Support for HB 301
An RPS for Alaska's Railbelt

Chris Rose
Executive Director
Renewable Energy Alaska Project (REAP)

House Special Committee on Energy
March 10, 2022

REAP

Renewable Energy Alaska Project

Founded in 2004, REAP is a statewide non-profit coalition of diverse businesses, electric utilities, Alaska Native Corporations, NGOs and clean energy developers.

REAP's mission is to increase renewable energy development and promote energy efficiency in Alaska.

REAP Education & Programs

STEM educators promote energy literacy through AK *EnergySmart* and *Wind for Schools*

Alaska Network for Energy Education and Employment (ANEEE) builds career paths

Partnerships with US DoE and national labs brings technical assistance to rural communities

Sustainable Southeast Partnership assists communities in Southeast Alaska

A variety of conferences, energy fairs, webinars and presentations educates the public

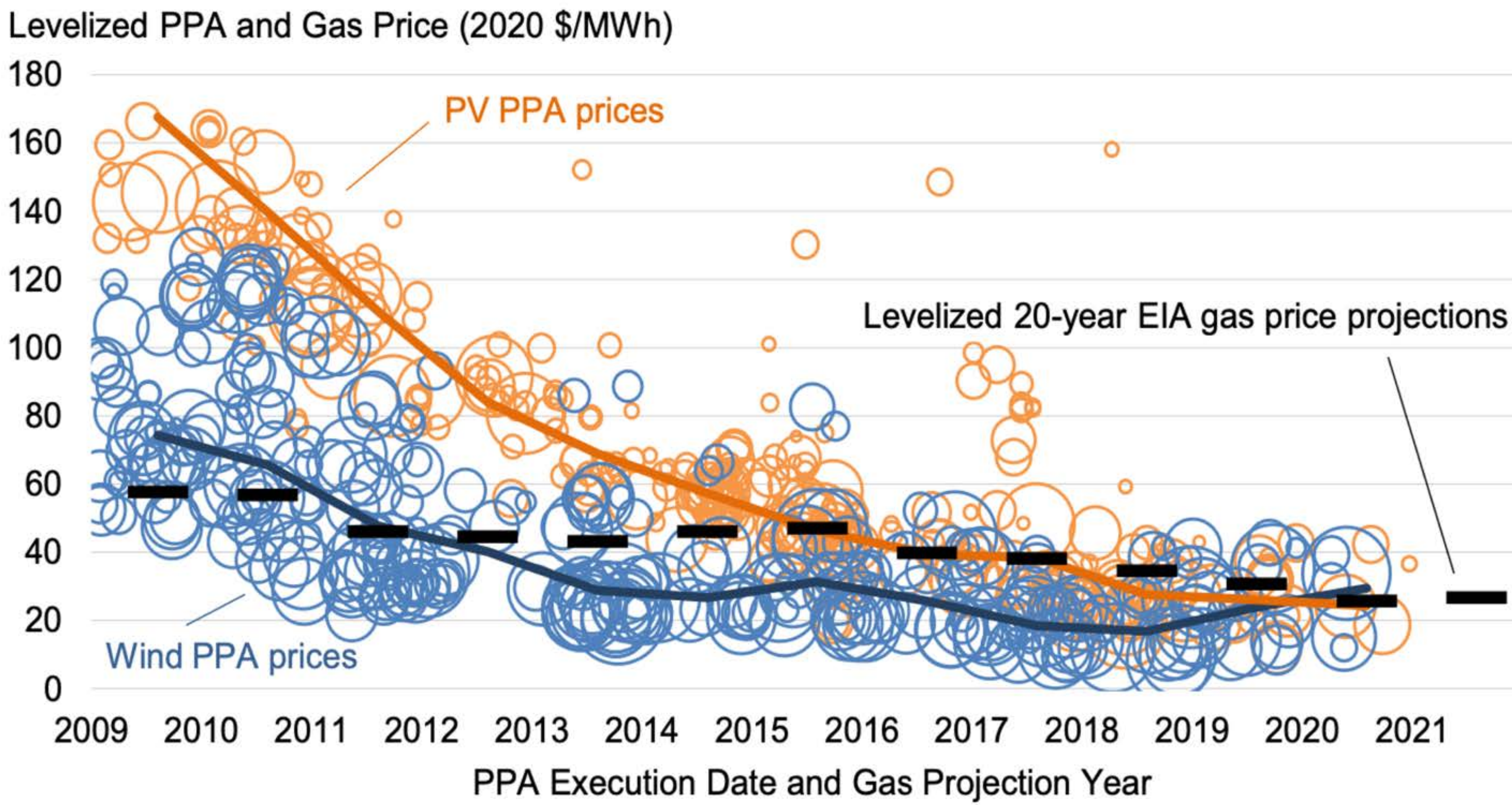
REAP Advocacy

2008:	Renewable Energy Fund ($275 million appropriated, to date)
2008-15:	$640 million to AHFC for home weatherization programs
2010:	Emerging Energy Technology Fund House Bill 306 (State Energy “Policy”)
2016:	SB 196 (PCE Endowment)
2017:	Property Assessed Clean Energy (C-PACE)
2020:	Railbelt Grid Reform (SB 123)
2021-22:	Green Bank (HB 170 & SB 123) Renewable Portfolio Standard (HB 301 & SB 179)

