

STATE OF THE US



MARKETS

Green-e® Energy Reporting Year 2021

Michael Leschke
DIRECTOR,
CERTIFICATION PROGRAMS

Outline.

CERTIFIED SALES

CUSTOMERS PURCHASING

CERTIFIED SUPPLY

CERTIFIED PRODUCT TYPES

Key Takeaways.

**WHAT YOU NEED TO KNOW
ABOUT CERTIFIED SALES IN
THE 2021 REPORTING YEAR**

Key Takeaways

2021 was the biggest year of certified sales to date.

- **110 million retail MWh**, or more than 2.8% of the overall US electricity mix
- **20 million more MWh sold than in 2020**, the highest increase yet
- **1.3 million retail purchasers** of Green-e® certified renewable energy, including **almost 309,000 businesses**, almost tripling the amount of non-residential customers who purchased the previous year
- Impacts of COVID and supply constraints seen acutely on the residential side, while commercial sales continue to lift the market
- Sales mostly to the coasts, supply mostly from the Midwest and Texas
- Newer renewables continuing to drive the market

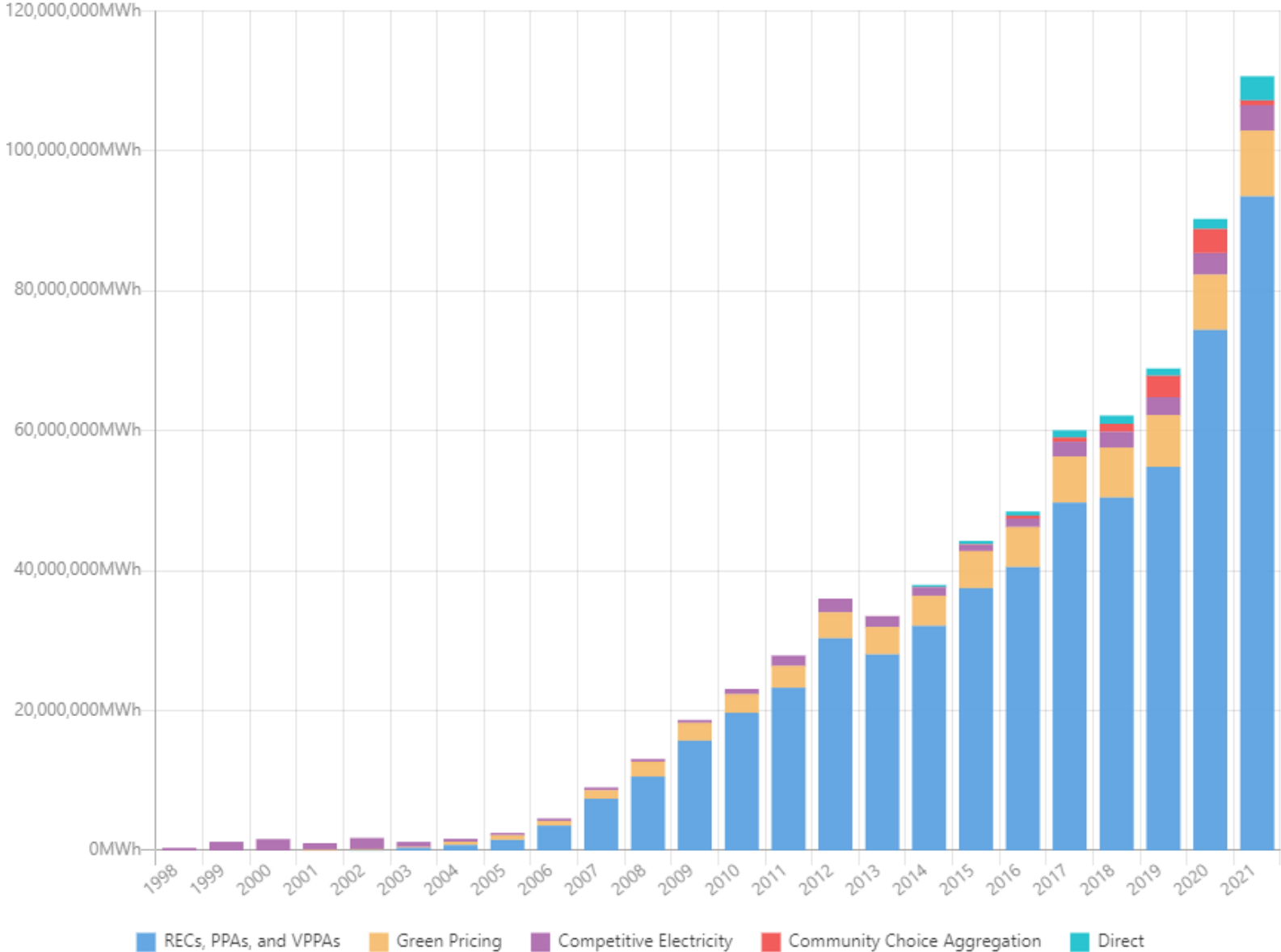
Charts, Data and Analysis.

**VISUAL REPRESENTATION
OF THE 2021 REPORTING
YEAR**

Total Certified Sales of Renewable Energy by Product Type and Customer Type

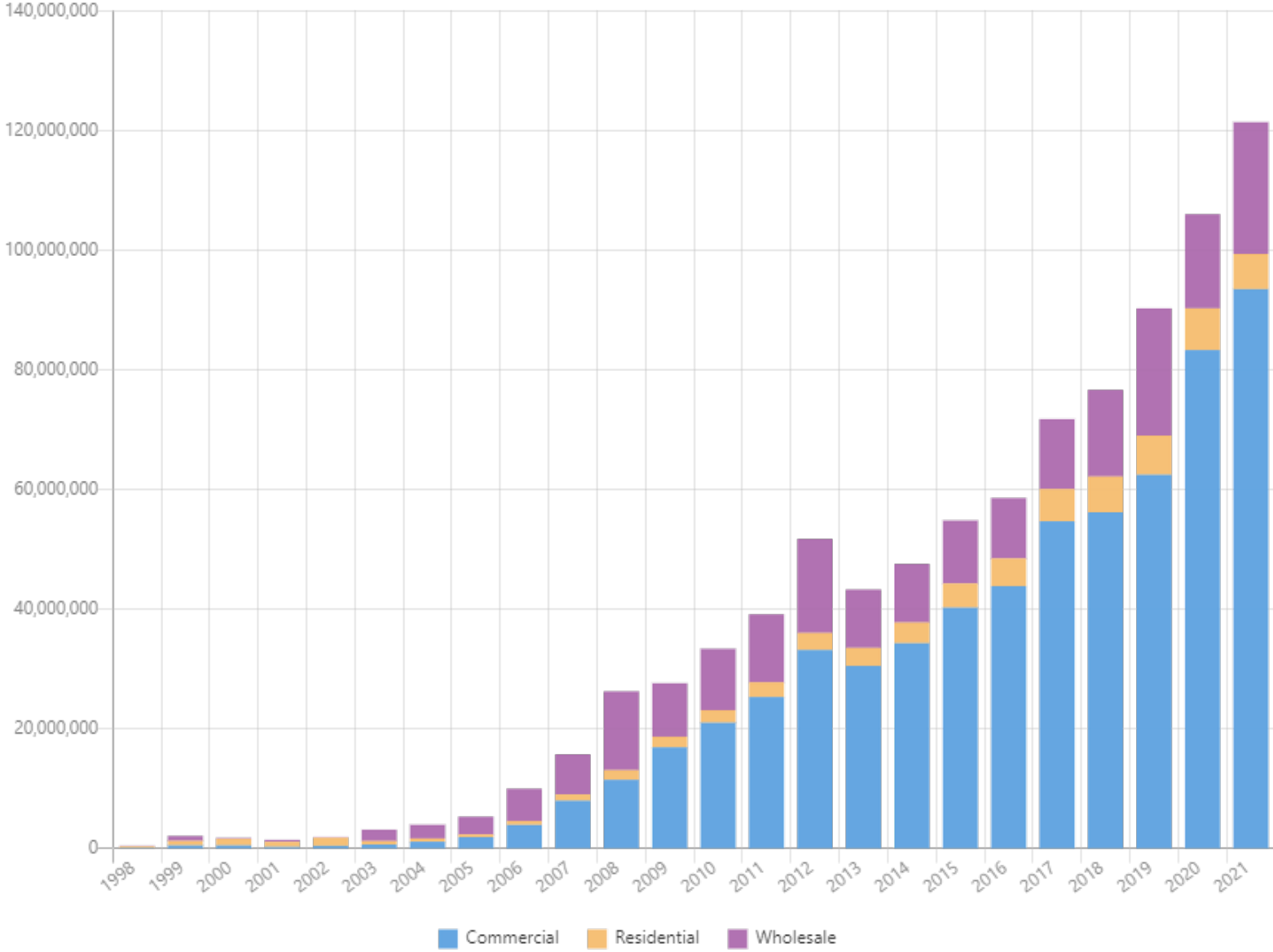
	Residential (Retail)	Non-Residential (Retail)	Wholesale
RECs, PPAs, and VPPAs	764,000	92,680,000	16,461,000
Green Pricing	4,872,222	4,527,000	
Competitive Electricity	136,000	3,474,000	5,552,000
Direct		3,441,000	
Community Choice Aggregation	121,000	592,000	
Total Sales	5,893,000	104,714,000	22,013,000
Total Retail:	110,607,000 MWh		
Total Unique Certified:	121,927,000 MWh		
Total Certified Transactions:	132,620,000 MWh		

Sales By Product Type, 1998 – 2021 (In MWh)

