NREL
Transforming ENERGY

Status and Trends in the Voluntary Market (2019 data)

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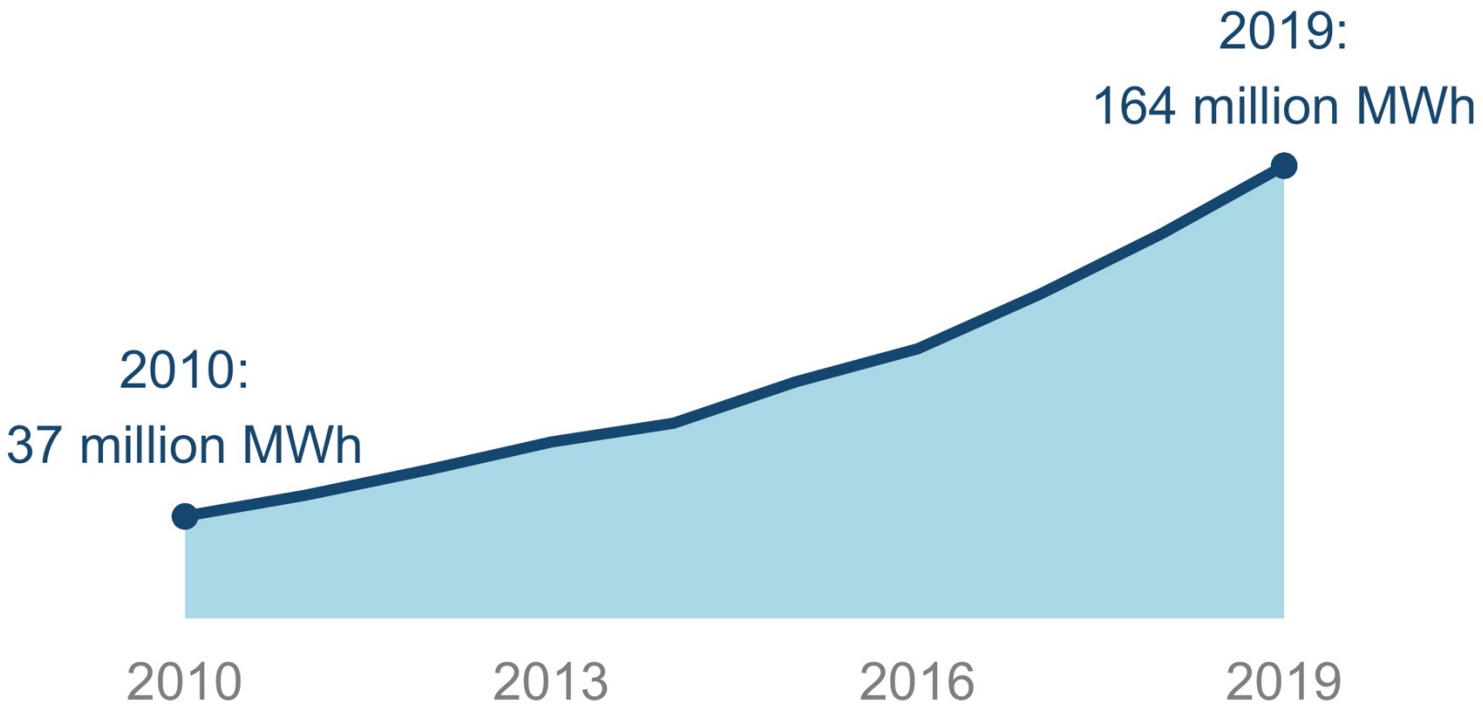
State of the Voluntary Green Power Market
Green Power Partnership Webinar
January 28, 2021

The Big Picture

In 2019, about **7.8 million customers** procured about **164 million MWh** of renewable energy through green power markets.



Total green power sales 2010-2019 (million MWh)

That represents about:

1 in 20
U.S. retail electricity customers

4%
of U.S. retail electricity sales

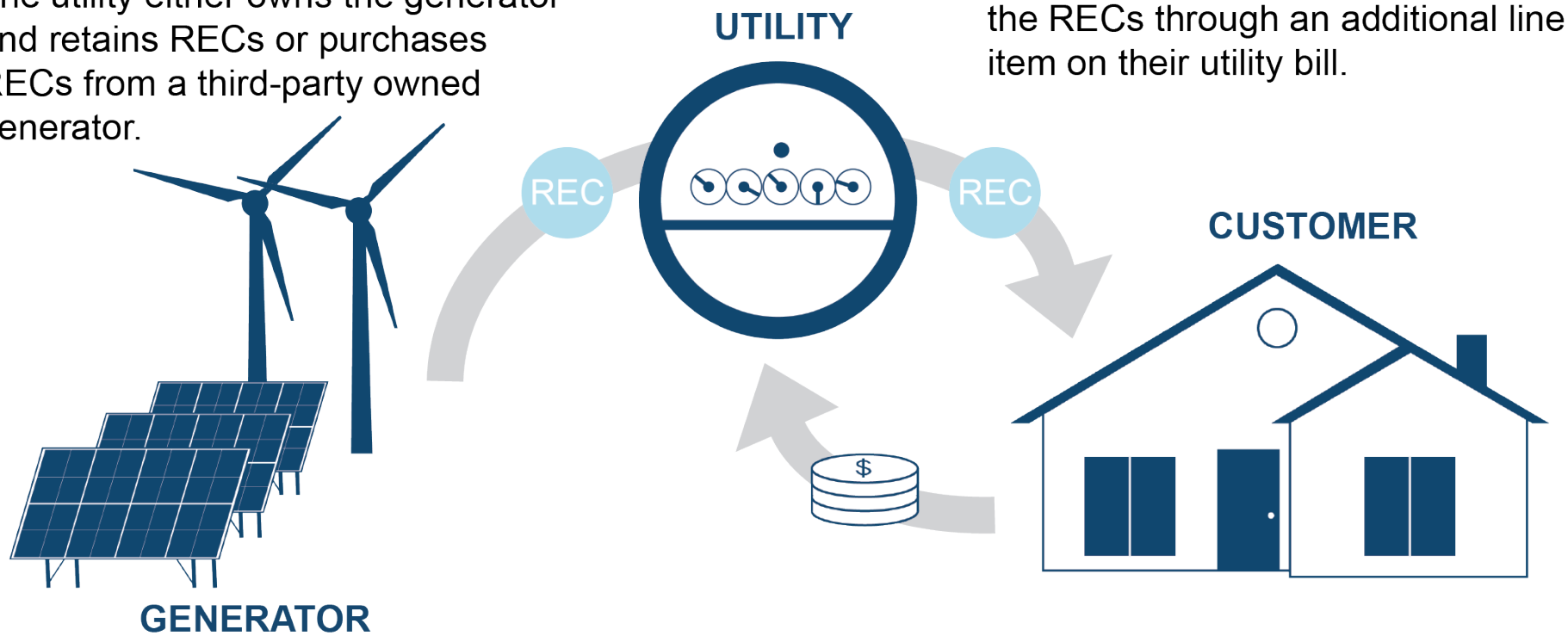
32%
of U.S. non-hydro renewable energy generation

Voluntary Market Trends by Market Segment

Utility Green Pricing

Utility green pricing programs begin with a renewable energy generator. The utility either owns the generator and retains RECs or purchases RECs from a third-party owned generator.

The utility retires the RECs on behalf of green pricing customers, who pay for the RECs through an additional line item on their utility bill.

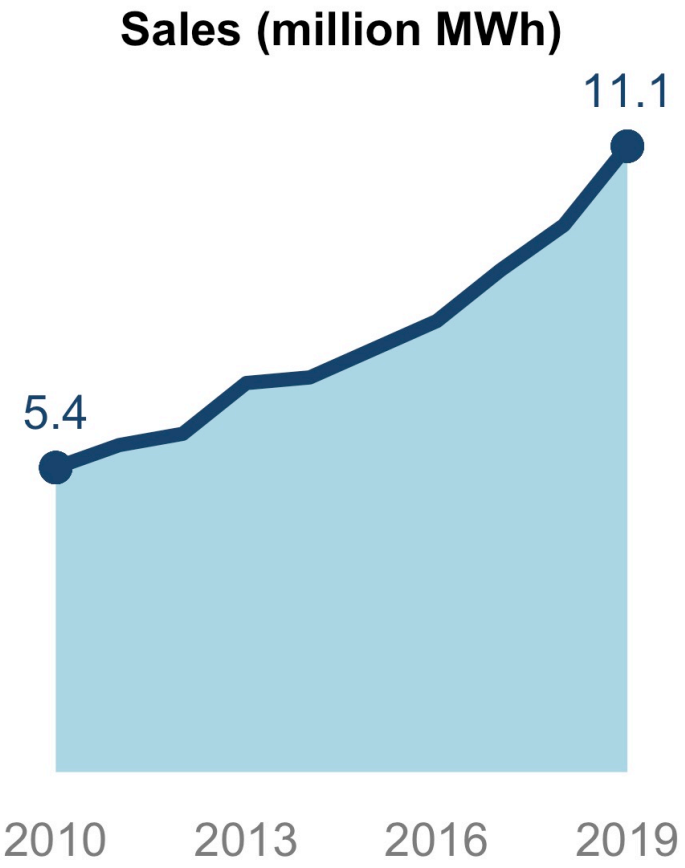


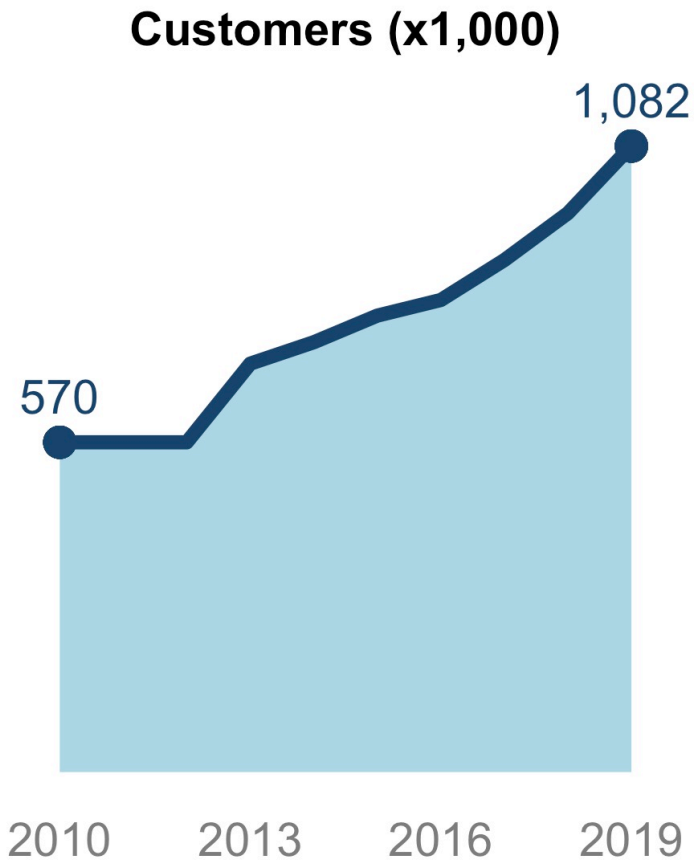
Basic utility green pricing program structure

Specific program structures vary

Utility Green Pricing Trends

About **1,082,000 customers** procured about **11.1 million MWh** of renewable energy through utility green pricing programs in 2019. According to NREL's estimates, 2019 marks the first year where more than 1 million customers participated in utility green pricing programs.





