cost-for-electricity-use/article_6bb617e2-6253-53fd-ad15-fda1a07d4d29.html

The Recent Past

In 2014, WE Energies proposed to levy monthly charges on all homes and businesses with solar installation claiming that they were increasing costs for everyone else.

Can We Align Our Interests?

1. Integrated Resource Planning
2. Performance-Based Regulation



https://rmi.org/states-move-swiftly-on-performance-based-regulation-to-achieve-policy-priorities/

The Future Grid Fully Optimized with DER Aggregation and Microgrids

Both systems operate in parallel with utility and non-utility businesses building and maintaining assets =

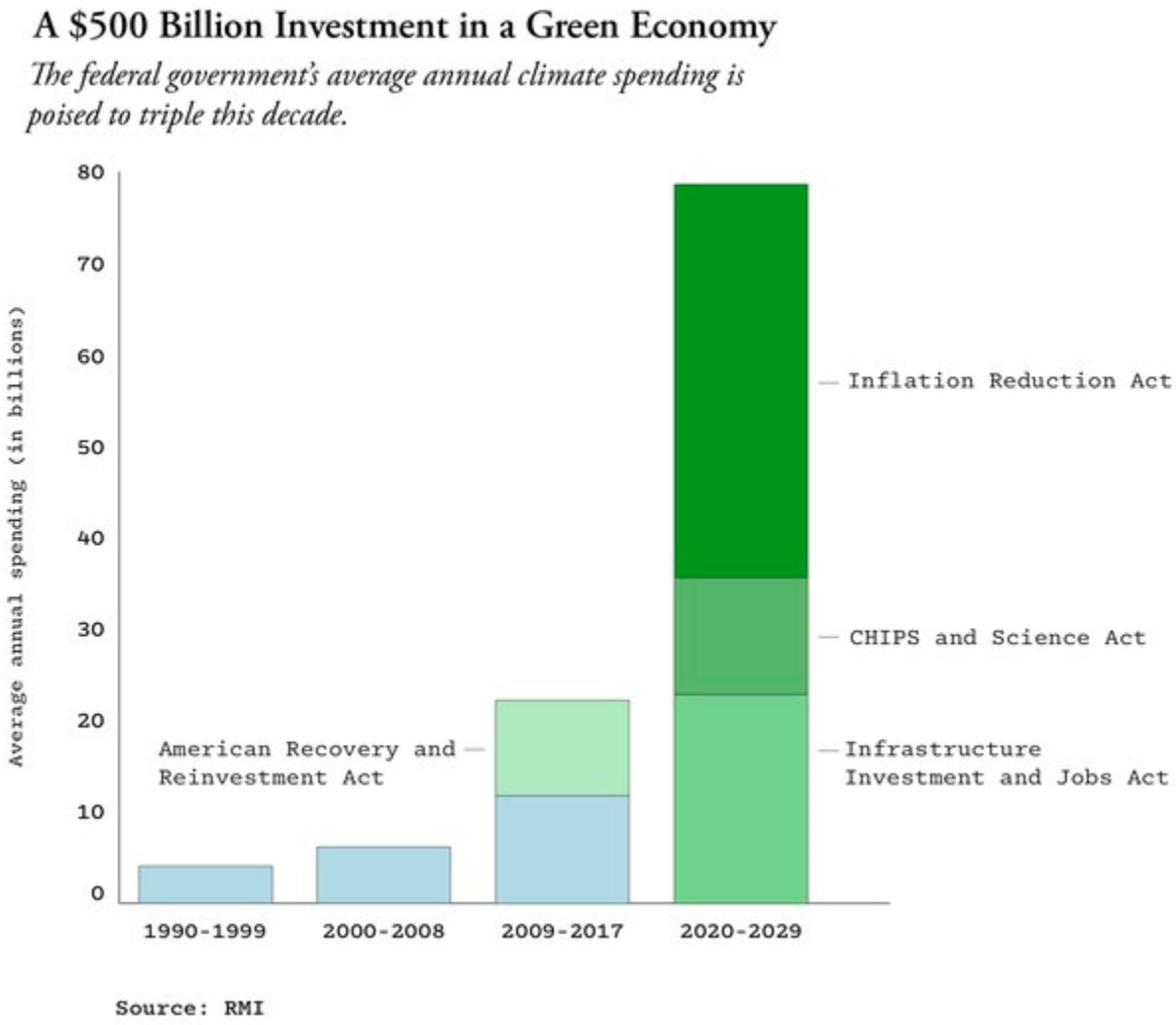
LESS COST AND MORE JOBS!

https://www.vox.com/energy-and-environment/2018/11/30/17868620/renewable-energy-power-grid-architecture

Federal Legislative Overview

1. **Bipartisan Infrastructure Act**
   - Large-Scale RE Enabling!
2. **CHIPS Act**
   - Future Clean Tech Enabling!
3. **Inflation Reduction Act**
   - DER Enabling!

"The combined government climate and clean energy spending from the Inflation Reduction Act — along with recently passed laws to fund technology manufacturing and infrastructure — will be about $514 billion."



https://www.theatlantic.com/science/archive/2022/08/chips-act-climate-bill-biden/671095/

How Will IRA Grow DER?

- Electrifying 1 million LMI households
  - $4.5 billion in direct rebates through the High Efficiency Electric Home Rebate Act (HEEHRA)
  - $1 billion for affordable housing in grants and loans
- Tax deductions for electric upgrades, Solar, EVs
  - Energy Efficient Home Improvement Credits, New Energy Efficient Home Credit, Commercial Buildings Energy Efficient Credit, Solar ITC, Storage ITC, EV (new and used) more
- Defense Production Act
  - $500 million for domestic manufacturing of heat pumps and critical minerals
- Fossil Transition and EJ Community Support
  - $27 billion GHG Reduction Fund with $15 billion for low-income communities for zero emission technologies and $3 billion ECJ Block Grants.
- Loans for Clean Energy Investments
  - Dept. of Energy loan office will have $3.6 billion in guarantees and $40 billion in principal.

https://www.rewiringamerica.org/policy/inflation-reduction-act

The Solar Investment Tax Credit (ITC)
- After the Passage of the Inflation Reduction Act -

- 30% for 10 Years
- Direct Pay for Governments and Non-Profits
- Transferability
- Increased tax credit for low income, ‘energy zones’, prevailing wage, apprenticeship, domestic content

WPR

A garage with rooftop solar panels to generate electricity for a nearby house is seen in Billings, Mont. on Thursday, May 23, 2019. *Matthew Brown/AP Photo*

More than 90K homes could install rooftop solar in Wisconsin under Inflation Reduction Act