Why the Railbelt Needs an RPS

- The region has a dangerously lopsided generation portfolio dependent on one, high-priced fuel
- The region has some of the highest-priced electricity in the nation, discouraging investment
- The region is blessed with all types of renewable resources: wind, solar, hydro, geothermal, biomass and tidal energy
- The state has no energy policy, and the Railbelt has a history of relative inaction

Declining Wind & Solar Prices Compared to Natural Gas

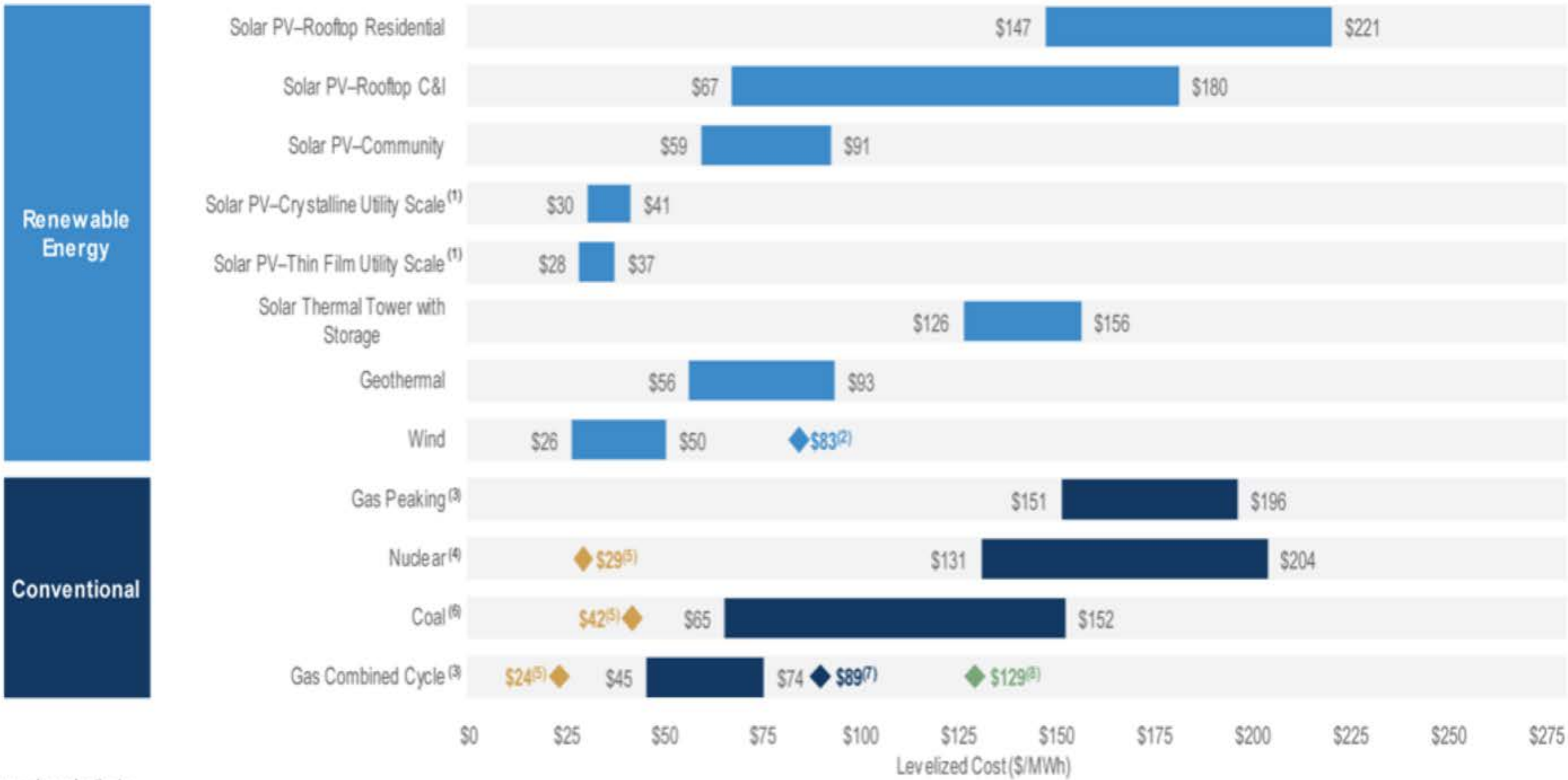


Note: Smallest bubble sizes reflect smallest-volume PPAs (<5 MW), whereas largest reflect largest-volume PPAs (400 MW)

Sources: Berkeley Lab, FERC, EIA

Levelized Cost of Energy Comparison—Unsubsidized Analysis

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



Source: Lazard estimates.

Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at 8% interest rate and 40% equity at 12% cost. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities. These results are not intended to represent any particular geography. Please see page titled "Solar PV versus Gas Peaking and Wind versus CCGT—Global Markets" for regional sensitivities to selected technologies.

(1) Unless otherwise indicated herein, the low case represents a single-axis tracking system and the high case represents a fixed-tilt system.

(2) Represents the estimated implied midpoint of the LCOE of offshore wind, assuming a capital cost range of approximately $2,500 – $3,600/kW.

(3) The fuel cost assumption for Lazard's global, unsubsidized analysis for gas-fired generation resources is $3.45/MMBTU.

(4) Unless otherwise indicated, the analysis herein does not reflect decommissioning costs, ongoing maintenance-related capital expenditures or the potential economic impacts of federal loan guarantees or other subsidies.

