Status and Trends in the Voluntary Market (2018 data)

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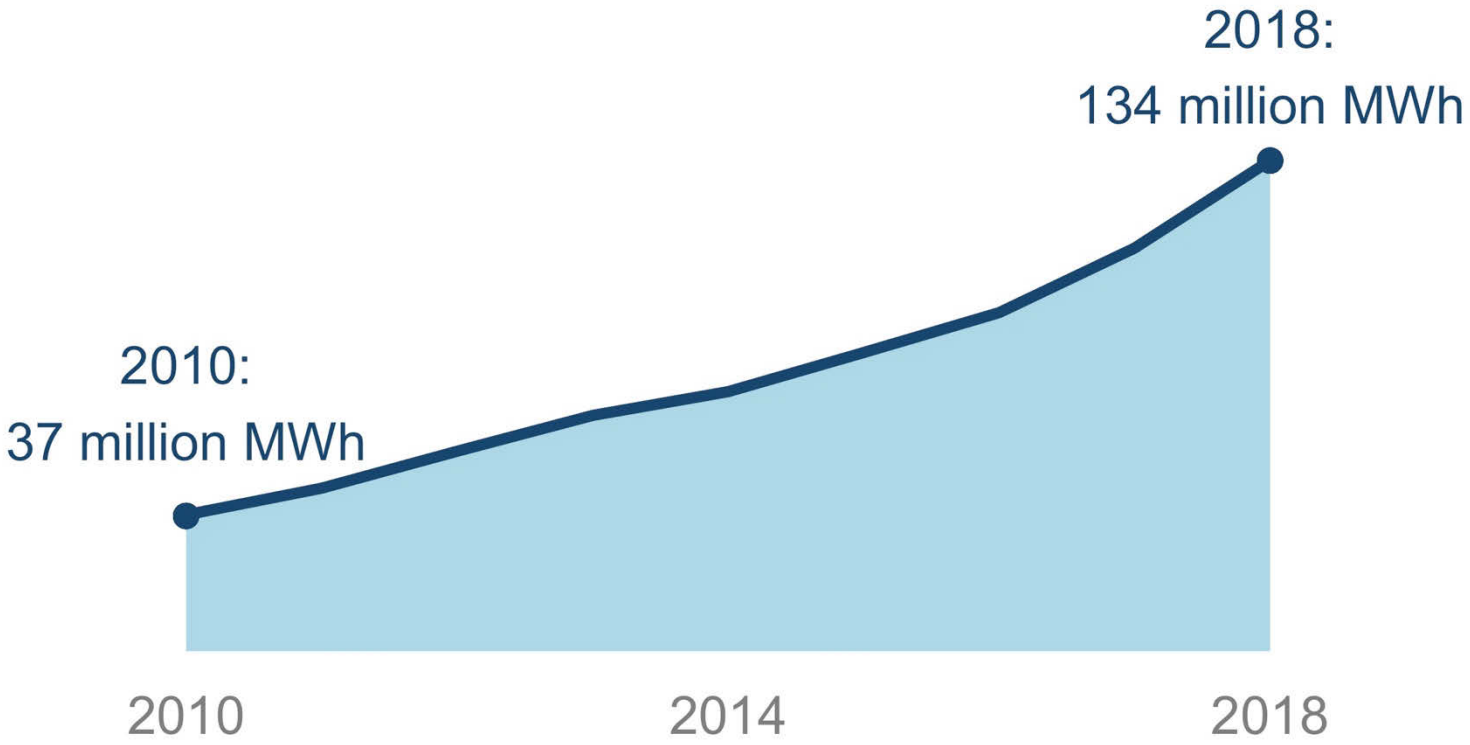
The Big Picture

In 2018, about **6.3 million customers** procured about **134 million MWh** of renewable energy through green power markets.



Total green power sales 2010-2018 (million MWh)

That represents about:

3%

of U.S. retail electricity sales

28%

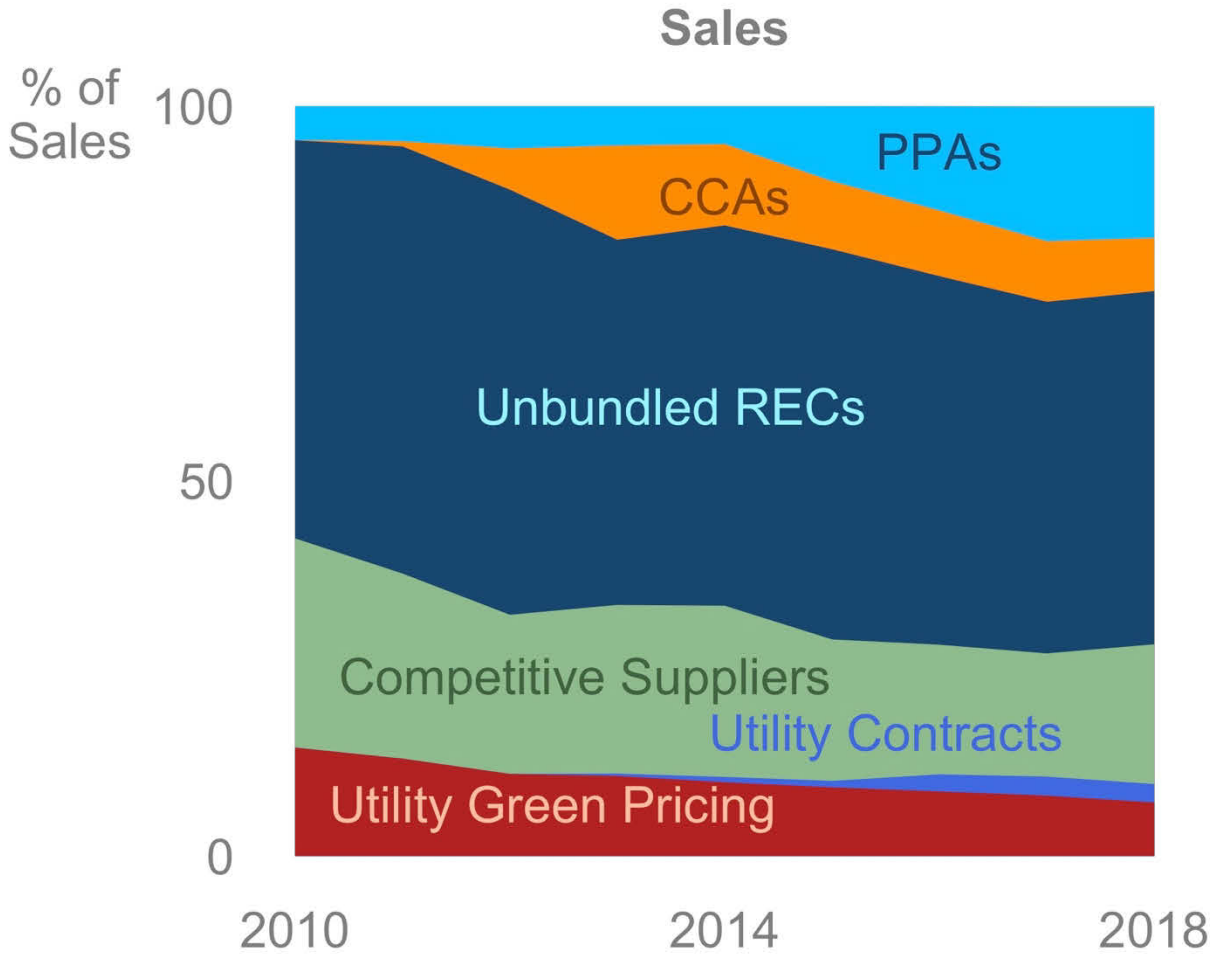
of U.S. non-hydro renewable energy generation