The nearly $370B law contains incentives for energy upgrades, renewable projects

By Danielle Kaeding

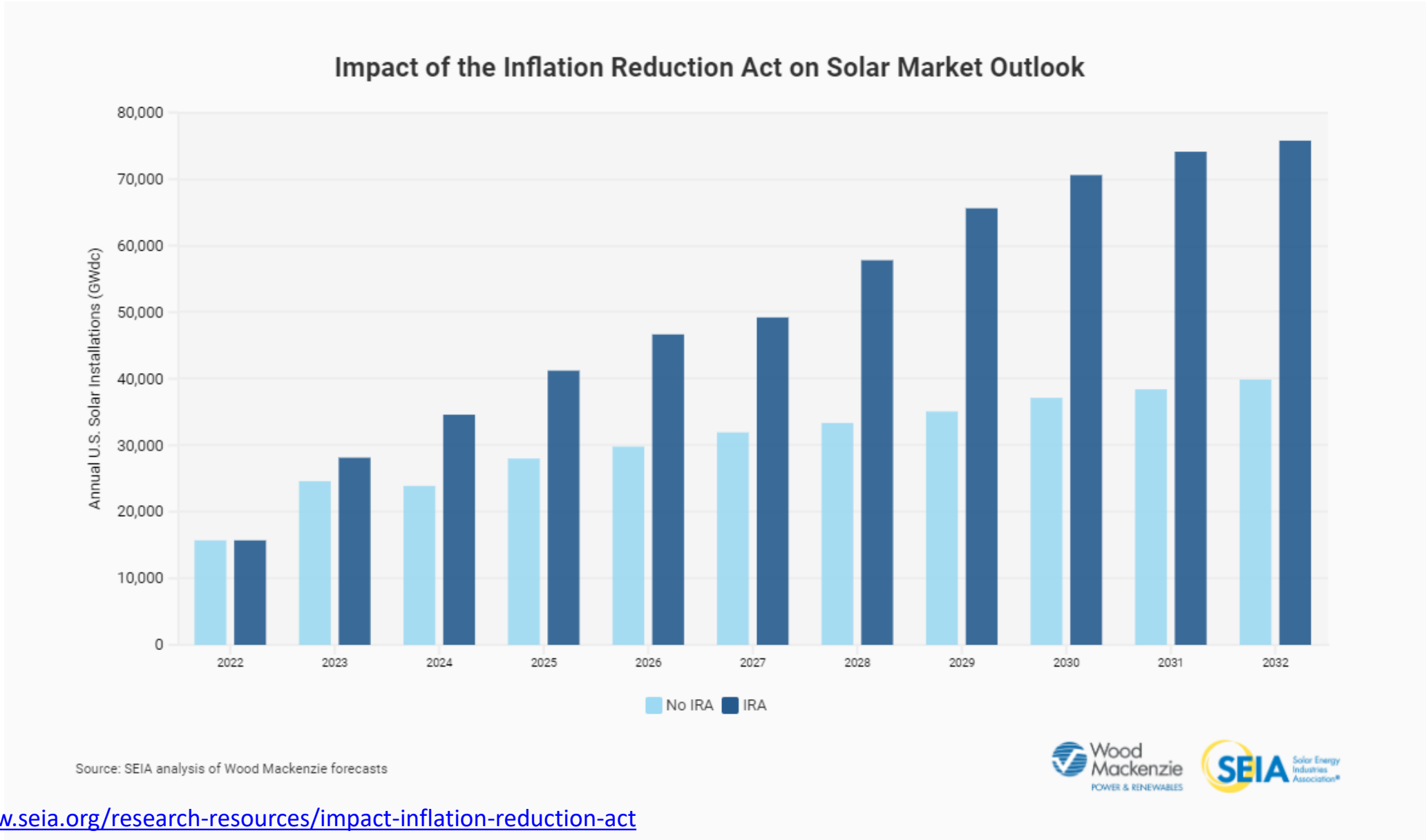
Published: Thursday, September 1, 2022, 6:05pm

SHARE:

Listen Download

https://www.wpr.org/more-90k-homes-could-install-rooftop-solar-wisconsin-under-inflation-reduction-act?eType=EmailBlastContent&eId=f32e95fa-9174-432b-a624-9a2227baeded

Impact of the Inflation Reduction Act

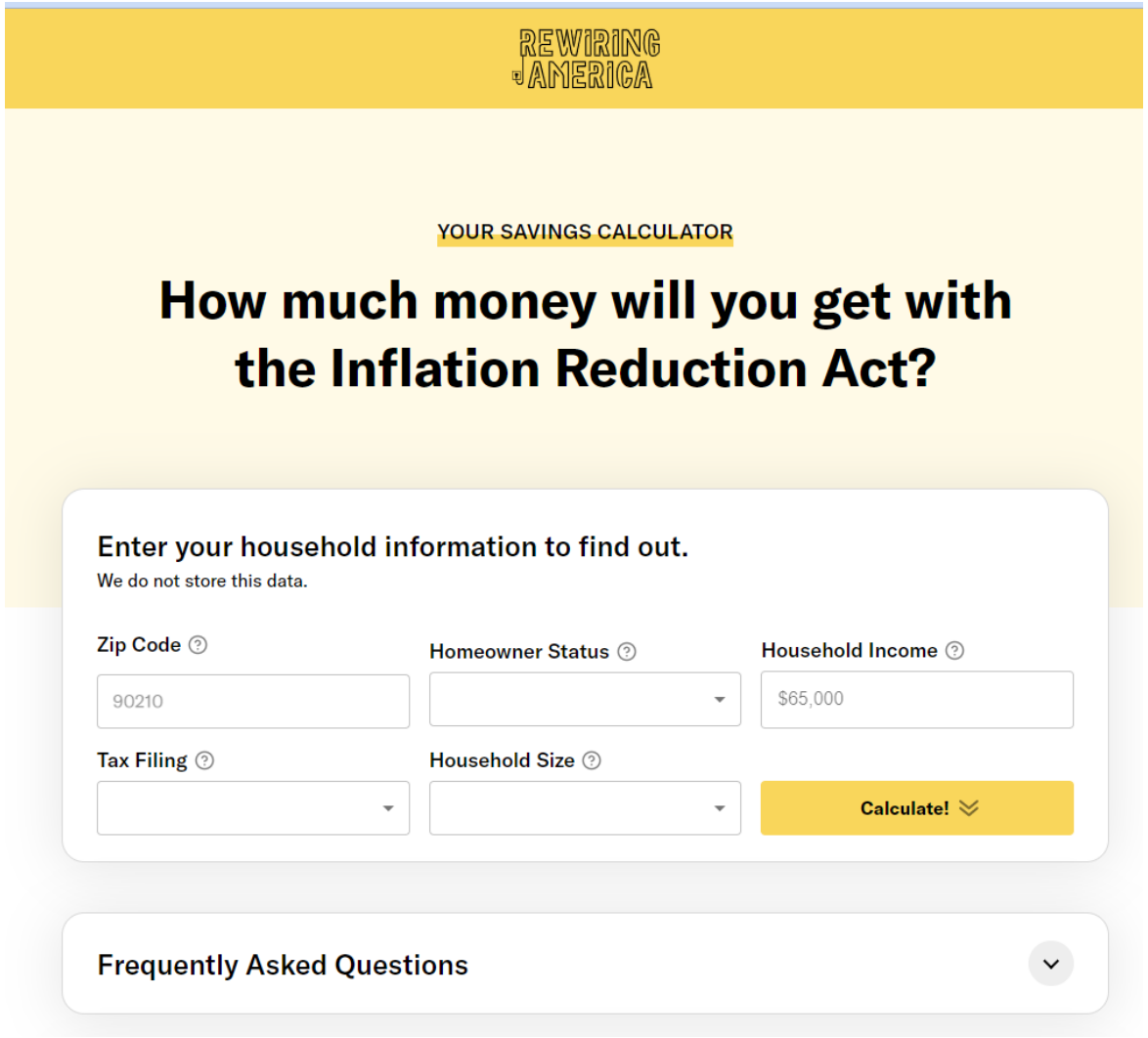


https://www.seia.org/research-resources/impact-inflation-reduction-act

What Does the IRA Mean for You?