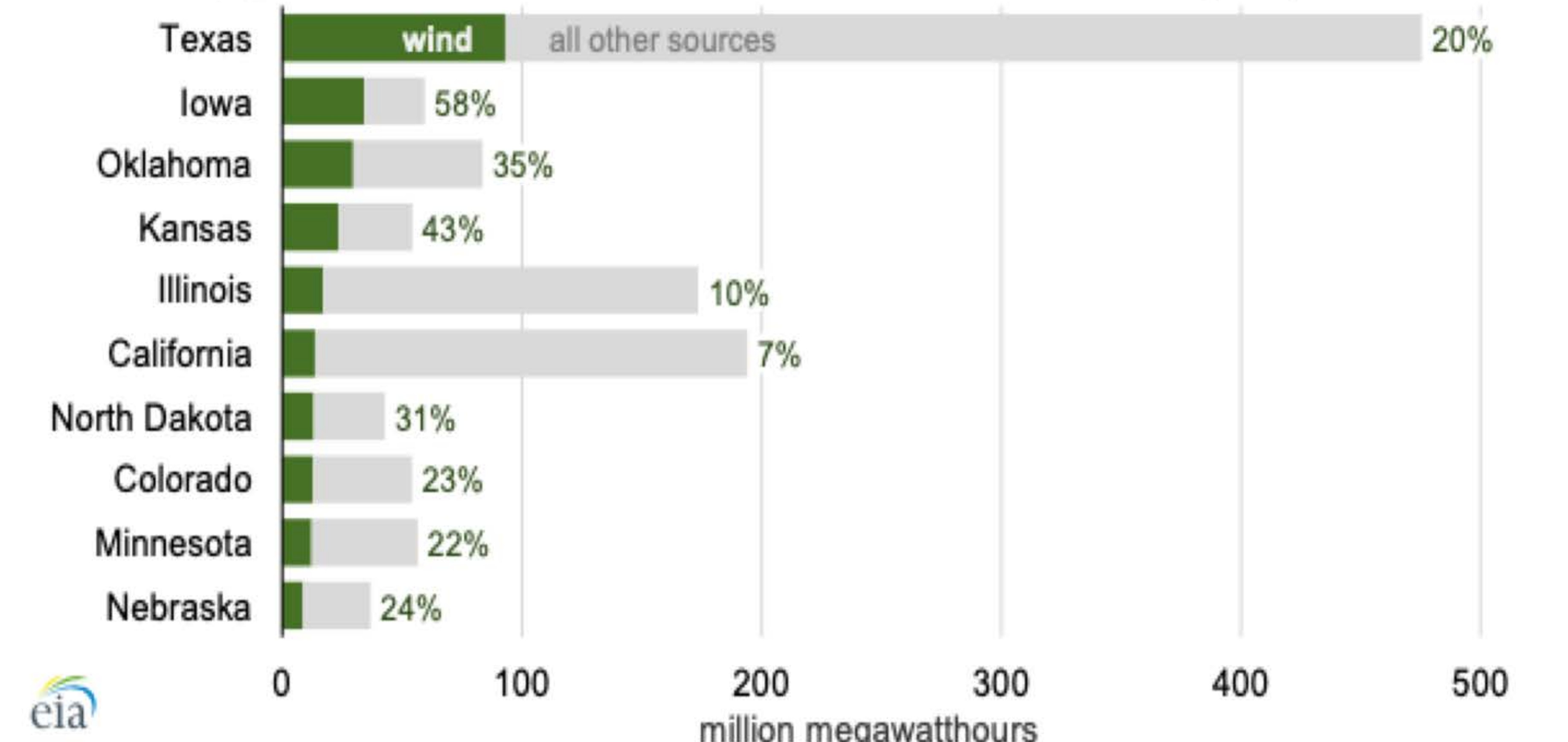
(5) Represents the midpoint of the marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper- and lower-quartile estimates derived from Lazard's research. Please see page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation" for additional details.

(6) High end incorporates 90% carbon capture and storage. Does not include cost of transportation and storage.

(7) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Blue" hydrogen, (i.e., hydrogen produced from a steam-methane reformer, using natural gas as a feedstock, and sequestering the resulting CO_2 in a nearby saline aquifer). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $5.20/MMBTU, assuming $1.39/kg for Blue hydrogen.

(8) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Green" hydrogen, (i.e., hydrogen produced from an electrolyzer powered by a mix of wind and solar generation and stored in a nearby salt cavern). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is $10.05/MMBTU, assuming $4.15/kg for Green hydrogen.

Net electricity generation from wind and other sources in selected states (2020)