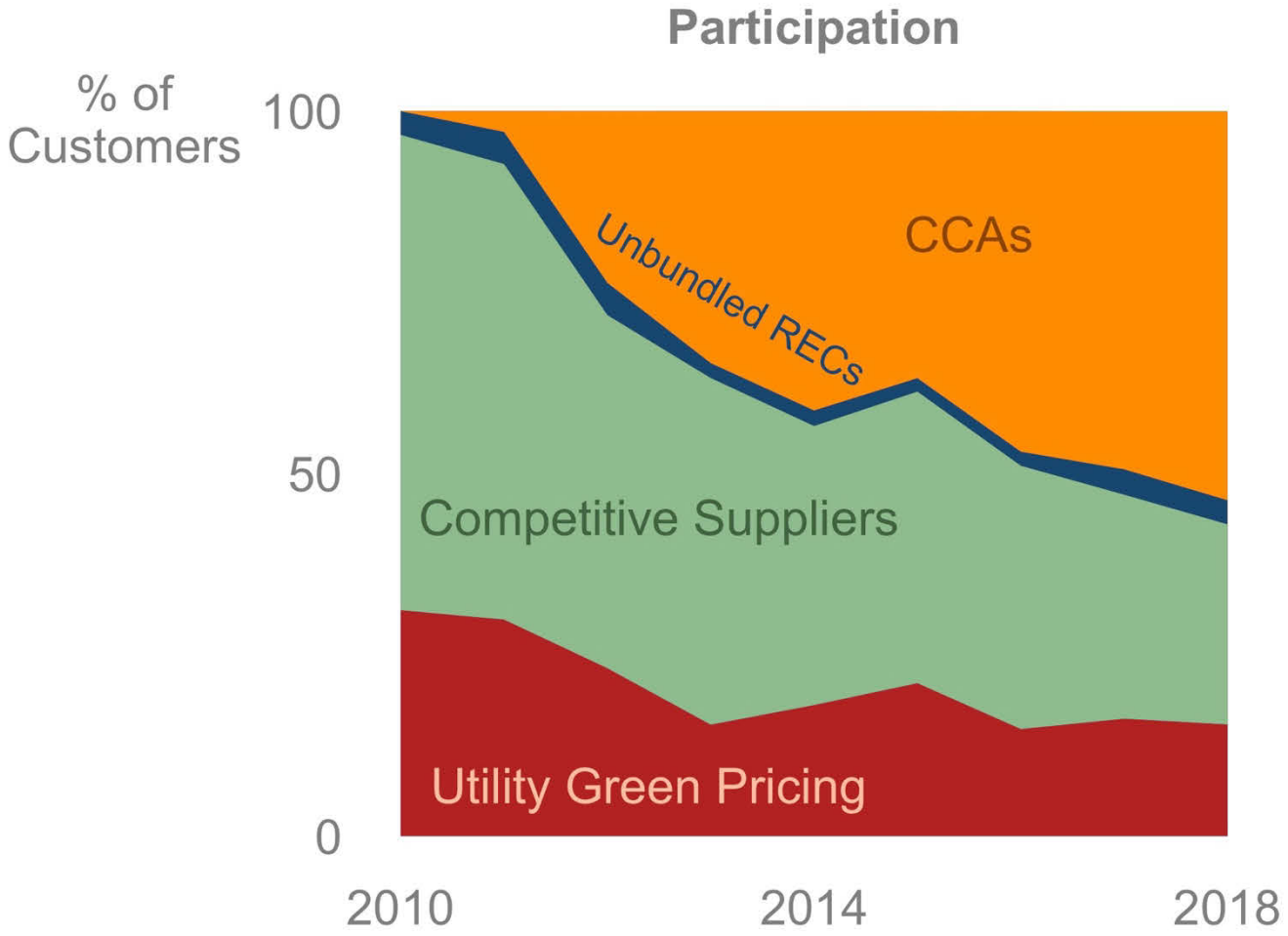
2018 Green Power Sales and Participation

Segment	Sales (million MWh)	Participation (x1000 customers)
Utility green pricing	9.7	966
Utility renewable contracts	3.3	0.003
Competitive suppliers	25	1,735
Unbundled RECs	63.2	209
Community choice aggregation	9.5	3,382
Power purchase agreements	23.5	0.28
Community solar	0.1	6
Total	**134.3**	**6,298**

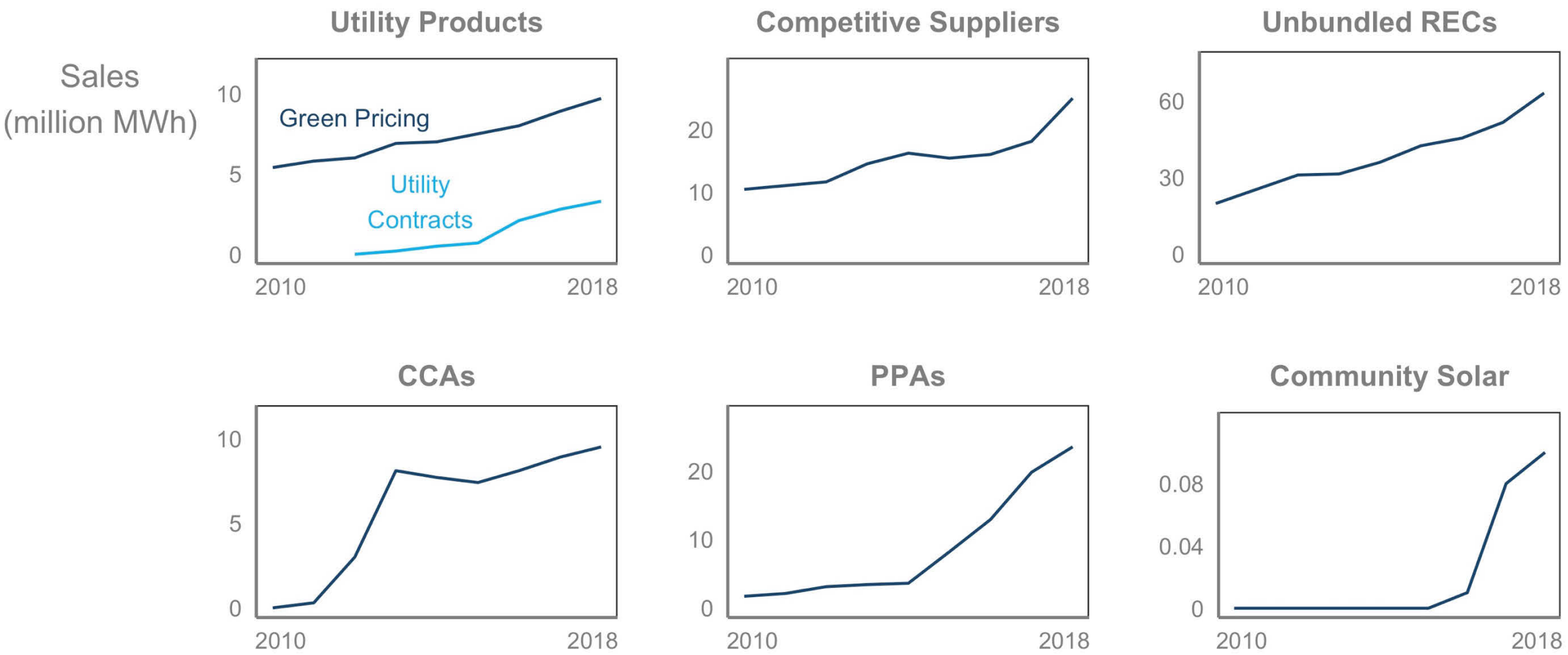
Green Power Sales and Customers by Mechanism

In 2018, the most voluntary sales were via unbundled RECs, while the most customers were via community choice aggregation (CCA) programs.



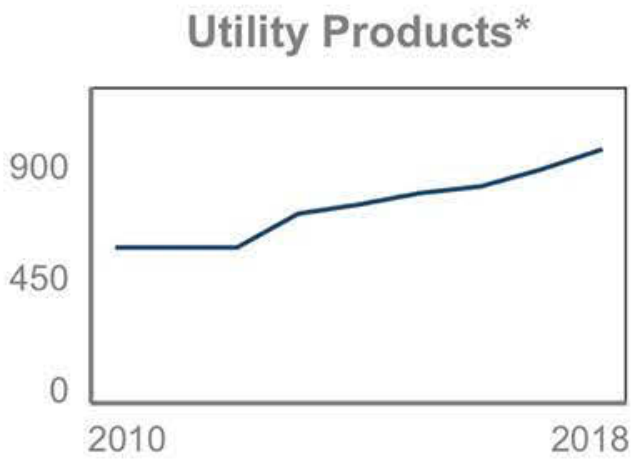


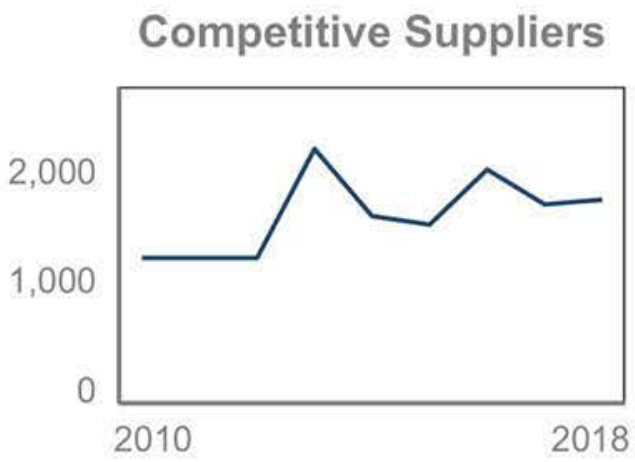
Voluntary Sales Increased in Each Market Segment