Utility Green Power Programs are Diversifying

Premium Products

- Utility green pricing programs have evolved significantly over the past decade.
- Many utilities now offer multiple products with different characteristics, including "premium" products derived from local solar.
- Premium products have been popular despite their higher costs.

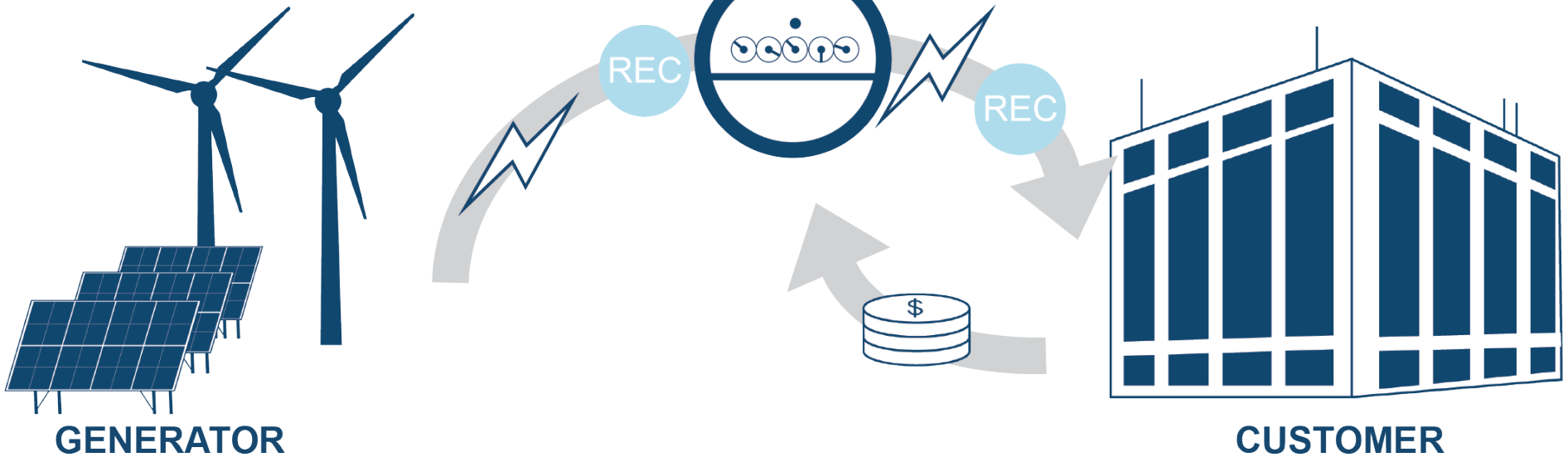
Community Renewables

- Several utilities have begun to offer community solar and community wind products where subscribers receive the RECs associated with their projects.
- In 2019, we estimate that about 13,000 customers bought about 430,000 MWh from these utility-led community renewables programs. For simplicity, we have included these estimates in the utility green pricing category.

Utility Renewable Contracts

In a utility renewable contract, the customer enters into a contract with the utility to procure power and RECs from a renewable energy provider. Unlike green pricing programs, the customer may be able to specify the resource for the product.

The utility provides the power and RECs to the customer. The customer continues to pay the utility with a modified green tariff or bilateral contract rate.

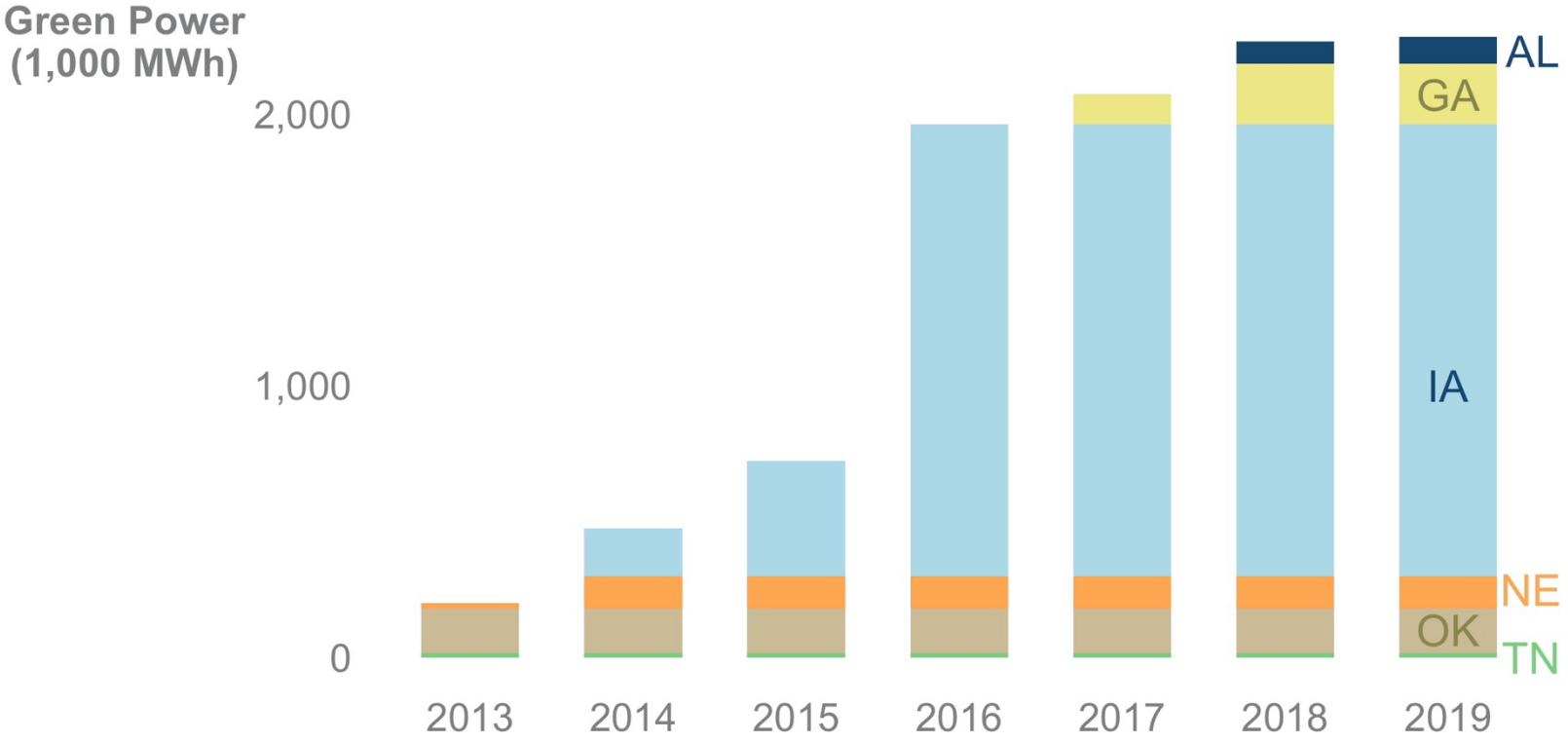


Basic utility renewable contract structure

Specific program structures vary

Bilateral Contracts

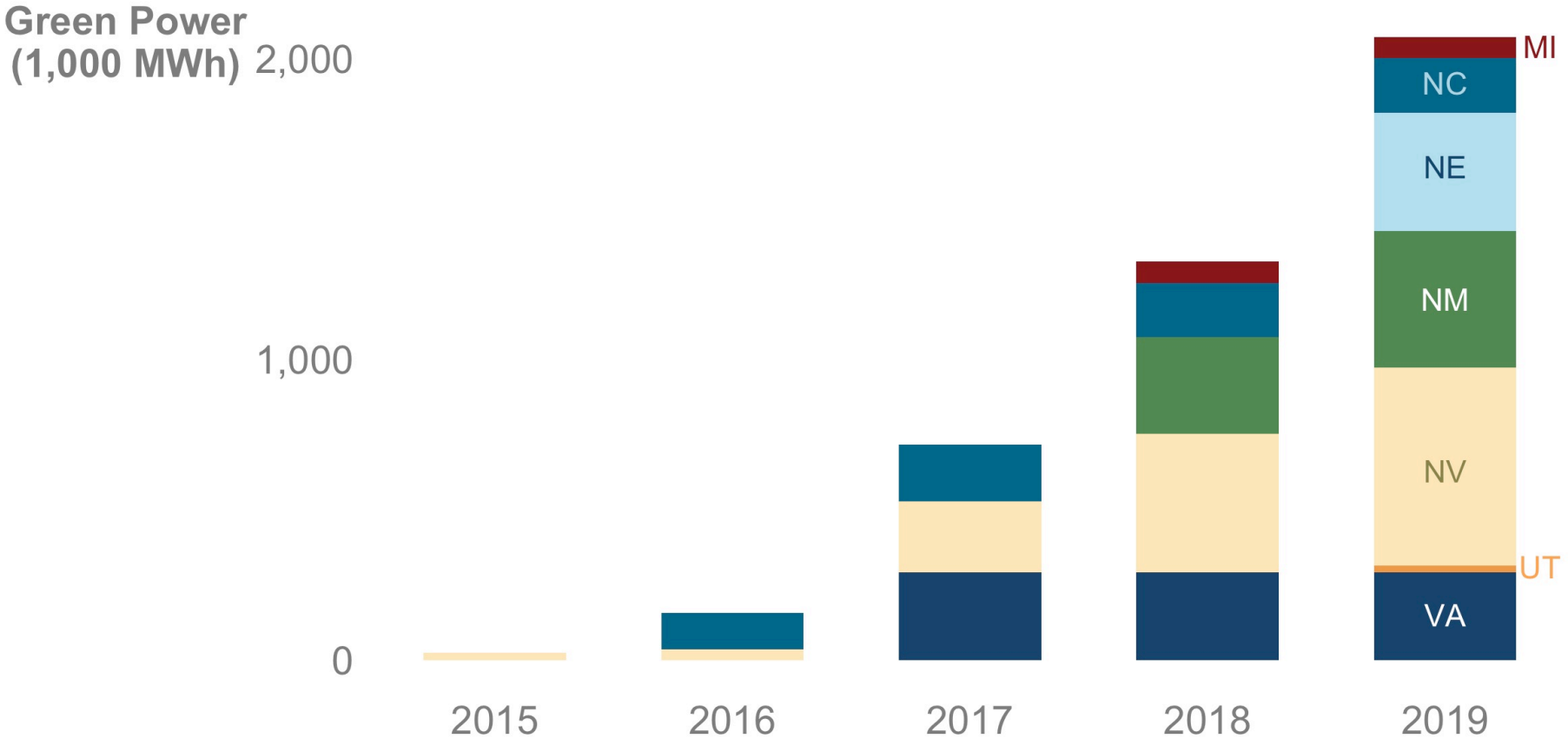
About 1,280 MW of green power capacity had been procured through bilateral contracts through the end of 2019, generating around 2.3 million MWh of green power in 2019.



