Renewable Energy 2020

An overview of renewable energy in the U.S., including key federal programs, recent policy developments, and projections

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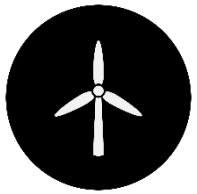
Energy High-Level Forecast: Renewables Lead in 2020



Growing renewables

The Energy Information Administration (EIA) forecasts that electric power generation from nonhydropower renewable energy sources will grow by **15%** in 2020, the fastest rate in four years

Lagging natural gas

EIA forecasts that electric power generation from natural gas-fired power plants will grow by **1.3%** in 2020, the slowest growth rate since 2017

Declining coal

EIA forecasts that electric power generation from coal-fired power plants will decline by **13%** in 2020

No federal renewable energy mandates currently exist. However, some states have established Renewable Portfolio Standards and targets, setting goals for the percentage of energy the state will derive from renewables in the future.

Sources: US Energy Information Administration, SEIA.

Renewable Energy Sources Overview

Solar: Historical and projected increases in electric power generation from renewables are partially due to additions to solar generating capacity. Solar supporters unsuccessfully lobbied to delay scheduled step-downs in key solar tax credits in the 2020 appropriations package.

Wind: Historical and projected increases in electric power generation from renewables are partially due to additions to wind generating capacity. A key wind energy tax credit was extended from its scheduled 2019 end date in the 2020 appropriations package.

Geothermal: Geothermal installations have slowed because of geographical limitations, declining wholesale electricity prices, and declining costs for other renewables, though existing geothermal plants have high capacity.

Hydroelectric: Hydroelectricity is a mature technology, and many of the most suitable sites for hydropower plants have already been developed. Hydropower consumption decreased in 2018.

Biomass: In 2018, biomass consumption accounted for 45% of annual renewables consumption, due in large part to U.S. use of fuel ethanol and biodiesel for transportation. Key biodiesel tax credits were extended in the 2020 appropriations package, though biofuel producers and farmer groups have criticized recent EPA biofuel regulatory measures.

Sources: US Energy Information Administration, *The San Diego Union-Tribune*, *Daily Energy Insider*, *Successful Farming*, *AgriNews*.

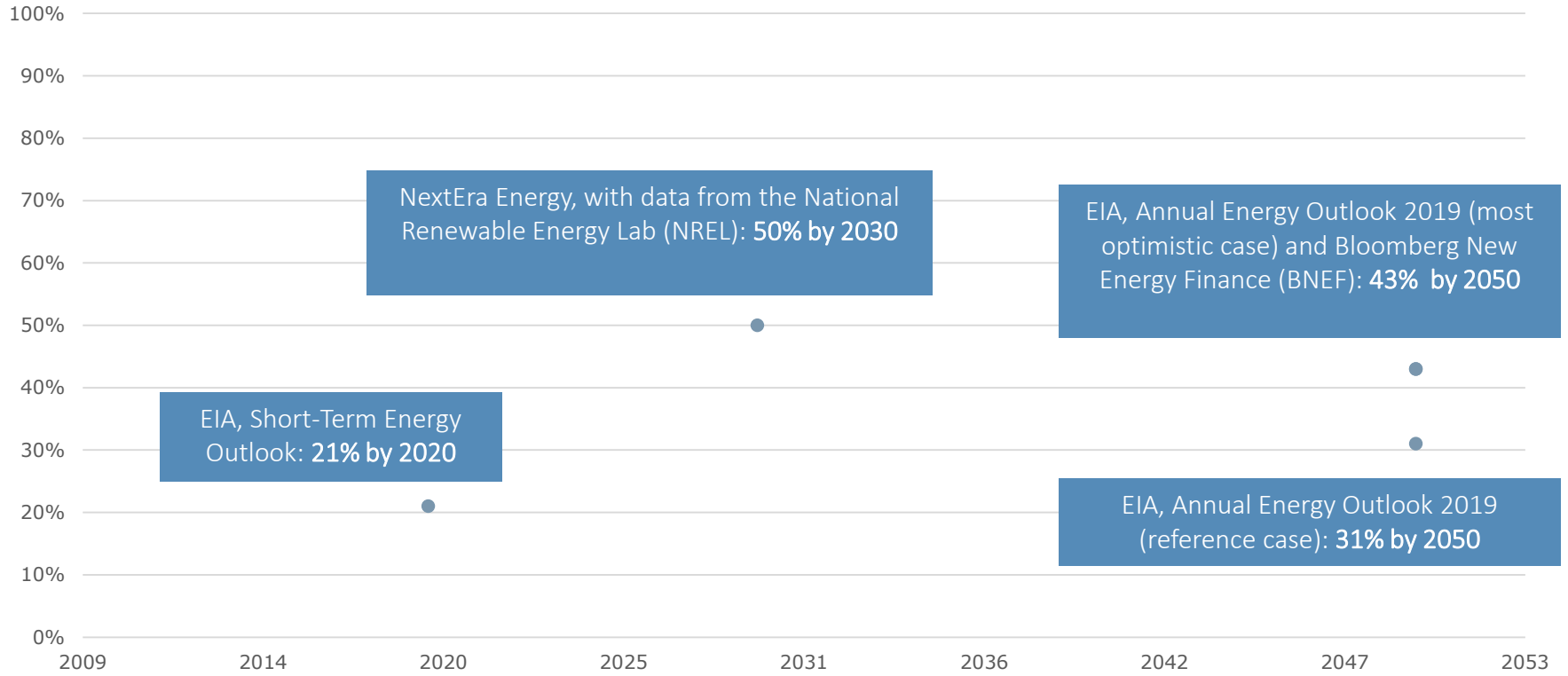
Madison DeLuca | Slide last updated on: January 16, 2020

