Why the Railbelt Needs a Renewable Portfolio Standard (RPS)

Chris Rose

Executive Director

Renewable Energy Alaska Project (REAP)

House Special Committee on Energy

April 27, 2023

Renewable Energy Alaska Project (REAP)

Established in 2004, REAP is a statewide, non-profit coalition of over 60 diverse energy stakeholders, including developers, consumer groups, electric utilities, Alaska Native organizations and businesses.

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

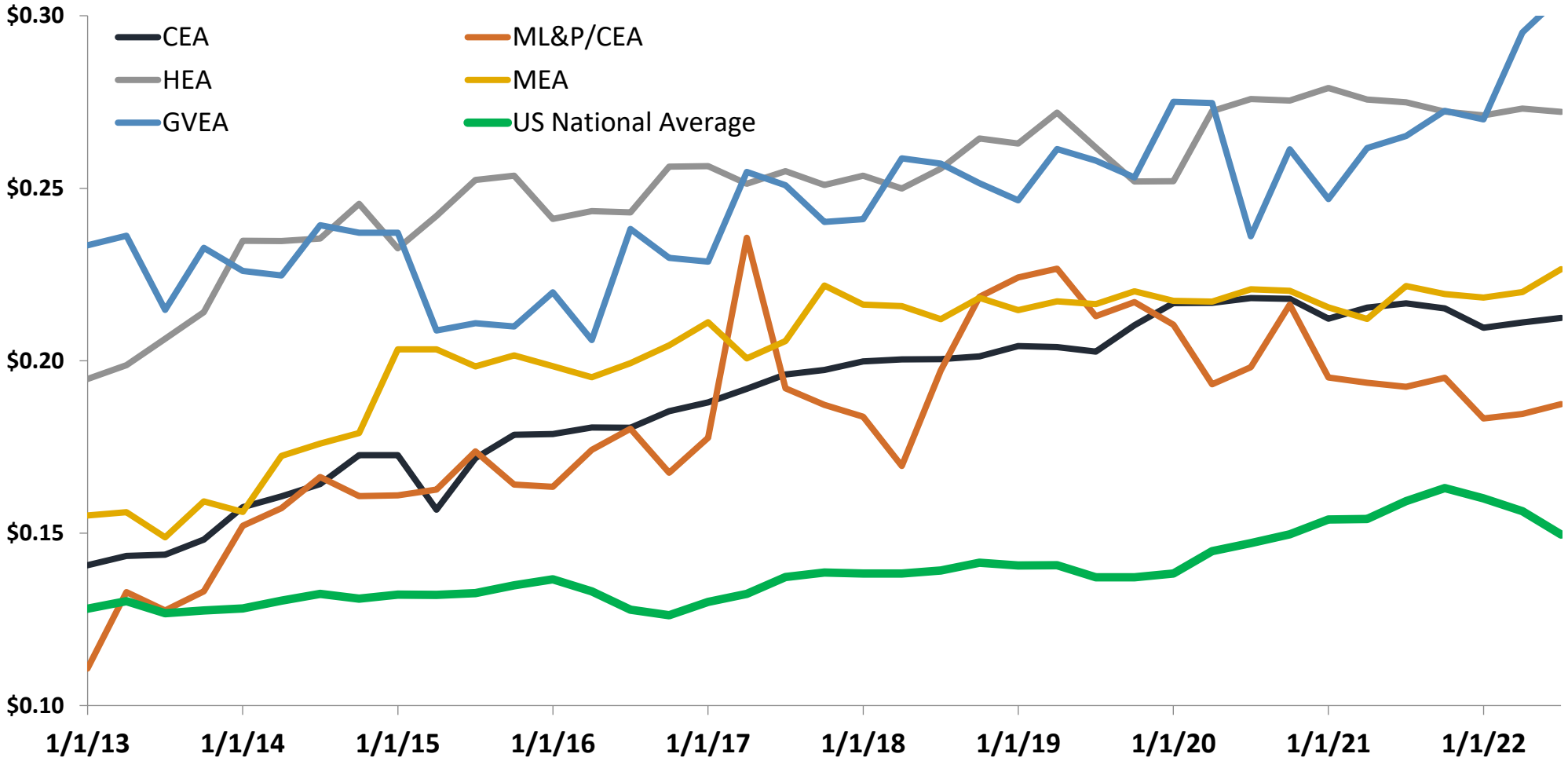
REAP runs programs for, and collaborates with, a number of state and federal agencies, national laboratories, universities and other NGOs.

REAP is focused not just on technology, but also the policy and financing, and especially the people, that are necessary for Alaska to transition to local, affordable, stably-priced renewable energy and energy efficiency.

Presentation Overview

- Railbelt electricity rates have been rising much faster than in the Lower 48
- Cook Inlet natural gas prices have also been rising quickly
- Alaska DNR says Cook Inlet gas production will see a shortfall as soon as 2027
- ***If*** the Railbelt imports LNG to make up for the shortfall:
  - Natural gas costs will dramatically increase, raising rates for Railbelt consumers
  - PCE reimbursements across rural Alaska will take a steep hit
  - The volatility of electricity prices across the state will increase
- Renewable energy costs have fallen precipitously worldwide, making it the cheapest electricity that can be generated in most jurisdictions
- **The Railbelt needs a renewable portfolio standard** to diversify our sources of electricity, and accelerate the deployment of local renewable energy resources **to protect consumers**

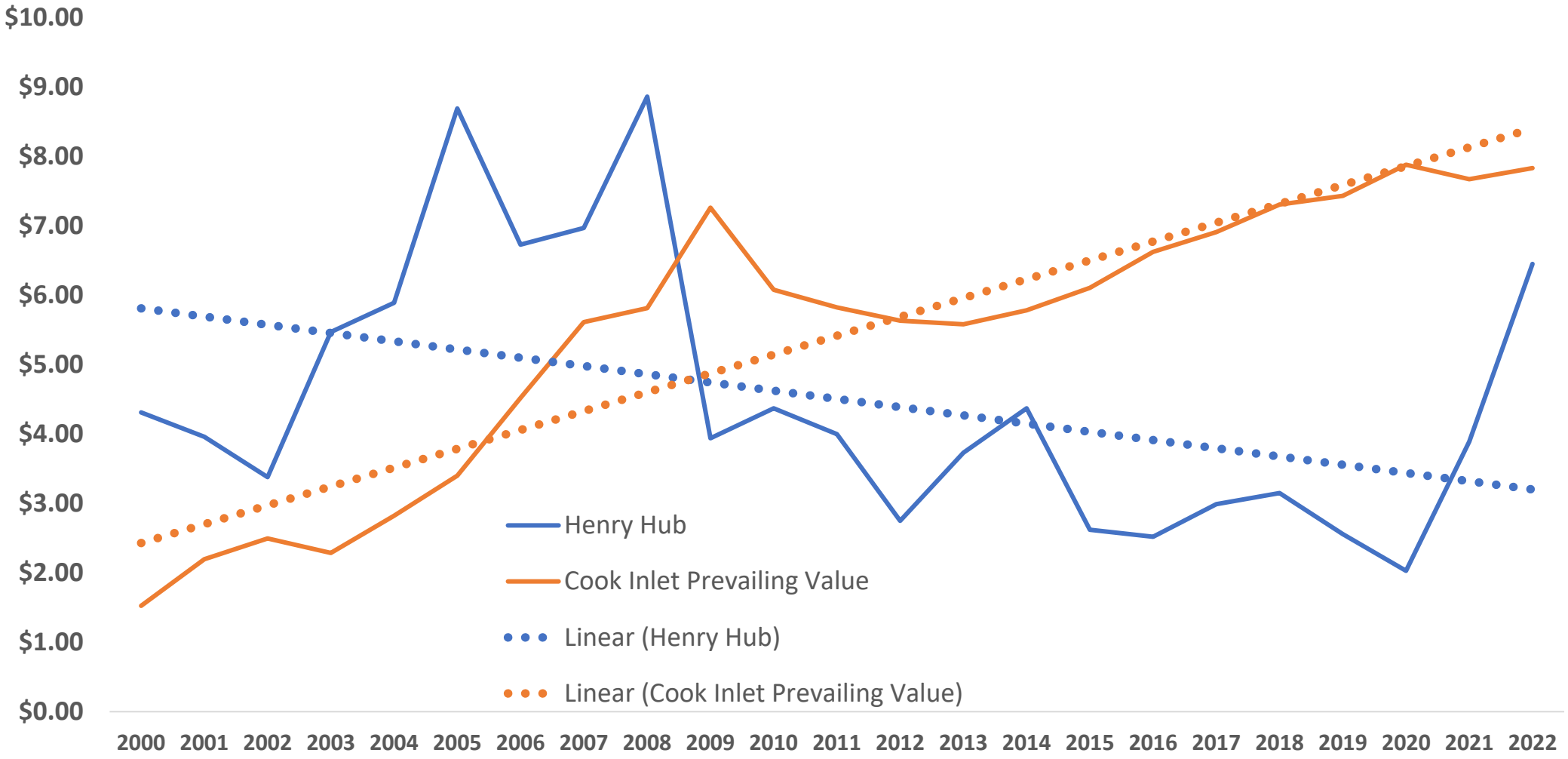
Railbelt Residential Electric Rates Have Risen Quickly



Over last 10 years, average residential rates rose more than 3x as much in the Railbelt as in the Lower 48.