Green power sales through bilateral contracts, 2013-2019

Utility Green Tariffs

About 3,600 MW of green power capacity had been procured through utility green tariffs by the end of 2019, generating around 2.1 million MWh in 2019.

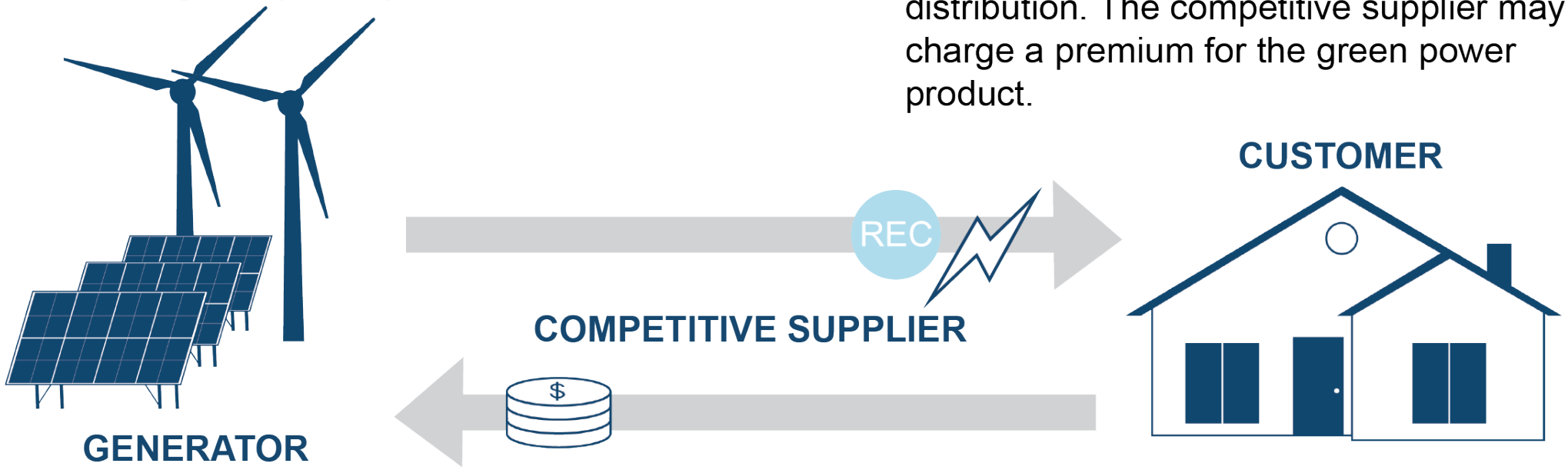


Green power sales through utility green tariffs, 2015-2019

Competitive Suppliers

In restructured electricity markets, customers may choose a competitive electricity supplier that offers a green power product.

The competitive supplier provides the customer with power and RECs. The utility remains responsible for transmission and distribution. The competitive supplier may charge a premium for the green power product.

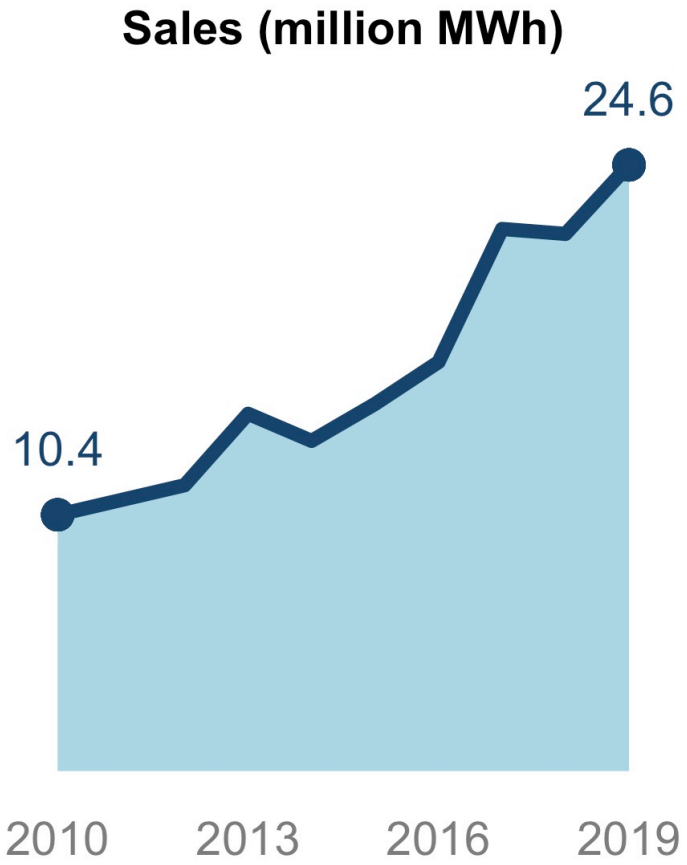


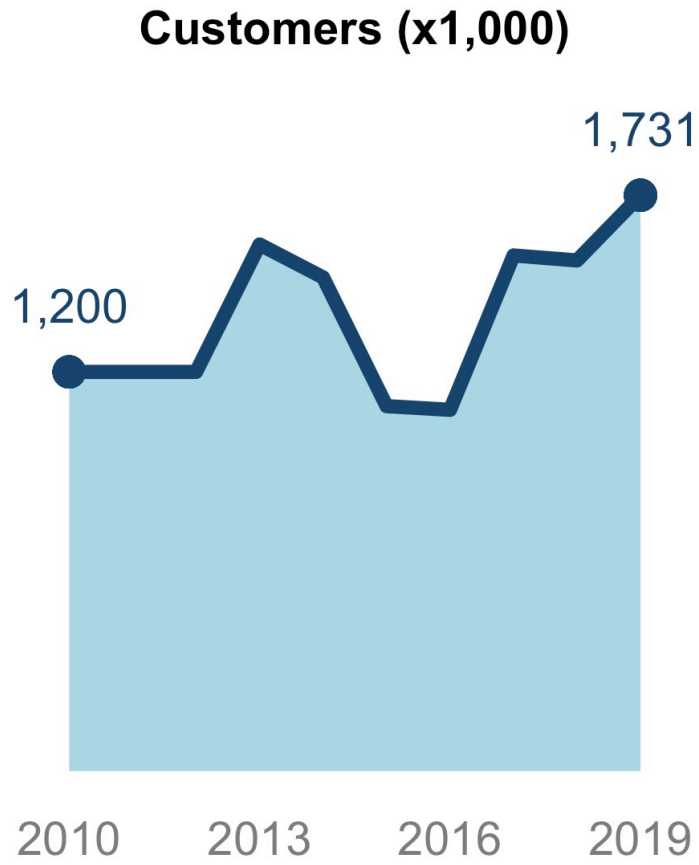
Basic competitive supplier sales structure

Specific program structures vary

Competitive Supplier Trends

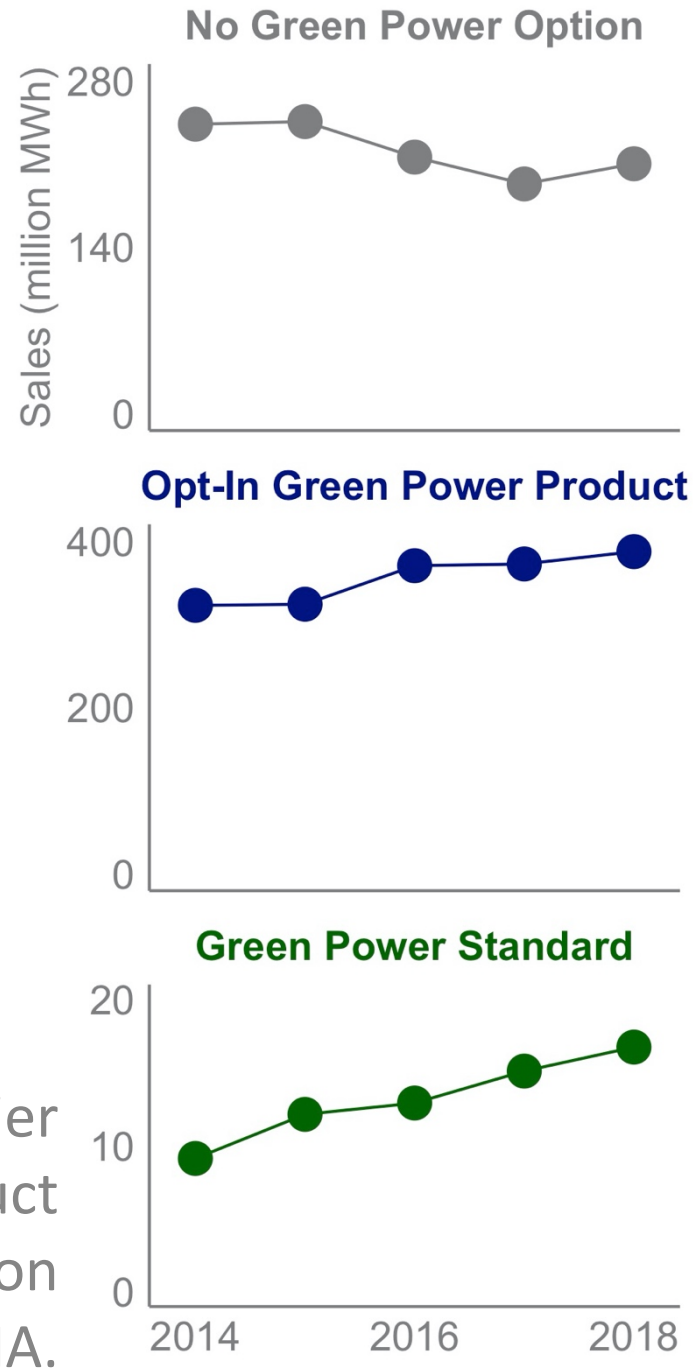
About **1.7 million customers** procured about **24.6 million MWh** of renewable energy through competitive suppliers in 2019.