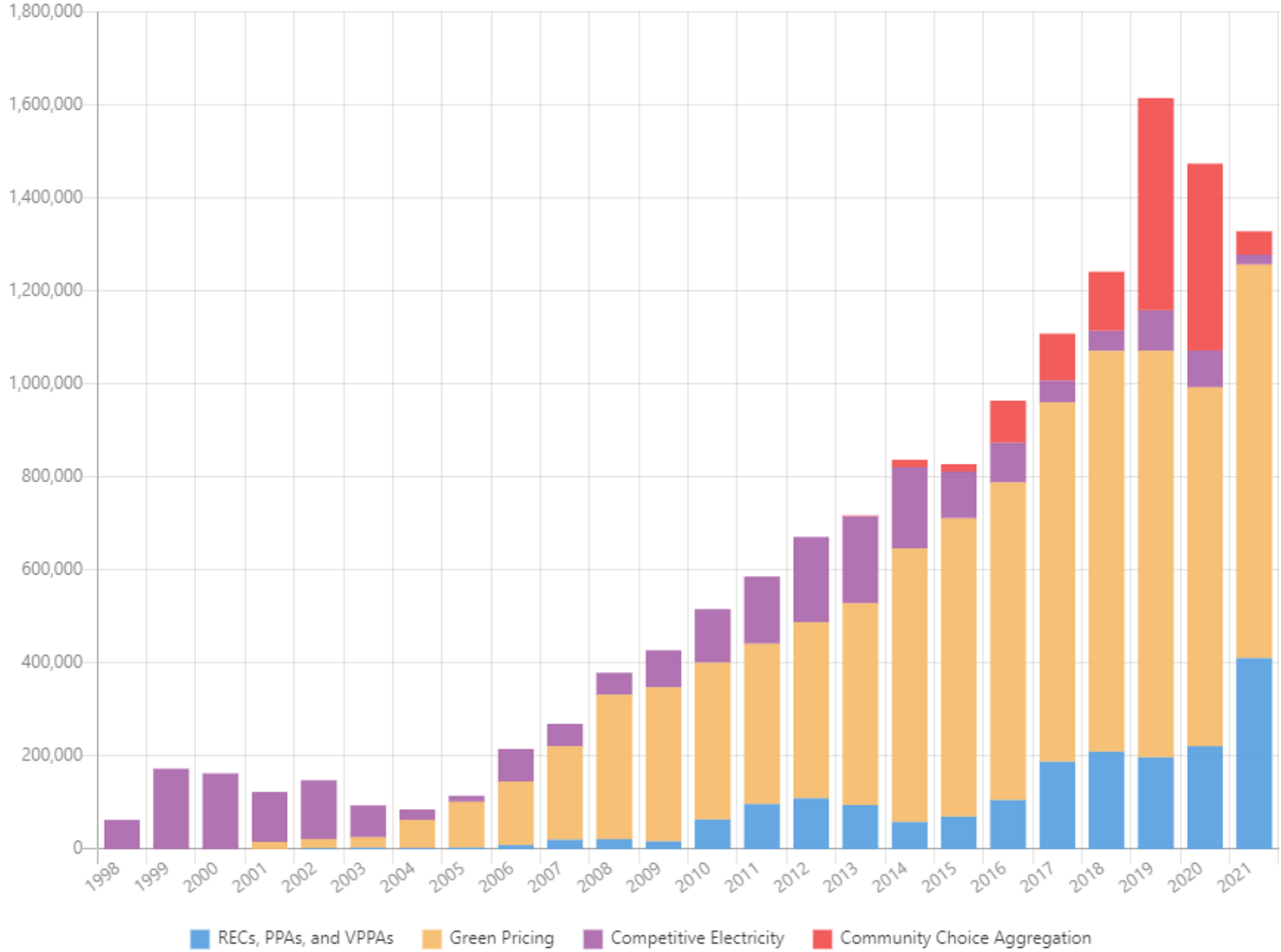


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Sales By Customer Type, 1998 – 2021 (In MWH)

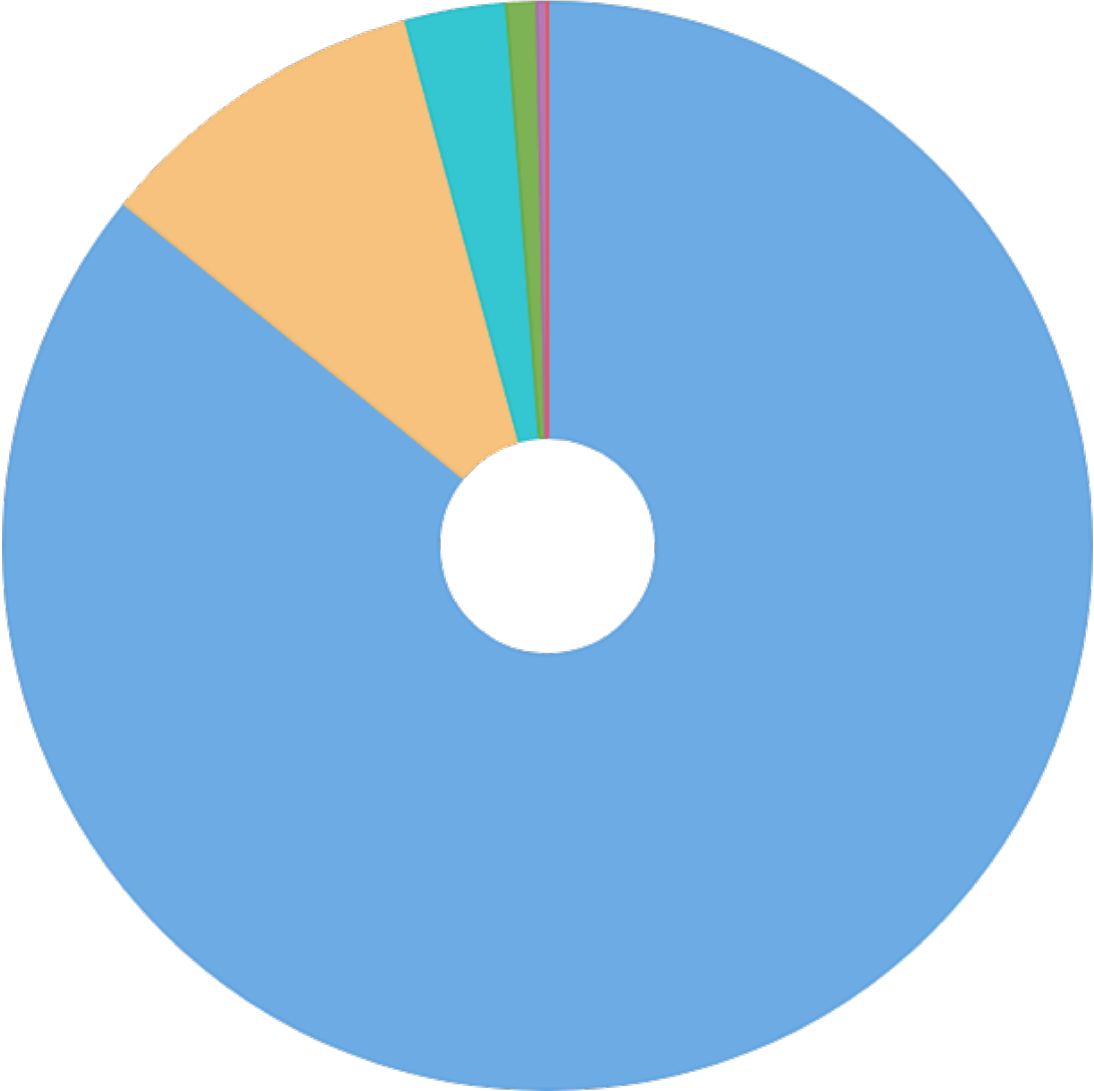


Customers by Product Type, 1998 – 2021



Contributions of Renewable Resource Types

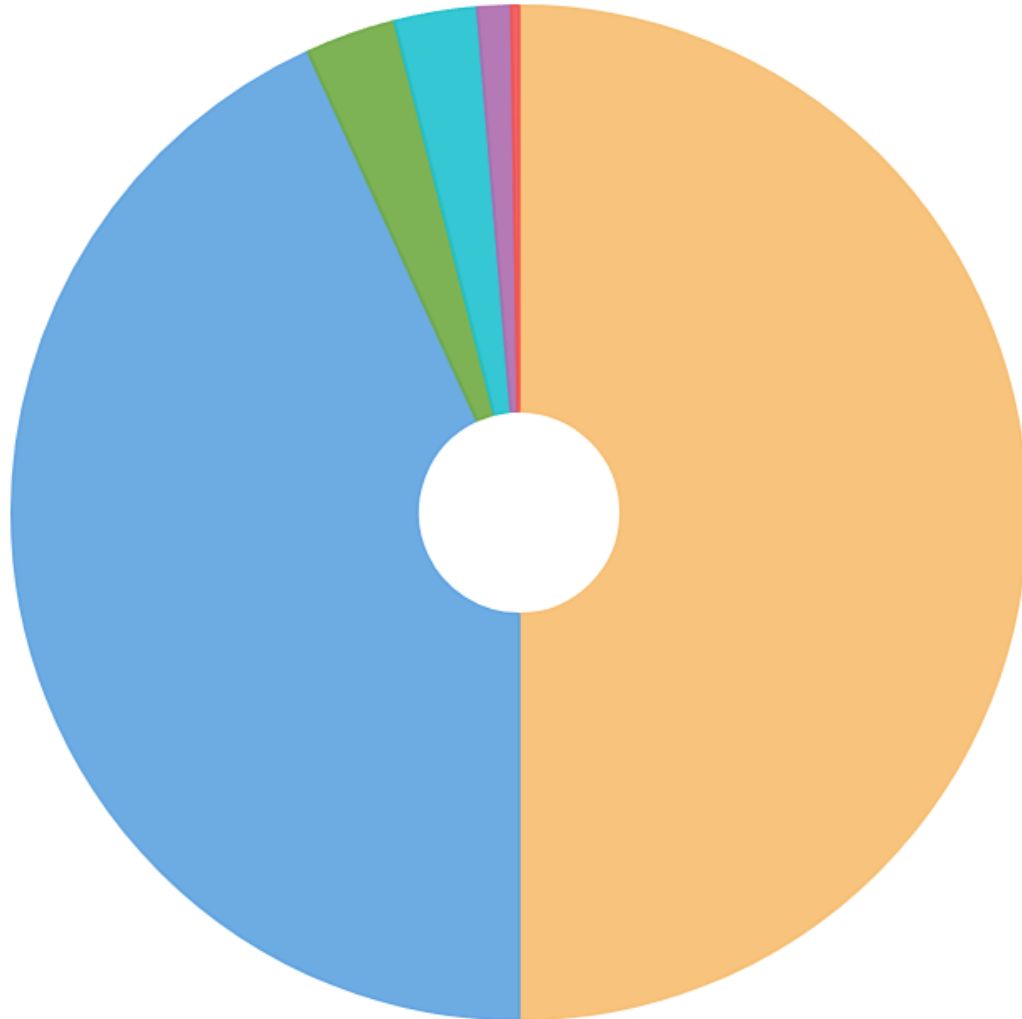
● Wind (86%)
 ● Solar (10%)
 ● Non-Gaseous Biomass (3%)
 ● Low-Impact Hydro (.9%)
 ● Gaseous (.3%)
 ● Geothermal (.01%)



Resource Type	MWh	Percentage
Wind	95,462,000	86%
Solar	11,418,020	10%
Non-Gaseous Biomass	2,749,000	2%
Low-Impact Hydro	943,000	1%
Gaseous Biomass	308,000	.2%
Geothermal	43,572	.04%