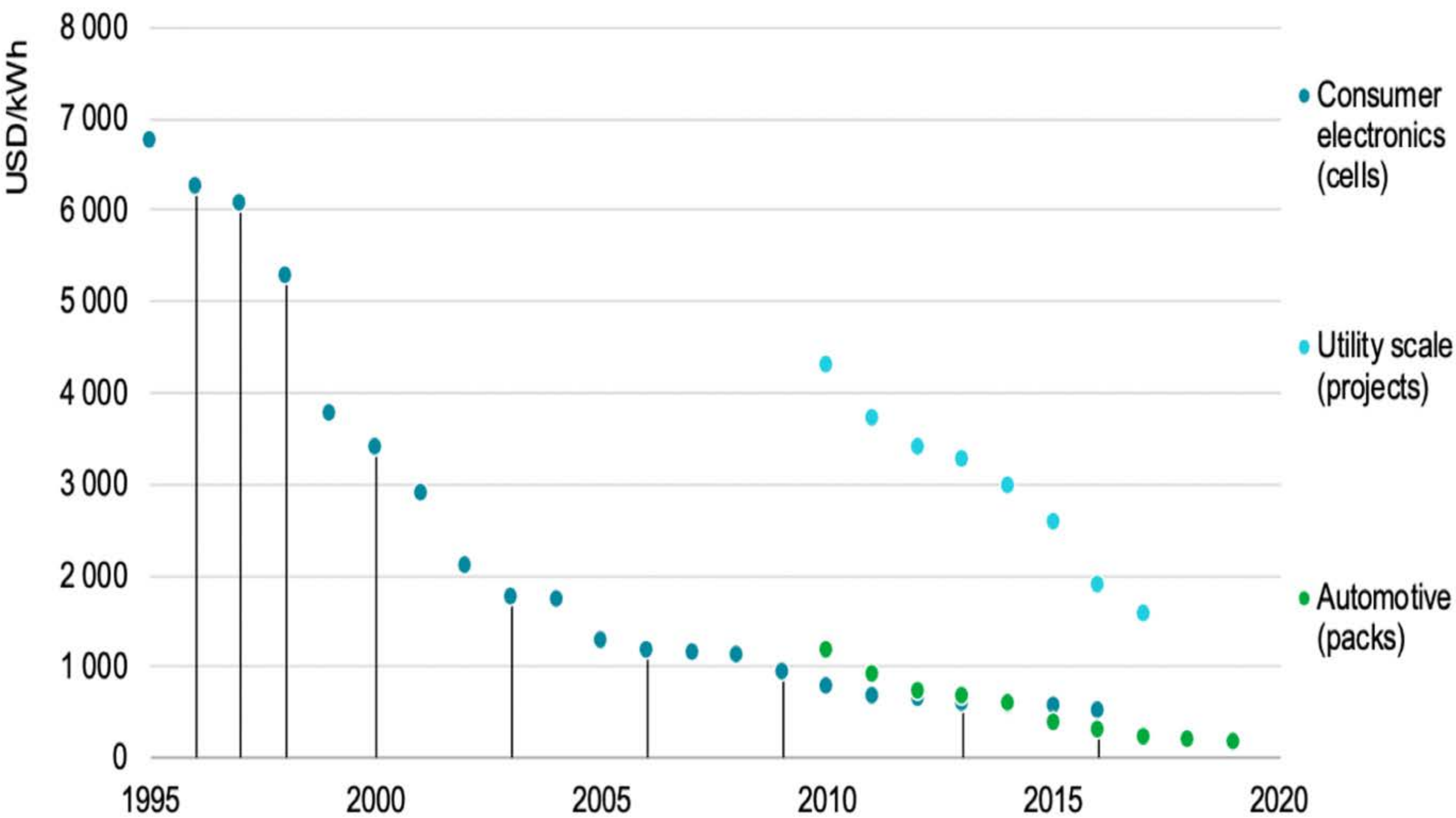


Source: U.S. Energy Information Administration, *Electric Power Monthly*

Texas has the most wind turbine capacity among states: 30.2 GW were installed as of December 2020. In 2020, Texas generated more electricity from wind than the next three highest states (Iowa, Oklahoma, and Kansas) combined. However, Texas generates and consumes more total electricity than any other state, and wind remains slightly less than 20% of the state's electricity generation mix.

In two other states—Iowa and Kansas—wind is the most prevalent source of in-state electricity generation. In both states, wind surpassed coal as the state's top electricity generation source in 2019.