Railbelt data compiled by RCA Staff; US National Average Data from US Energy Information Agency, https://www.eia.gov/electricity/data/browser/#/topic/7?agg=2,0,1&geo=g&freq=M&start=200101&end=202212&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin=

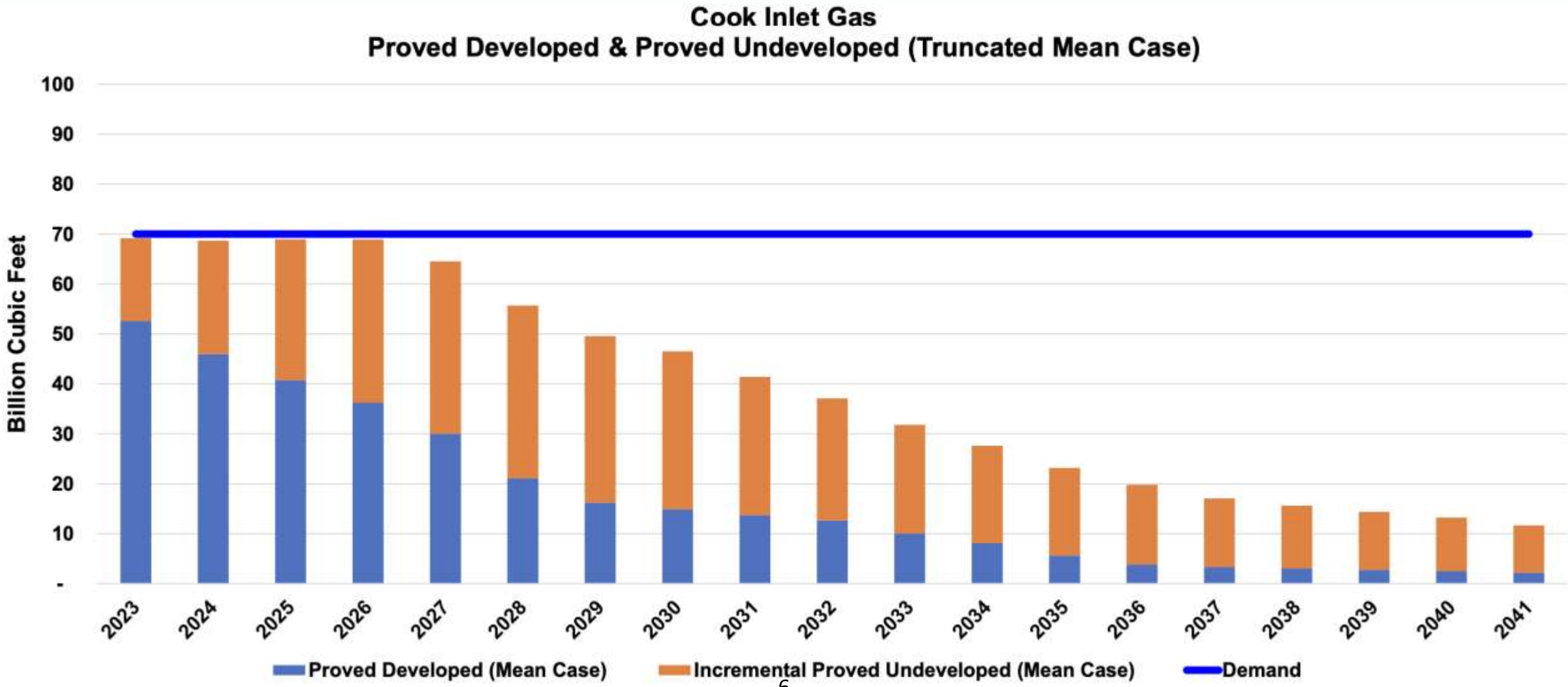
Cook Inlet and US Natural Gas Prices, $/Mcf



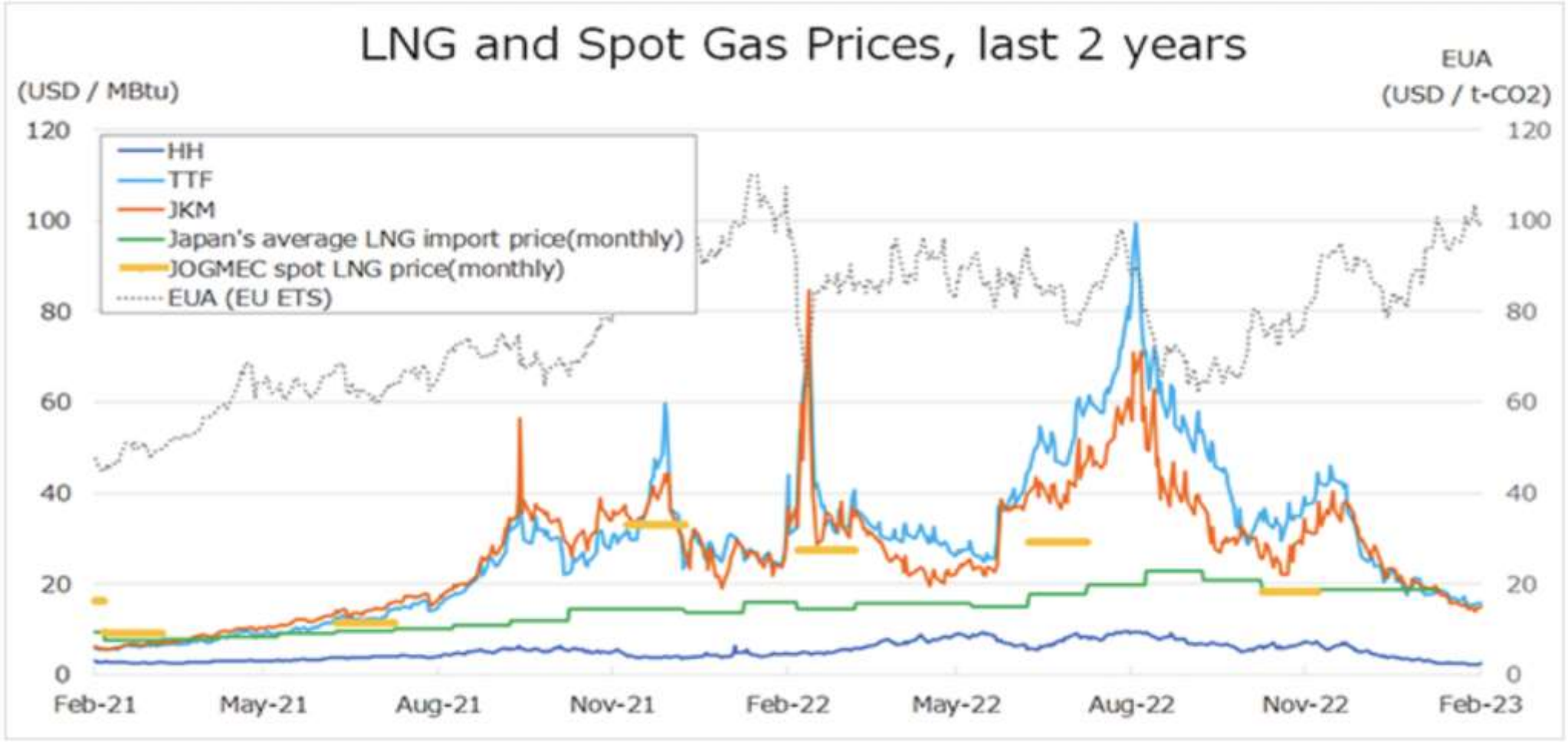
Over last 10 years, Cook Inlet gas prices rose more than 3x as much Henry Hub prices.

Cook Inlet data from Alaska Department of Revenue, http://www.tax.alaska.gov/programs/oil/prevailing/cook.aspx
Henry Hub data from US EIA, https://www.eia.gov/dnav/ng/hist/rngwhhdA.htm