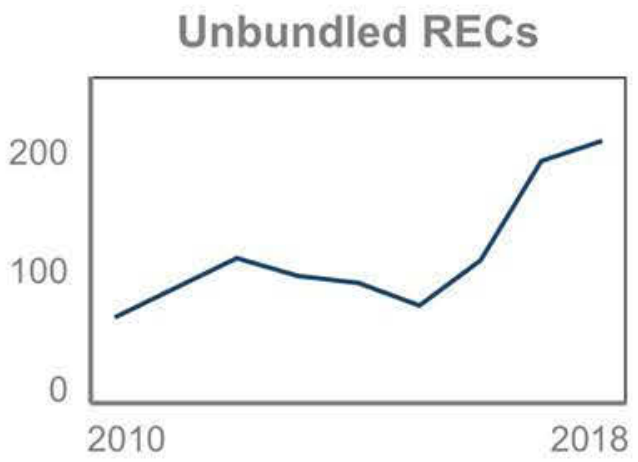


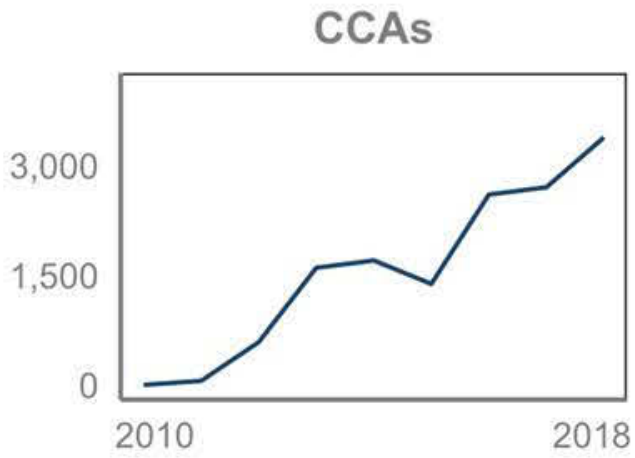
CCAs have the Largest Increase in Voluntary Market Customers

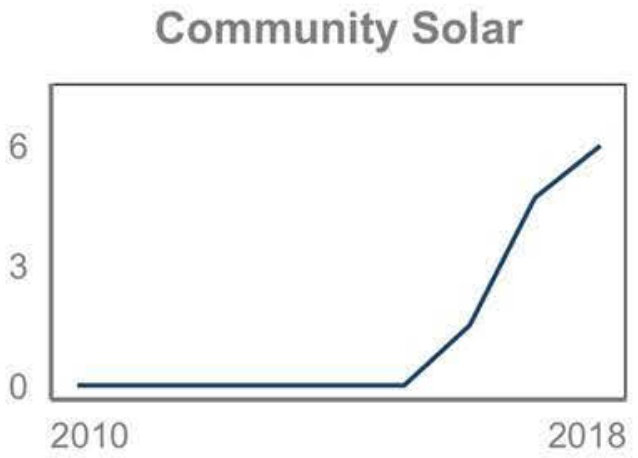
Customers (x1,000)





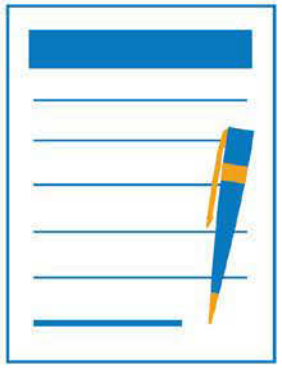




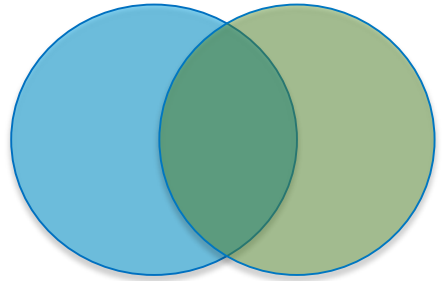


General Product and Market Trends

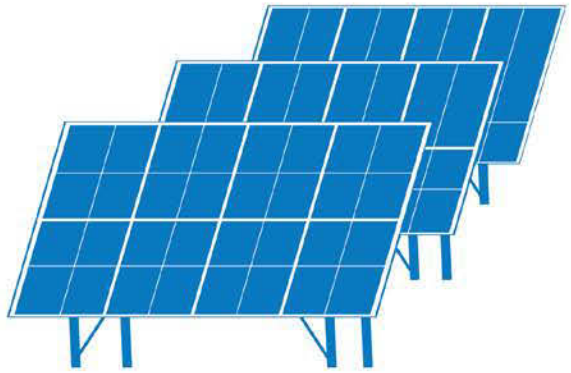
Customer-Friendly Terms and Processes



Blended Product Types



Use of Large-Scale Solar



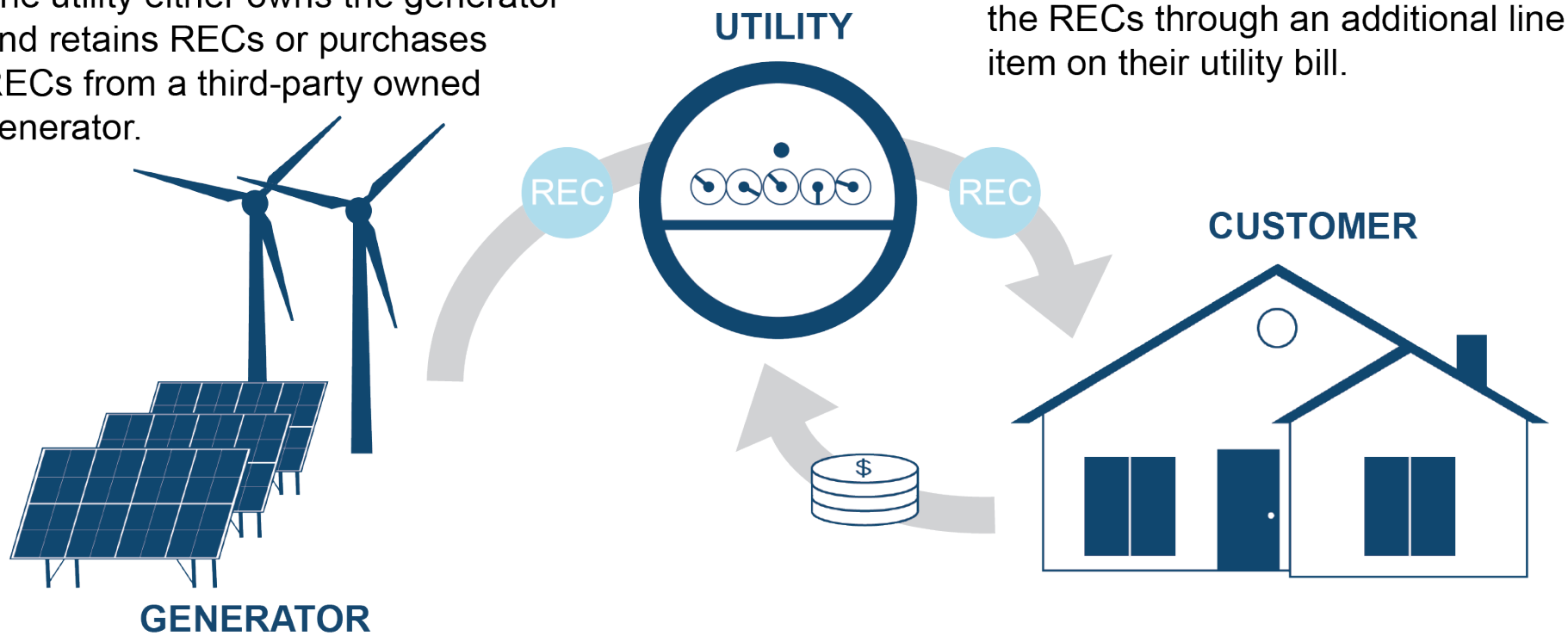
Global Market Expansion

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.