Roadmap

- High-level overview
- Projections
- Federal initiatives

Renewable energy projections vary widely; EIA projects 43% renewable generation in the U.S. by 2050 in its most optimistic case

Projections for share of U.S. energy generation originating from renewables



Sources: The Motley Fool.

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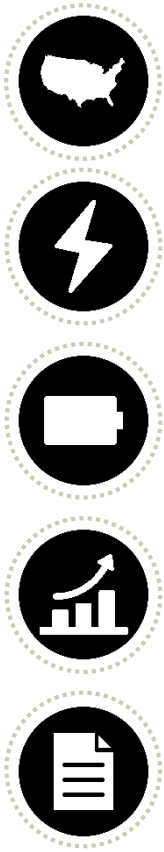
Energy Northwest Concludes SMRs are Needed for Decarbonization

- Deep decarbonization of the U.S. Northwest can be achieved at "manageable" costs by 2045, but only if utility agency Energy Northwest secures zero-emitting firm capacity, such as by relicensing Columbia Generating Station—the sole nuclear plant in the region—and building small modular reactors (SMRs)
- See Pacific Northwest Zero-Emitting Resources Study

U.S. utility-scale battery storage capacity is projected to grow

Capacity could exceed 2,500 MW by 2023



The United States has the second-highest installed energy storage capacity, closely following China

Globally, most energy storage projects use electro-chemical technology, followed by pumped hydropower storage, then thermal storage

Much of the conversation around energy storage concentrates on utility-scale battery storage power capacity

In March 2019, utility-scale battery storage capacity was 899 MW. Under the assumption that currently planned additions are completed and no current operating capacity is removed, capacity could exceed 2,500 MW by 2023

Growth in utility-scale battery storage is the result of supportive state policy and a FERC order directing power system operators to allow battery systems to engage in their markets

Sources: Energy Information Administration, DOE Global Energy Storage Database, Utility Dive

Key federal alternative energy tax credits

Renewable Electricity Production Tax Credit (PTC)

- Provides a 1.5 cent per kilowatt hour (kWh) tax credit for the first 10 years of a wind facility's operation
- The credit is based on when a facility is constructed; wind projects beginning construction before the end of 2020 qualify for 10 years of tax credits
- The PTC began phasing out in 2017 by reducing the percentage of the credit available to facilities
- The PTC was extended from its scheduled 2019 end date in the December 20, 2019 appropriations measure
- The law makes facilities constructed in 2020 eligible for 60% of the credit for 10 years, and retroactively extends the full PTC for key non-wind renewable energy sources, such as geothermal and hydropower
- The Joint Committee on Taxation estimates that in 2018, foregone federal revenues for the PTC were $4.8 billion

Business Energy Investment Tax Credit (ITC)

- The tax credit allows a 26% deduction for the cost of installing solar or wind energy systems from federal taxes
- ITC expiration dates are based on when construction begins
- Large wind energy systems could claim the ITC in lieu of the PTC through 2019
- Solar supporters unsuccessfully lobbied Congress to delay scheduled step-downs in the 2020 appropriations package
- The Joint Committee on Taxation estimates that in 2018, foregone federal revenues for the ITC were approximately $2.8 billion

Sources: DSIRE, Heartland, American Wind Energy Association, Daily Energy Insider, Energy.gov, The Federal Lawyer, PV Magazine, The San Diego Union-Tribune, Congressional Research Service.