Forecast Proved Developed & Proved Undeveloped

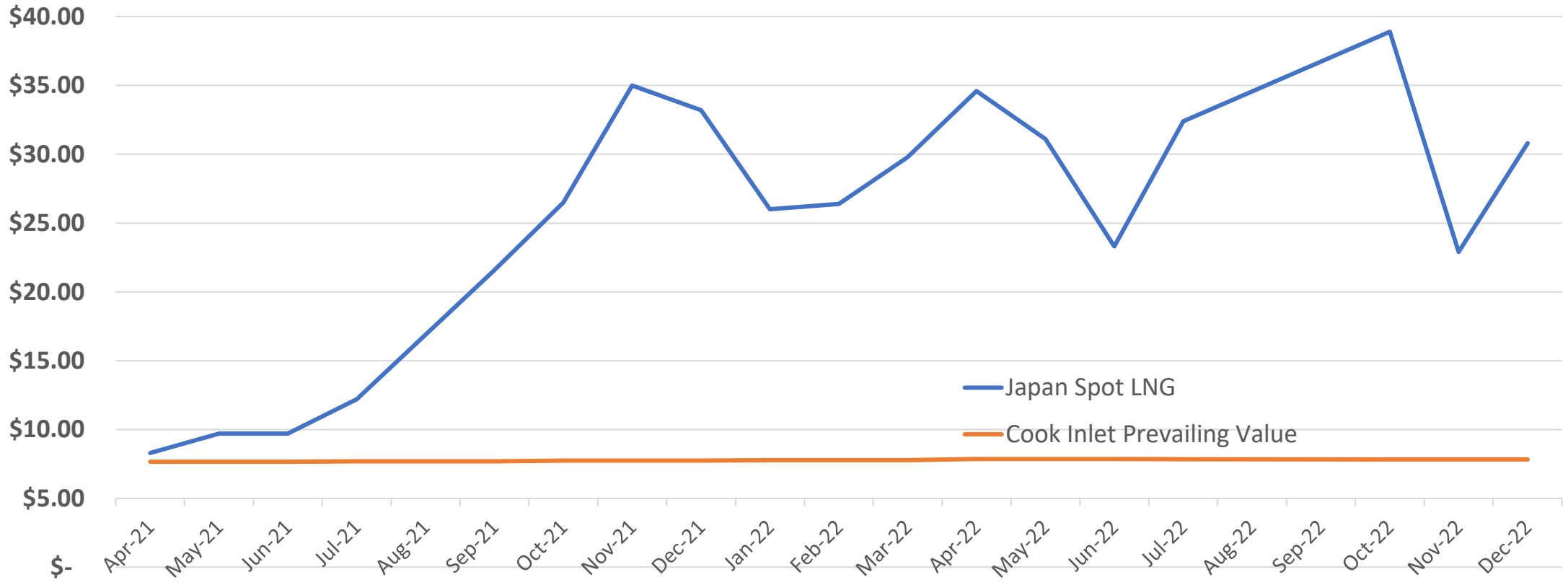


World LNG Spot Prices Are Volatile



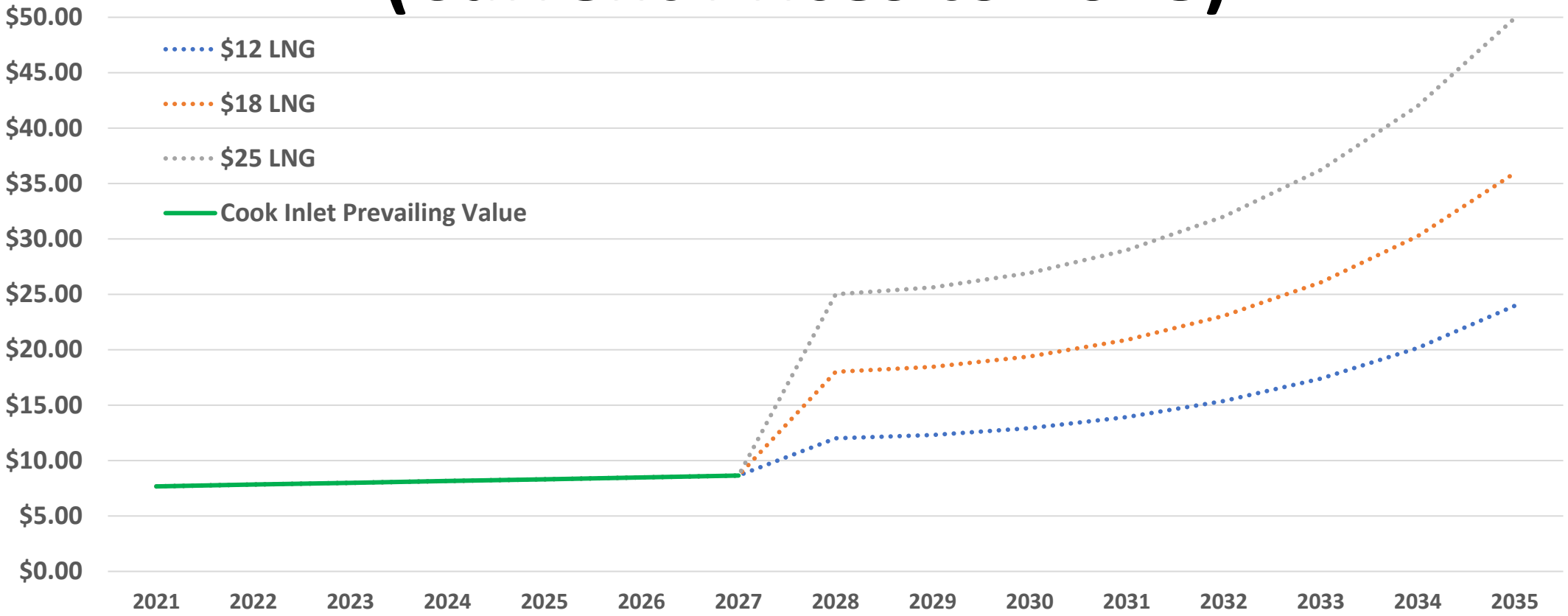
Source: https://oilgas-info.jogmec.go.jp/nglng_en/1007907/1009652.html#link01

Japanese LNG import spot price versus Cook Inlet average gas prices ($/Mcf)



Japan spot prices: https://oilgas-info.jogmec.go.jp/nglng_en/datahub/dh2023/1009626.html
Cook Inlet Price: http://www.tax.alaska.gov/programs/oil/prevailing/cook.aspx

Average Imported LNG Price Scenarios (Current Prices to 2028)

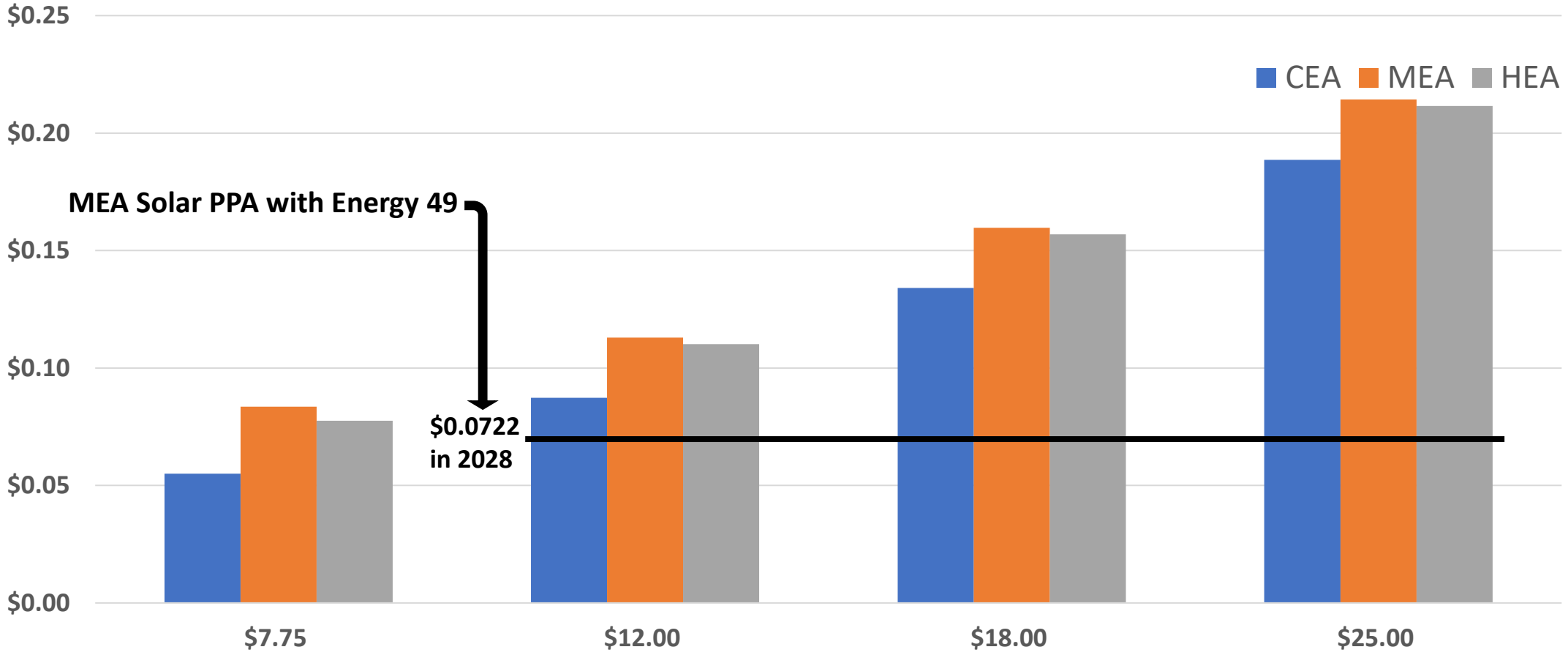


Chugach staff presentation to its board recently assumed $12 and $18 natural gas price to justify the reasonableness of continuing to evaluate the Dixon Diversion Project. Chugach Staff assumed 2.5% annual inflation.