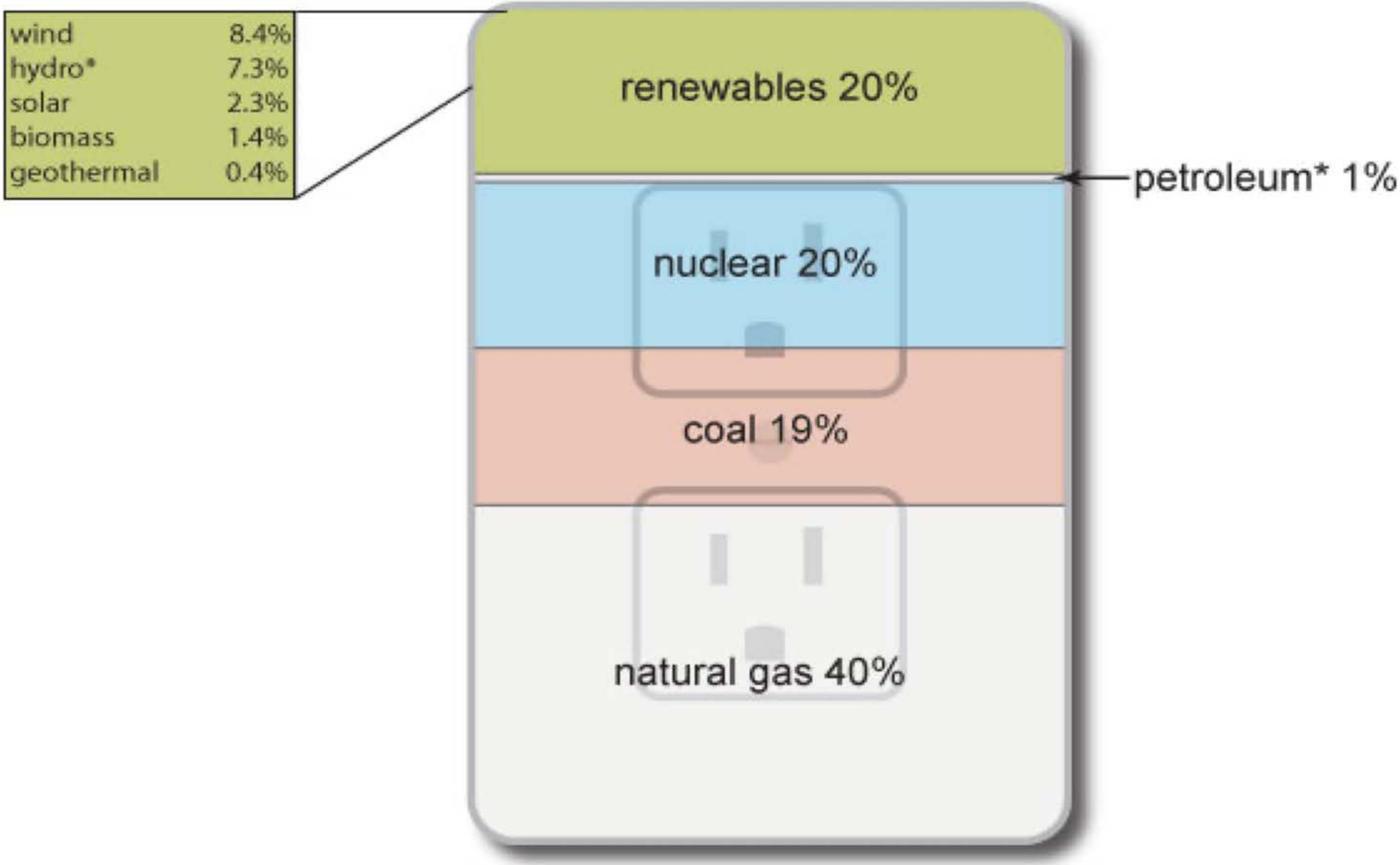
Declining Costs of Lithium Ion Batteries



Source: "Energy Technology Perspectives 2020 – Special Report on Clean Energy Innovation: Accelerating Technology Progress for a Sustainable Future," *International Energy Agency*, page 81.

Sources of U.S. electricity generation, 2020

Total = 4.12 trillion kilowatthours



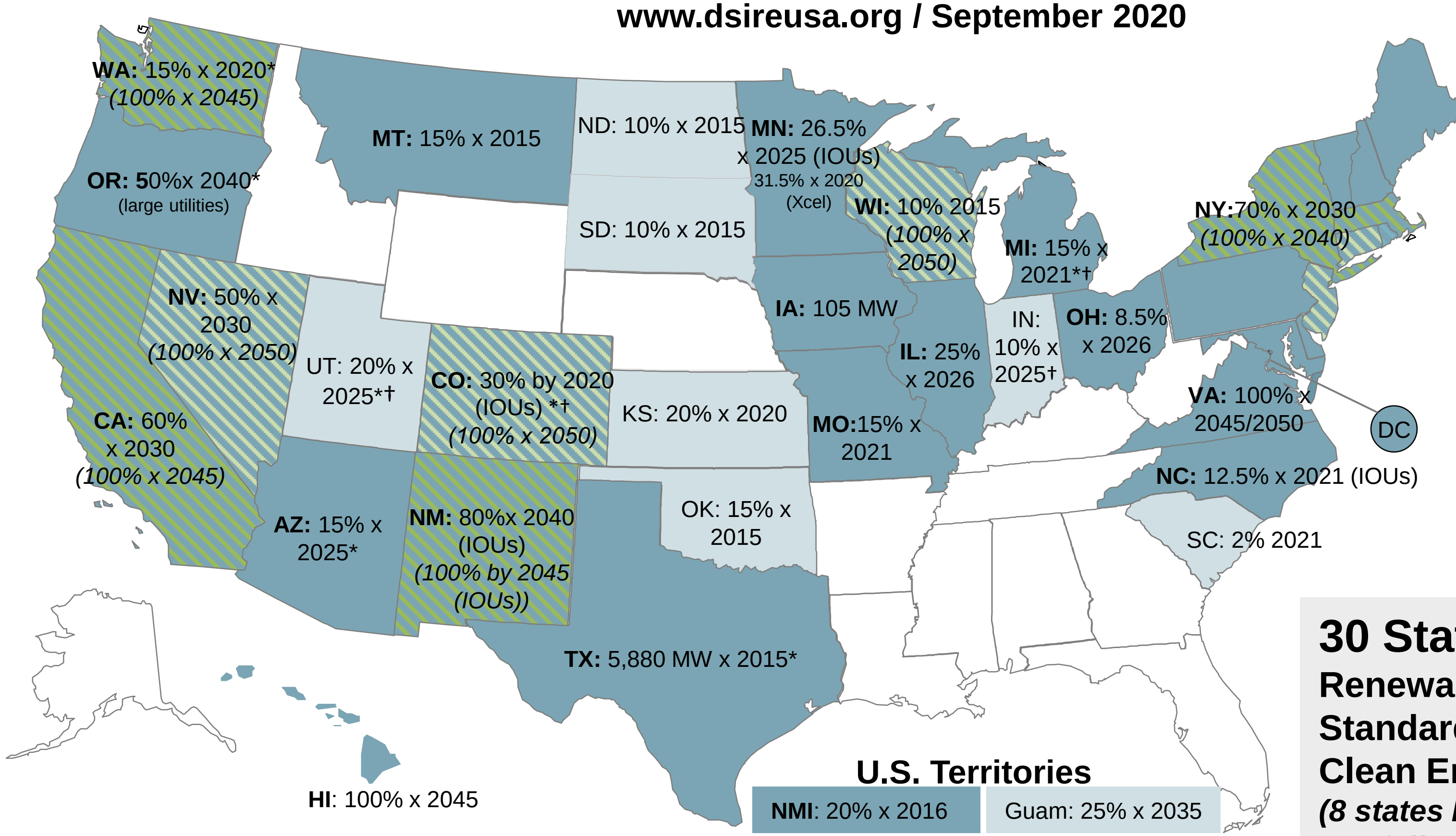
Note: Electricity generation from utility-scale generators. * Hydro is conventional hydroelectric; petroleum includes petroleum liquids and petroleum coke, other gases, hydroelectric pumped storage, and other sources.