Increasing Interest in Green Supplier Products?

- Available data suggest that competitive suppliers offering green power products as their standard options have increased sales more rapidly than other suppliers in recent years.*
- These trends could suggest that customers are switching more frequently to suppliers that offer opt-in or default green power products.



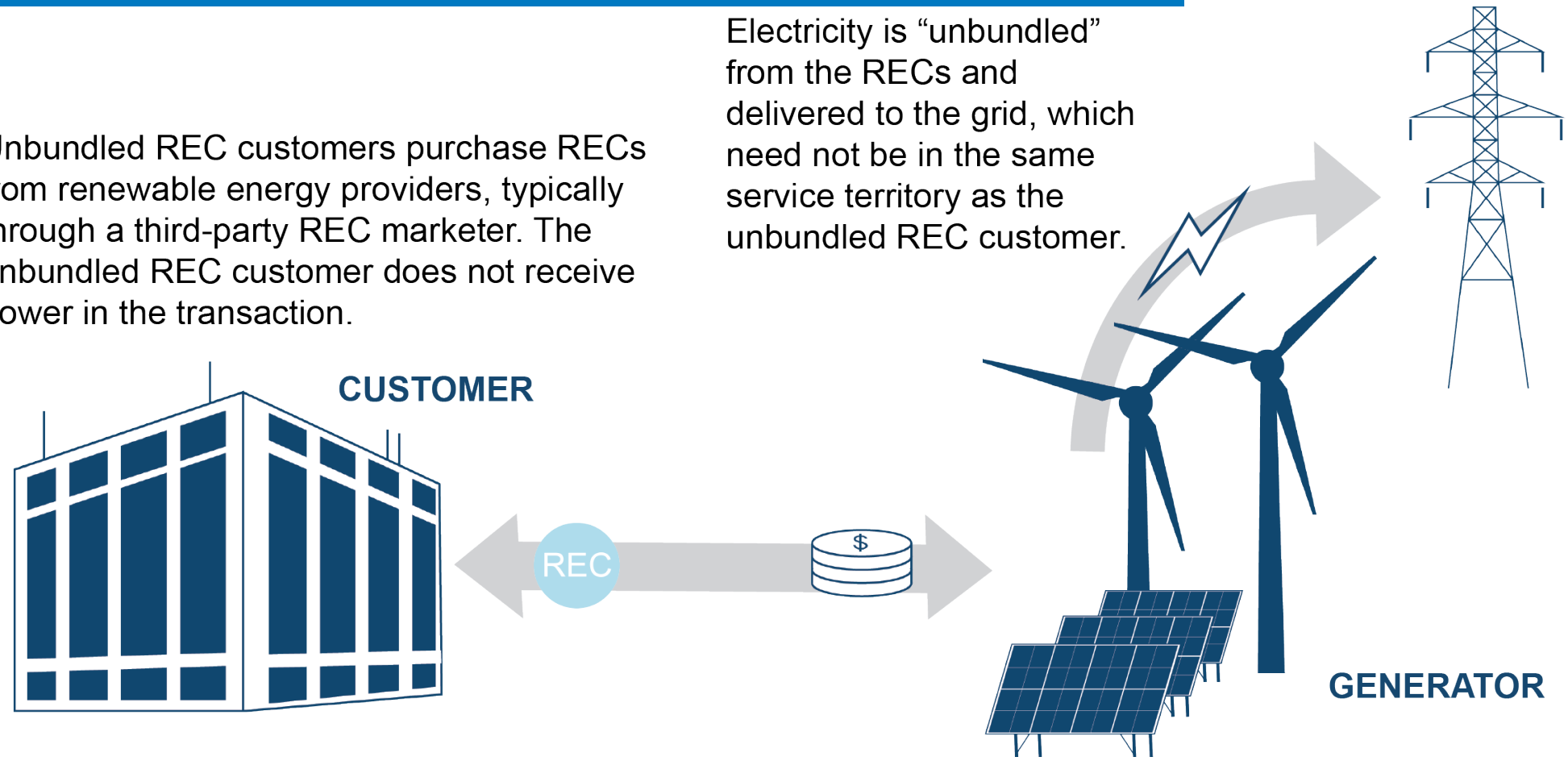
Total competitive supplier sales by supplier product types, 2014-2018, based on data from the U.S. EIA.

* Based on data from U.S. Energy Information Administration. EIA data are lagged each year, so that NREL's estimates are similarly lagged. The increase in estimated green power sales from 2018 to 2019 largely reflects the increase in competitive supplier sales in the EIA data from 2017 to 2018, as depicted in the bottom pane of the figure on this slide.

Unbundled RECs

Unbundled REC customers purchase RECs from renewable energy providers, typically through a third-party REC marketer. The unbundled REC customer does not receive power in the transaction.

Electricity is “unbundled” from the RECs and delivered to the grid, which need not be in the same service territory as the unbundled REC customer.

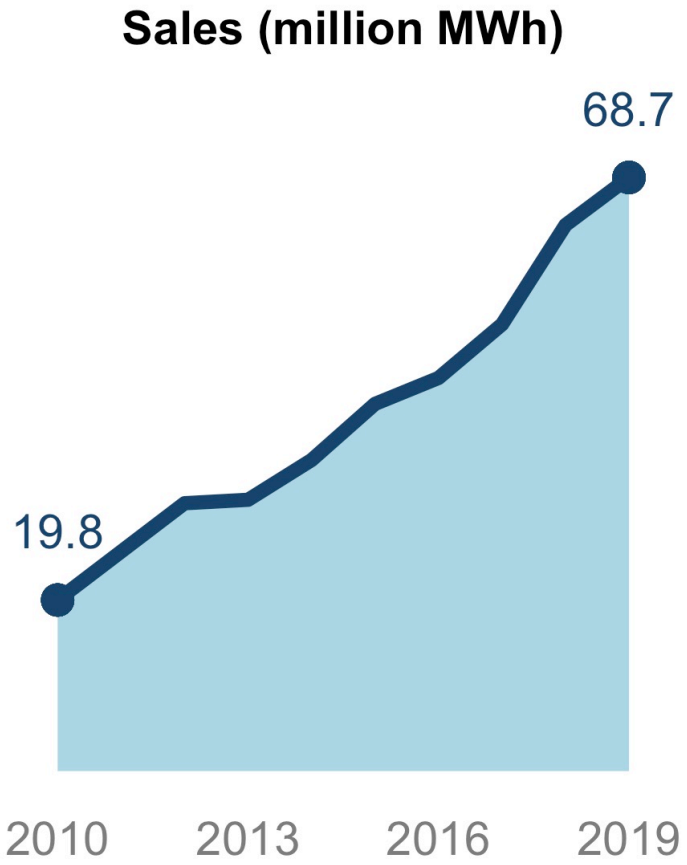


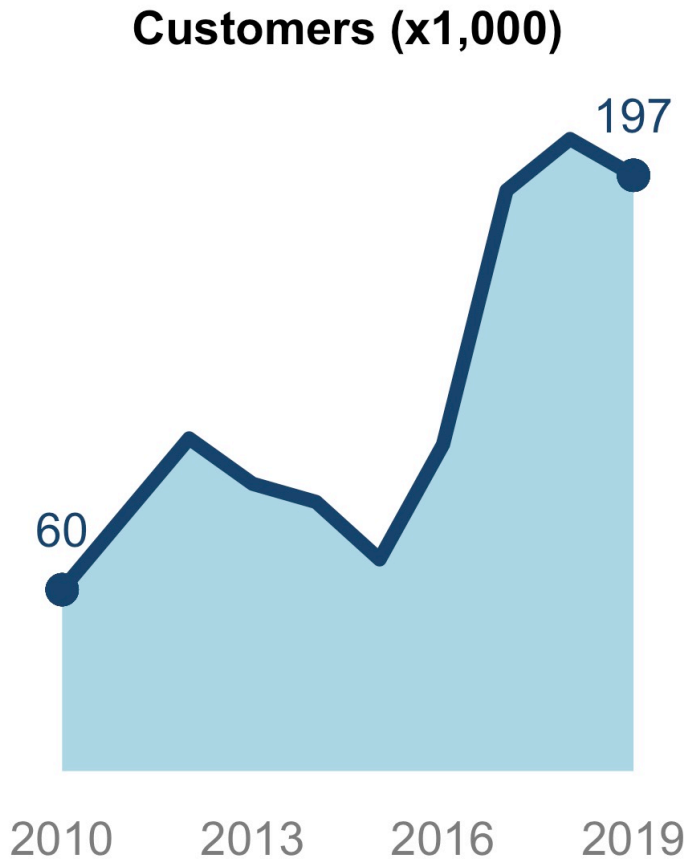
Basic unbundled RECs sales structure

Specific program structures vary

Unbundled RECs

About **197,000 customers** procured about **68.7 million MWh** of renewable energy through unbundled RECs in 2019.