“Avoided Cost”

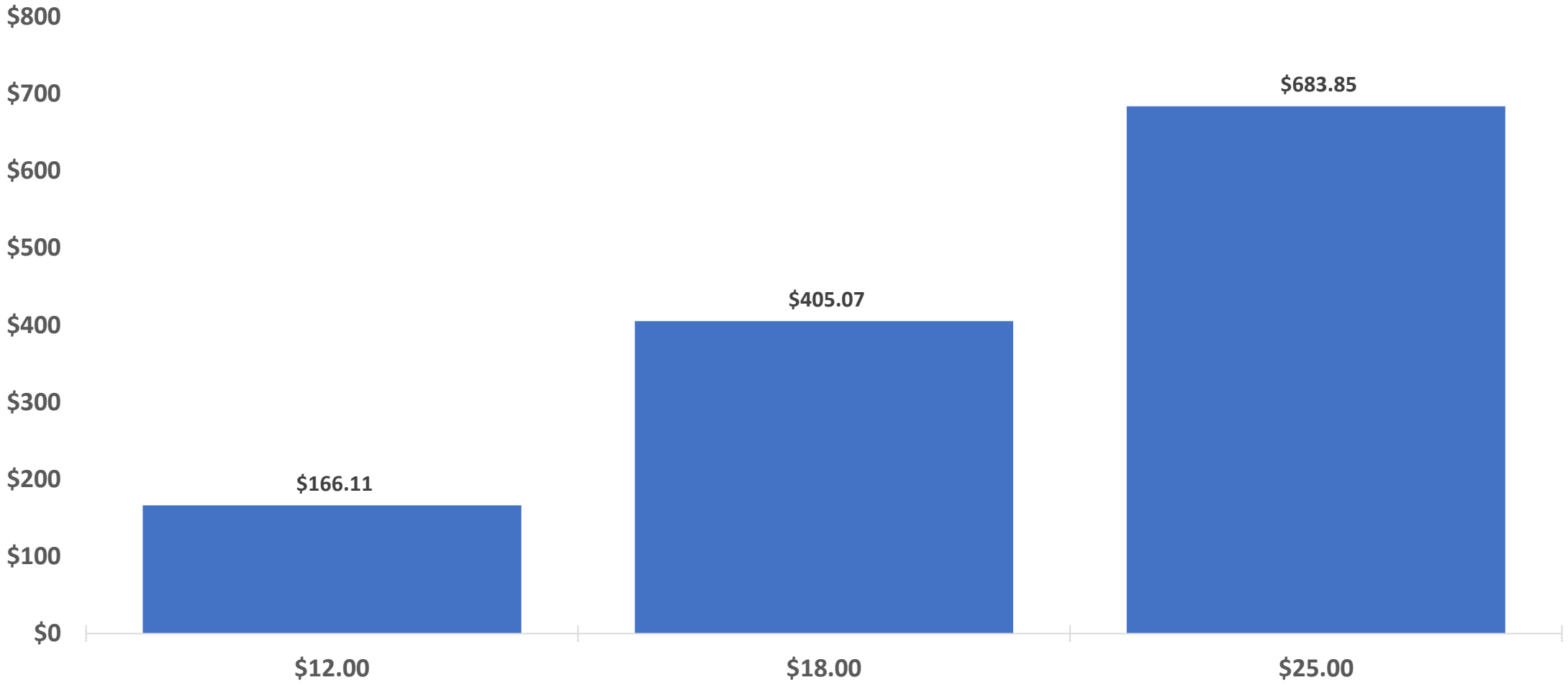
- “Avoided Cost” is an electric utility industry term of art.
- It refers to the **cost of generation** that a utility avoids when it purchases electricity from a third party.
- Avoided cost is composed of fuel and O&M costs attributable to the “last” MWh generated.
- A utility’s “avoided cost” is the *most expensive* power it would otherwise generate over a given interval of time.
- If the cost of renewable energy is less expensive ***over the life of a project*** than the utility’s avoided cost, then consumers will be better off with the renewables.
- **MEA’s Willow solar power purchase agreement (PPA) was justified by the RCA based on the utility’s avoided cost at the time the PPA was signed.**

2028 Railbelt Avoided Cost Scenarios (At Three Different Potential LNG Prices)



MEA's PPA price from TA535-18. 3/18/2022.
https://rca.alaska.gov/RCAWeb/ViewFile.aspx?id=179D912B-C930-4049-A108-E68764F19F9F

Impact of Three Possible LNG Import Prices on Annual Household PCE Reimbursements



Importing LNG Should Not be the Answer

When asked what the option for natural gas would be if the AK LNG project does not go forward, Railbelt Utility Mangers all had the same answer for the Senate Resources Committee:

"I think that option is going to be importing LNG." **Arthur Miller**, Chugach Electric Association

"LNG import is going to be the answer." **Tony Izzo**, Matanuska Electric Association

"I think whether I want to say it out loud or not, at some point, imports will be part of the transition plan from everything I've heard so far." **Brad Janorschke,** Homer Electric Association

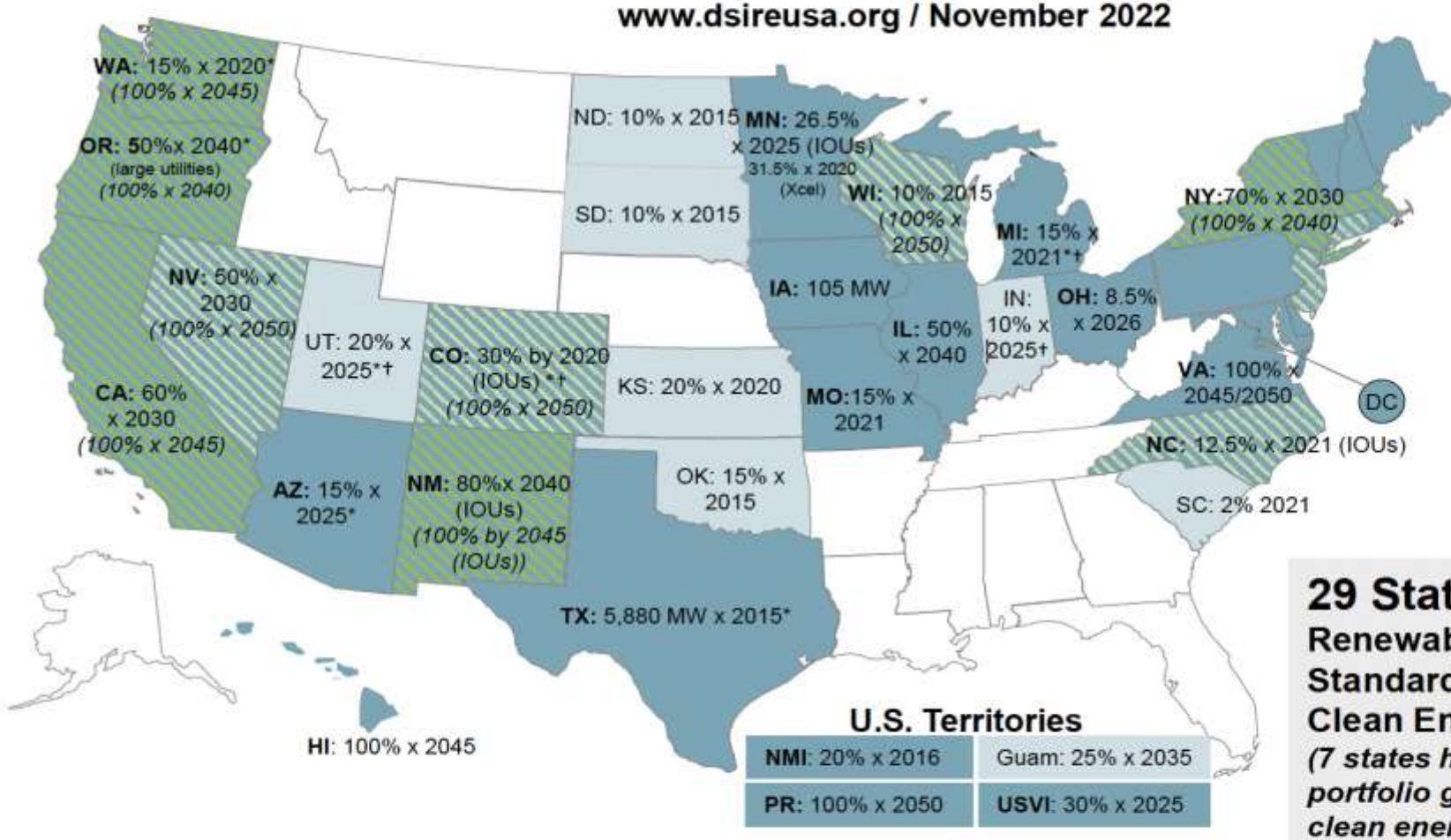
"I have been steadfast in looking at my three peers here and saying we are in this together and so if it is imported natural gas, so be it." **John Burns**, Golden Valley Electric Association

DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER

DSIRE insight

Renewable & Clean Energy Standards

www.dsireusa.org / November 2022



ME: 100% x 2050
NH: 25.2% x 2025
VT: 75% x 2032
MA: 40% x 2030 + 1% each year thereafter (new resources) 3.56% x 2021 (existing resources) *(80% x 2050)*
RI: 100% x 2033