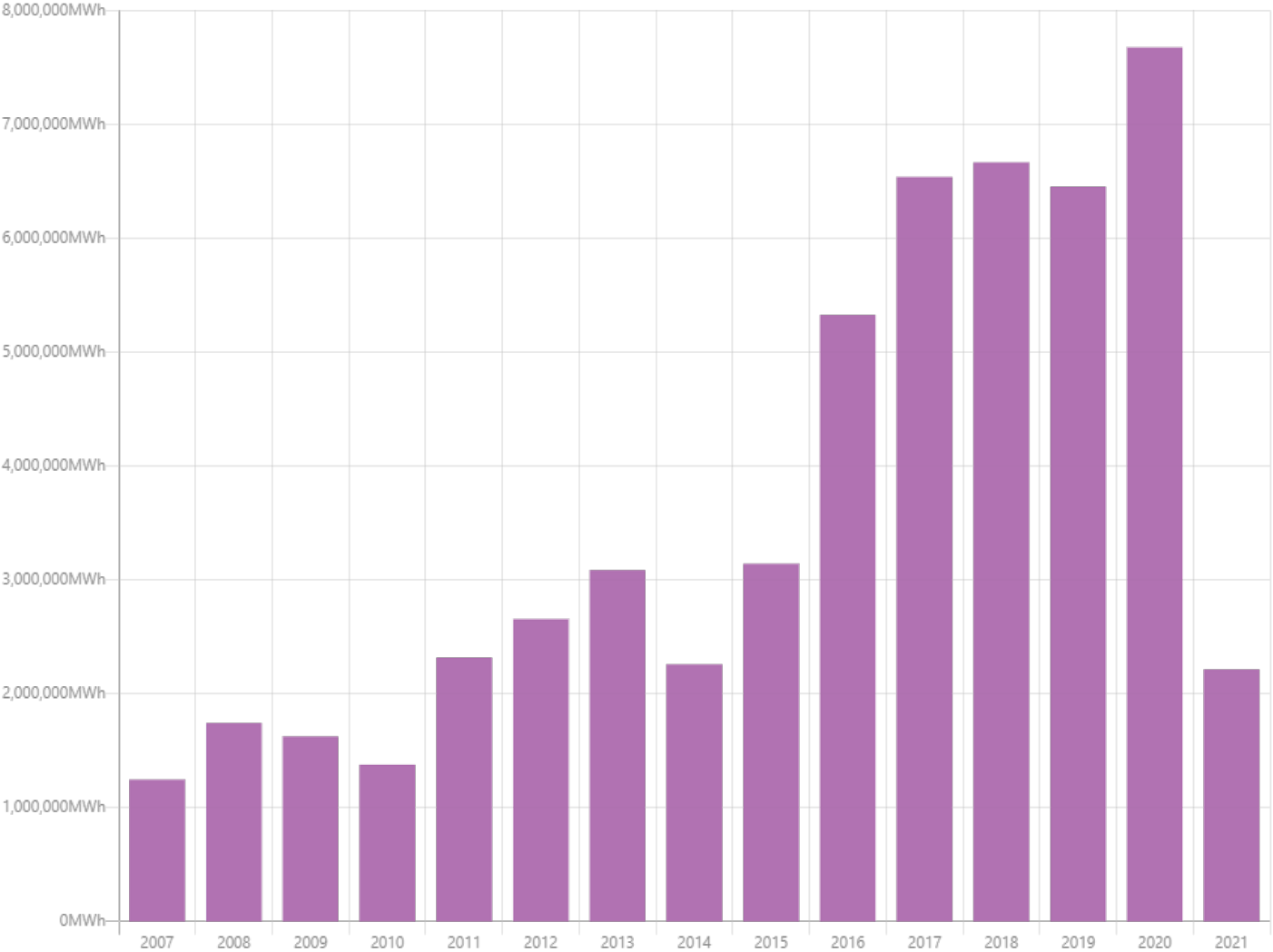
Facilities Supplying Certified Sales by Resource Type

● Solar (50%)
 ● Wind (43%)
 ● Non-Gaseous Biomass (3%)
 ● Gaseous Biomass (3%)
 ● Low-Impact Hydro (1%)
 ● Geothermal (.25%)



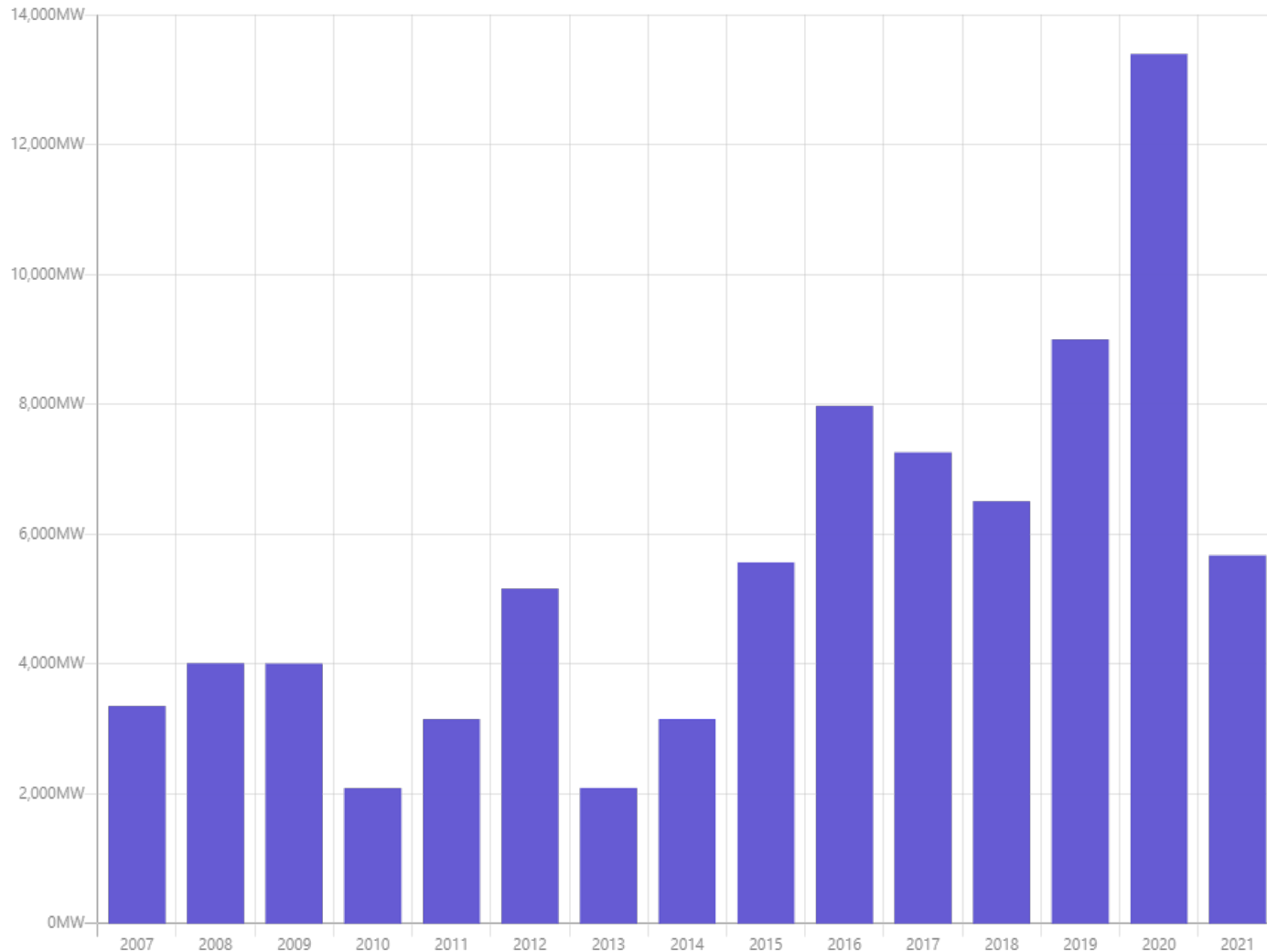
Resource Type	Unique Facilities	Percentage
Solar	607	50%
Wind	524	43%
Non-Gaseous Biomass	35	3%
Gaseous Biomass	32	3%
Low-Impact Hydro	13	1%
Geothermal	3	.3%

Megawatt-Hours by Facility Date of First Operation or Repowering



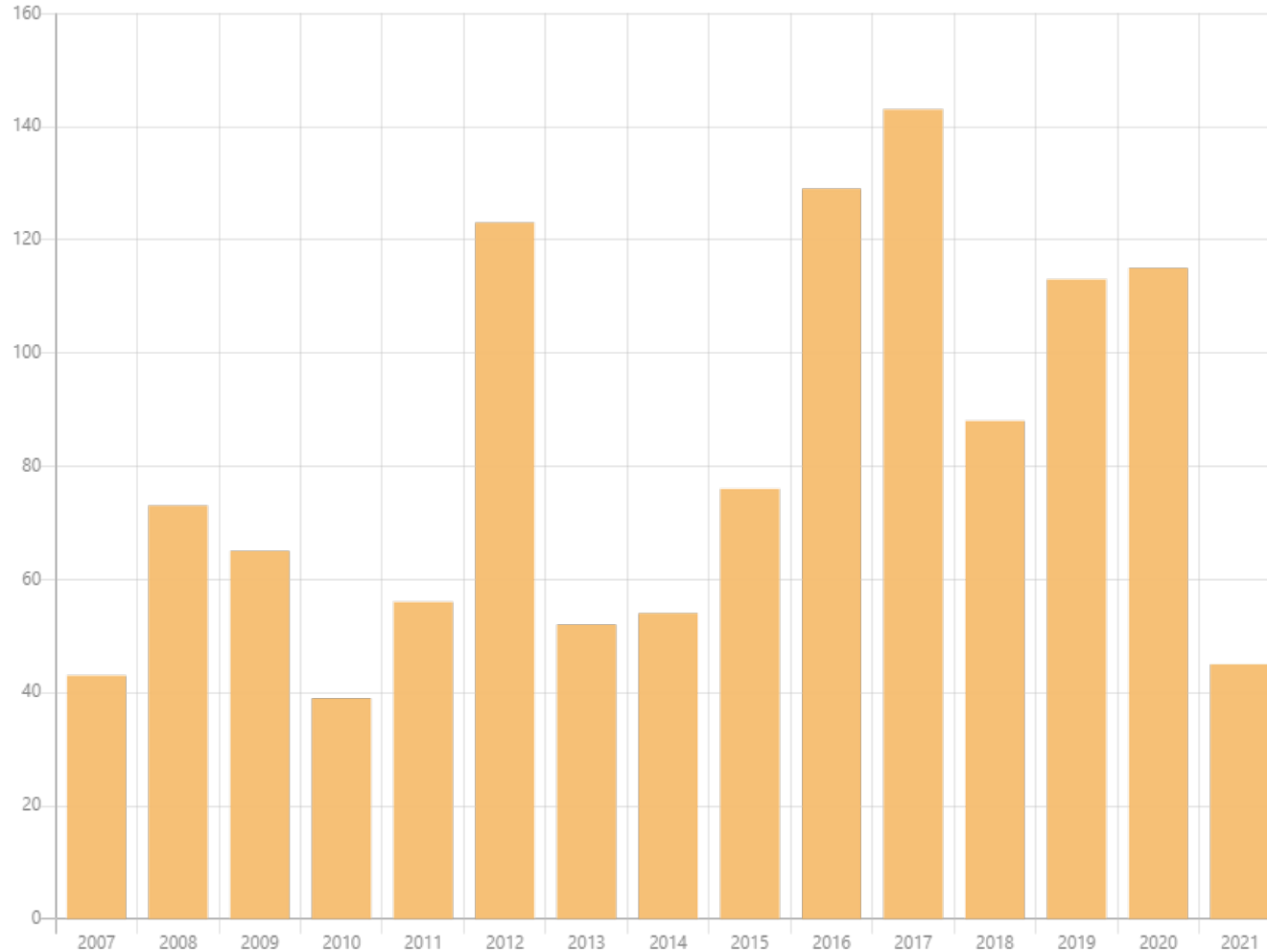
- **54%** of supply from facilities aged 5 years or younger

Capacity (MW) by Facility Date of First Operation or Repowering



- **51%** of overall capacity from facilities aged 5 years or younger

Count of Facilities by Year of First Operation or Repowering



- **41%** of facilities are 5 years or younger

Top 10 States by Retail Sales Volume

State	% of Total Sales
WA	18%
TX	15%
CA	11%
OH	7%
OR	6%
NY	4%
MN	4%
PA	3%
NC	3%
AR	3%

2021 followed the same general rule as previous years – consumption of certified electricity is highest in more populated states and states near a coast

Percent of Total Retail Customers by State (Includes REC Sales)

State	% of Customers
OR	29%
WA	9%
CA	8%
CO	6%
IL	6%
OH	6%
UT	5%
PA	5%
TX	5%
NY	3%