Benefits available to the Nick Hylla household:

- Tax credits: $16,250
- Annual bill savings: $1,100
- Includes: storage, geothermal, electric panel/wiring, EV, heat pump, heat pump water heater, rooftop solar, and weatherization



https://www.rewiringamerica.org/app/ira-calculator

$150 Million Coming to WI (Fall 2024)

Type of Home Energy Project	Households below 80% Area Median Income (AMI)	Households between 80 and 150% AMI	Households above 150% AMI[2]
Home Efficiency Project with at least 20% predicted energy savings	80% of project costs up to $4,000[1]	50% of project costs up to $2,000 (maximum of $200k for a multifamily building)	
Home Efficiency Project with at least 35% predicted energy savings[2]	80% of project costs up to $8,000[1]	50% of project costs up to $4,000 (maximum of $400k for a multifamily building)	

https://focusonenergy.com/home-energy-rebates

$150 Million Coming to WI (Fall 2024)

Type of Home Energy Project	Households below 80% Area Median Income (AMI)	Households between 80% and 150% AMI	Households above 150% AMI
Home Electrification Project Qualified Technologies (only households with an income below 150% AMI are eligible)	100% of project costs up to $14,000	50% of project costs up to $14,000	Not Applicable
	ENERGY STAR® electric heat pump water heater	Up to $1,750	
	ENERGY STAR® electric heat pump for space heating	Up to $8,000	
	ENERGY STAR® electric heat pump clothes dryer	Up to $840*	
	ENERGY STAR® electric stove, cooktop, range, oven	Up to $840*	
	Electrical load service center (electrical panel)	Up to $4,000	
	Electrical Wiring	Up to $2,500	
	Insulation, air sealing, ventilation	Up to $1,600	

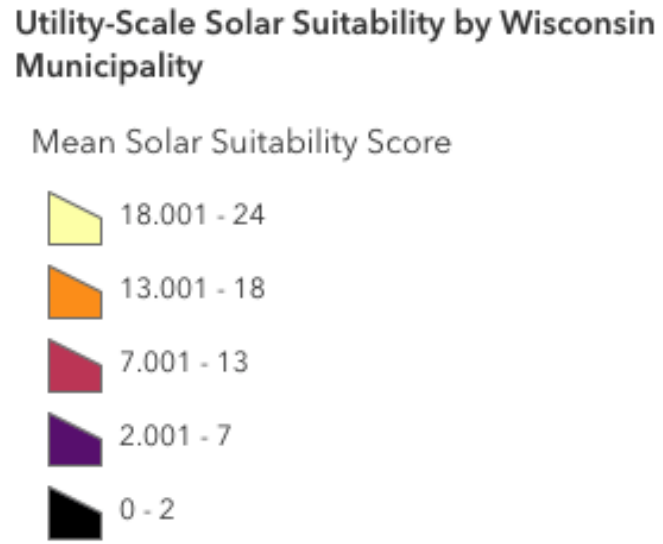
https://focusonenergy.com/home-energy-rebates

Wisconsin Electric Vehicle Infrastructure

- Exempts businesses that set up charging stations from regulation as public utilities
- Requires anyone running a charging station to obtain a state permit.
- Requires charging station to purchase all electricity from incumbent utility.
- 3-cent per kilowatt hour excise tax
- Local governments and state agencies not allowed to operate public charging stations but can charge their vehicles.
- Allows the state to administer $78.7 million in federal grants to help businesses construct charging stations

https://apnews.com/article/wisconsin-electric-vehicles-charging-stations-8f240084670b7b210d162f83b22168d9

Utility-Scale Solar Site Suitability



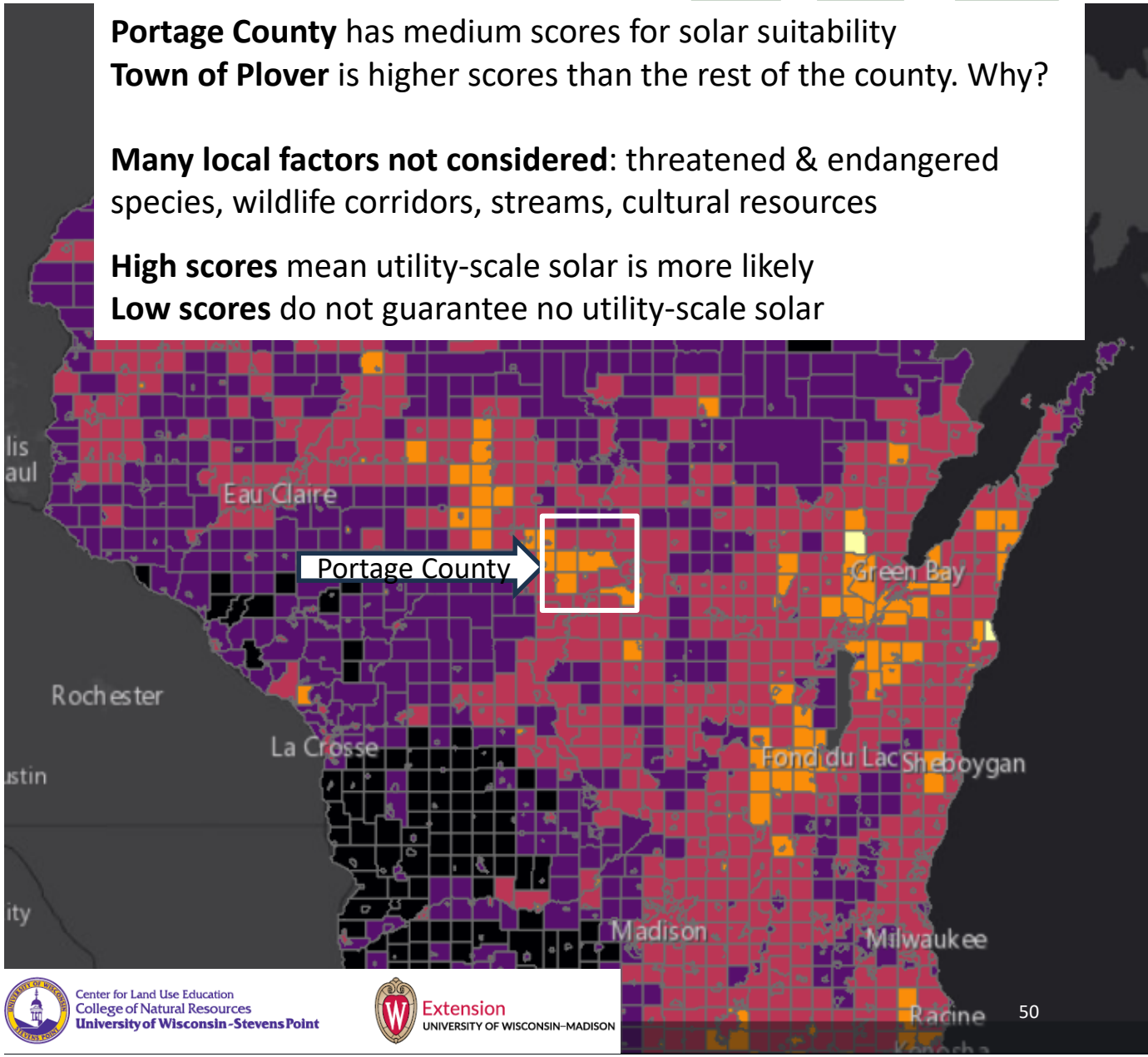
Weight	Data Input	Classification Notes
3	Transmission Lines	*Land within 1 mile of existing transmission lines most favored.*
1	Substations	*Land within 2 miles of existing substations most favored.*
2	Property Class	*Parcels classified as agricultural and undeveloped most favored, opposed to those with developed land uses.*
2	Land Cover	*More open land cover types, such as agricultural, pasture, and barren, were ranked as more favorable than forest, wetland, open water, or developed areas.*
N/A	Slope	*Slope is the only Boolean input to the suitability model. Areas with slope greater than 5% rise were excluded.*