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

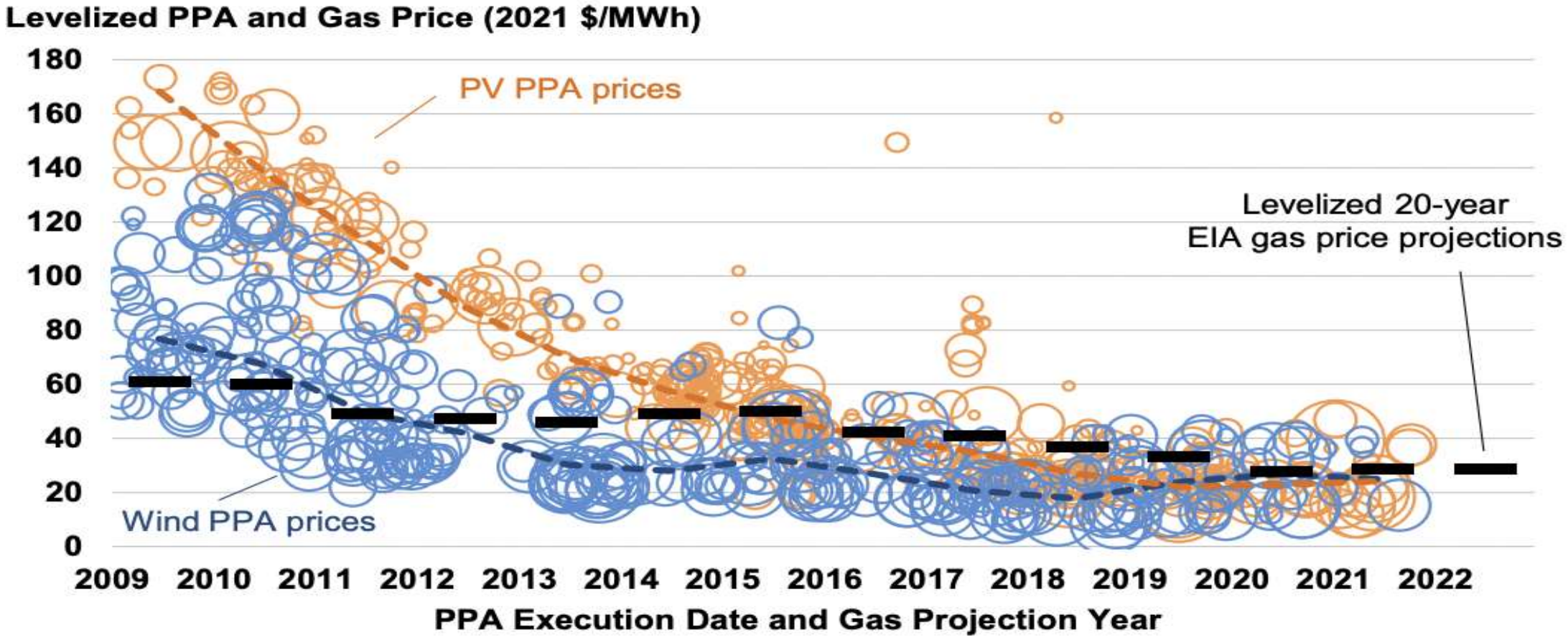
NMI: 20% x 2016	Guam: 25% x 2035
PR: 100% x 2050	**USVI:** 30% x 2025

29 States + DC have a Renewable Portfolio Standard, 6 states have a Clean Energy Standard
(7 states have renewable portfolio goals, 6 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

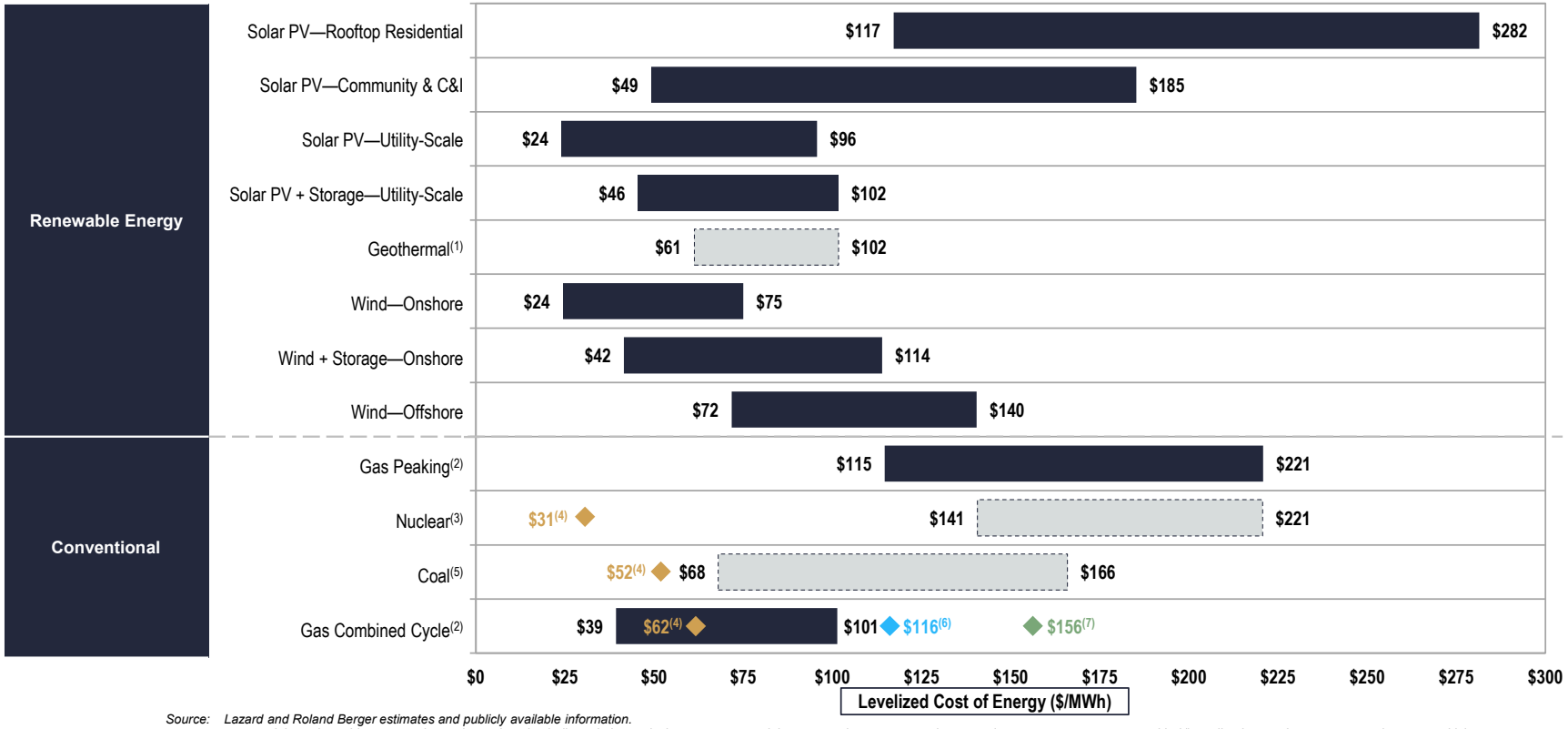
Costs of Wind and Solar Electricity Power Purchase Agreements (PPA)



Source: Lawrence Berkeley National Lab, “Utility-Scale Solar, 2022 Edition” http://utilityscalesolar.lbl.gov

Levelized Cost of Energy Comparison—Unsubsidized Analysis

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



Source: *Lazard and Roland Berger estimates and publicly available information.*

Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at an 8% interest rate and 40% equity at a 12% cost. See page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities.

(1) Given the limited data set available for new-build geothermal projects, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation.

(2) The fuel cost assumption for Lazard's unsubsidized analysis for gas-fired generation resources is $3.45/MMBTU for year-over-year comparison purposes. See page titled "Levelized Cost of Energy Comparison—Sensitivity to Fuel Prices" for fuel price sensitivities.

(3) Given the limited public and/or observable data set available for new-build nuclear projects and the emerging range of new nuclear generation strategies, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation (results are based on then-estimated costs of the Vogtle Plant and are U.S.-focused).

(4) Represents the midpoint of the unsubsidized 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. See page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation Technologies" for additional details.