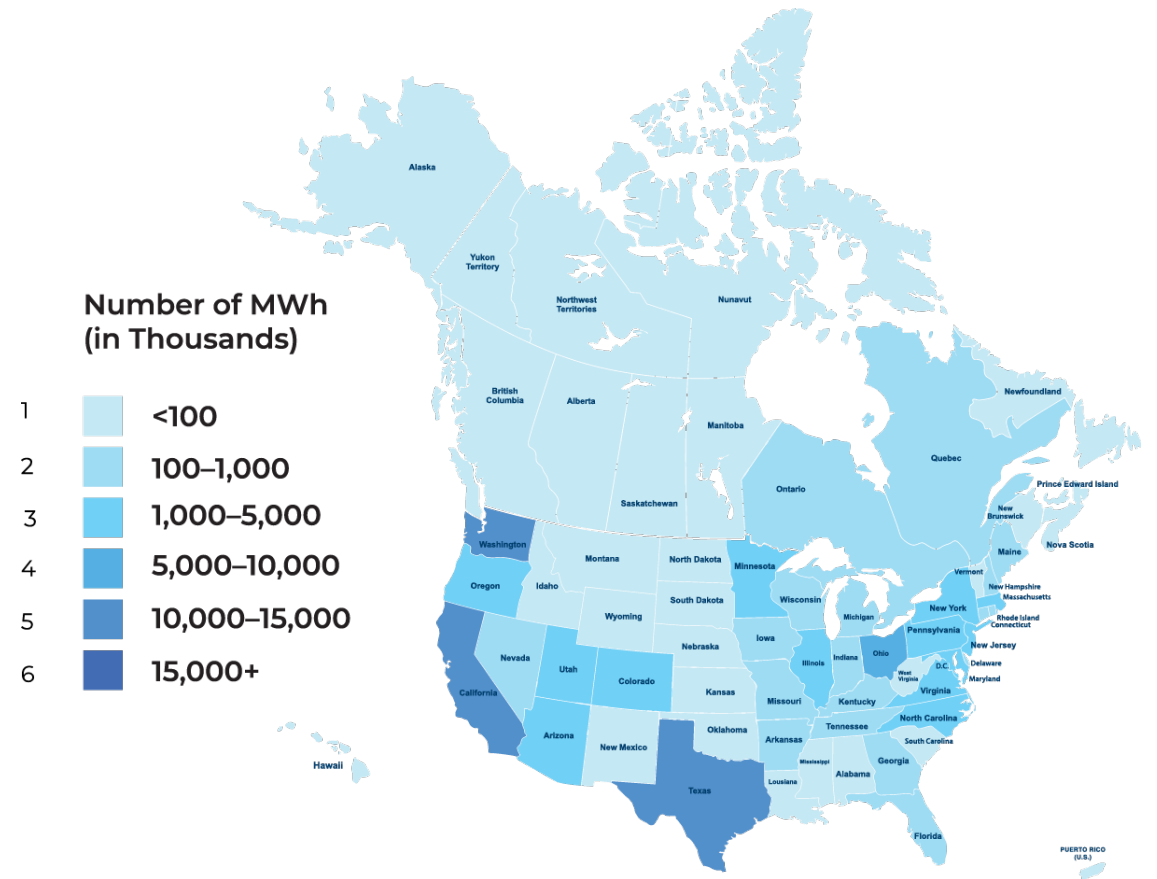
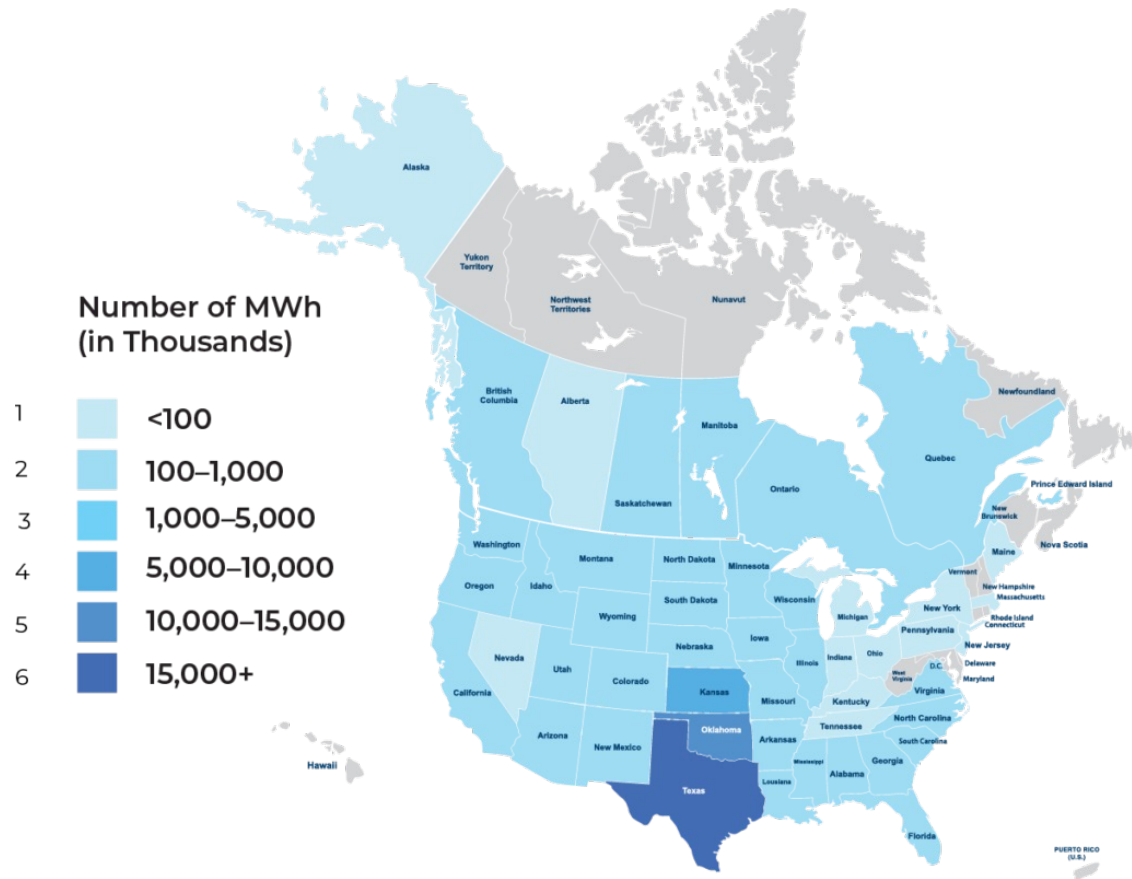
The states with the highest amount of customers tend to be in states with successful utility green pricing programs, showing the stability that utility programs can offer.

State/Province	% of Total
TX	39%
OK	15%
KS	8%
QC	5%
SD	4%
ND	3%
FL	2%
OR	2%
NE	2%
GA	2%

Top Ten States and Provinces Supplying Certified Retail Sales

The difference between states with generators versus purchasers of renewable energy demonstrates how the market for unbundled RECs is allowing customers with limited access to local renewable energy products to support changes in generation portfolios in the US and Canada.

Certified Sales (Left) and Supply (Right)



Contact.

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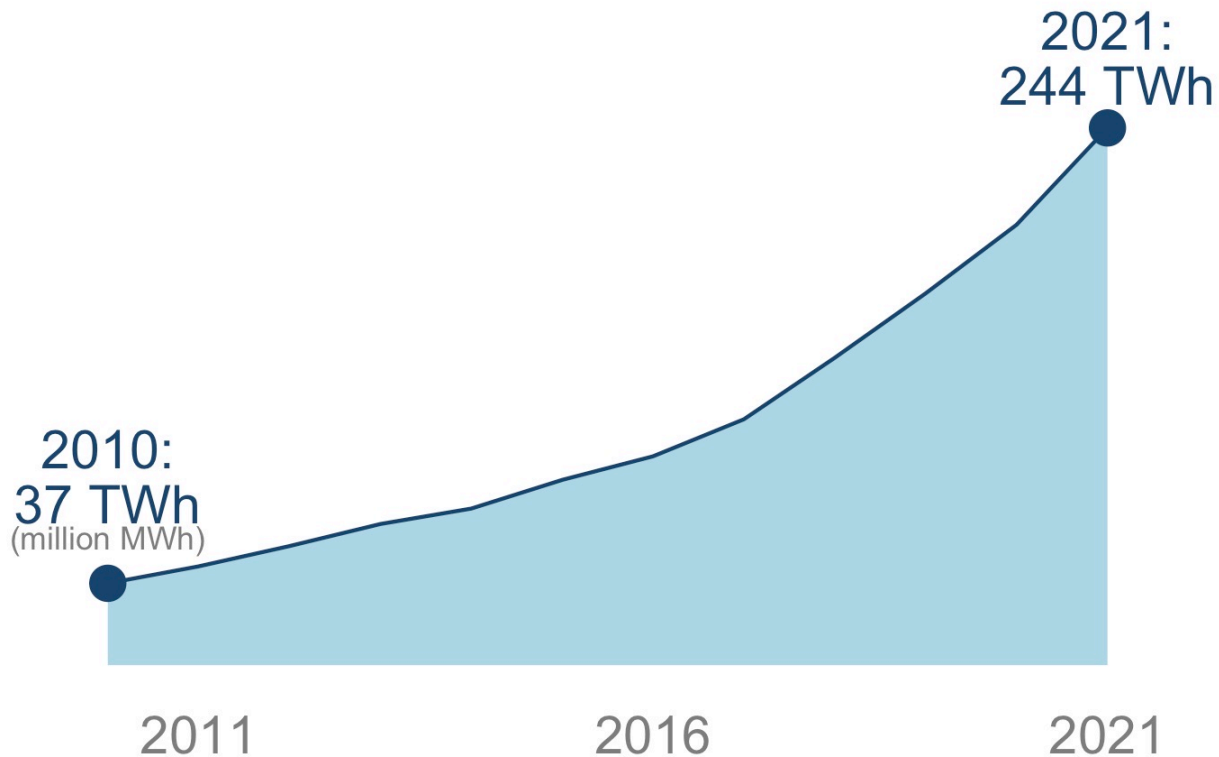


Status and Trends in the Voluntary Market (2021 data)

Jenny Heeter
Renewable Energy Markets Conference
September 15, 2022

Voluntary Market Context

In 2021, about **8 million customers** (8% increase y/y) procured about **244 million MWh** (22% increase y/y) of voluntary green power.