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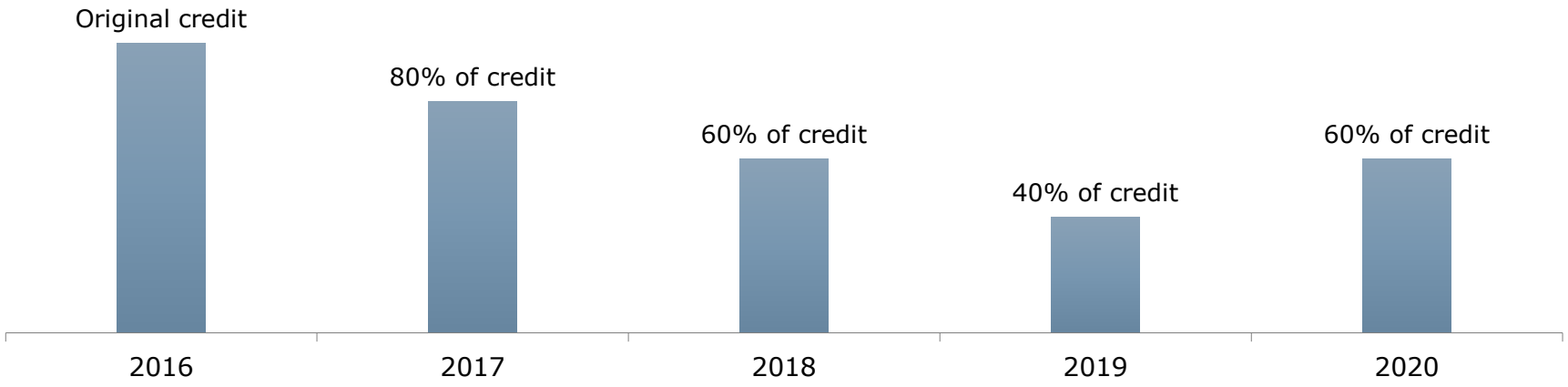
PTC reduction schedule
BASED ON YEAR WIND FACILITIES BEGAN CONSTRUCTION



Sources: DSIRE, Heartland, Congressional Research Service, American Wind Energy Association, Daily Energy Insider.

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Value of ITC

Technology	12/31/16	12/31/17	12/31/18	12/31/19	12/31/20	12/31/21	12/31/22	Future years
Solar Water Heating, Solar Space Heating/Cooling, Solar Process Heat	30%	30%	30%	30%	26%	22%	10%	10%
Hybrid Solar Lighting, Small Wind	30%	30%	30%	30%	26%	22%	22%	N/A
Large Wind	30%	24%	18%	12%	N/A	N/A	N/A	N/A

Sources: Energy.gov, The Federal Lawyer, PV Magazine, The San Diego Union-Tribune, Congressional Research Service.

Supporters Want to Bolster Renewables Industry; Opponents Concerned About Economic Impacts

Supporters

- Supporters say allowing ITC to sunset will stall the rapidly growing solar industry
- In 2014, solar energy displaced an estimated 20 million metric cons of carbon emissions, the equivalent of taking 4 million cars off U.S. roads for a year
- By spurring investment and establishing a U.S. manufacturing base, the PTC has helped drive U.S. wind power costs down by 67% in the last 7 years

"[The U.S. needs] permanent tax incentives for domestic production of clean electricity and storage, energy efficient homes and commercial buildings, electric vehicles, and modernizing the electric grid"

- Senate Minority Leader Chuck Schumer (D-NY)

Opponents

- Critics say the decreasing cost of solar installation lessens the need for the ITC
- While PTC extension may lead to further investment and growth in wind infrastructure, this potential is limited
- Research is mixed on whether the PTC has effectively reduced greenhouse gas emissions
- The Trump administration is committed to rolling back Obama-era tax incentives

"As a matter of our policy, we want to end all of those subsidies…whether it's for renewables and so forth"

- Larry Kudlow, Chief economic adviser to President Trump

Sources: Energy.gov Residential Renewable Energy Tax Credit; Why Congress Should Extend the Expiring Solar Energy Investment Tax Credit, *The Federal Lawyer*, March, 2016; Christian Roselund, "Top Senate Democrat Calls for permanent renewable energy, storage, EV tax credits," *PV Magazine*, December 11, 2018; Timothy Cama, "White House jumps into fight over energy subsidies," *The Hill*, Dec. 4, 2018; Molly F. Sherlock, "The Renewable Electricity Production Tax Credit: In Brief," Congressional Research Service, Nov. 27, 2018.

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