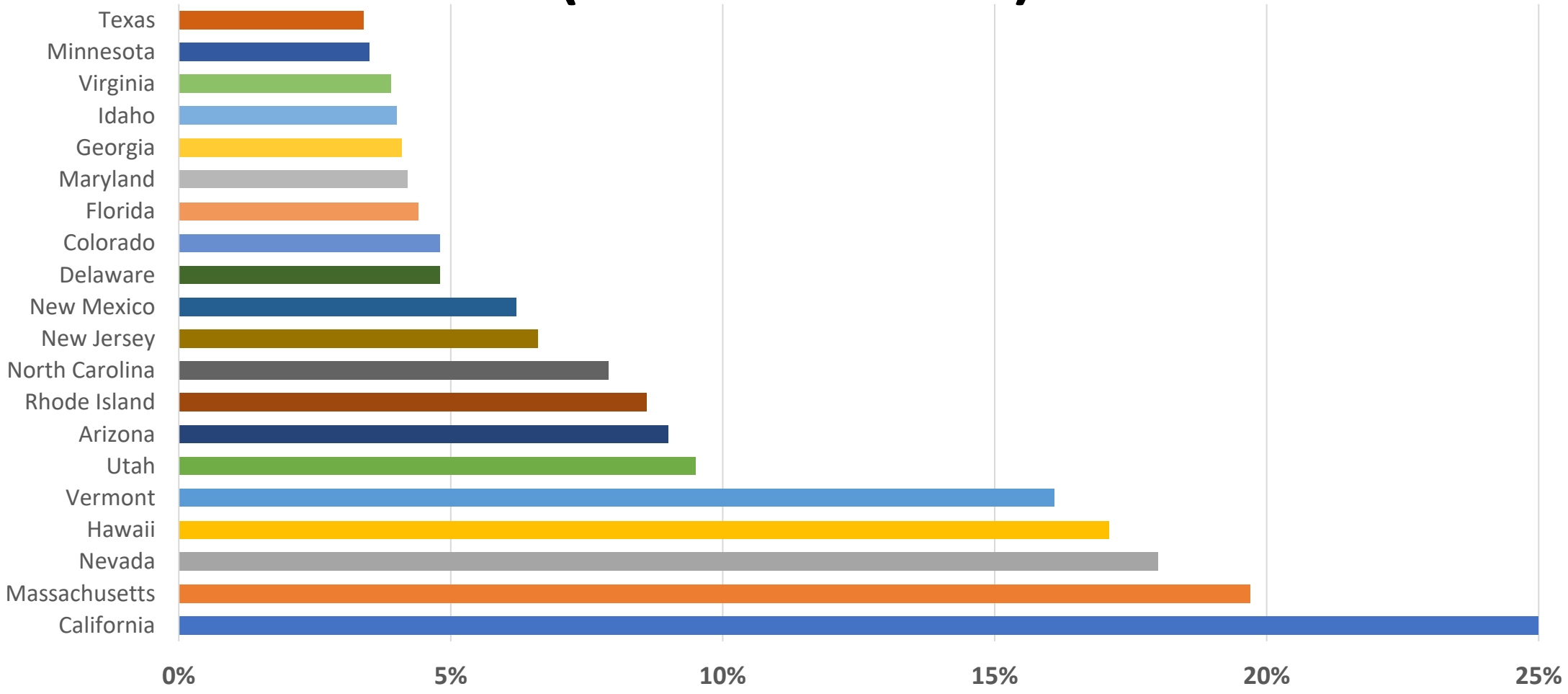
(5) Given the limited public and/or observable data set available for new-build coal projects, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation. High end incorporates 90% carbon capture and storage ("CCS"). Does not include cost of transportation and storage.

(6) 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 ~$1.40/kg for Blue hydrogen.

(7) 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.

LAZARD

Percentage of Net Generation from Solar in 2022 (Selected States)



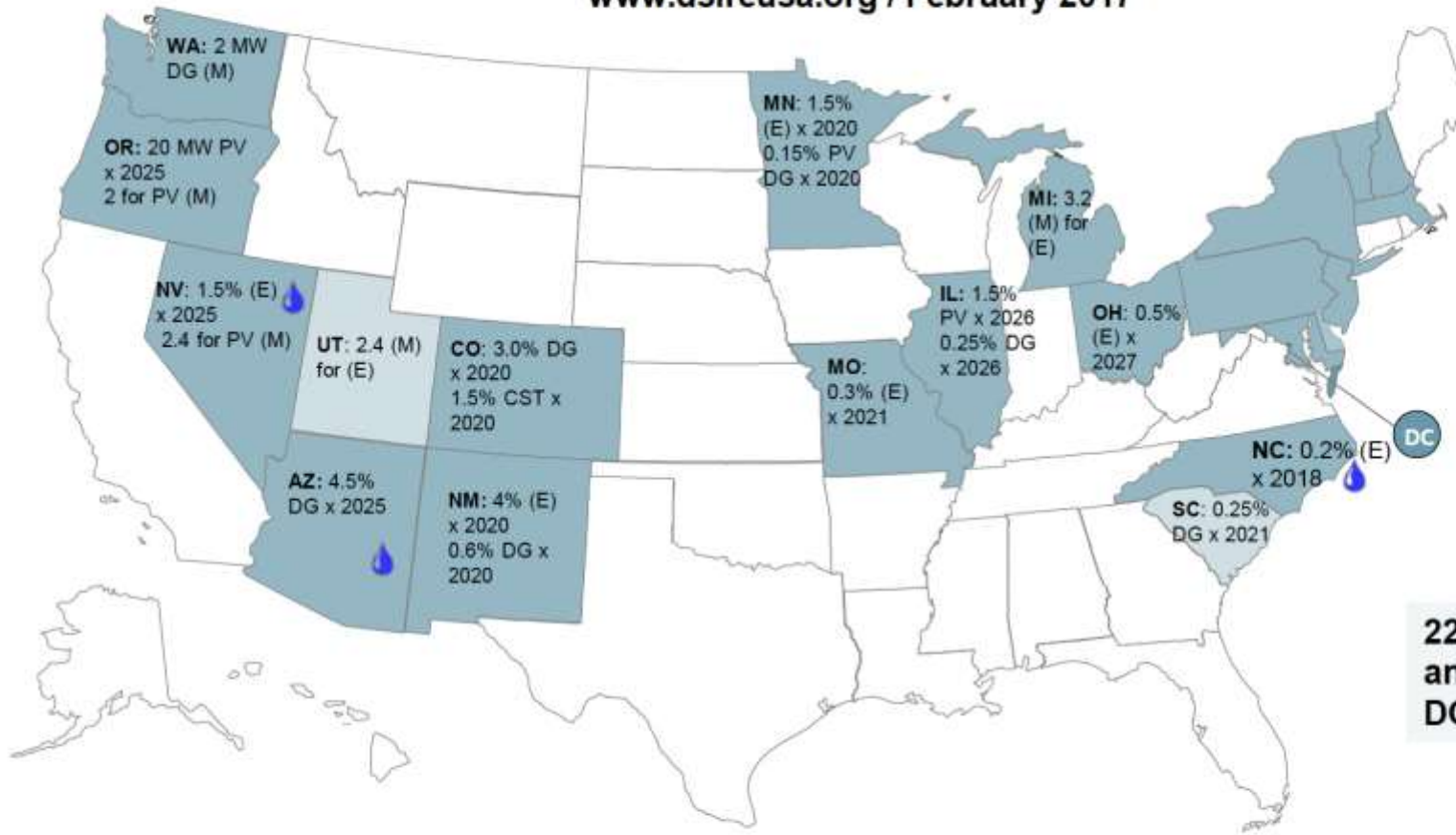
Data from “Utility-Scale Solar, 2022 Edition”; http://utilityscalesolar.lbl.gov

DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER

DSIRE insight

Renewable Portfolio Standards (RPS) with Solar or Distributed Generation Provisions

www.dsireusa.org / February 2017



VT: 1% DG X 2017 + 3/5ths of 1%/year until 10% X 2032

NH: 0.3% (E) x 2014

MA: 400 MW PV x 2020

NY: 0.58% customer - sited x 2015

PA: 0.5% PV x 2021

NJ: 4.1% (E) x 2028

DC: 2.5% (E) x 2023

DE: 3.5% PV x 2026 3.0 for PV (M)

MD: 2.5% (E) x 2020

22 States + DC have an RPS with solar or DG provisions

Renewable Portfolio Standard with solar/distributed generation (DG) provision

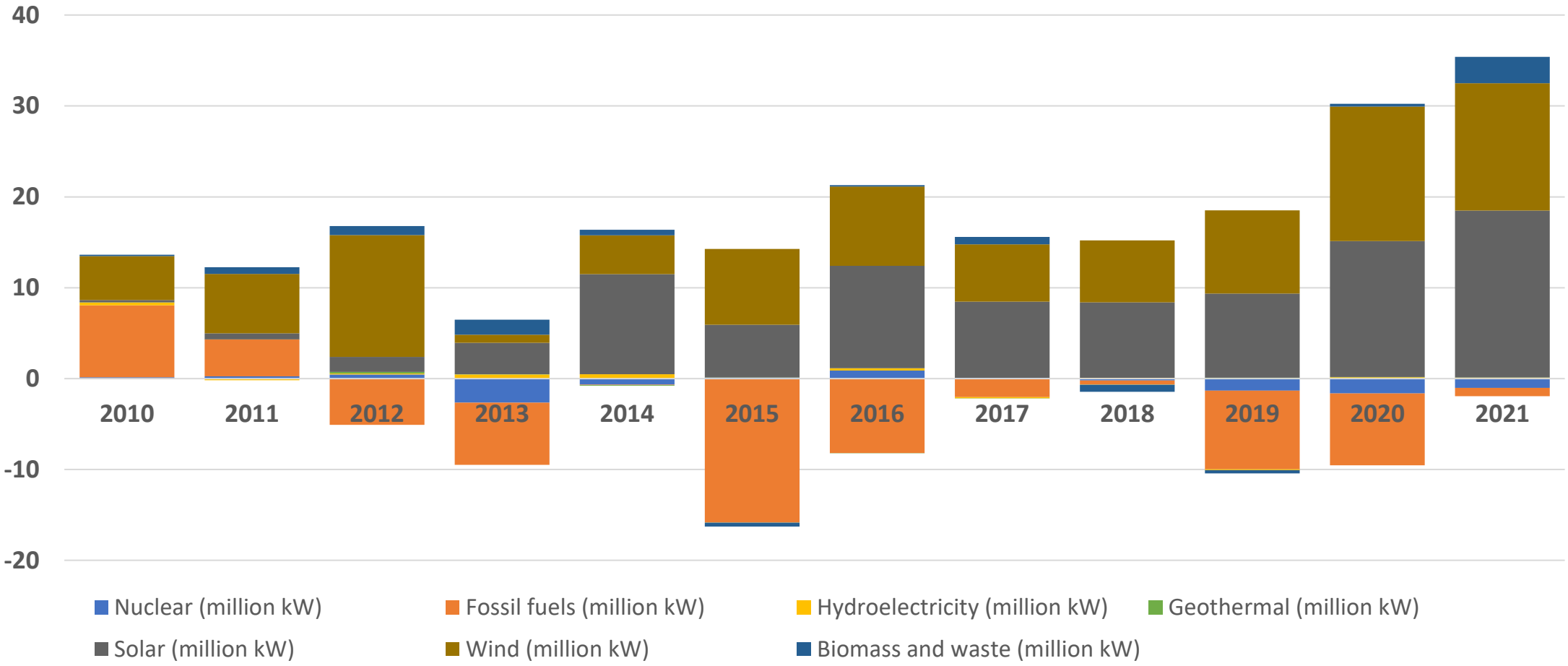
Renewable Portfolio Goal with solar/DG provision