That represents about:

1 in 20

U.S. retail electricity customers

6%

of U.S. retail electricity sales

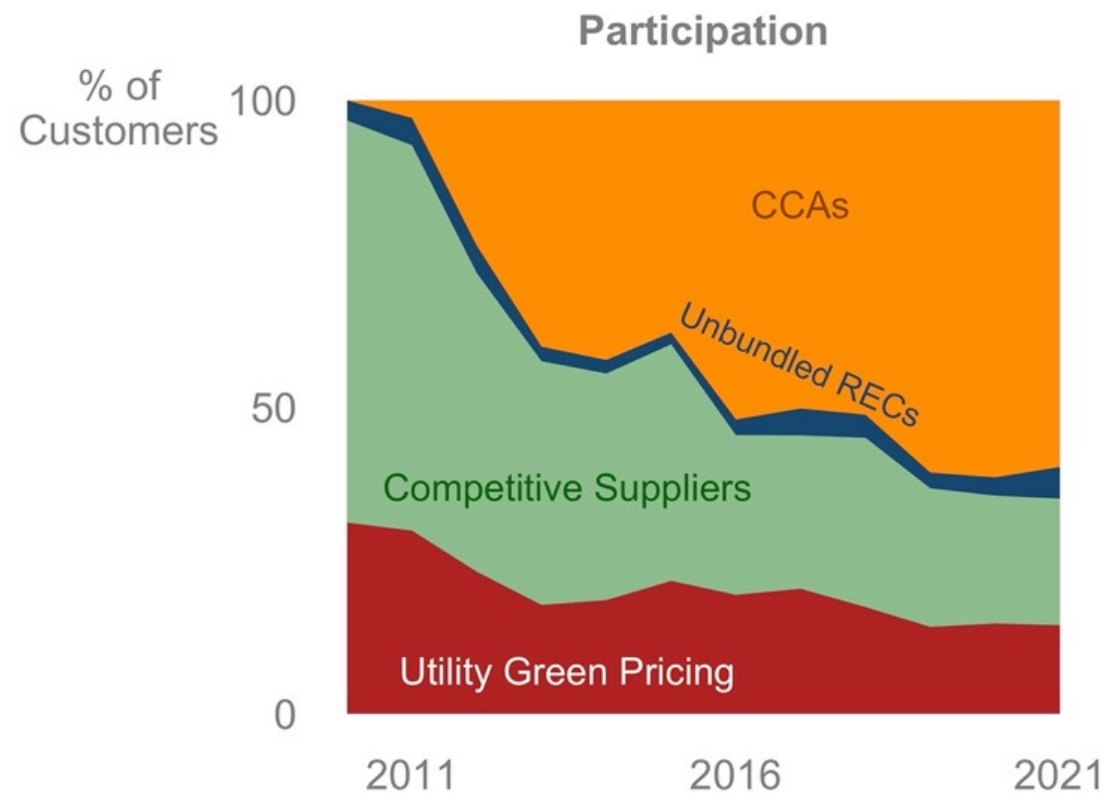
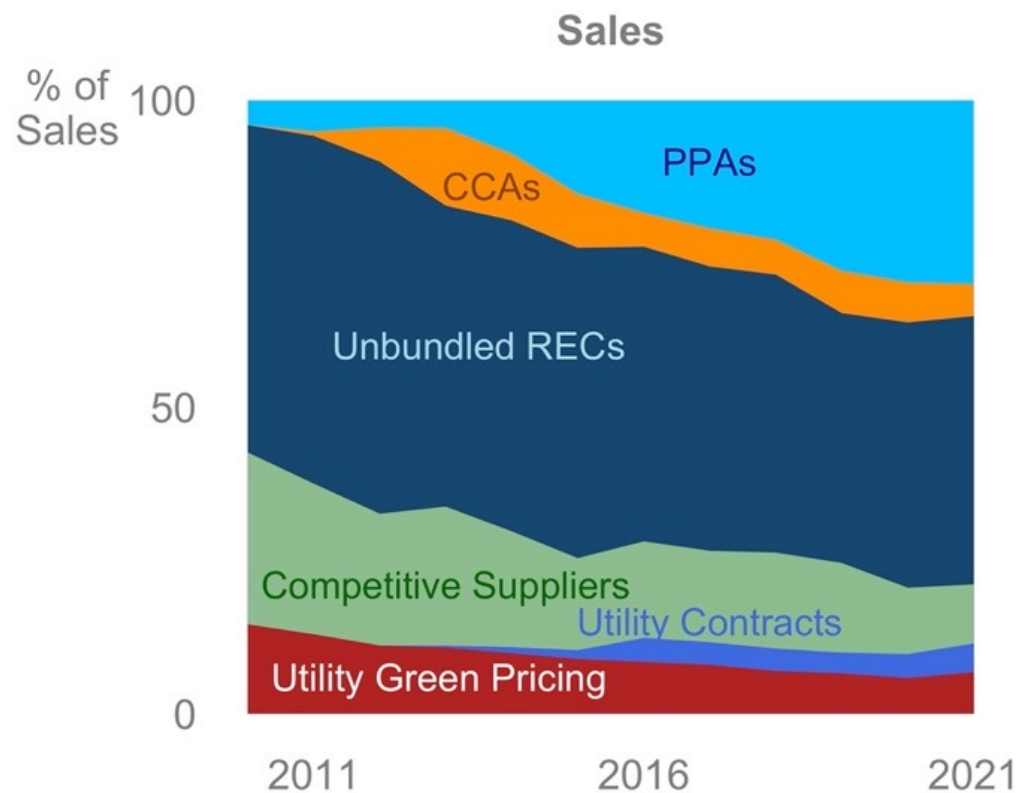
38%

of U.S. non-hydro renewable energy generation

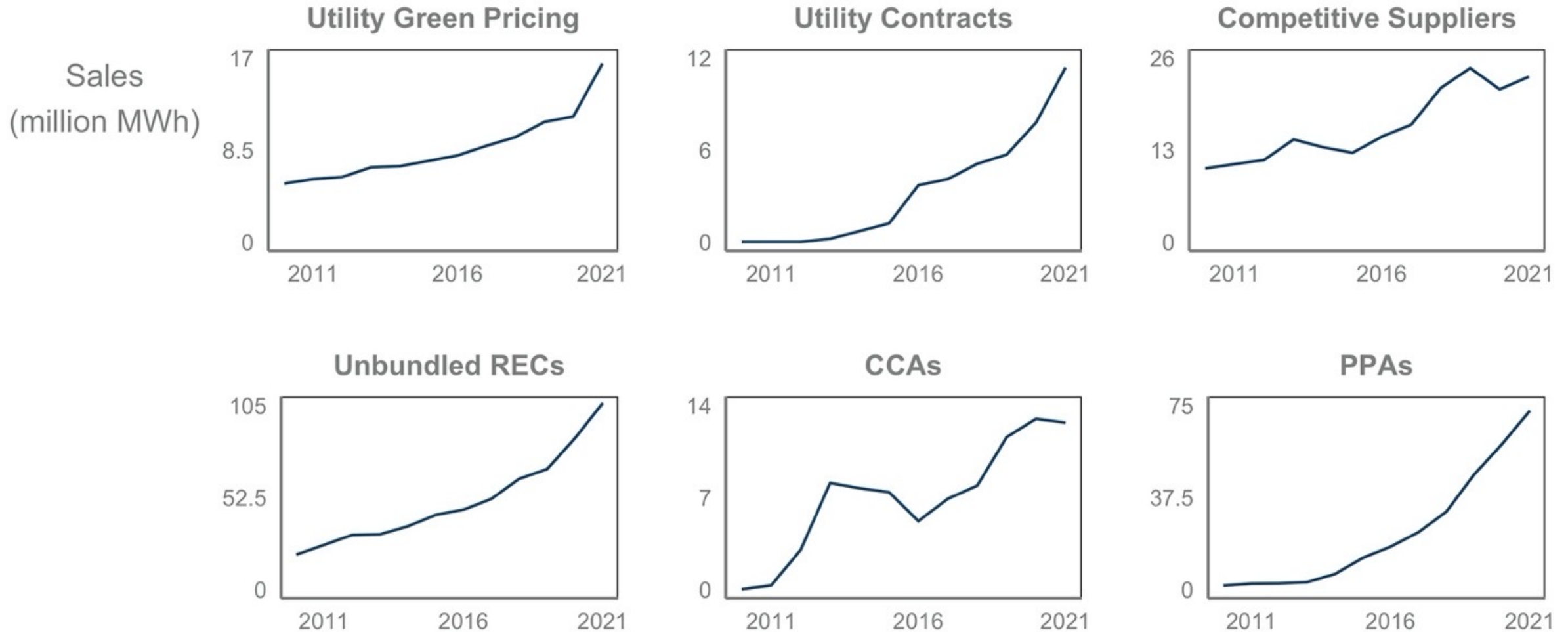
Total green power sales 2010-2021 (million MWh)

Green Power Sales and Customers by Mechanism

In 2021, the most voluntary sales were via unbundled RECs, while the most customers were via community choice aggregation (CCA) programs. Unbundled RECs purchases are dominated by C&I customers who purchase large volumes, while CCA customers are typically residential customers purchasing low volumes.



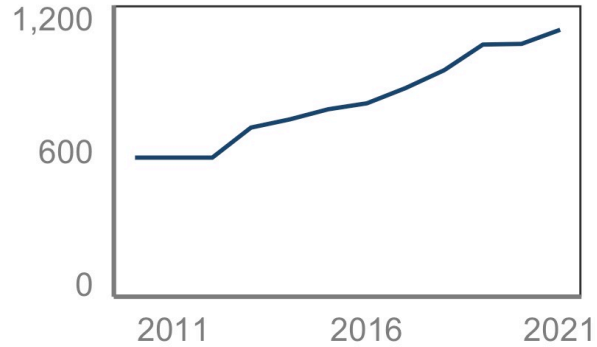
Voluntary Sales Continue to Increase



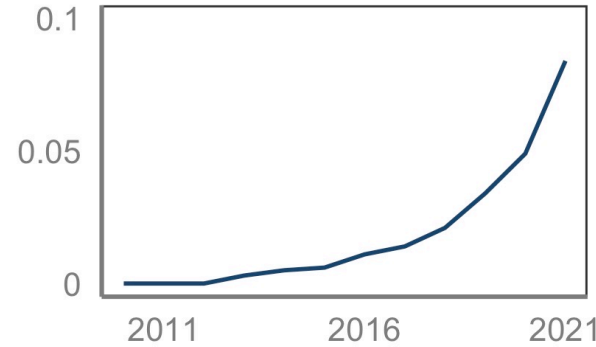
Voluntary Customers Grew in Most Market Segments

Customers
(x1,000)