Credit: Lynn Markham

Portage County has medium scores for solar suitability
Town of Plover is higher scores than the rest of the county. Why?

Many local factors not considered: threatened & endangered species, wildlife corridors, streams, cultural resources

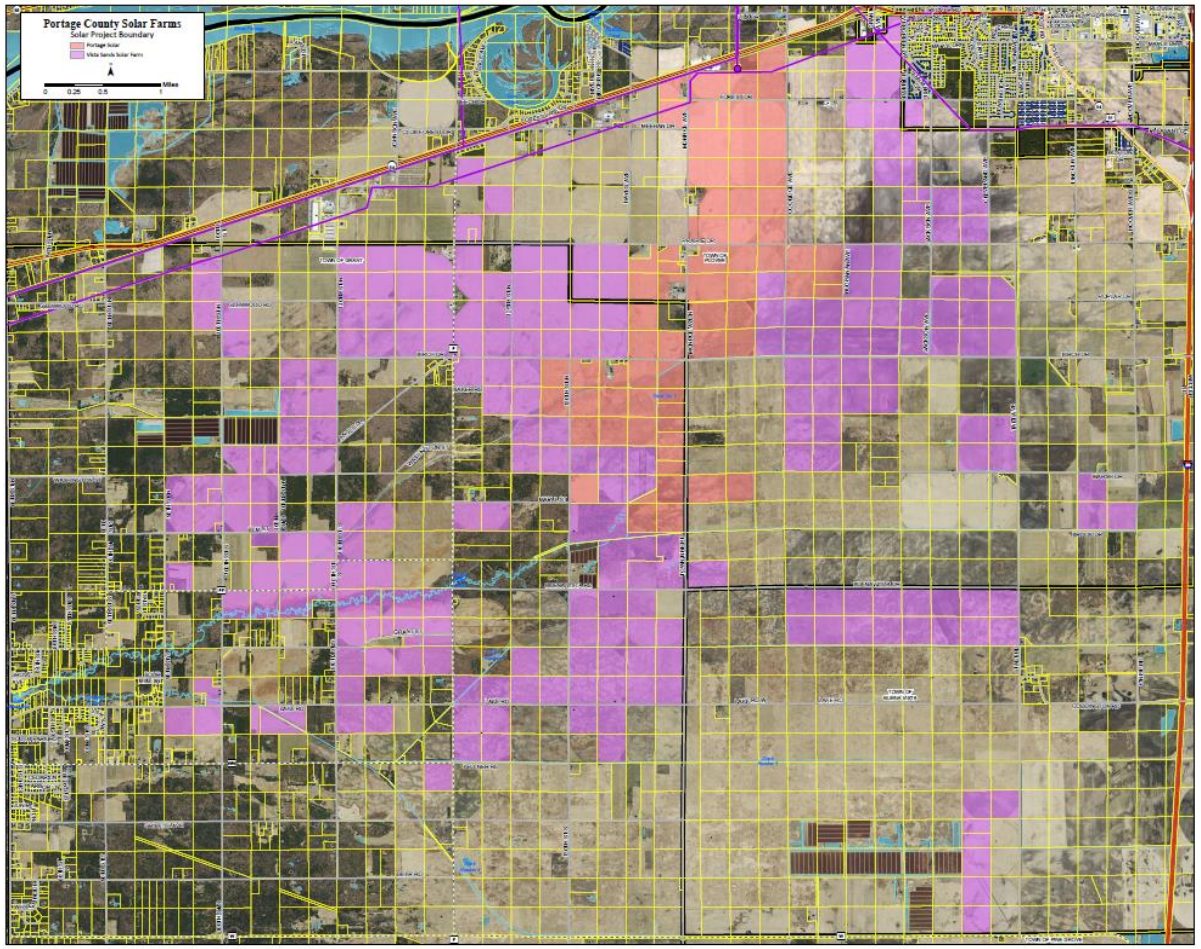
High scores mean utility-scale solar is more likely
Low scores do not guarantee no utility-scale solar



Large Solar Projects

Development Process

- Site and Acquire
  - Private development
  - Utility ownership
- Landowner agreements
  - Lease payments
  - “Good Neighbor” payments
- Local approvals
  - Approve 50MW to 100MW
  - Planning and zoning
  - Joint Development Agreements
- State approvals
  - PSCW (WDNR, Utility Aid Fund)