(E): Solar Electric
PV: Solar Photovoltaic
DG: Distributed Generation
(M): Multipliers
(CST): Customer - Sited

Delaware allows certain fuel cell systems to qualify for the PV carve-out

Solar water heating counts toward solar/DG provision

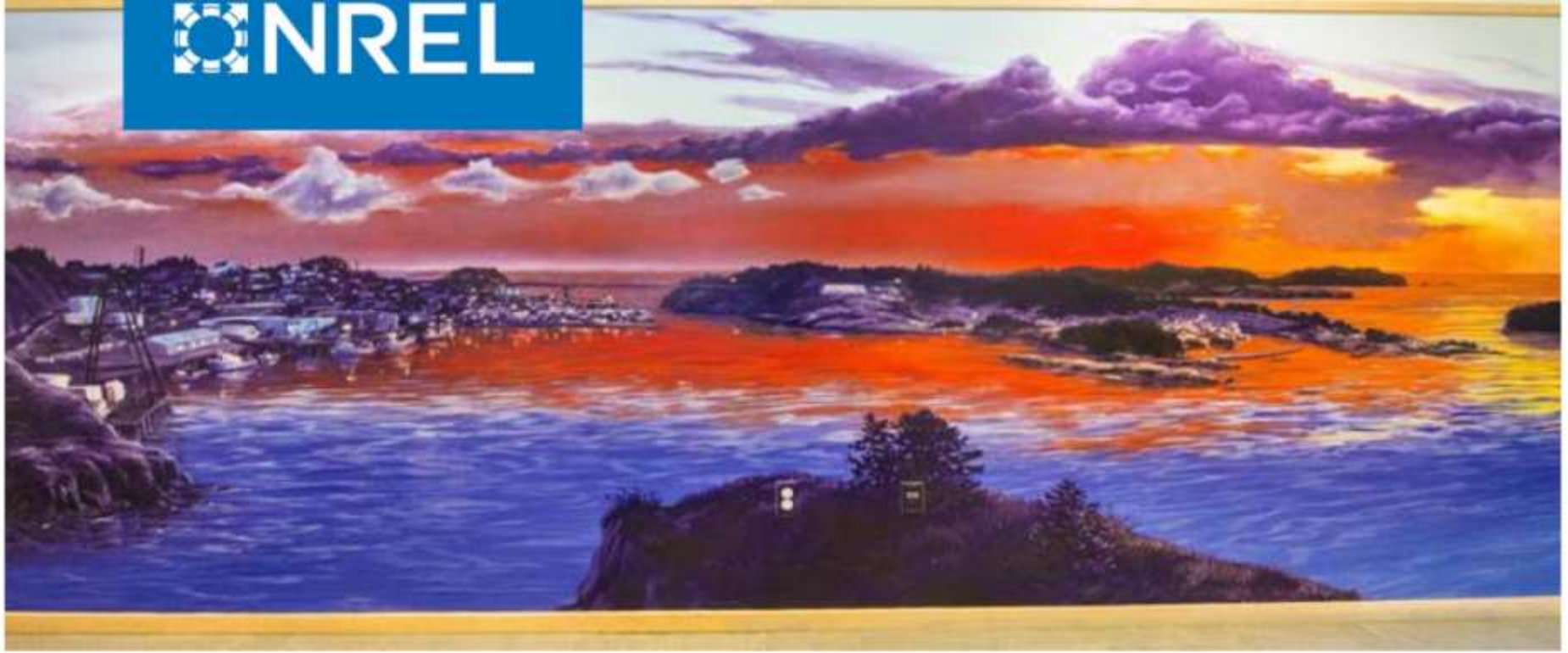
U.S. Net Capacity Additions by Source (Gigawatts)



Source: US Energy Information Administration

An RPS Bill Similar to HB 121 Was Introduced by Governor Dunleavy in 2022

HB 301 passed out of both the House Energy and House Labor & Commerce Committees before the 32nd Legislature ended

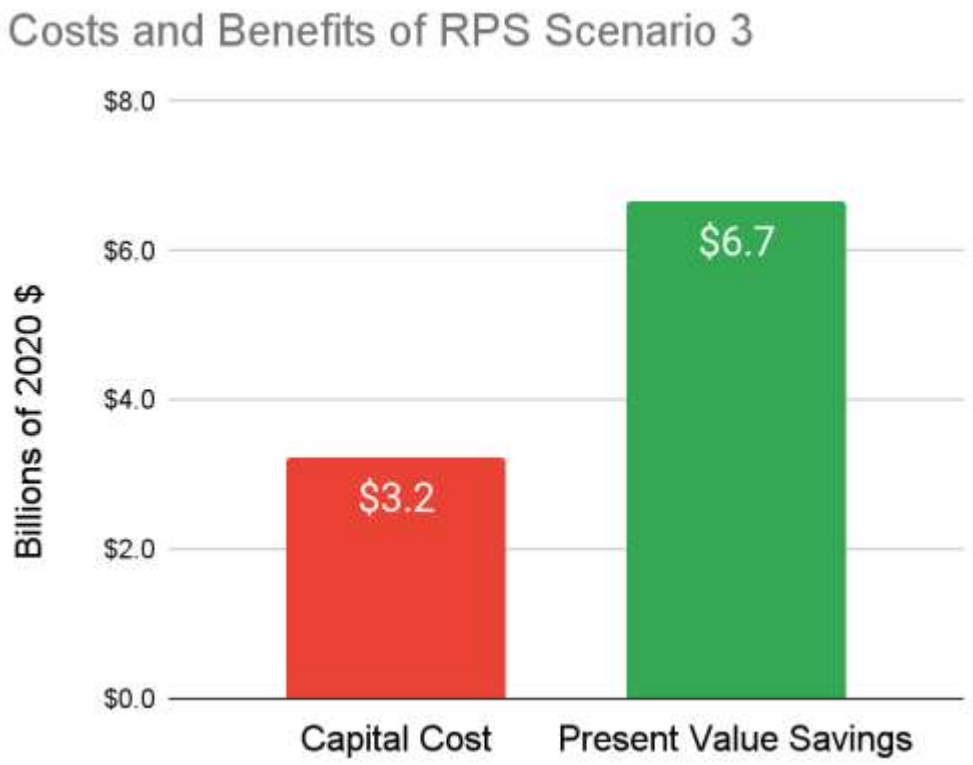


Renewable Portfolio Standard Assessment for Alaska's Railbelt

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.

Preliminary Benefit/Cost Analysis of 80% by 2040 RPS (NREL Scenario #3)



Present Values are anchored to the year 2035

- 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.
- This analysis was done *before* federal tax credits for renewable energy were extended for 10 years.

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 an 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.

- 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.

- A 3% inflation adjusted discount rate was used for calculating present value.

Additional Benefits That Were *Not* Considered in the 2022 Analysis

No federal Production Tax Credit (PTC) or other types of federal support. Those 30% tax credits were extended by Congress for 10 years in August 2022.