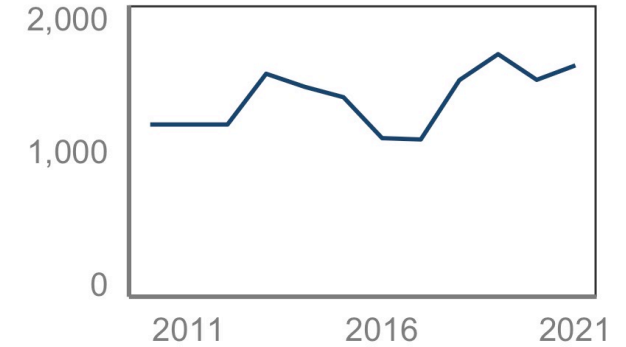
Utility Green Pricing



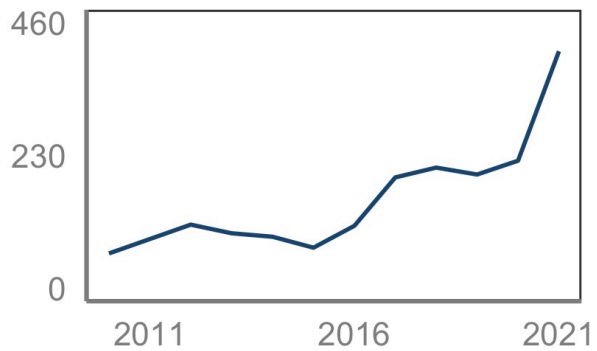
Utility Contracts



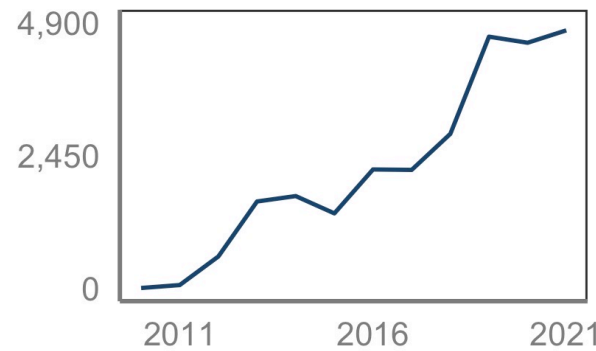
Competitive Suppliers



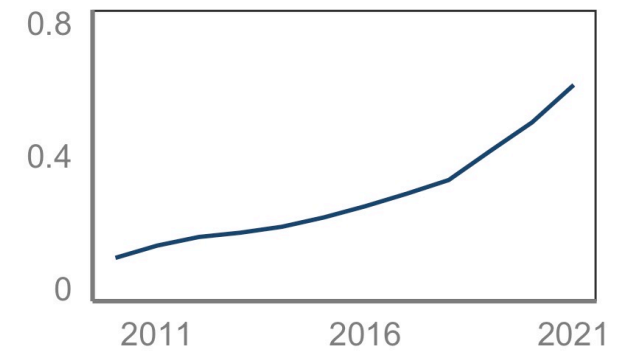
Unbundled RECs



CCAs



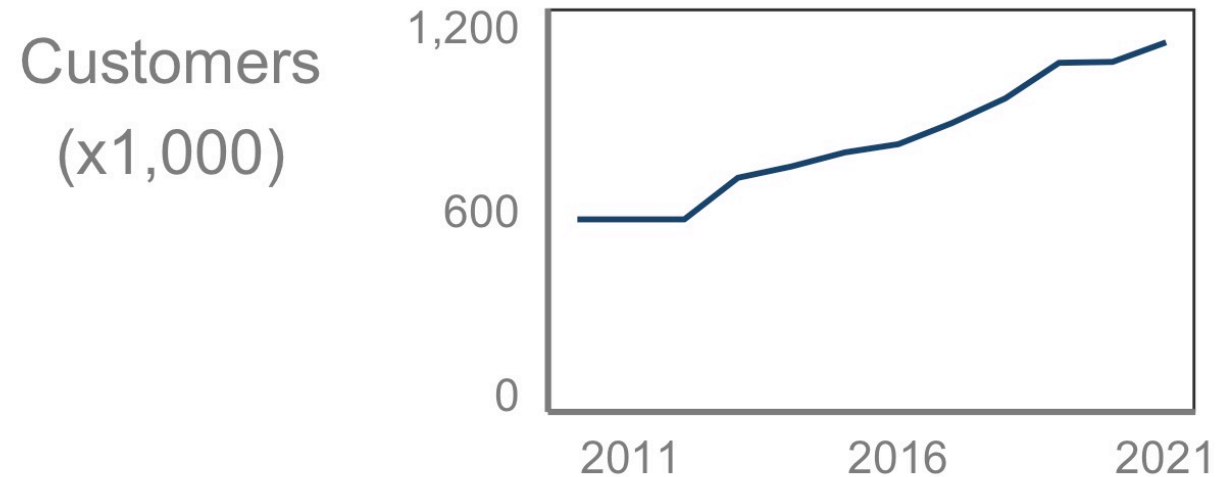
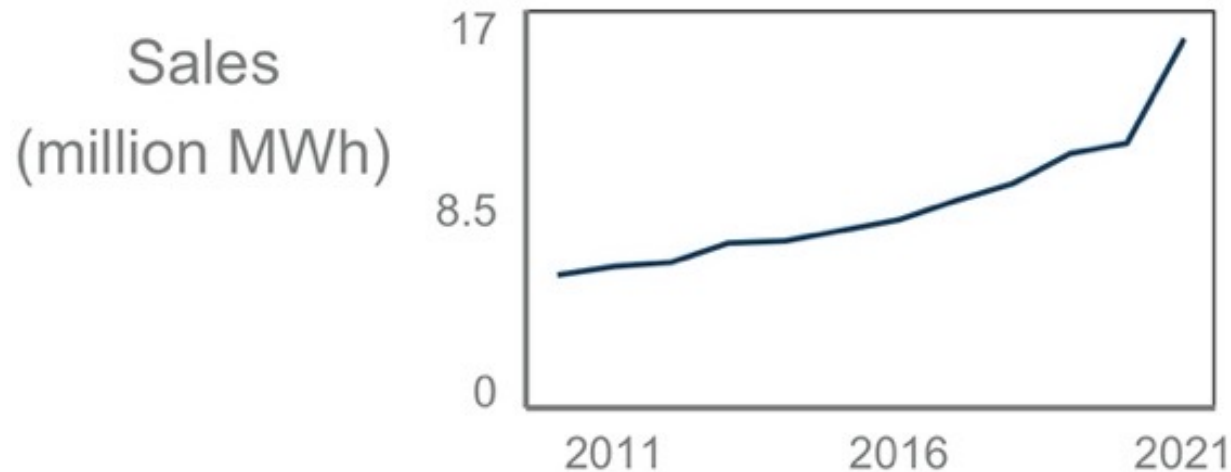
PPAs



Utility Green Pricing Trends

About **1.2 million customers** procured about **16.5 million MWh** of voluntary green power through utility green pricing programs in 2021.

The market recovered after a relatively flat year in 2021, increasing sales by 42% ('20-'21) compared to only 5% ('19-'20). While sales increased 42% ('20-'21), customers only increased by 6%, indicating that larger per-customer volumes are driving sales growth.



Large Pipelines of Utility Contracts Exist Across the Country

In 2021, utility contracts served 11.4 million MWh; nearly the size of the utility green pricing market. Sales increased 46% from 2020 and a substantial share of projects are in the pipeline.



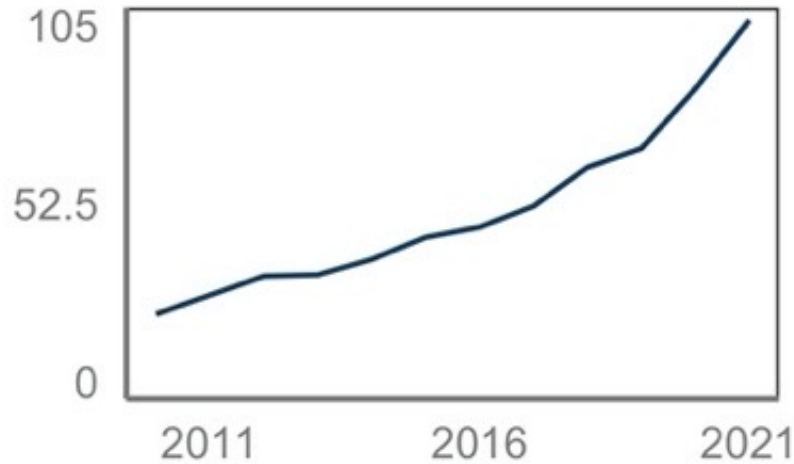
Unbundled RECs

Unbundled RECs represented **44% of total market sales** in 2021. Higher REC prices in 2021 did not translate into slower growth; the market grew 23% from 2020-2021, similar to growth trends in previous years.

Unbundled REC customers increased sharply in 2021, to more than 400k.

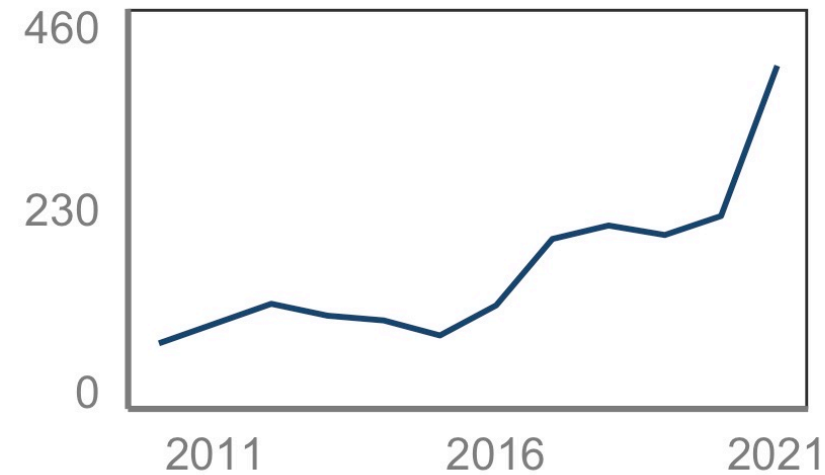
Unbundled RECs

Sales
(million MWh)



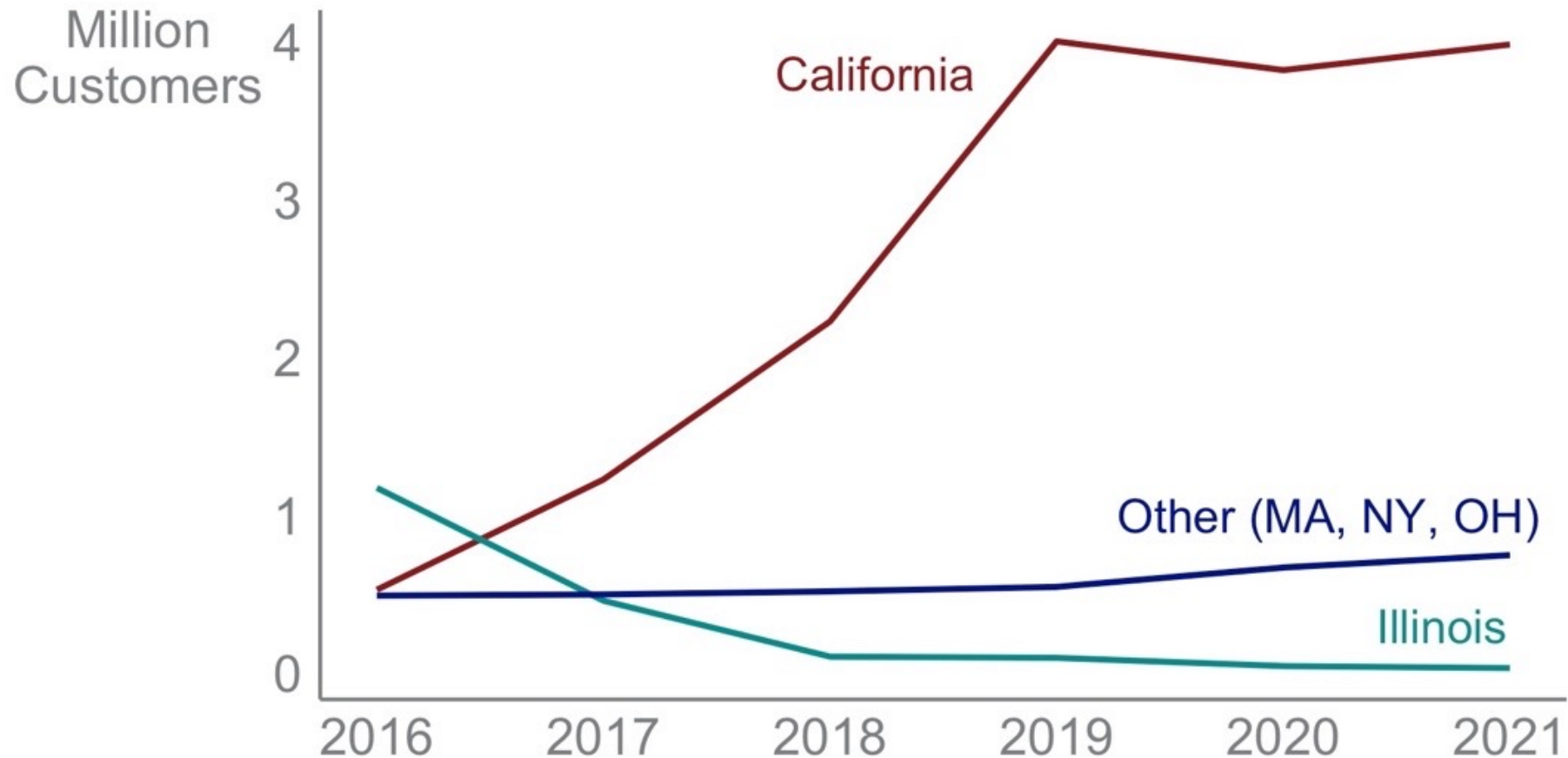
Customers
(x1,000)