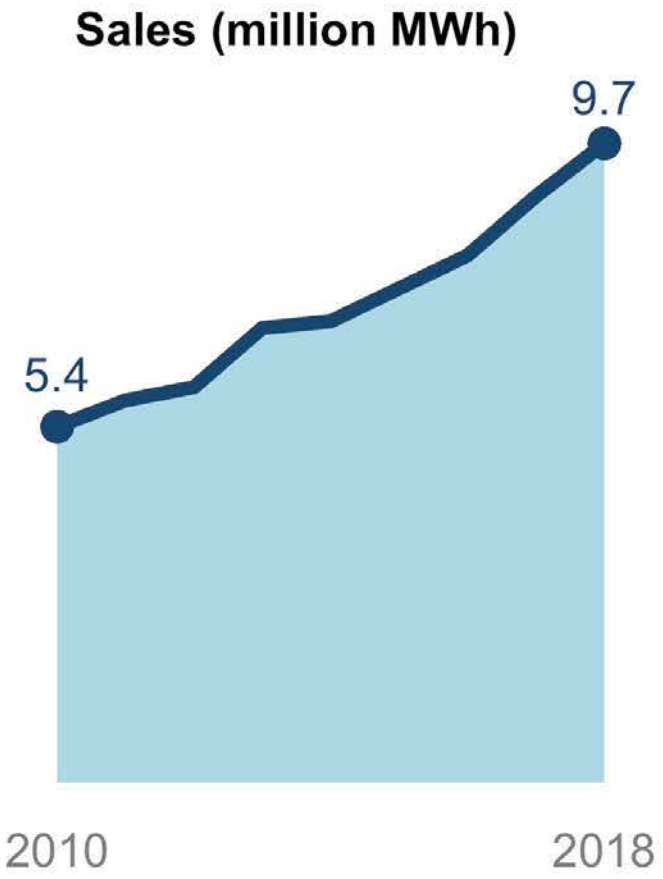


Basic utility green pricing program structure

Specific program structures vary

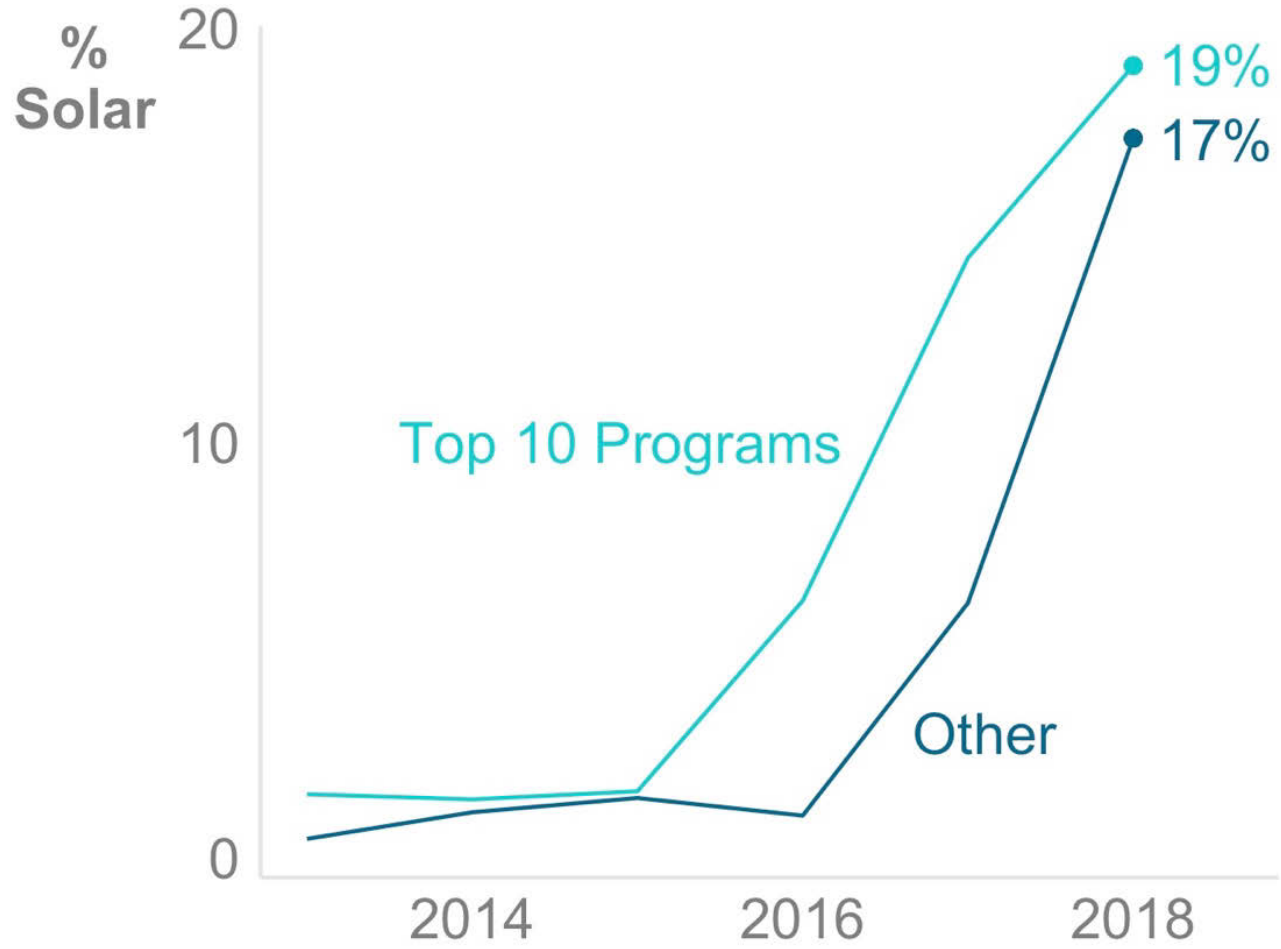
Utility Green Pricing Trends

About **966,000 customers** procured about **9.7 million MWh** of renewable energy through utility green pricing programs in 2018. Utility green pricing sales grew by about 9% from 2017 to 2018.



Green Pricing Programs Continue to Increase Solar Procurement

- Solar now accounts for about 19% of utility green pricing sales, up from 14% in 2017 and just 2% in 2013.
- Increasing solar procurement in green pricing programs was initially driven by the largest programs. 2018 marks the first year that solar accounts for more than 10% of green pricing sales in programs outside the top 10.

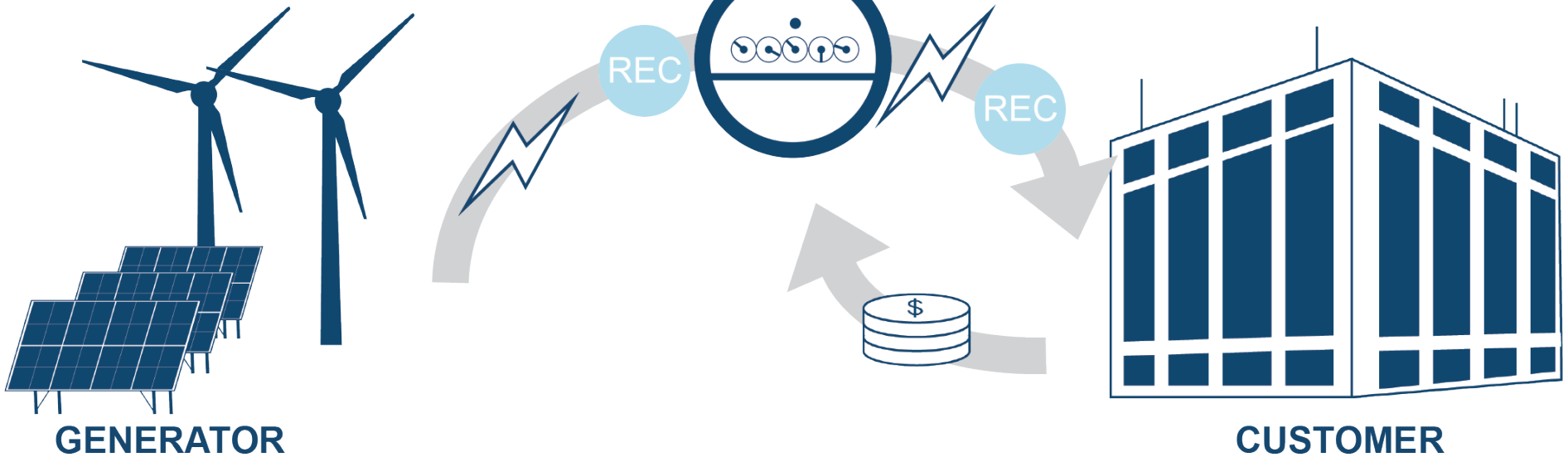


Solar percentage of utility green pricing sales in top 10 and other programs

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.