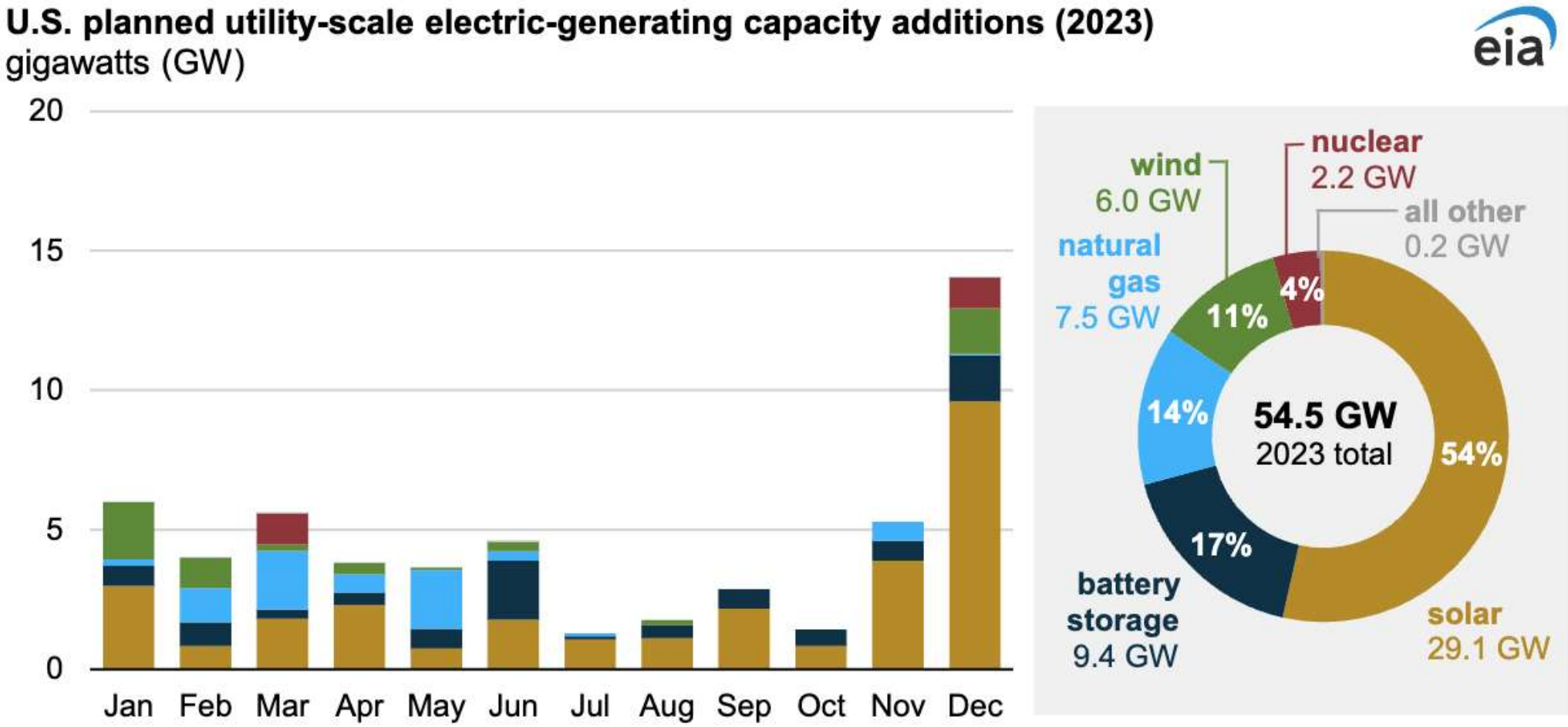
Higher LNG prices. The AEA gas price forecast projected $11 Mcf gas in 2030.

No further decline in wind and solar costs between 2020 and 2035

No increase in fuel prices beyond general inflation after 2040

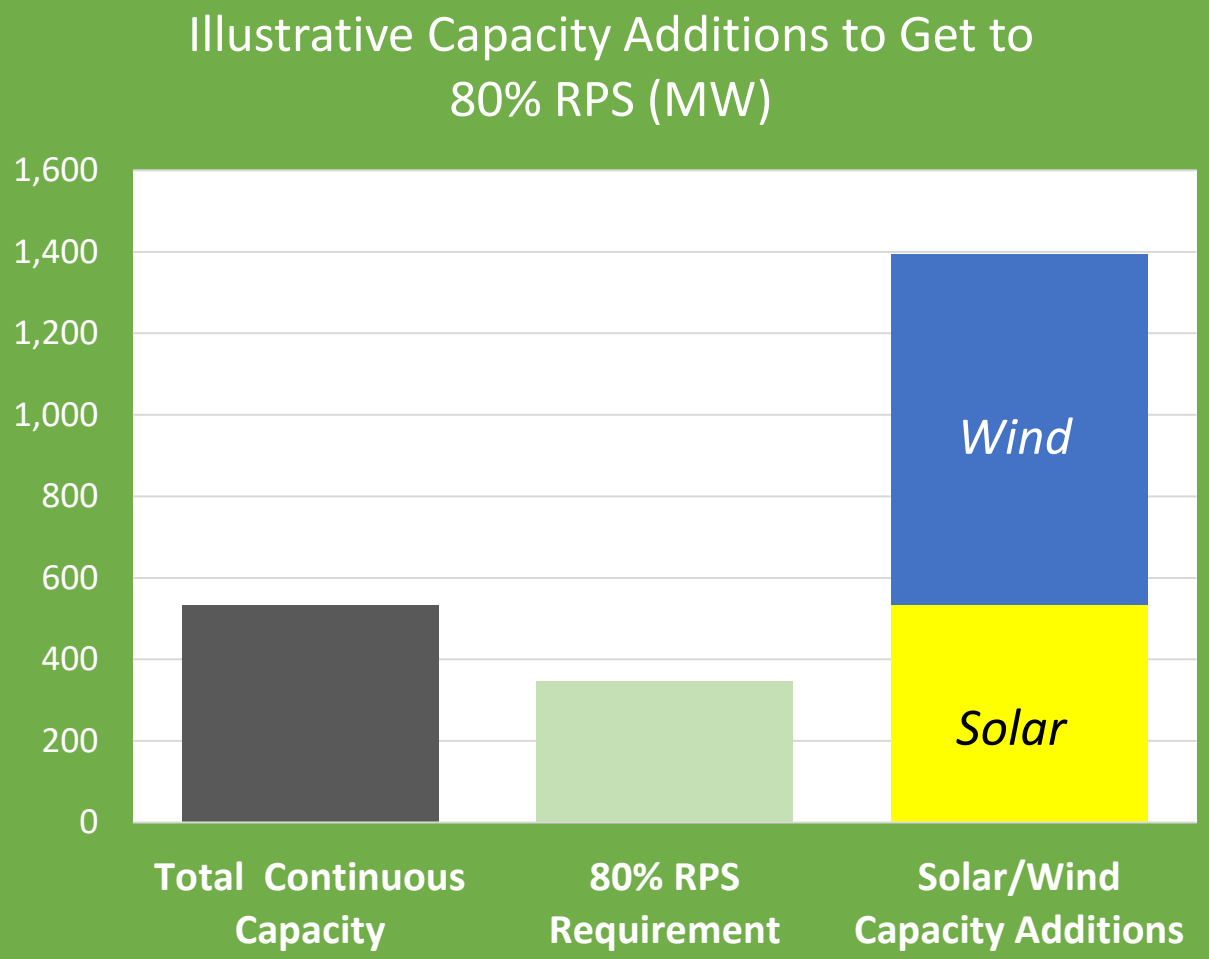
No carbon tax avoided

U.S. 2023 Planned Capacity Additions (Gigawatts)



Source: U.S. Energy Information Administration, Preliminary Monthly Electric Generator Inventory, Dec 2022

How Much Renewable Capacity Gets Us to 80%?



- In 2021 Railbelt generated 4,685,898 MWh
- Equivalent to 535 MW capacity, operating at 100% capacity factor (24 hours/day, 365 days)
- Renewables are currently 15% of total energy
- **80% RPS → Need an additional 348 MW**
- *One case* with only wind and solar (roughly emulating NREL Scenario 3):
  - 535 MW of installed solar @ 12% capacity factor = 64 MW fossil equivalent
  - 860 MW of installed wind @ 33% capacity factor = 284 MW fossil equivalent

The Railbelt Reliability Council Would Implement 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, was certificated in September 2022 as the Railbelt Reliability Council (RRC)

New generation and transmission portfolios will be developed by the RRC through an integrated resource plan (IRP). The first regional IRP for the Railbelt will be a 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.

The $2.5 Billion Utility Transmission Ask

The Railbelt Utilities are asking the State for:

- $250 million for five years running – the equivalent of $400/year for each of 625,000 PFD recipients

- $125 million per year for another 10 years – the equivalent of $200/year for each of 625,000 PFD recipients

How other states do it: plan transmission corridor requirements around where renewable resources are, and rely more on storage

Instead of waiting for silver bullets and federal grants we need to make incremental progress now

We can do more than one thing at a time!

A Railbelt RPS Would:

- ***Diversify*** the region's generation portfolio and protect consumers from rising rates.
- ***Displace*** high-priced natural gas fuel used for electricity and help reserve Cook Inlet gas for the region's heating needs.
- ***Utilize*** local, renewable resources like wind and solar that have no fuel costs.
- ***Stabilize*** Cook Inlet energy costs.
- ***Increase*** the region's energy independence and keep Alaska competitive in a fast-changing world.
- ***Create*** jobs, spur statewide innovation and keep hundreds of millions of precious energy dollars circulating in the state's economy.
- ***Establish*** a standard that triggers action ***before*** we import LNG.

Time is of the Essence

The Railbelt utilities and Enstar are meeting regularly to discuss importing LNG

The next NREL study will come out in late May

The Governor's Energy Security Task Force will not report until the Fall

The Railbelt Reliability Council is about to start getting staffed up

The Legislature will reconvene in January

REAP respectfully suggests ongoing RPS hearings over the interim