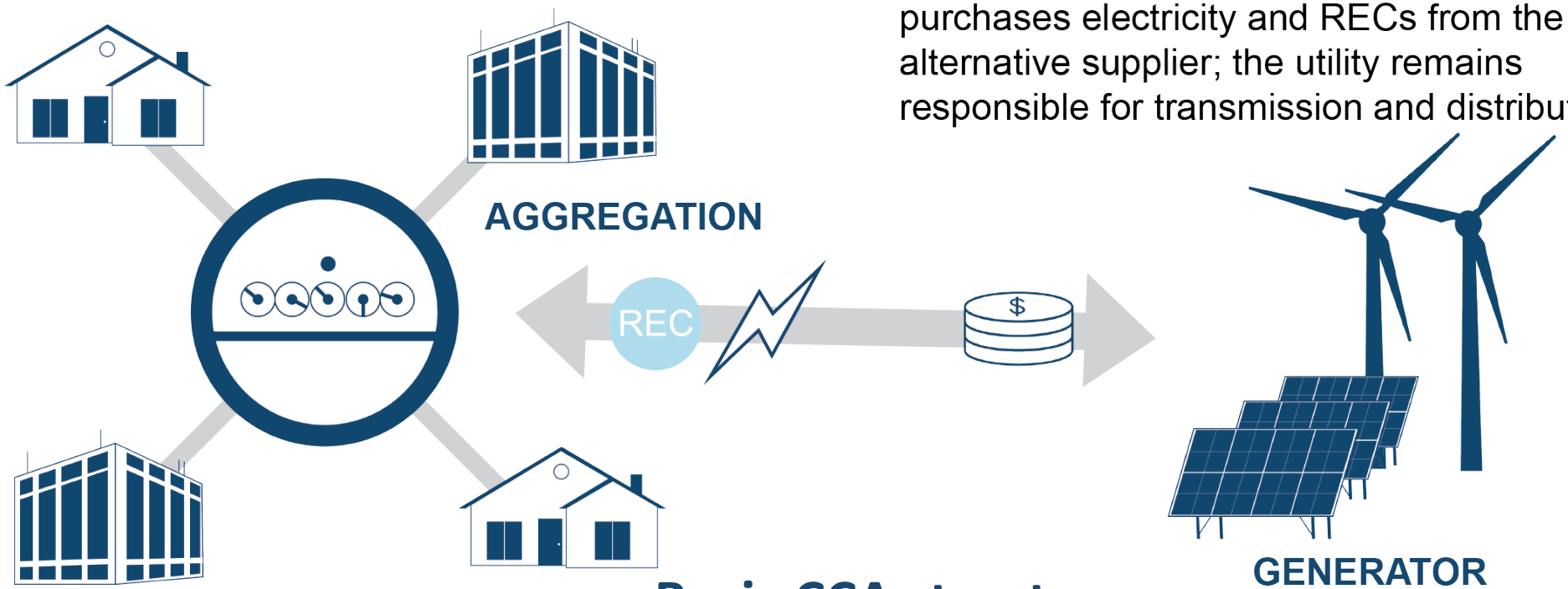




Community Choice Aggregation

A CCA effectively "aggregates" the electricity demand of many customers (residential and non-residential) in order to procure electricity from an alternative supplier.

The CCA "switches" from an incumbent electricity supplier to an alternative supplier with a renewable energy product (though the switch may include a non-renewable product). The CCA purchases electricity and RECs from the alternative supplier; the utility remains responsible for transmission and distribution

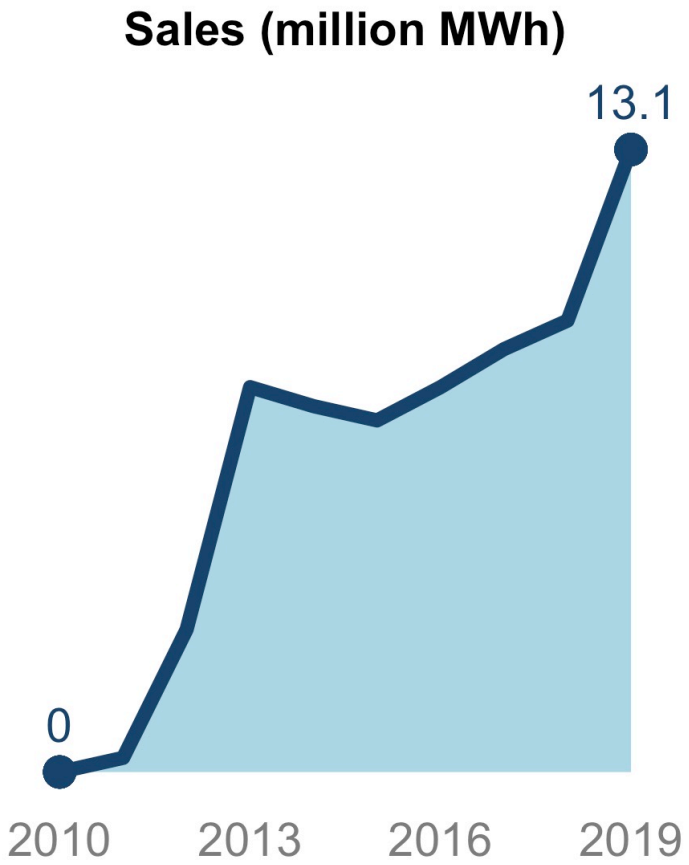


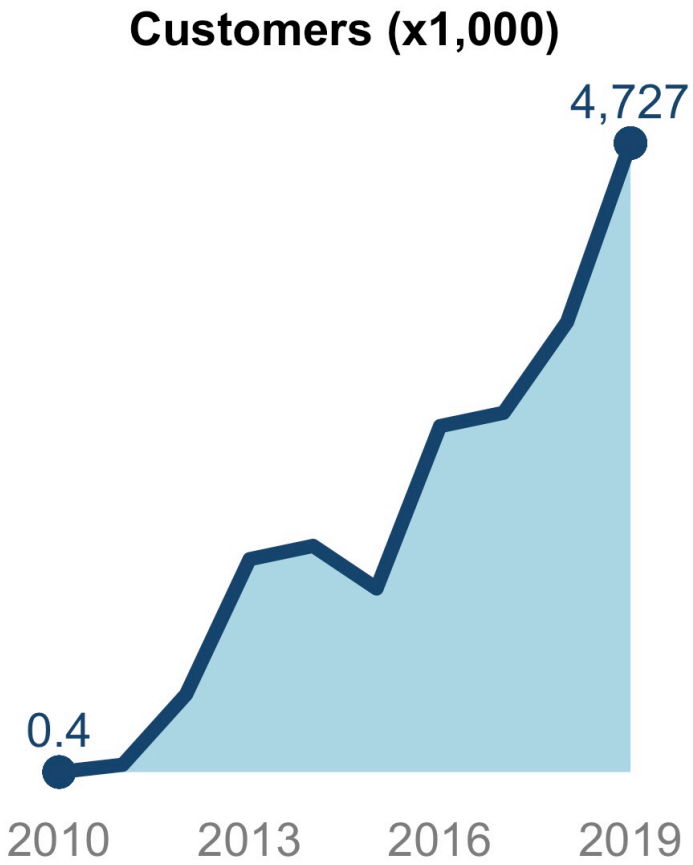
Basic CCA structure

Specific program structures vary

CCA Trends

About **4.7 million customers** procured about **13.1 million MWh** of renewable energy through CCAs in 2019. Participation in CCAs grew by about 40% from 2018 to 2019 due mostly to the ongoing expansion of CCAs in California.



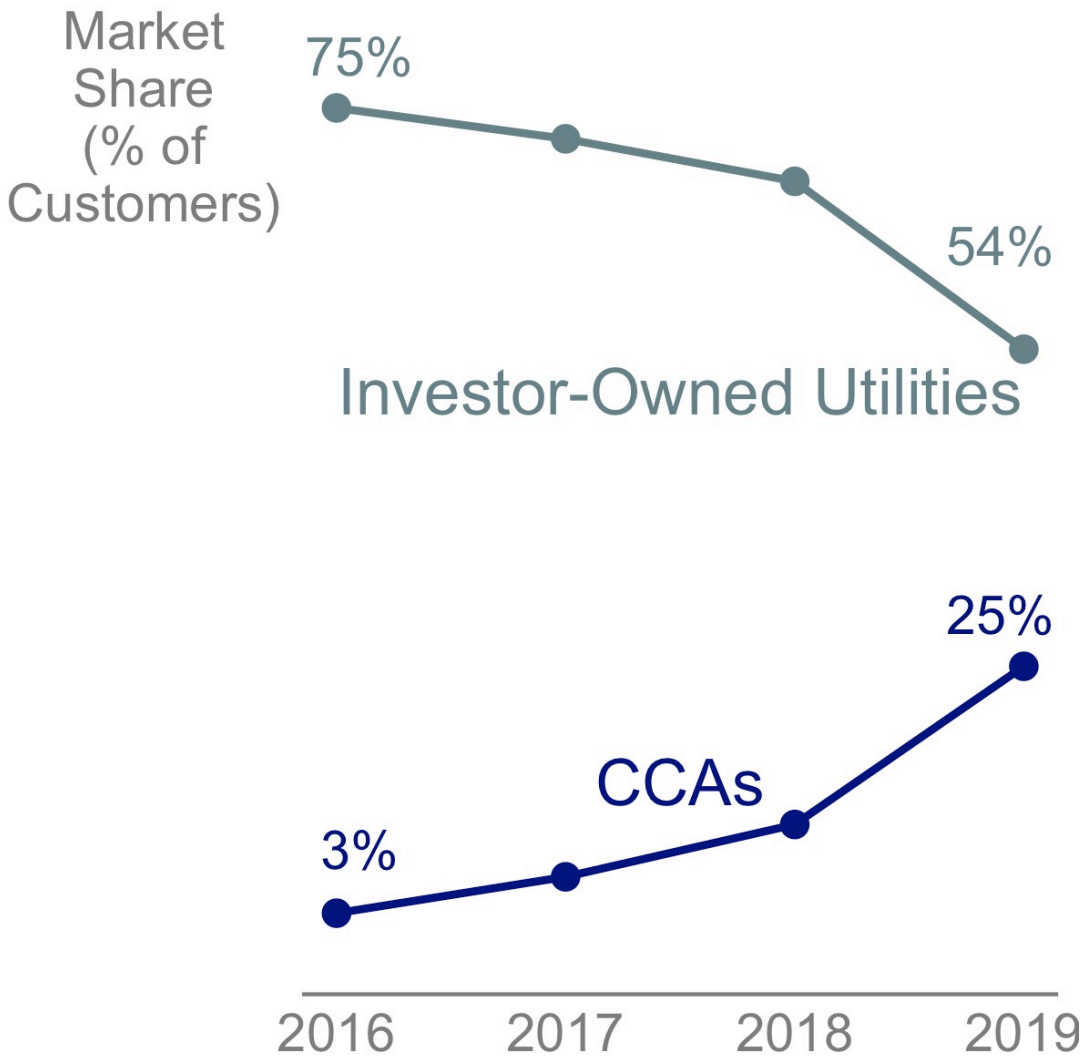


CCA Sales by State

State	Green Power Sales (MWh)	Green Power Customers
California	8,016,000	4,074,000
Illinois	2,508,000	98,000
Massachusetts	1,480,000	360,000
Ohio	691,000	111,000
New York	433,000	84,000
TOTAL	**13,128,000**	**4,727,000**

CCAs in California

- California continues to drive increasing CCA sales and participation.
- According to preliminary EIA estimates, the percentage of customers served by CCAs in California increased from just 3% in 2016 to about 25% in 2019.
- Most of these customers buy default CCA portfolios, which generally supply more renewable energy than what is required by RPS, but do not provide 100% green power.