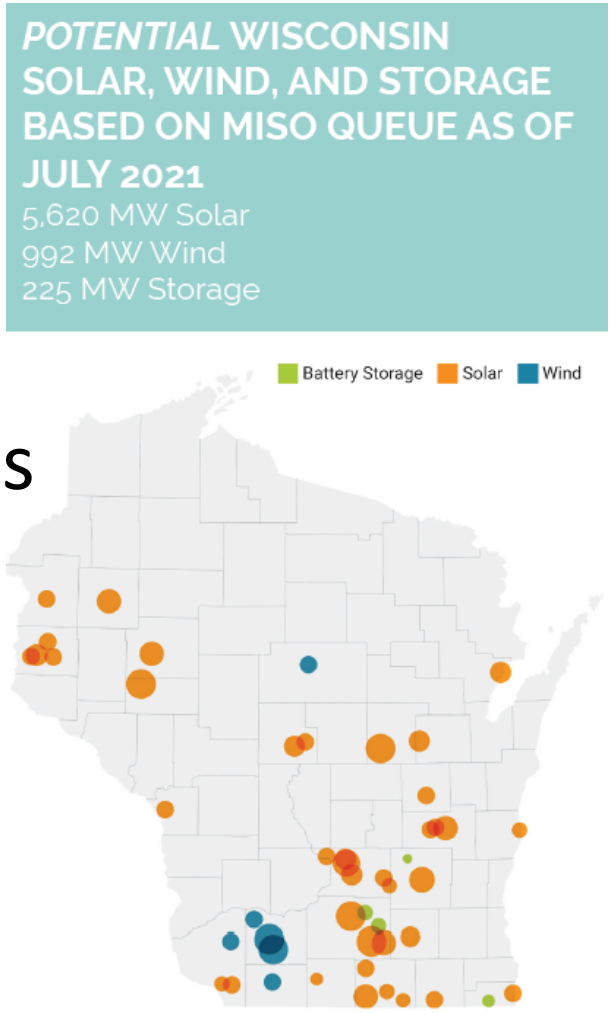


Source: Portage Solar, PSCW (250MW)
https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=428866
Vista Solar, PSCW (1,300MW)
https://psc.wi.gov/Pages/CommissionActions/CasePages/VistaSandsSolarProject.aspx

Large Solar Projects

Development Characteristics

- No central planning
- PSCW approval
- Beneficial lease payments
- Jurisdiction utility aid payments
- Energy storage co-siting
- Pollinator planting/grazing
- IRA Tax Requirements
  - Apprenticeship Ratio
  - Prevailing Wage
  - Domestic Content



Source: Solar Energy - RENEW Wisconsin

A100 MW solar farm would provide approx. $233,000 annually to the host county and $167,000 annually to the host township(s), totaling more than $10 million over the project operating life of 25 years.

Source: https://www.cleanwisconsin.org/wp-content/uploads/2022/10/Final-Evolved-Energy-Research_100-percent-in-Wisconsin-Summary.pdf

Detailed energy and economic modeling shows Wisconsin can cost-effectively transition to net zero emissions by 2050.

Achieving a net zero economy means that the amount of greenhouse gas produced is not greater than the amount taken away.

Net Zero Economy-Wide was shown to provide the most economic, health, and emissions benefits, and key findings are focused on this scenario.

Ultimately, Wisconsin can achieve net zero emissions at similar energy costs to taking no policy action or implementing clean electricity policy alone.

Source: https://www.cleanwisconsin.org/wp-content/uploads/2022/10/Final-Evolved-Energy-Research_100-percent-in-Wisconsin-Summary.pdf

cleanwisconsin

CORN ETHANOL VS. SOLAR
LAND USE COMPARISON

JAN 19, 2023 / ANALYSIS BY PAUL MATHEWSON, PHD, AND NICHOLAS BOSCH

Source: https://www.cleanwisconsin.org/wp-content/uploads/2023/01/Corn-Ethanol-Vs.-Solar-Analysis-V3-9-compressed.pdf

Wisconsin already uses over 1,000,000 acres of agricultural land for energy production in the form of corn used to produce ethanol.

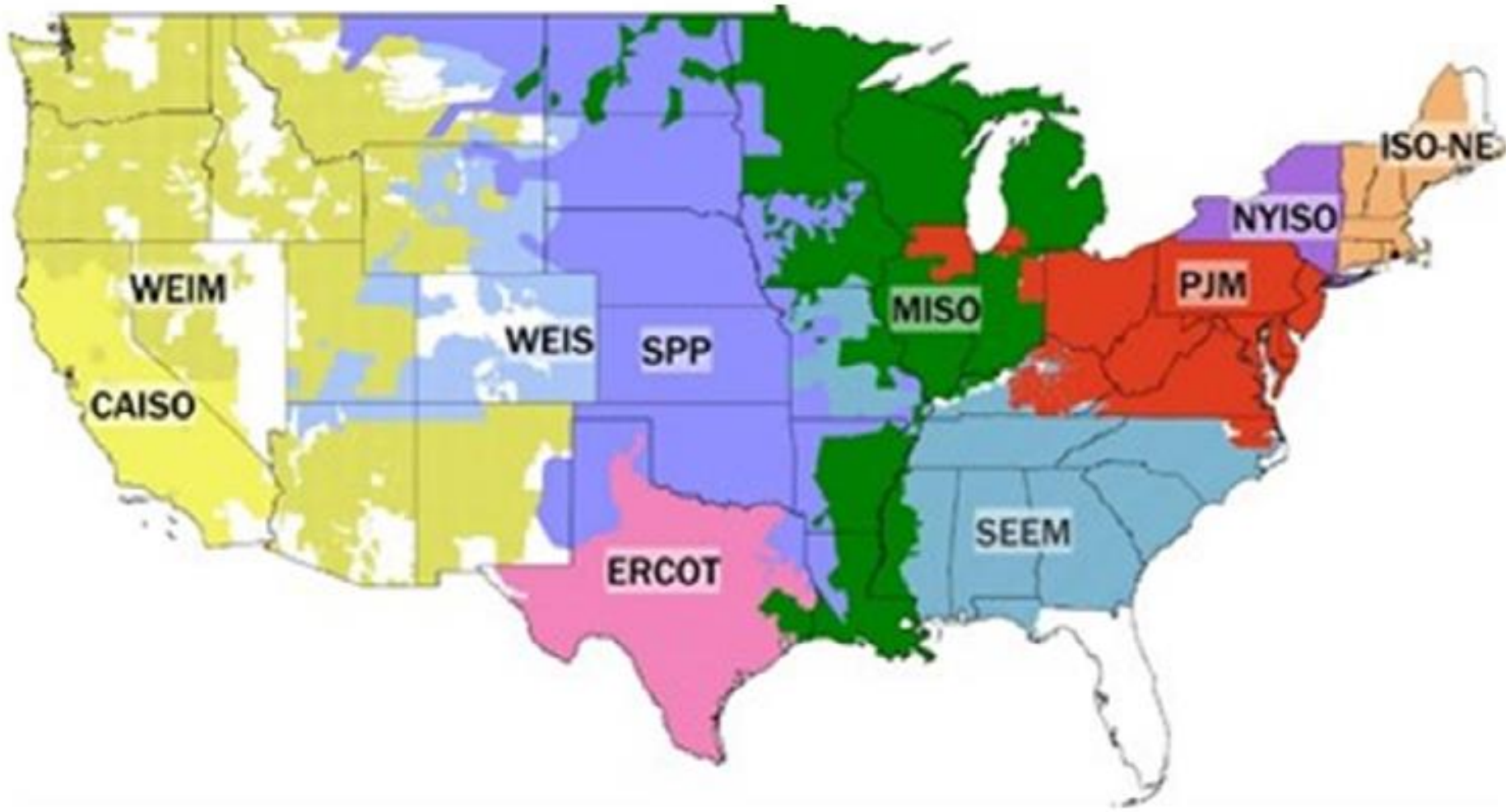
Looking at land-use efficiency, corn-derived ethanol used to power internal combustion engines requires about 85x as much land to power the same number of transportation miles as solar PV powering EVs.