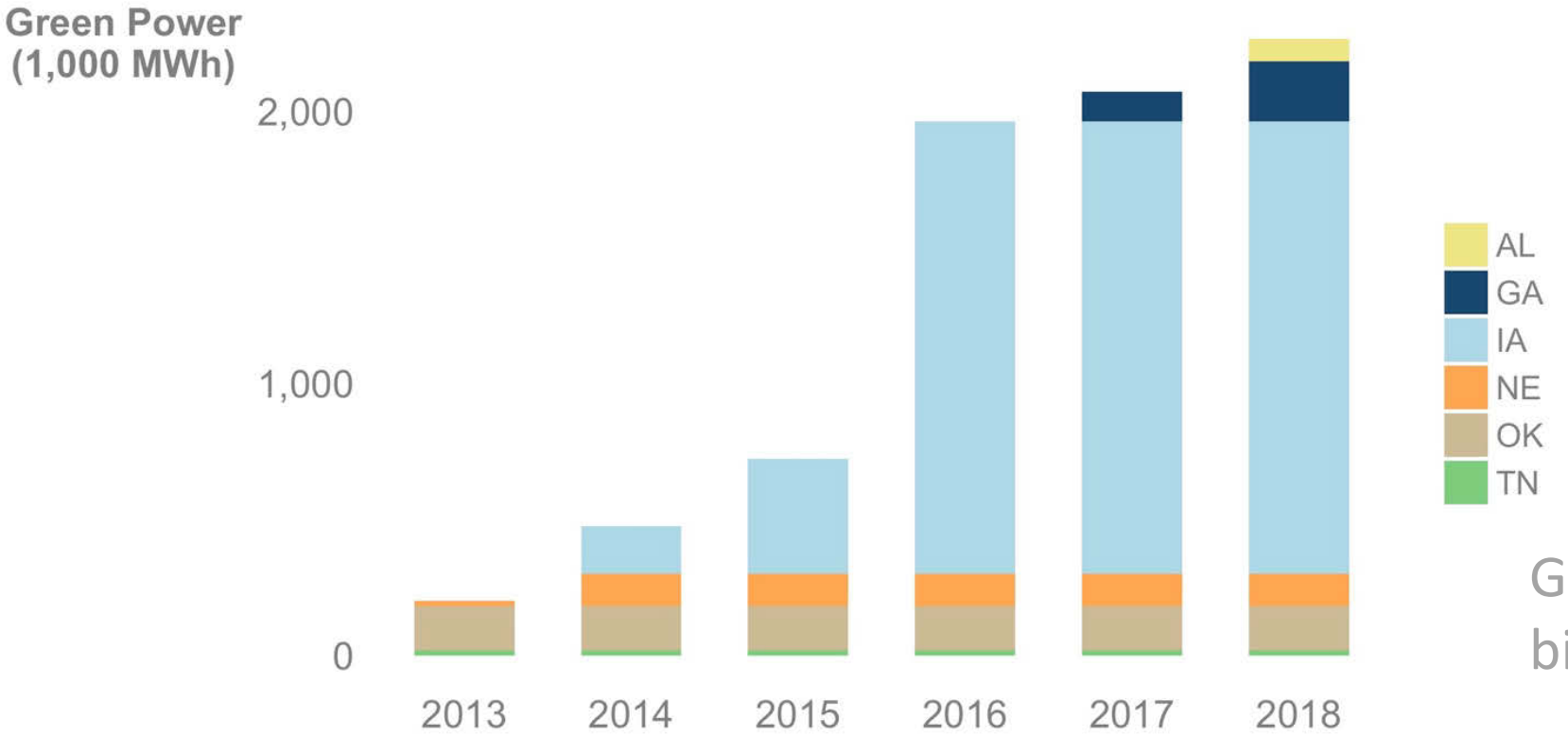


Basic utility renewable contract structure

Specific program structures vary

Bilateral Contracts

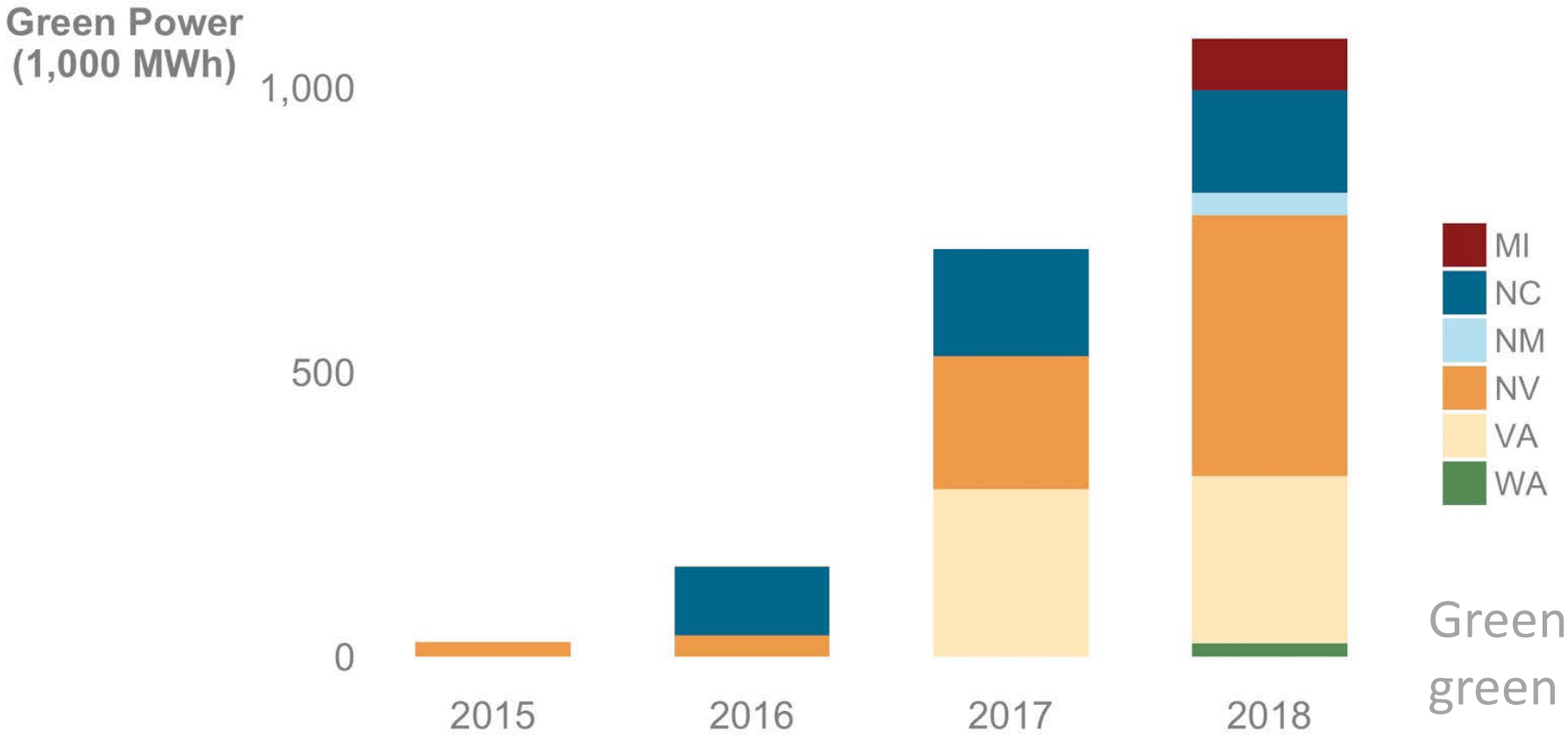
About 740 MW of green power capacity had been procured through bilateral contracts through the end of 2018, generating around 2.3 million MWh of green power in 2018.



Green power sales through bilateral contracts, 2013-2018

Utility Green Tariffs

About 1,200 MW of green power capacity had been procured through utility green tariffs by the end of 2018, generating around 1.1 million MWh in 2018.

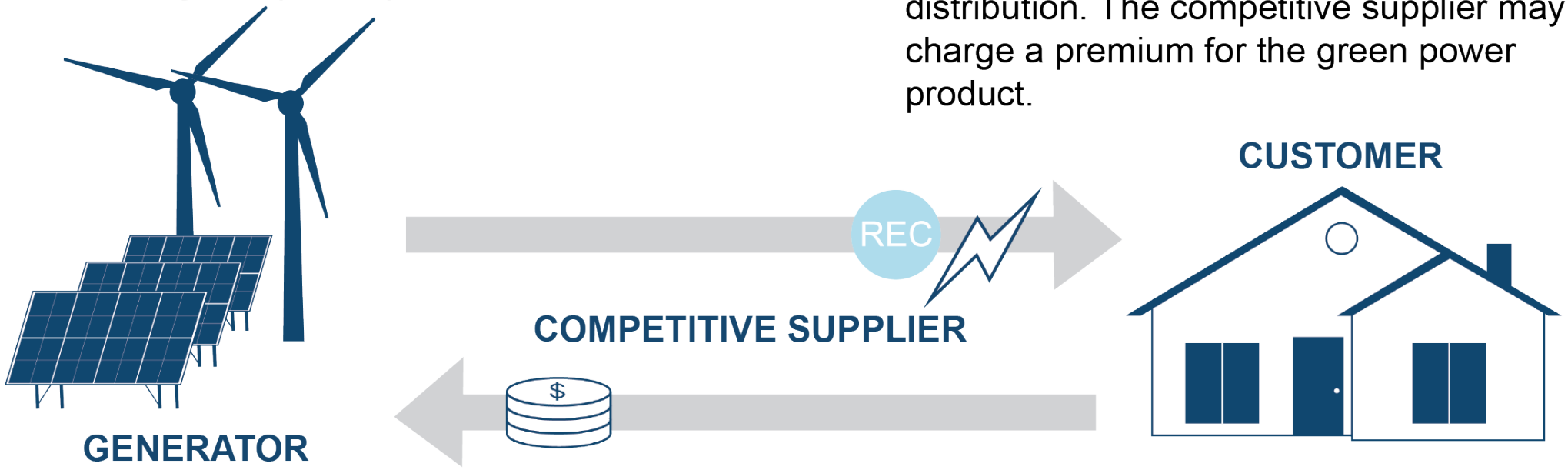


Green power sales through utility green tariffs, 2015-2018

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.