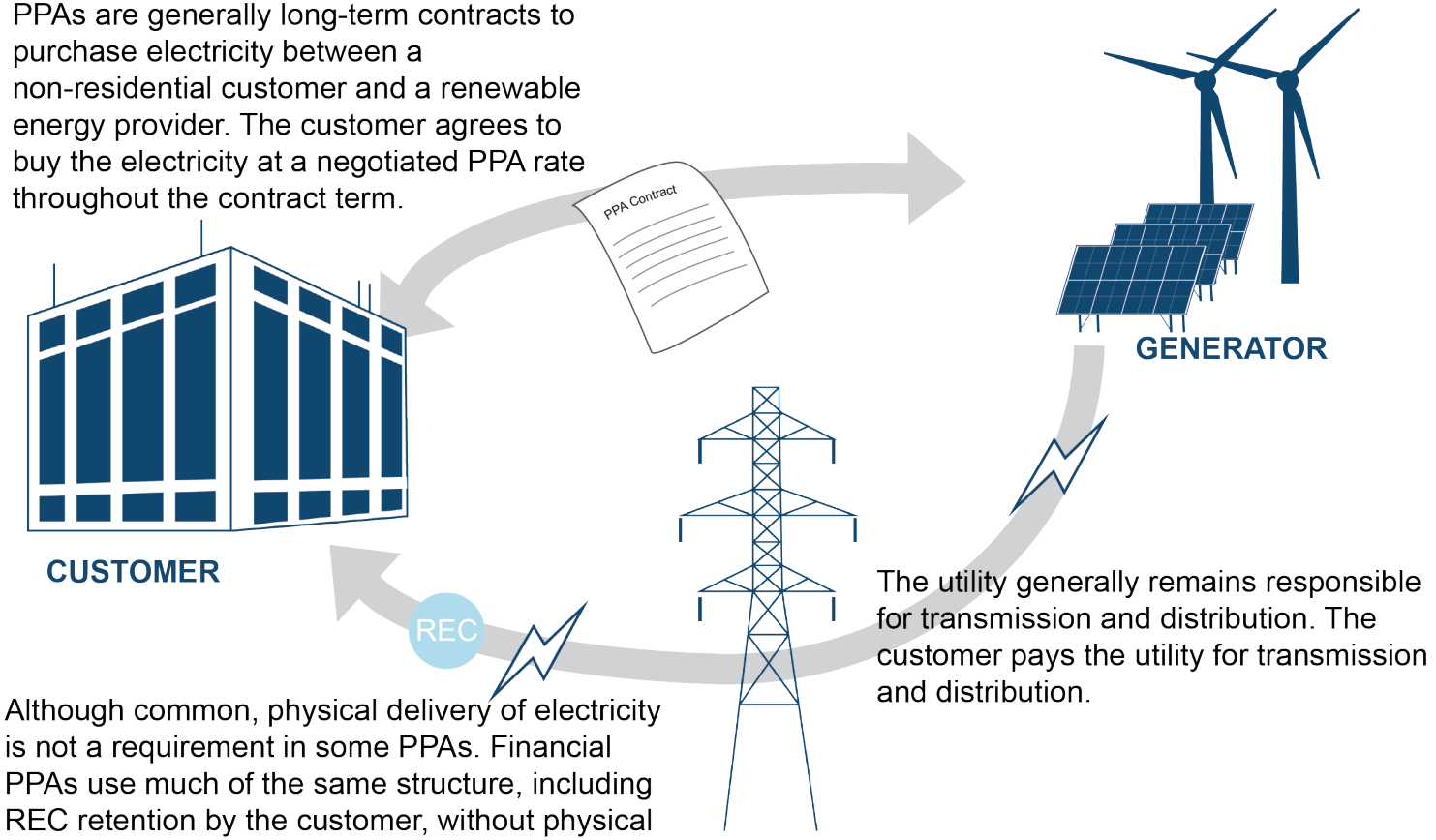


CCA market shares in California

Based on EIA data

Power Purchase Agreements

PPAs are generally long-term contracts to purchase electricity between a non-residential customer and a renewable energy provider. The customer agrees to buy the electricity at a negotiated PPA rate throughout the contract term.



The utility generally remains responsible for transmission and distribution. The customer pays the utility for transmission and distribution.

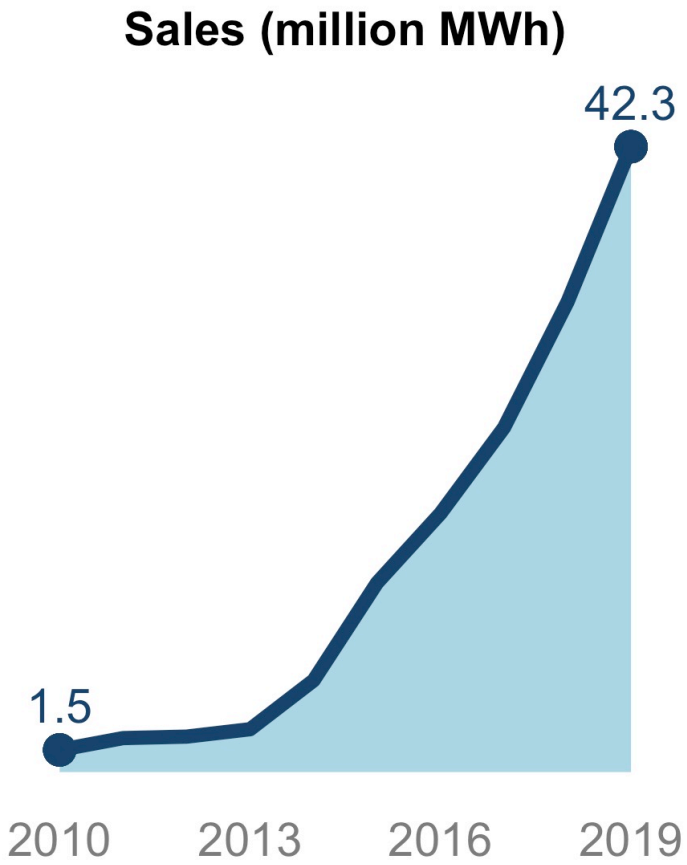
Although common, physical delivery of electricity is not a requirement in some PPAs. Financial PPAs use much of the same structure, including REC retention by the customer, without physical electricity delivery.

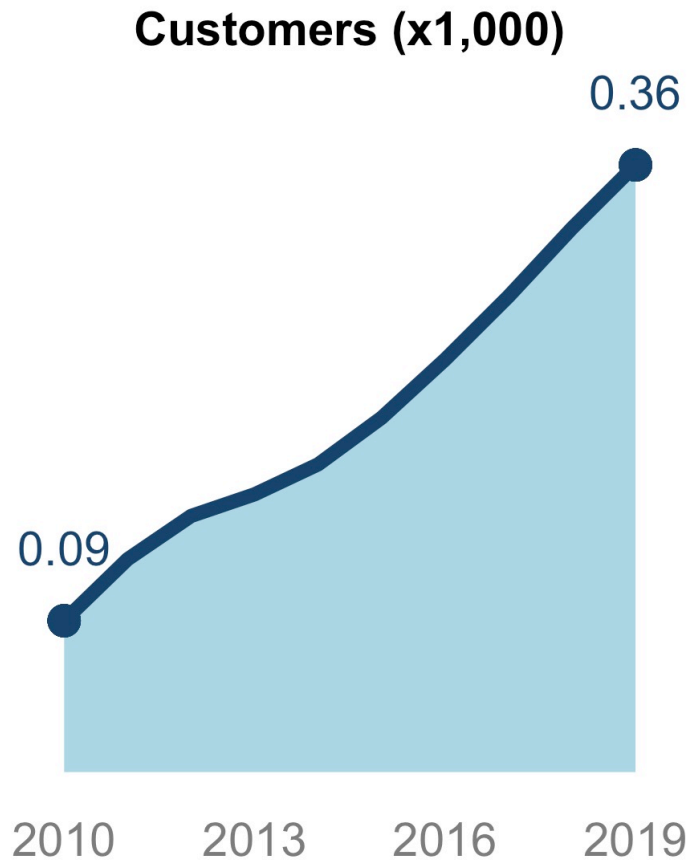
Basic PPA structure

Specific program structures vary. See full report for a more complete description of the differences between physical and financial PPAs

PPA Trends

About **360 offtakers** procured about **42.3 million MWh** of green power through PPAs in 2019. PPA green power sales grew by about 33% from 2018 to 2019. These figures include only PPA sales where we estimate that the purchaser has retained the RECs.