Source: U.S. Energy Information Administration, *Electric Power Monthly*, February 2021, preliminary data

DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER | DSIRE insight

Renewable & Clean Energy Standards

www.dsireusa.org / September 2020



ME: 100% x 2050
NH: 25.2% x 2025
VT: 75% x 2032
MA: 35% x 2030 + 1% each year thereafter (new resources) 6.7% x 2020 (existing resources) *(80% x 2050)*
RI: 38.5% x 2035; 100% x 2030 Goal
CT: 40% x 2030; *(100% x 2040)*
NJ: 50% x 2030; *(100% x 2050)*
PA: 18% x 2021†
DE: 25% x 2026*
MD: 50% x 2030
DC: 100% x 2032

U.S. Territories

NMI: 20% x 2016	Guam: 25% x 2035
PR: 100% x 2050	USVI: 30% x 2025

30 States + DC have a Renewable Portfolio Standard, 5 states have a Clean Energy Standard
(8 states have renewable portfolio goals, 5 states have clean energy goals)

- Renewable portfolio standard
- Renewable portfolio goal
- *Clean energy standard*
- *Clean energy goal*

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

The Railbelt is Dangerously Dependent on High-Priced Cook Inlet Natural Gas

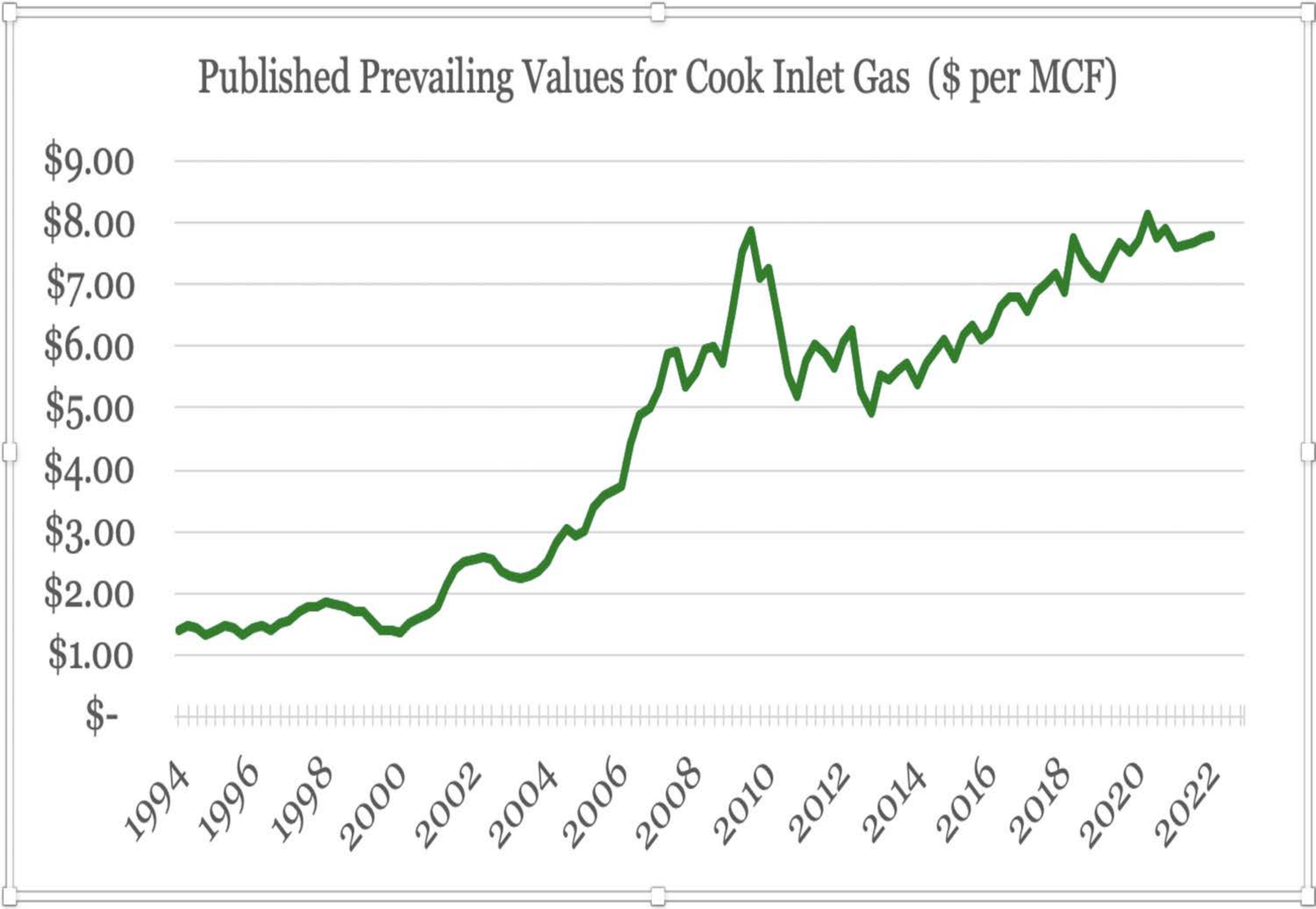
Approximately 80% of all electric generation in the Railbelt relies on natural gas from Cook Inlet