Unbundled RECs



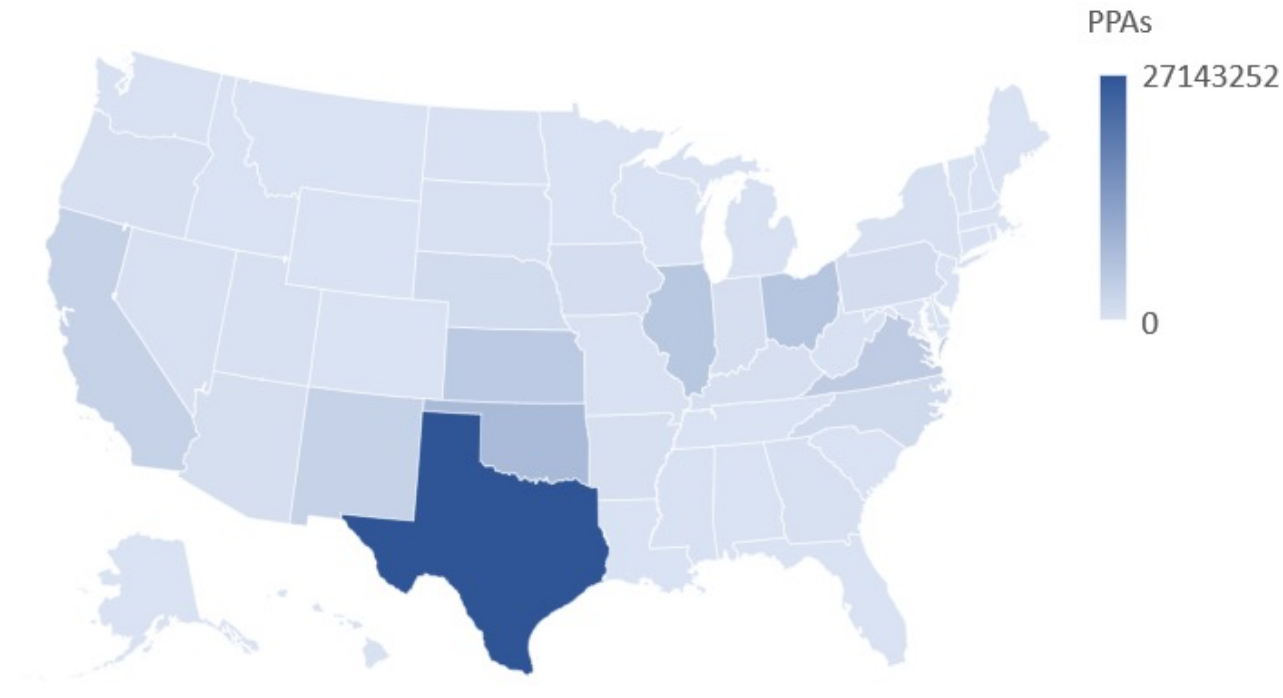
CCA Trends

About **4.8 million customers** procured about **12.8 million MWh** of voluntary green power through CCAs in 2021; largely the same as in 2020.



PPA Trends

- More than **600 oftakers** procured about **73.0 million MWh** of voluntary green power through PPAs in 2021.
- These figures include only PPA sales where we estimate that the purchaser has retained the RECs.
- Sales grew by around 23% from 2020 to 2021.
- Texas continues to dominate PPA supply, serving



2021 Summary Trends

- Market sales grew 22% and customers grew by 8% in 2021
- Unbundled REC purchasing represents 44% of market sales and continues to grow, despite higher prices than in previous years
- Community choice aggregation (CCA), which greatly expanded residential customer access, has flatlined in California, the leading CCA market
- Utility renewable contract (“green tariffs”) supply is similar in scale to green pricing, but far behind the power purchase agreement supply.

Other 2021 Trends

- **Purchasing:** Executive Order for federal purchasing: 100% carbon pollution-free electricity by 2030; 50% of that on a 24/7 basis
- **Disclosure:** SEC proposed climate-related disclosure requirements for public companies
- **Impact:** Increasing interest in purchasing with *social* impacts
- **New Focus Areas:** Renewable fuels (renewable natural gas, green hydrogen), international procurement, supply chain products

Additional NREL Resources

Find additional resources, including our data files, at the NREL Voluntary Green Power Procurement landing page:

www.nrel.gov/analysis/green-power.html

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State of the North American RNG Market



An Overview of Renewable Gas Procurement

PRESENTED BY: Sam Lehr

14.09.2022



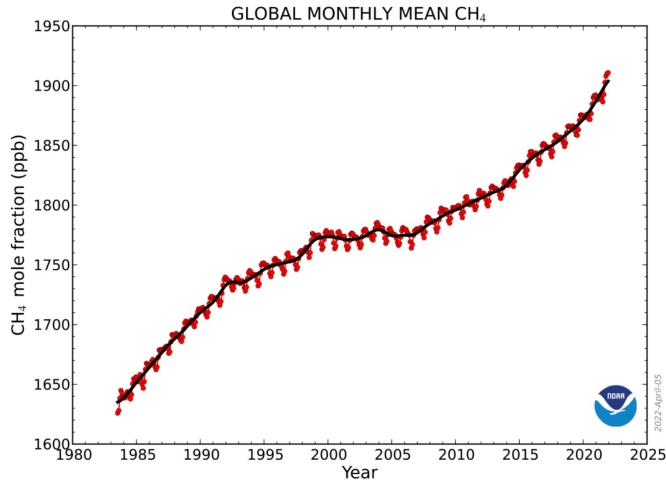
About the RNG Coalition

- The leading advocacy and education voice for RNG in North America
- We advocate for the sustainable development, deployment and utilization of renewable natural gas so that present and future generations will have access to domestic, renewable, clean fuel and energy
- 350+ members including: RNG developers, marketers, financiers, technology providers, consultants, utilities and labor coming together
- 98%+ of the RNG supply in North America

RNG Captures Methane from Organic Waste and Puts it to Productive Use

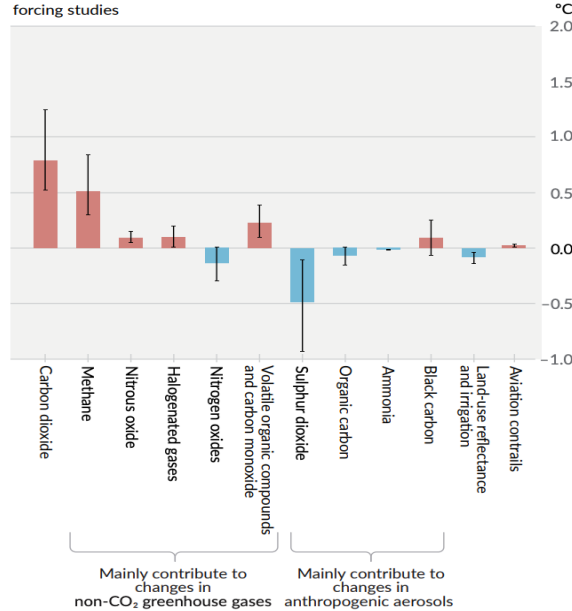


Intergovernmental Panel on Climate Change (IPCC) Says that Reducing Methane is a Critical Near-term Climate Strategy



CH4 trend: This graph shows globally-averaged, monthly mean atmospheric methane abundance determined from marine surface sites since 1983. Values for the last year are preliminary. (NOAA Global Monitoring Laboratory)

(c) Contributions to 2010–2019 warming relative to 1850–1900, assessed from radiative forcing studies



- Methane in the atmosphere continues to grow rapidly
- Second most impactful greenhouse gas (GHG) after carbon dioxide (CO₂)
- Methane is short-lived (relative to CO₂) but has a very strong warming impact (80x) in the first 20 years
- Sectors producing the largest methane emissions globally: fossil fuel production and distribution, agriculture and waste management

Organic Waste-to-X



Thermal



Transportation



Electricity

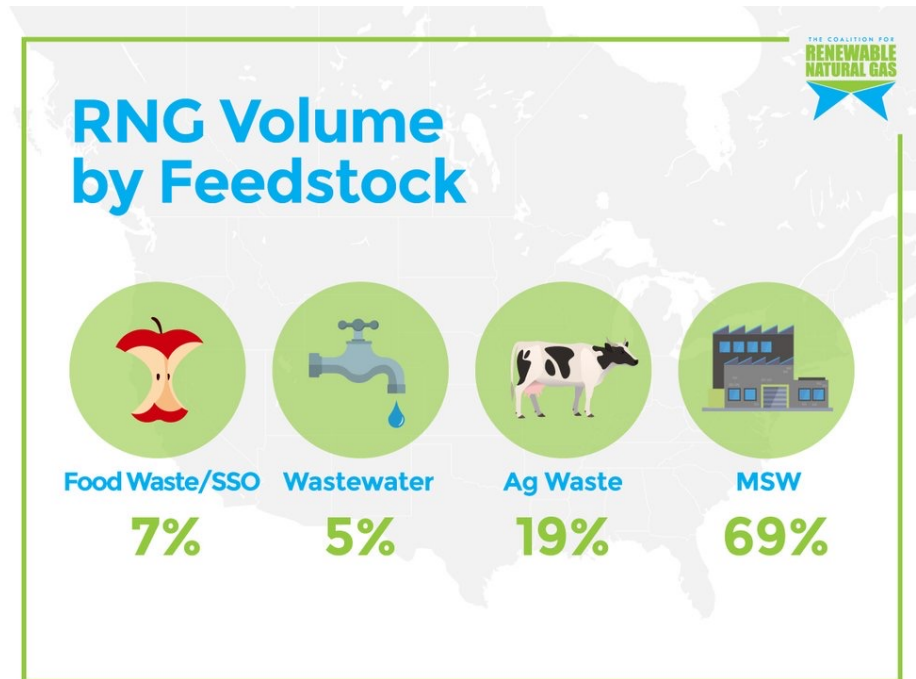


Hydrogen



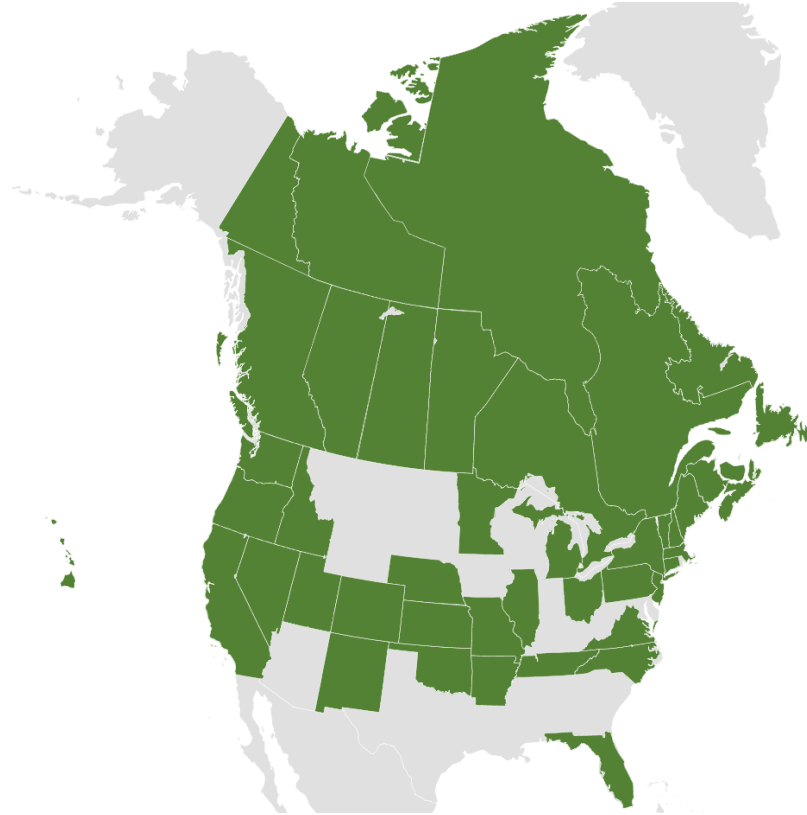
Bio-based Products

Where Does RNG Come From Today?