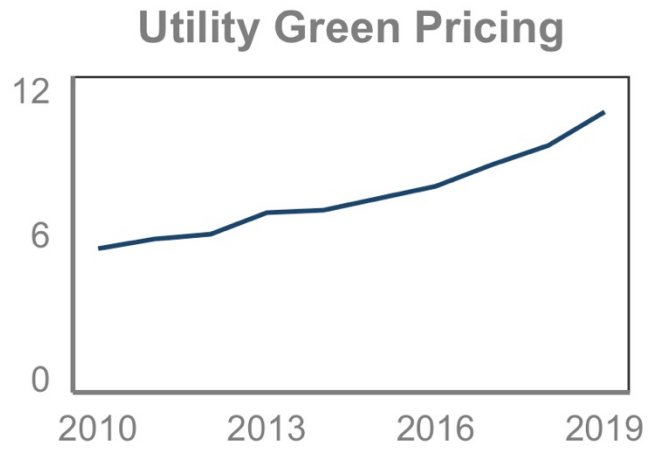
Summary Trends

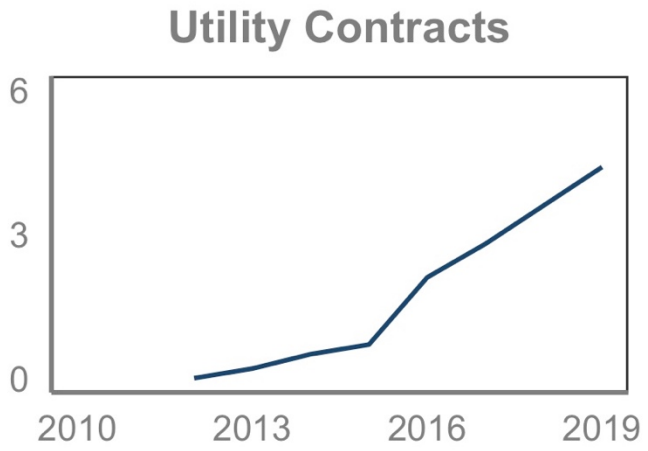
2019 Green Power Sales and Participation

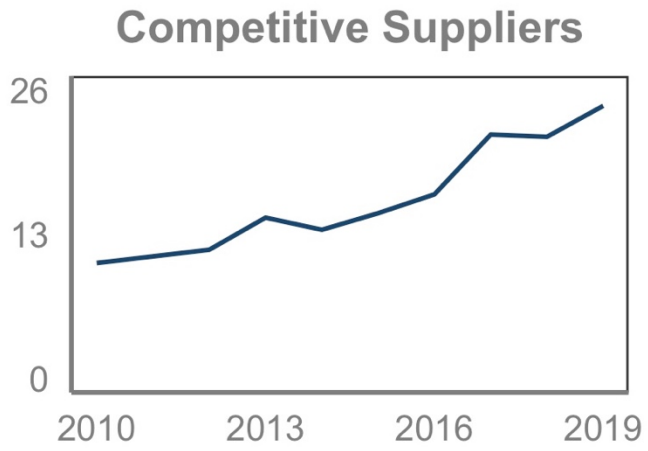
Segment	Sales (million MWh)	Participation
Utility green pricing	11.1	1,082,000
Utility renewable contracts	4.4	23
Competitive suppliers	24.6	1,731,000
Unbundled RECs	68.7	197,000
Community choice aggregation	13.1	4,727,000
Power purchase agreements	42.3	365
Total	**164.2**	**7,7737,000**

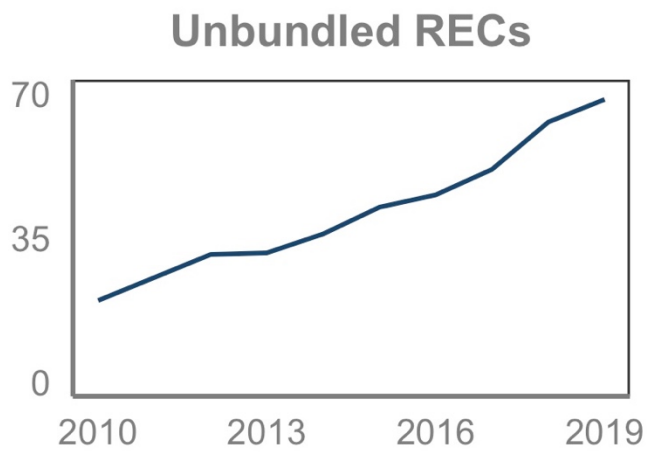
Sales Trends

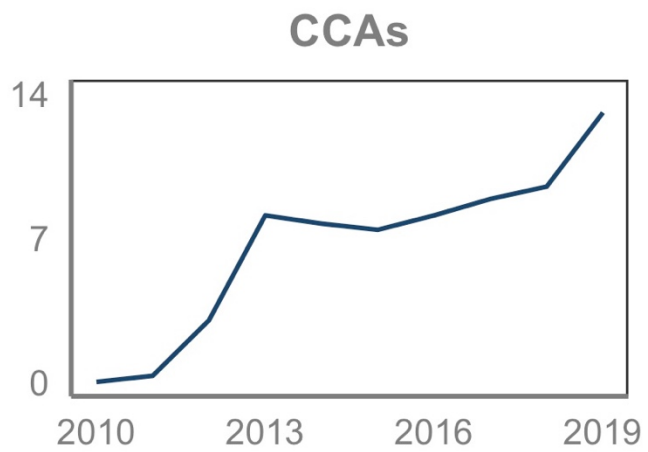
Sales (million MWh)

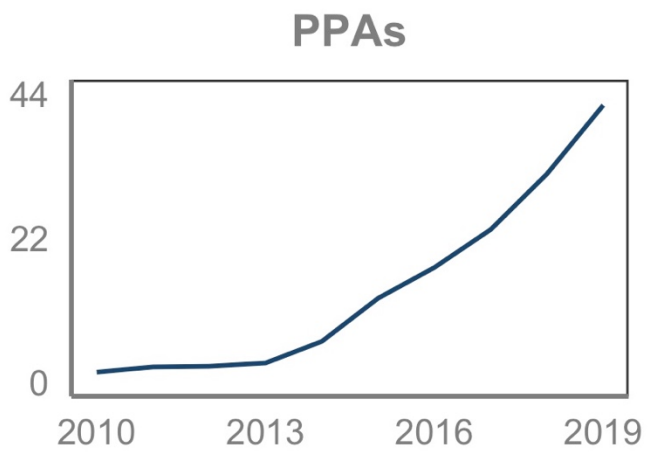






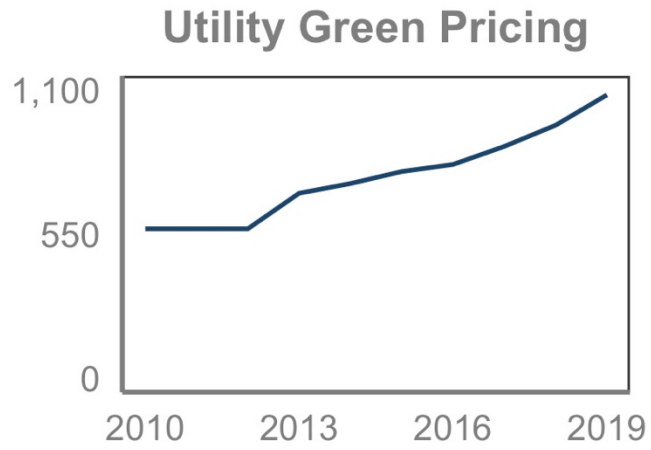


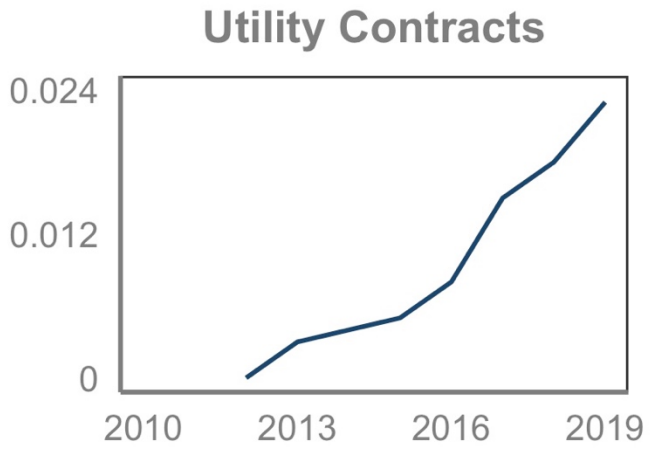


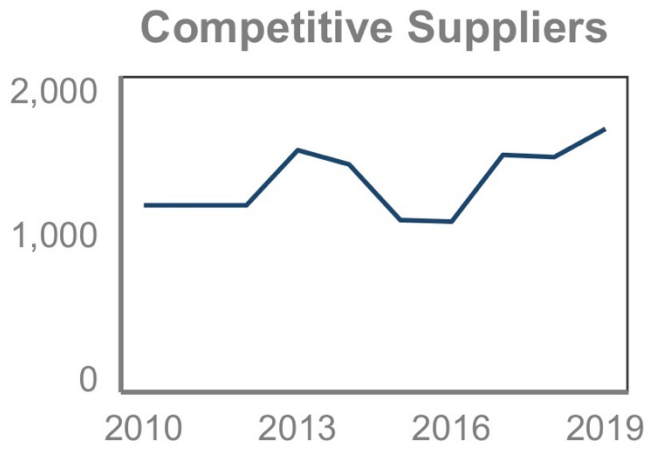


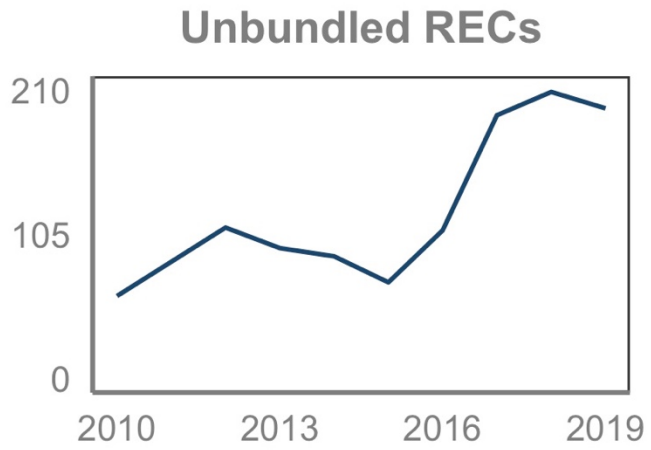
Participation Trends

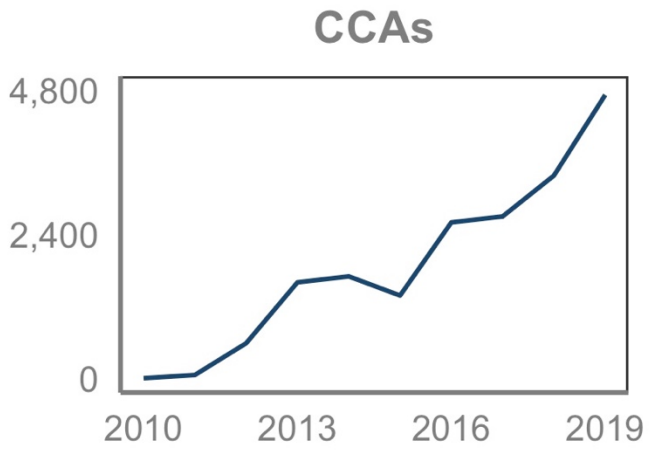
Customers (x1,000)