Cook Inlet gas is twice as expensive as Lower 48 gas

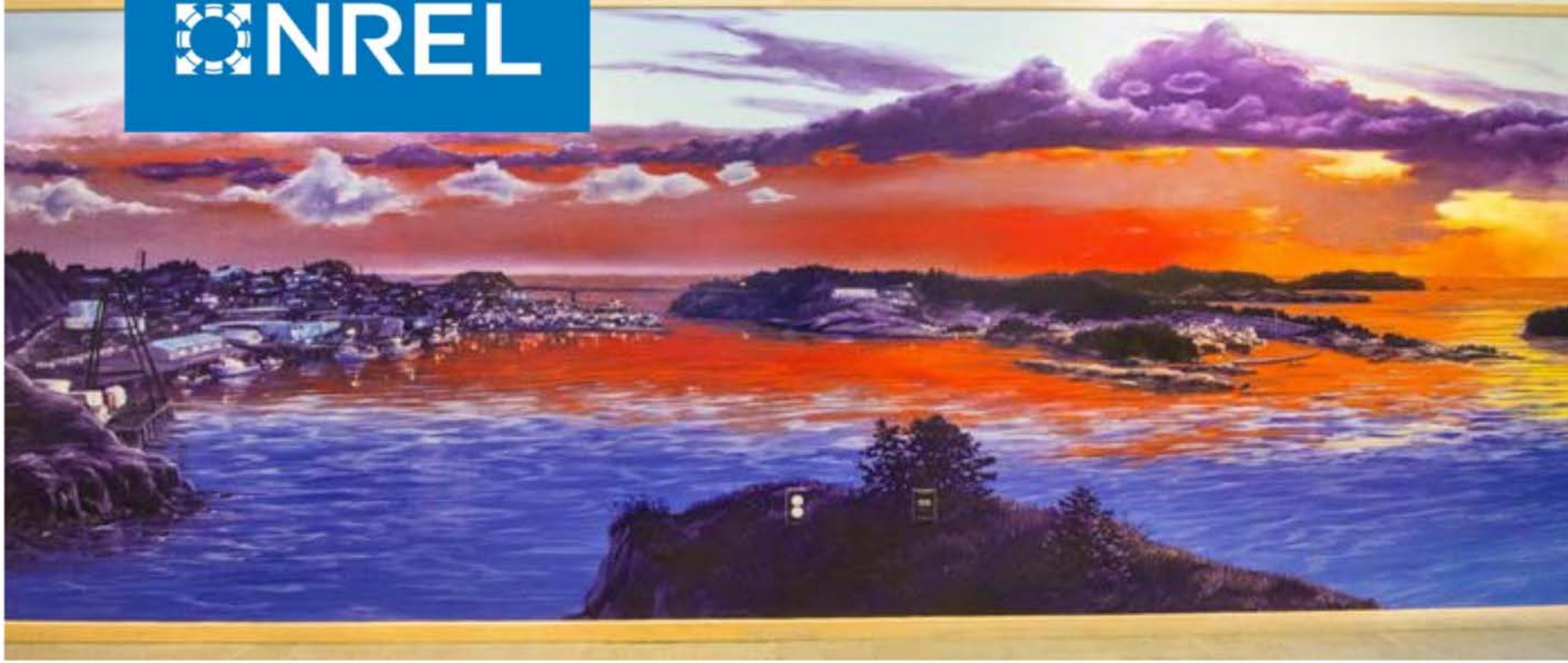
The small Cook Inlet gas market is under virtual monopoly control by Hilcorp

Cook Inlet gas suffers from flat demand, high production costs & aging infrastructure

Cook Inlet also relies on unsustainable state gas subsidies



Source: Alaska Department of Revenue - Tax Division. "Cook Inlet Prevailing Values."