Net energy production per acre is 100-125x greater for solar PV than for corn-based ethanol.

To meet WI carbon-free goals, 260,000 acres will be needed for solar PV with today's technology. This amounts to almost 2.0% of agricultural land in the state. This is less than 1/3 of the land currently being used to grow corn for ethanol.

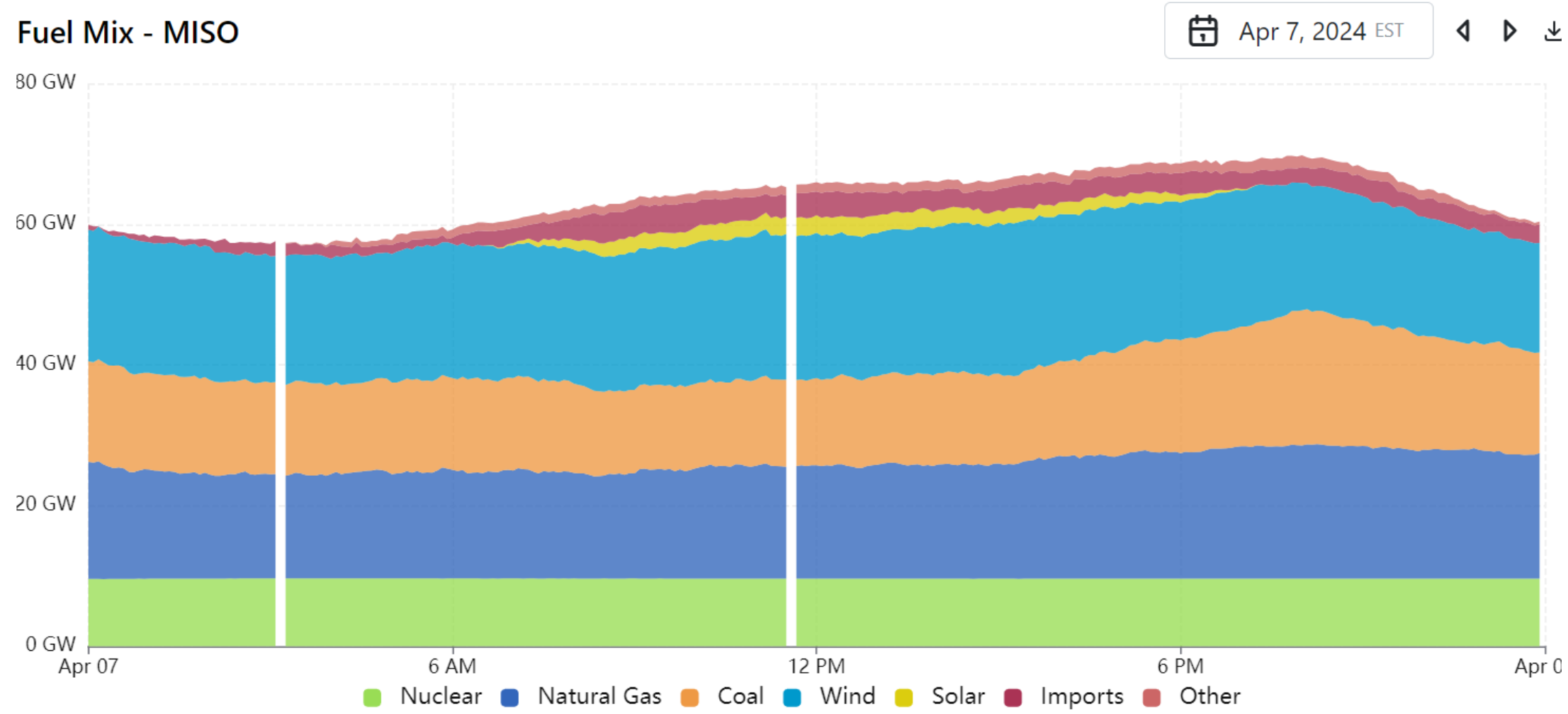
Source: https://www.cleanwisconsin.org/wp-content/uploads/2023/01/Corn-Ethanol-Vs.-Solar-Analysis-V3-9-compressed.pdf

US Wholesale Electricity Markets



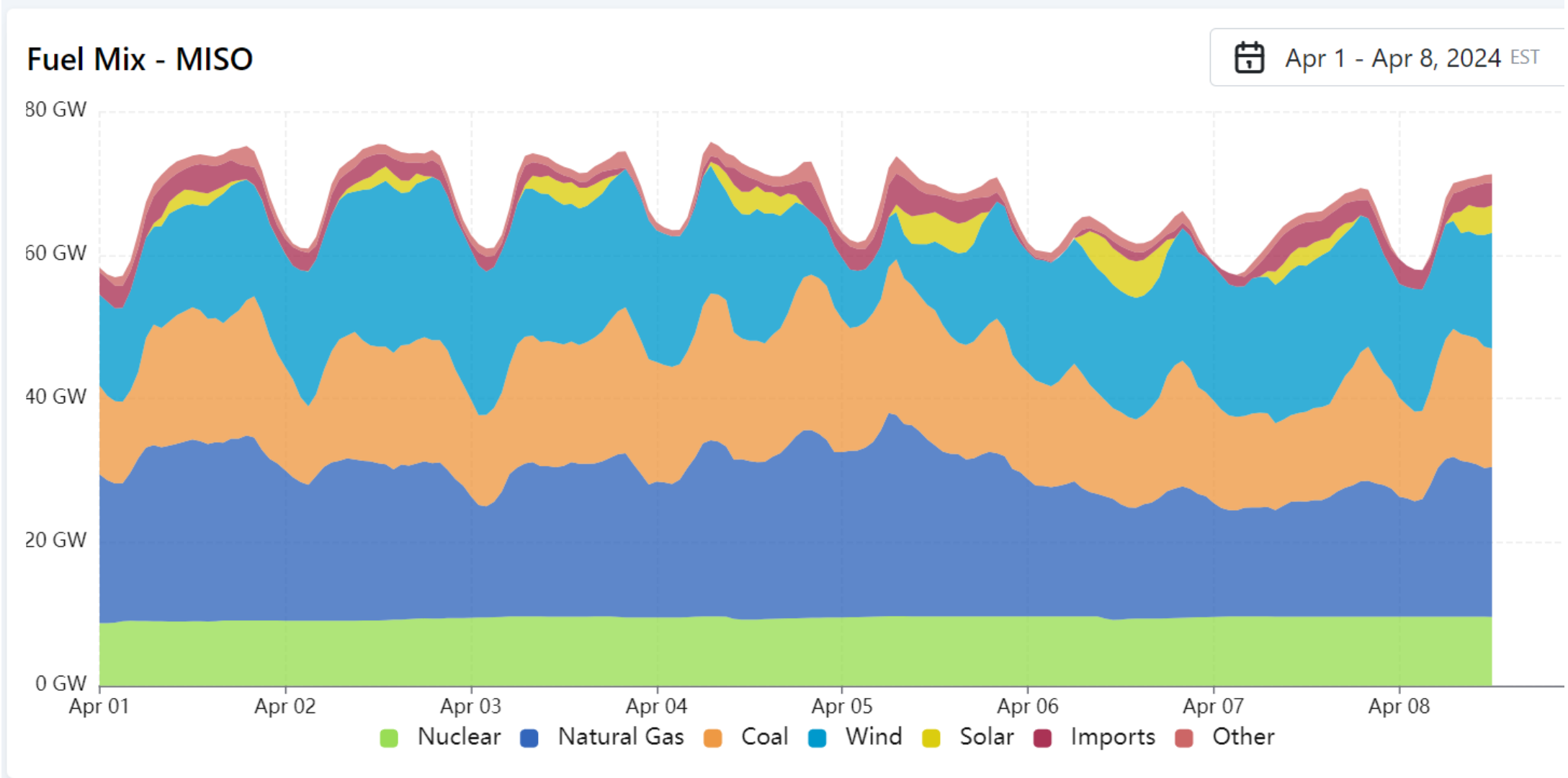
Source: https://www.ferc.gov/reports-analyses