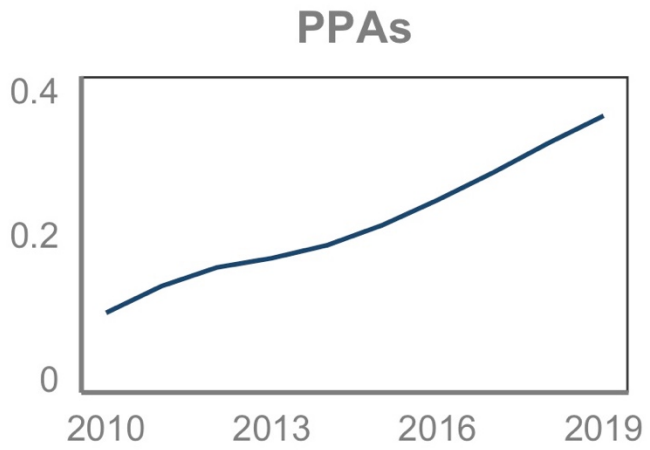




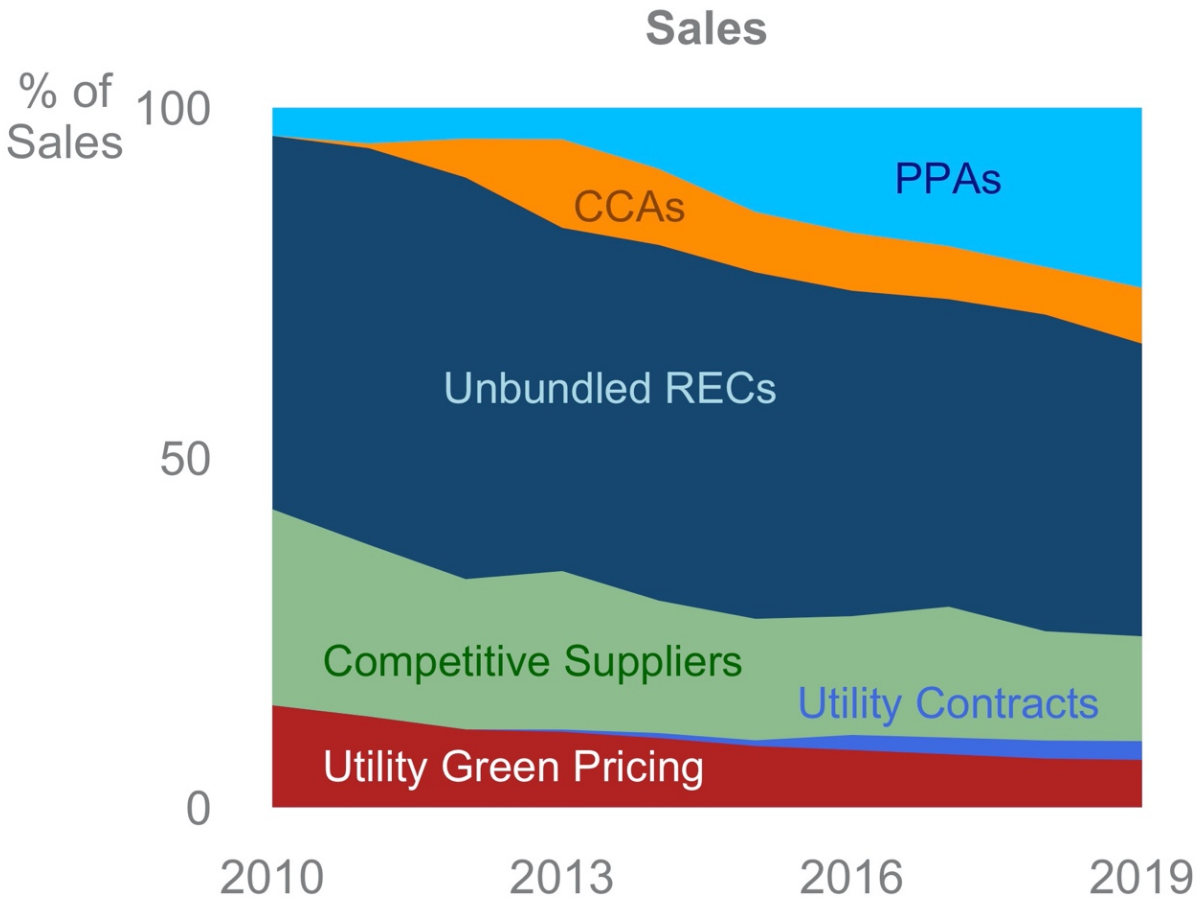


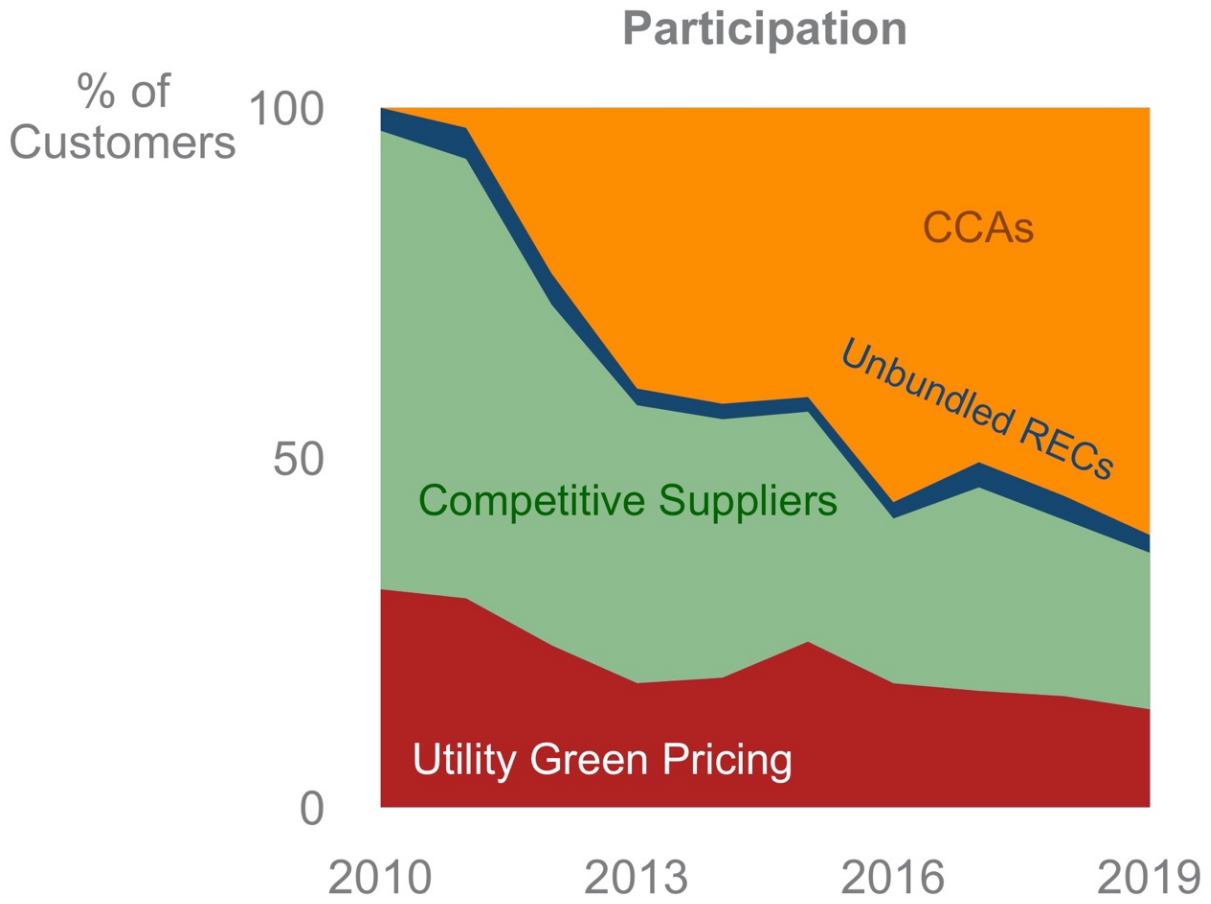






Green Power Sales and Customers by Mechanism





NREL's Voluntary Market Research

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

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Status and Trends in the U.S. Voluntary Green Power Market (2017 Data)
The latest full technical report of NREL's annual tracking of the voluntary market products, customers, and sales.

Community Choice Aggregation: Challenges, Opportunities, and Impacts on Renewable Energy Markets
This report explores the emergence of community choice aggregation, an energy procurement model that puts communities in control of their electricity supply. It features data on community choice aggregation voluntary green power sales and impacts on voluntary green power markets.

Existing and Potential Corporate Off-Site Renewable Procurement in the Southeast
This project assesses the market for off-site PV in the Southeast, based on projected corporate load, corporate renewable goals for load in the Southeast, solar economics relative to utility rates, presence of a viable PV purchasing method, and other factors. The project team gathered data directly and indirectly from corporations, higher education institutions, and cities and counties with renewable energy targets. State summaries are available for Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee.

Policies for Enabling Corporate Sourcing of Renewable Energy Internationally: A 21st Century Power Partnership Report
This report explores the policy and regulatory enabling environment for corporate sourcing of renewables. The authors find that policy certainty is essential to creating vibrant markets for renewable energy, that policymakers may need to adjust policy mechanisms over time as markets go through different stages of maturity, and that policymakers must also consider the economic decisions that end users make in evaluating projects. [summary]

Thank you!

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