Renewable Portfolio Standard Assessment for Alaska’s Railbelt

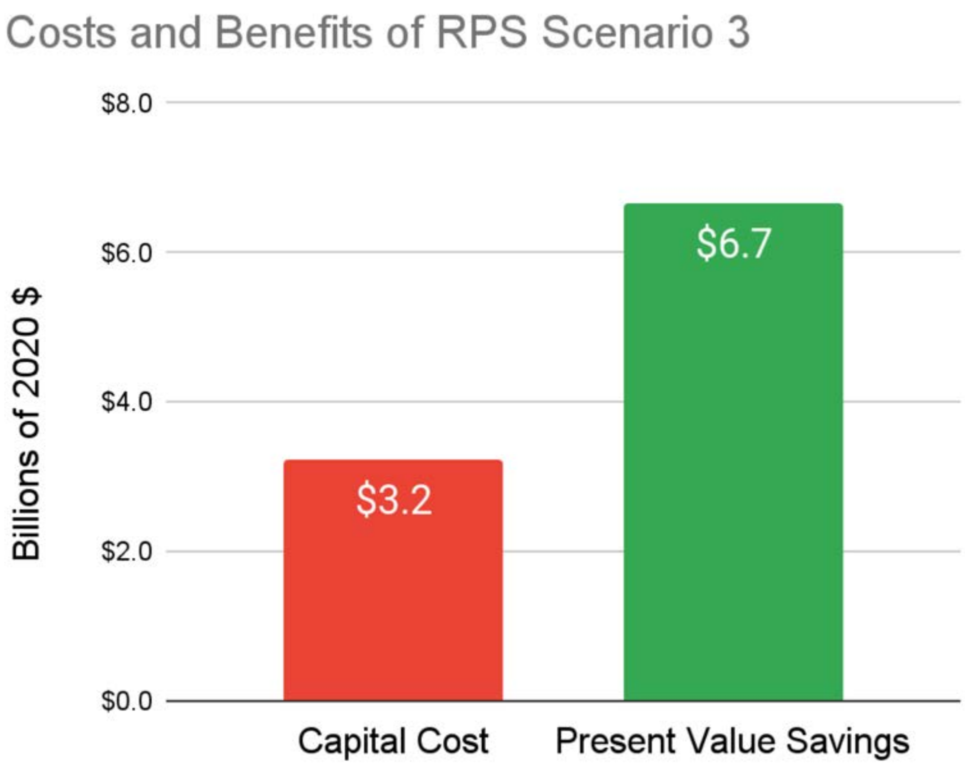
Overall Finding 1: Multiple pathways exist for achieving an 80% RPS while balancing supply and demand under major outage conditions with appropriate system engineering.

Overall Finding 2: An 80% RPS achieves a substantial reduction in fuel costs, which could be compared to capital cost expenditures for a comprehensive impact assessment.

Alan Mitchell, *Analysis North*

- Owner of *Analysis North* since 1986
- Director of Economic Analysis at GCI (1995-2010)
- Contract Economist to AEA for reviewing Renewable Energy Fund applications
- Has completed economic analyses of a $70 million package of energy conservation programs, a $150 million package of electrical interties, a $120 million set of coal-fired power plants and a $200 million natural gas pipeline to Fairbanks
- Master's Degree in Energy and Resources from UC Berkeley
- Bachelor’s Degree in Electrical Engineering from Stanford University (1st in class, Phi Beta Kappa)

Preliminary Benefit/Cost Analysis of NREL's RPS Scenario #3



- Capital Cost of implementing RPS Scenario #3 (predominantly wind + solar) is $3.2 billion, relative to the Base Case.
- Present Value Benefits (fuel savings, with small offset from renewable operating costs) are $6.7 billion.
- Capital costs *could more than double* and Scenario #3 would still be cost effective.

Present Values are anchored to the year 2035

Source: Analysis North. Model at https://analysisnorth.com/rps-econ

Analysis Assumptions

- Renewable capacity and fuel savings were used without modification from NREL RPS Study Scenario #3.
  - NREL fuel savings are based on AEA Fuel Price Forecast
  - Capital cost includes addition of hydro, biomass, wind and solar
- All necessary transmission upgrades and battery energy storage are included in all of NREL's five scenarios, including the Base Case.
- For modeling simplicity, all investments were assumed to occur in 2035 and fuel savings were included for 22 years after that year.
- A 3% inflation adjusted discount rate was used for calculating present value.
- Wind capital costs were estimated at $2,912/kW, a conservatively high estimate of 1.94 times the Lower 48 average in 2020, based on the ratio of the costs of the Eva Creek Wind Project built in 2012 to the national costs for wind in that same year.
- Solar capital costs were estimated from existing and proposed Railbelt projects at $1,750/kW, roughly 1.46 times the average cost in the Lower 48.

Additional Benefits That Were *Not* Considered in the Analysis

- No further decline in wind and solar costs between 2020 and 2035
- No increase in fuel prices beyond general inflation after 2040
- No carbon tax avoided
- No federal Production Tax Credit (PTC) or other types of federal support

A New Railbelt ERO Would Execute an RPS

For decades, there was no mandate for the Railbelt utilities to plan together or adhere to regional interconnection and reliability standards.

In 2020, the passage of SB 123 required the Railbelt to establish an Electric Reliability Organization (ERO) to develop and enforce standards and execute regional planning for generation and transmission.

The Railbelt Reliability Council (RRC), made up of 13 utility and non-utility stakeholders, is applying to the RCA in late March to become the ERO.

New generation and transmission portfolios will be developed by the ERO through an integrated resource plan (IRP). The first regional IRP for the Railbelt will be multi-year, public process that will analyze the technical and economic feasibility of a range of options, select a preferred portfolio and develop an action plan before submitting the IRP package to the RCA for final approval.

A Railbelt RPS Would:

- Diversify the region's generation portfolio and increase resiliency
- Displace high-priced natural gas fuel, and save hundreds of millions of dollars every year
- Utilize local, flat-priced renewable resources
- <u>Not</u> impact reliability on the grid
- Keep Alaska competitive in a fast-changing world, increase energy independence and meet consumer demand
- Support electrification of transportation and heat
- Create jobs, spur statewide innovation and keep precious energy dollars circulating in the state's economy
- Establish a standard that triggers <u>action</u>

Thank you!

www.realaska.org

chris@realaska.org

REAP | Renewable Energy Alaska Project