Status of Procurement Policy



RNG at a Glance:

- Mandatory, voluntary, and other enabling policies in 44 states and provinces
- 94.8 tBtu/yr production capacity
- 82.7 tBtu/yr planned
- 1,425.3 – 4,300 tBtu/yr from AD achievable by 2040

Low Carbon/Clean Fuel Standards Continue to Expand, Existing Programs Focusing on Increases in Ambition

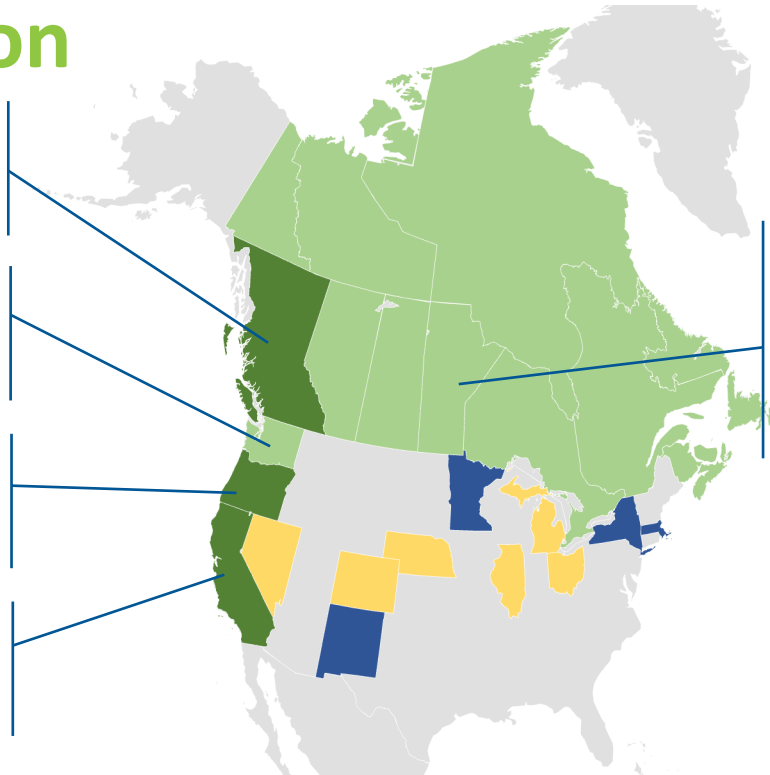


BC: Committed 30% by 2030 (from 2010)

WA: Examining up to 20% by 2034 (from 2017)

OR: Examining 20% by 2030, 37% by 2035 (from 2015)

CA: Examining at least 25% by 2030, 54% by 2035 (from 2010)

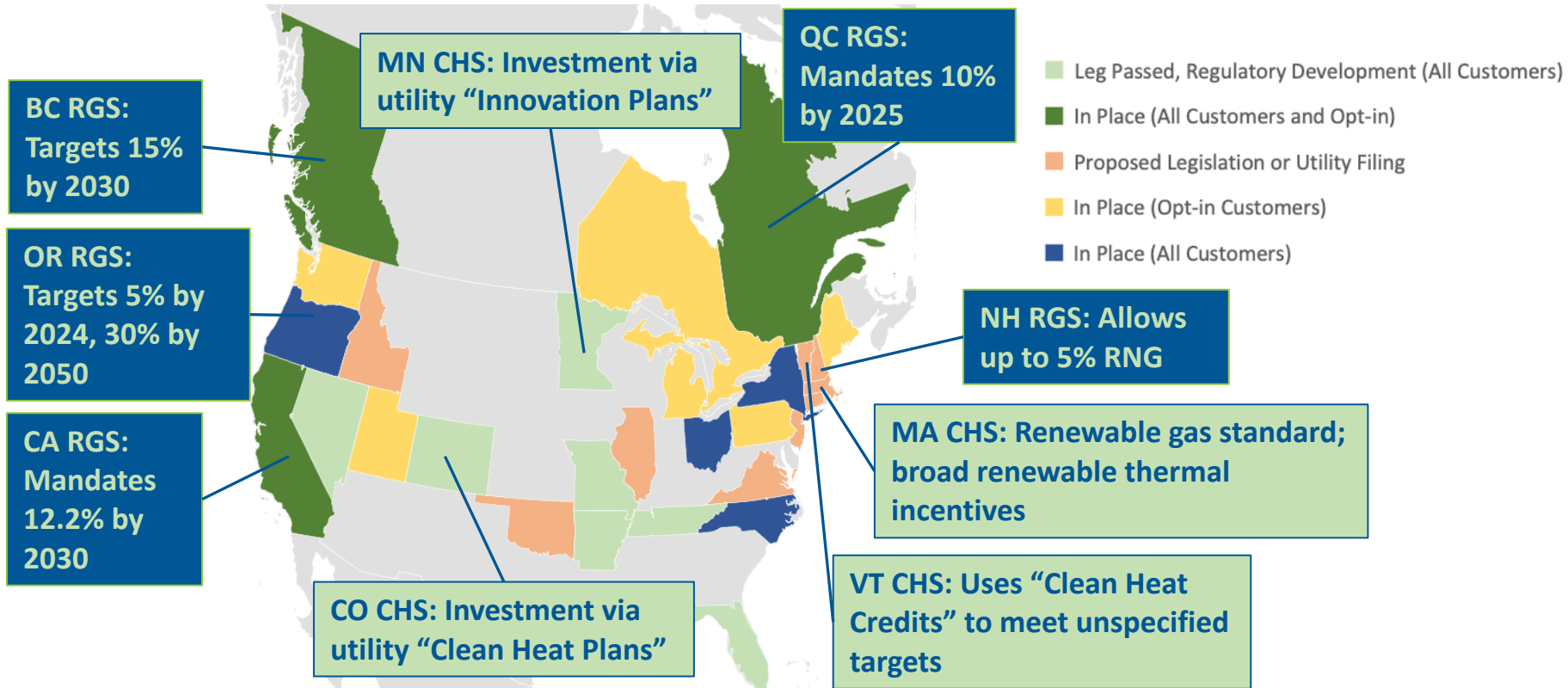


CAN: Examining 15% by 2030 (from 2016)

- Legislation Introduced
- Regulatory Development
- In Place
- Under Study

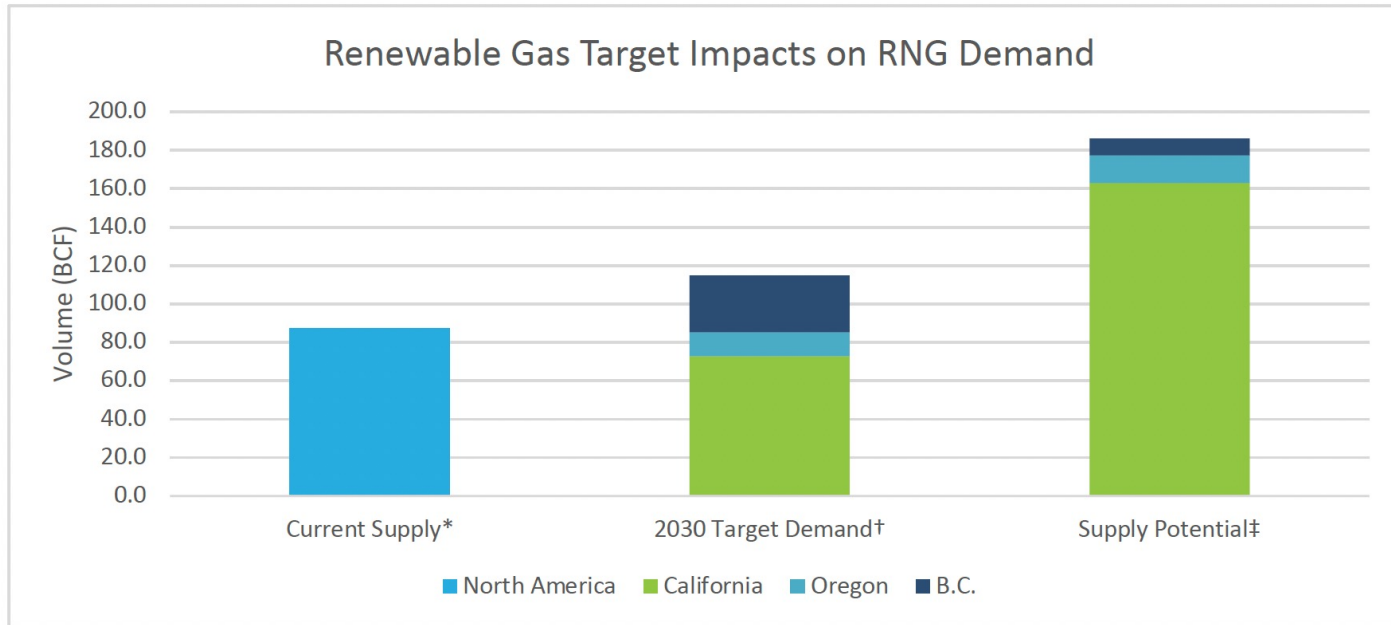


Renewable Gas and Clean Heat Standards





RNG Demand in CA, OR, and BC





Inflation Reduction Act

Contains beneficial tax policies advocated for by RNG Coalition:

- Biogas property, including cleaning and conditioning equipment, as qualifying equipment for purposes of the Section 48 energy credit
- Extension of \$.50 alternative fuel tax credit
- New clean hydrogen tax credit that allows for the use of RNG as a qualifying feedstock
- 45Q carbon oxide sequestration credit



Broad Considerations

- Circular Economy – Recycling resources to create a circular economy
- Sustainability – How can RNG production facilities be used to facilitate broader change?
- Carbon Neutrality/Negativity – Eye toward full carbon neutrality across production and use through 100% clean energy inputs, use of carbon capture and storage
 - See Argonne National Lab's GREET Model
- GHG Accounting Standards – Must align with existing programs and purchasing practices for renewable energy



Speaker Info

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