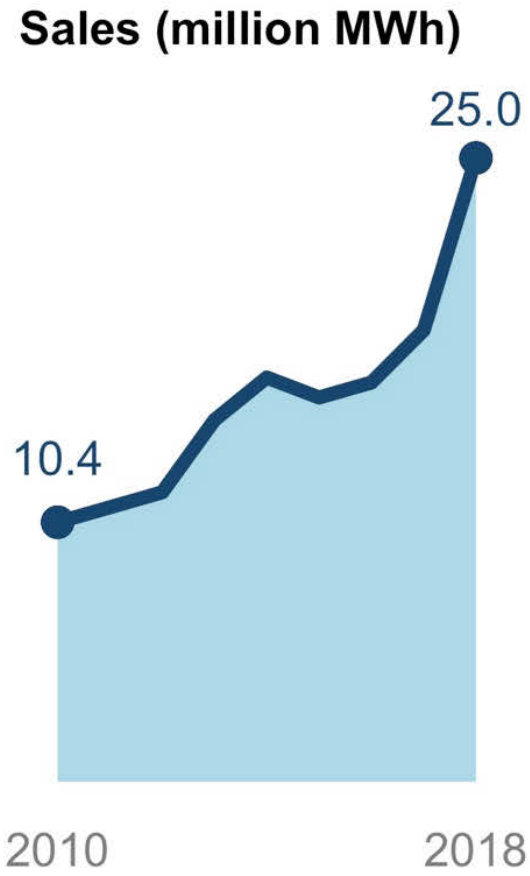


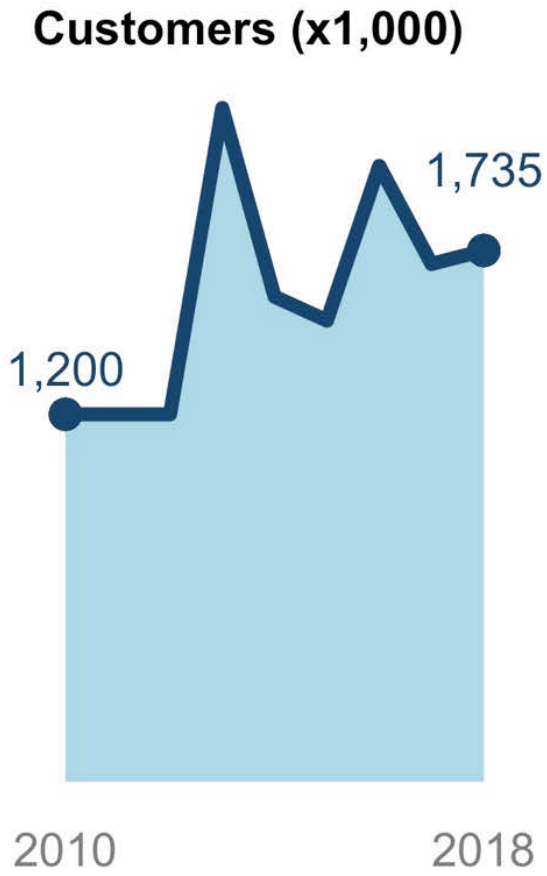
Basic competitive supplier sales structure

Specific program structures vary

Competitive Supplier Trends

About **1.7 million customers** procured about **25 million MWh** of renewable energy through competitive suppliers in 2018. Competitive supplier green power sales grew by about 38% from 2017 to 2018, largely due to increased green power sales by a single large supplier.

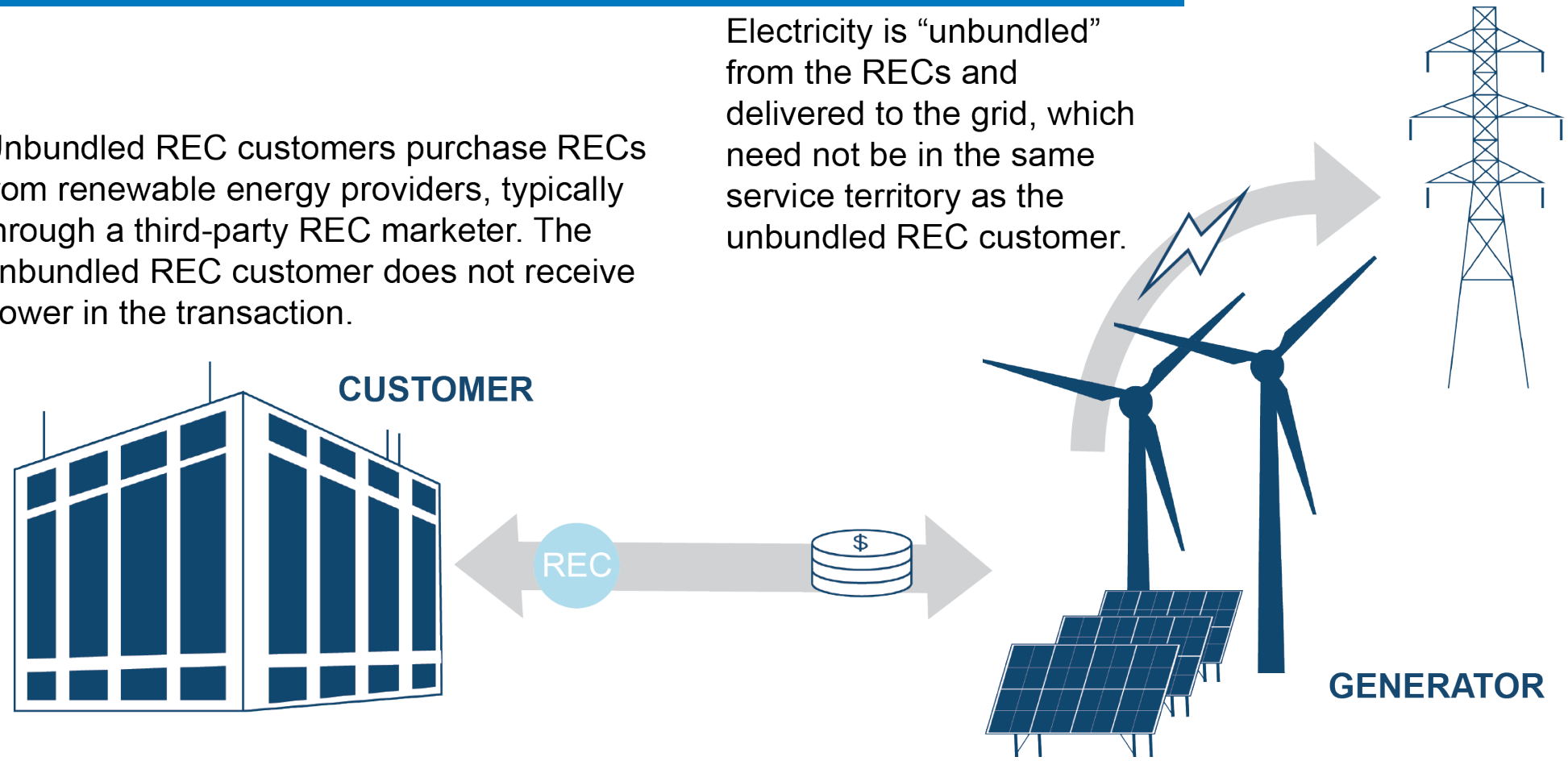




Unbundled RECs

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.