US Wholesale Electricity Markets - MISO



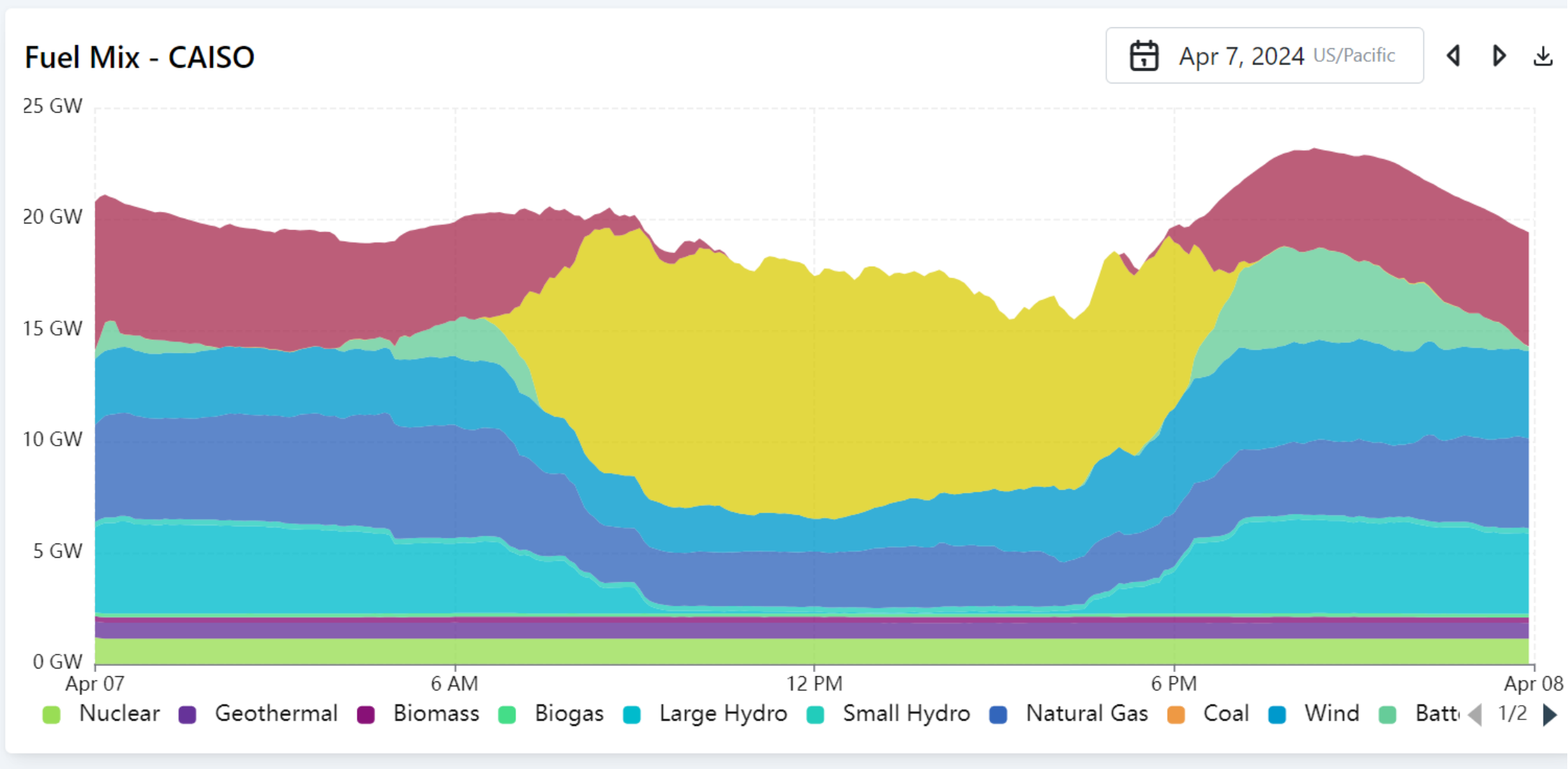
Source: https://www.gridstatus.io/

US Wholesale Electricity Markets - MISO



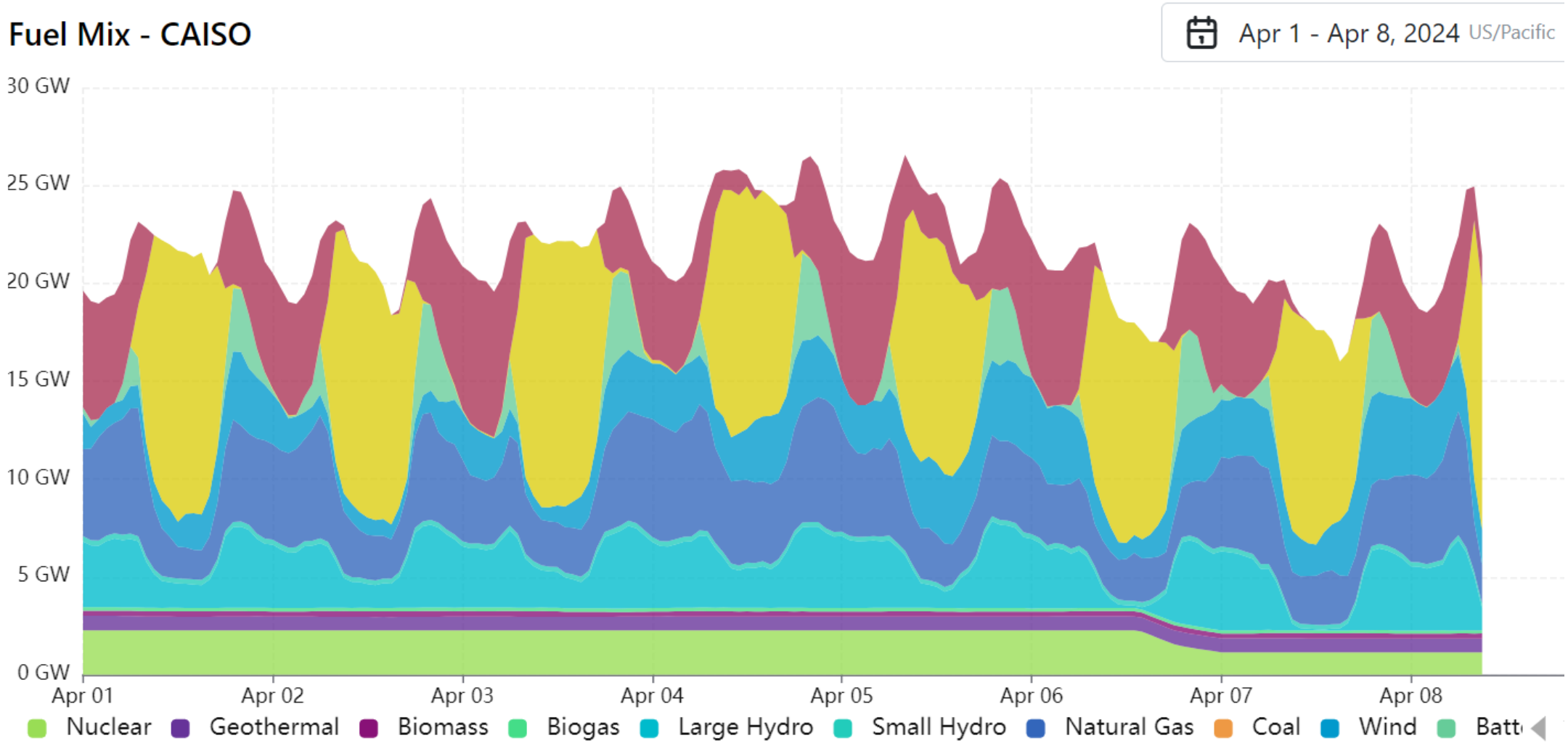
Source: https://www.gridstatus.io/

US Wholesale Electricity Markets - CAISO



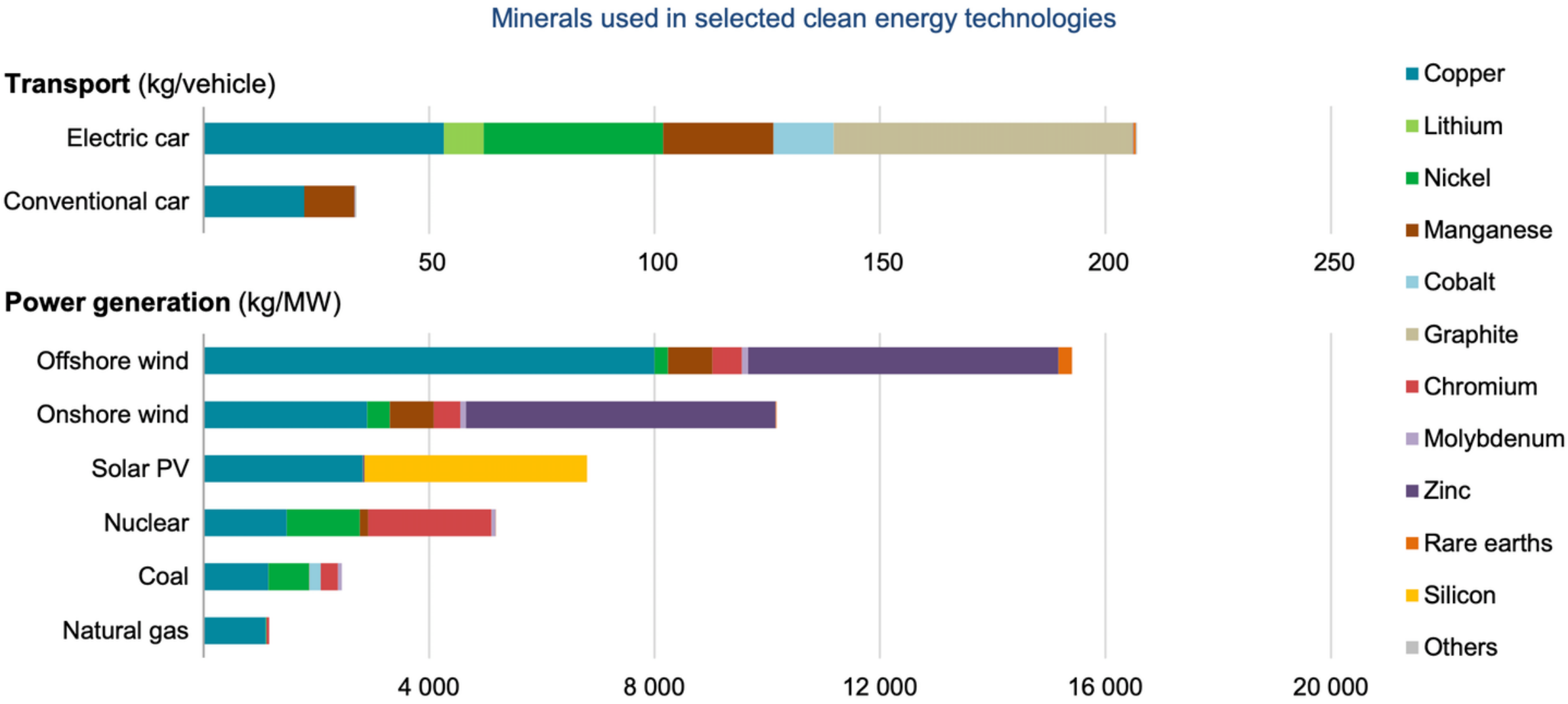
Source: https://www.gridstatus.io/

US Wholesale Electricity Markets - MISO



Source: https://www.gridstatus.io/

Minerals and Electrification



Source: https://www.volts.wtf/p/minerals-and-the-clean-energy-transition

Green | Cleaner Tech

Tesla Co-Founder JB Straubel Built an EV Battery Colossus to Rival China

A first look inside the high-tech recycling machine that's gobbling up the equivalent of 250,000 dead EV batteries a year.

The battery intake field, where 30 acres of old batteries await the recycler at Redwood Materials in Nevada. *Photographer: Emily Najera/Bloomberg*

JB Straubel takes in the view at Redwood Materials' facility. *Photographer: Emily Najera/Bloomberg*

https://www.bloomberg.com/news/features/2024-04-18/redwood-material-s-nevada-ev-battery-recycling-facility-attempts-to-rival-china?utm_source=website&utm_medium=share&utm_campaign=copy

Questions?

Nick Hylla
nickh@midwestrenew.org