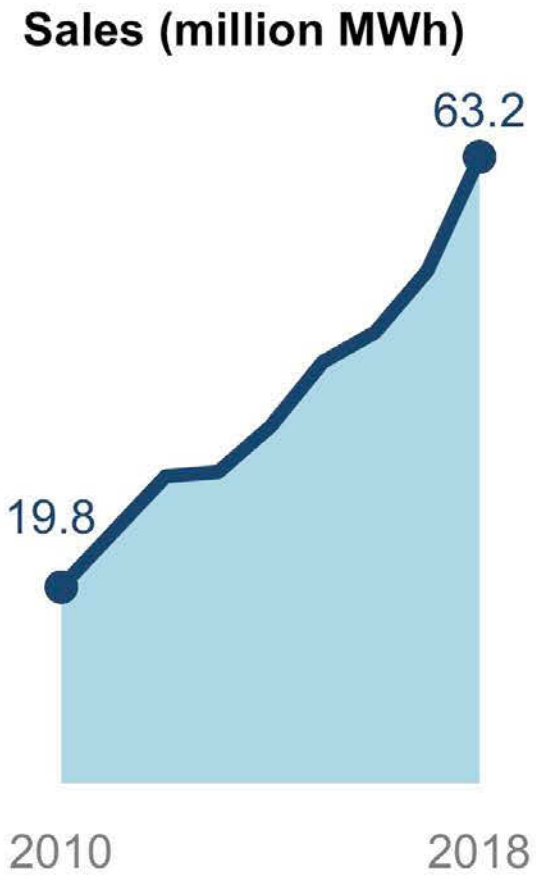


Basic unbundled RECs sales structure

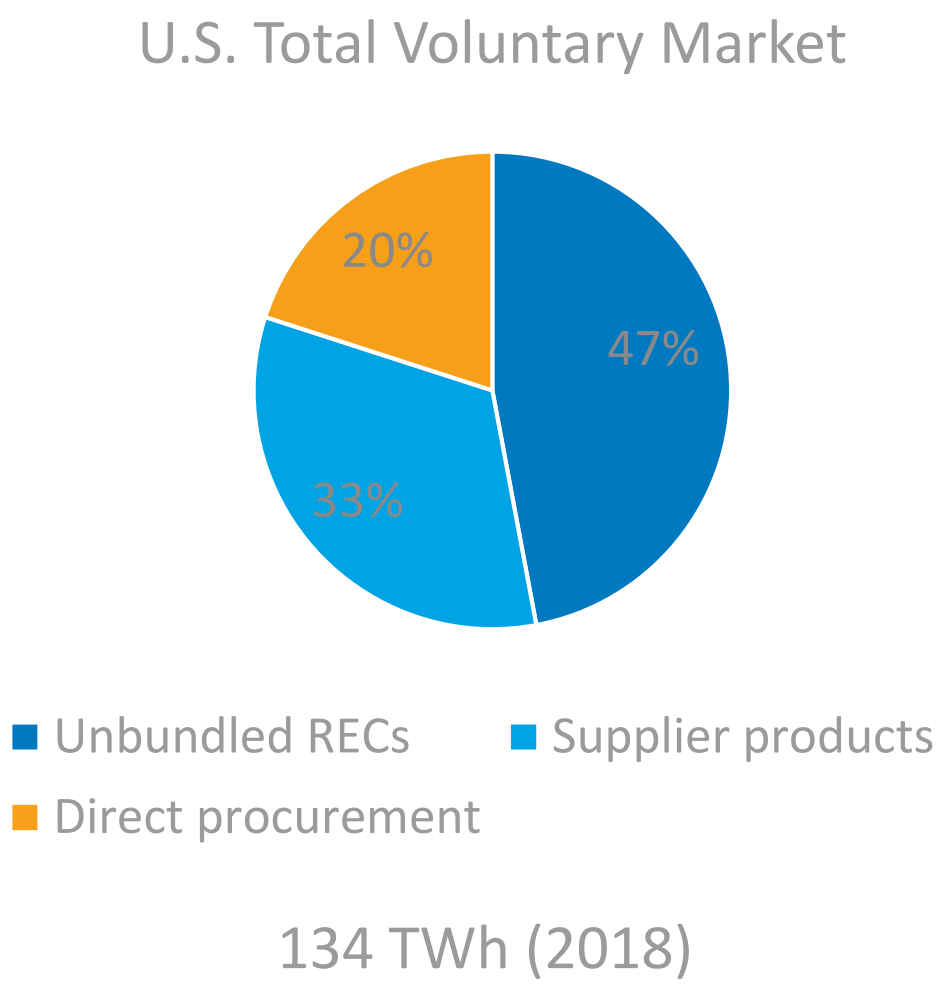
Specific program structures vary

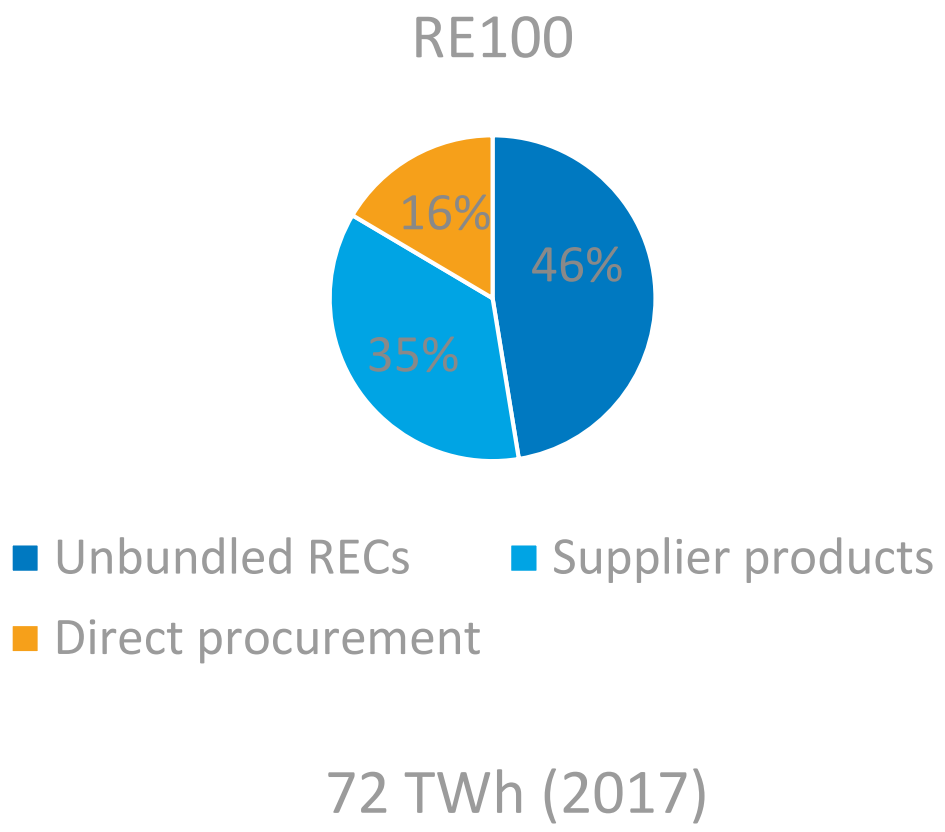
Unbundled RECs Trends

About **209,000 customers** procured about **63.2 million MWh** of renewable energy through unbundled RECs in 2018. Unbundled REC sales grew by about 22% from 2017 to 2018.



U.S. Procurement Types are Consistent with RE100 International Trends



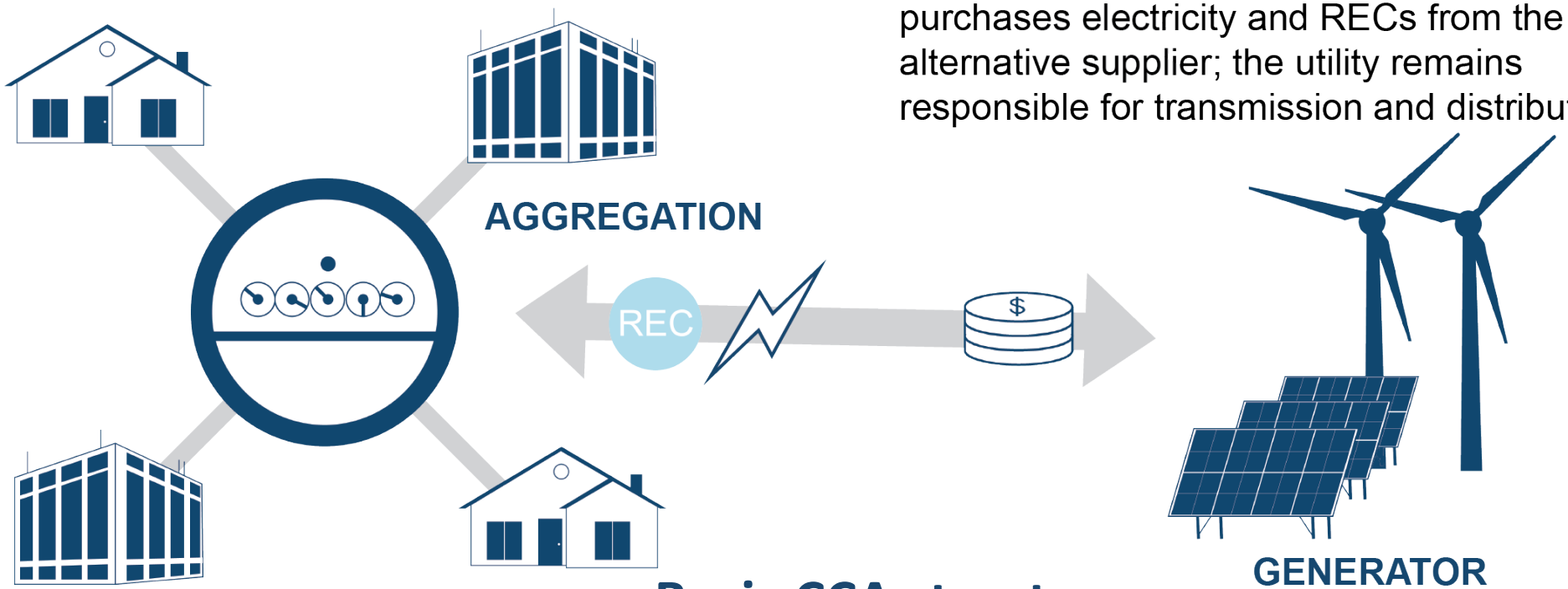


Note that there is some overlap between purchasers in the U.S. Market and in RE100.

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

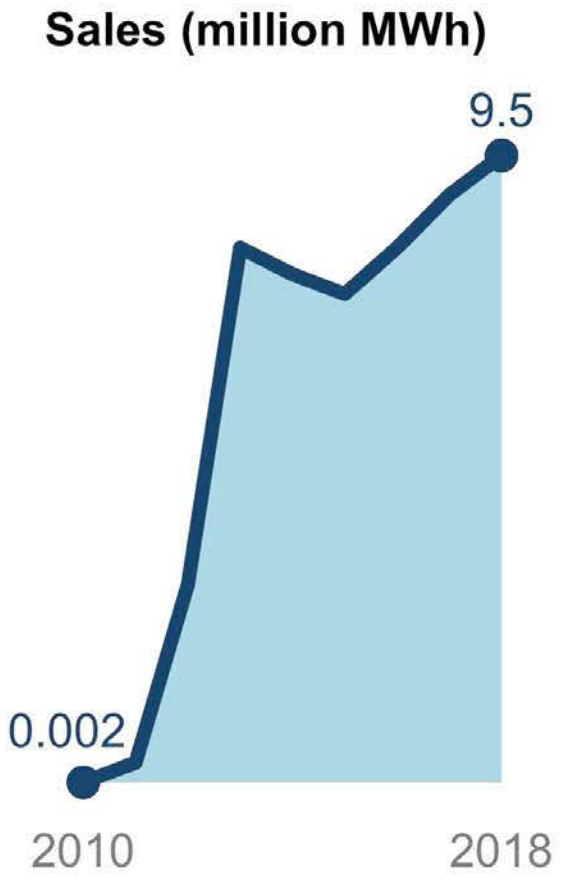


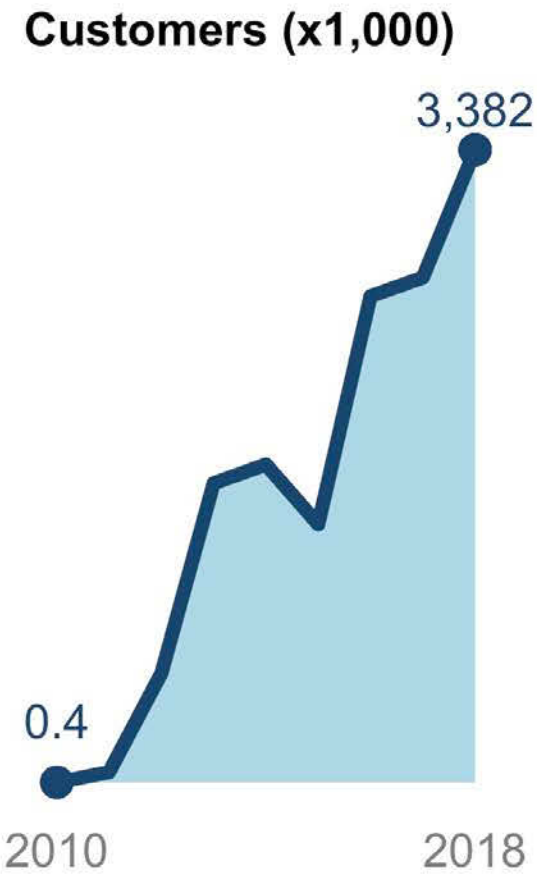
Basic CCA structure

Specific program structures vary

CCA Trends

About **3.4 million customers** procured about **9.5 million MWh** of renewable energy through CCAs in 2018. CCA green power sales grew by about 7% from 2017 to 2018.



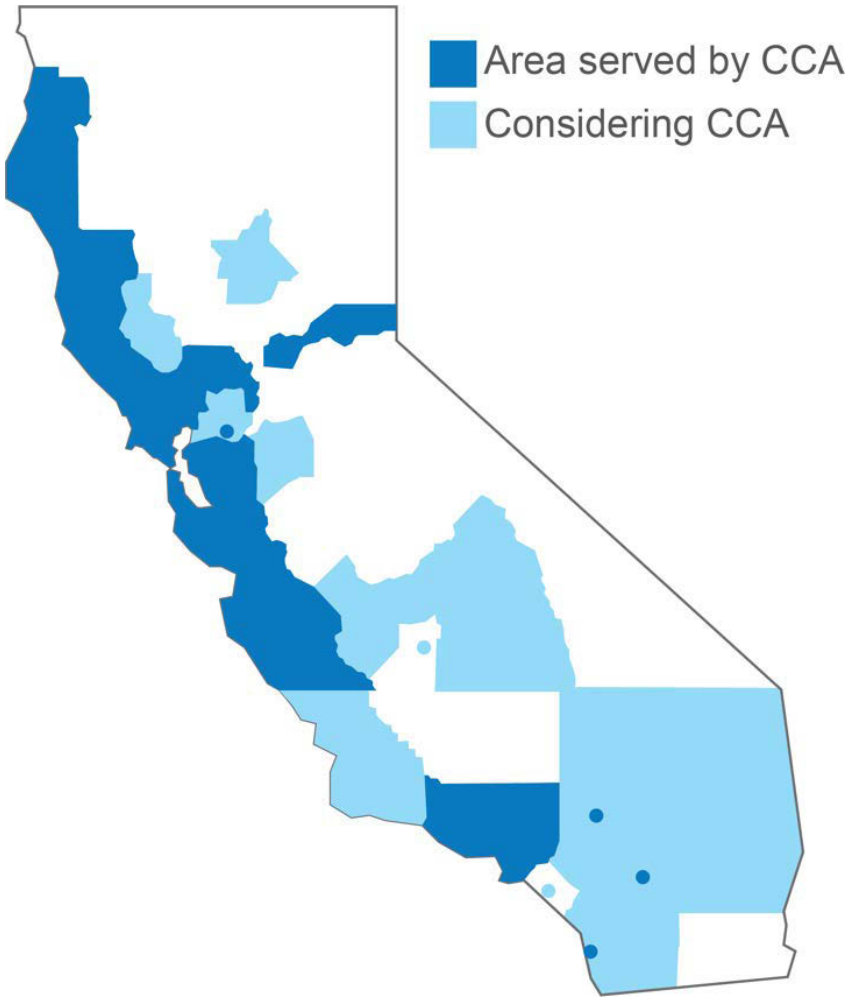


CCA Sales by State

State	Green Power Sales (MWh)	Green Power Customers
California	4,374,00	2,229,000
Illinois	2,786,000	104,000
Massachusetts	1,222,000	877,000
Ohio	691,000	111,000
New York	396,000	61,000
TOTAL	**9,469,000**	**3,382,000**

CCAs in California

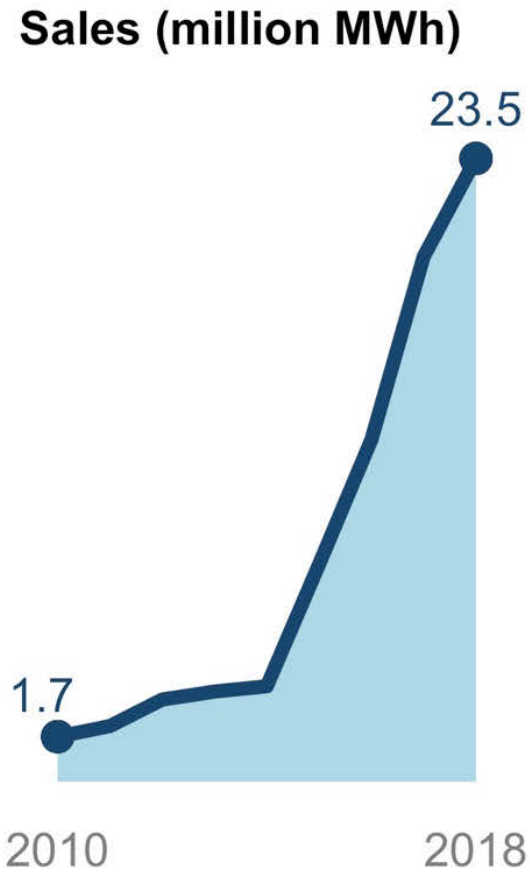
- California continues to drive increasing CCA sales and participation.
- CalCCA projects that total CCA sales will nearly double from 2018 to 2019 alone, due to the ongoing geographic expansion of CCAs into new jurisdictions.
- Unlike CCAs in other states, every California CCA offers a default electricity product with more renewable energy than required by California RPS. Most CCAs offer opt-up voluntary green power products with higher renewable energy content.

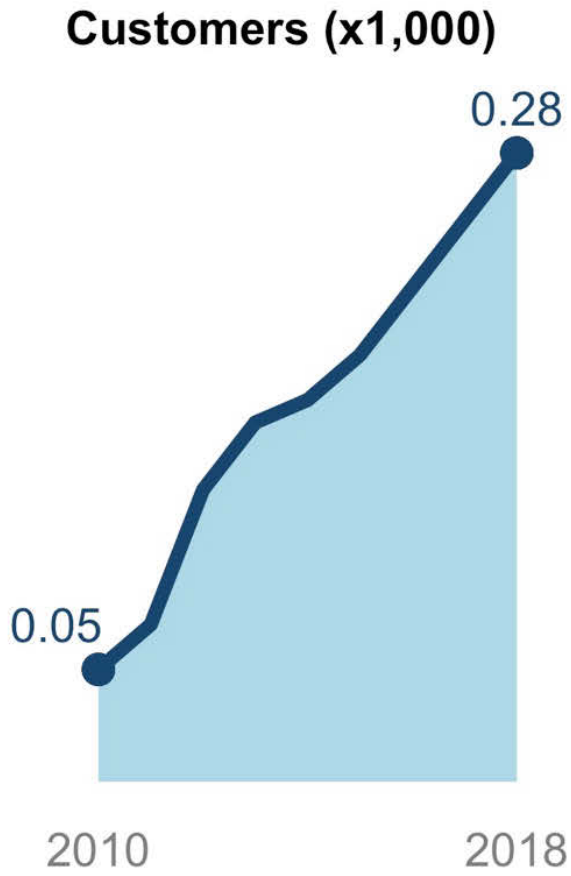


Areas currently served by and considering CCAs. Map modified from CalCCA (2019).

PPA Trends

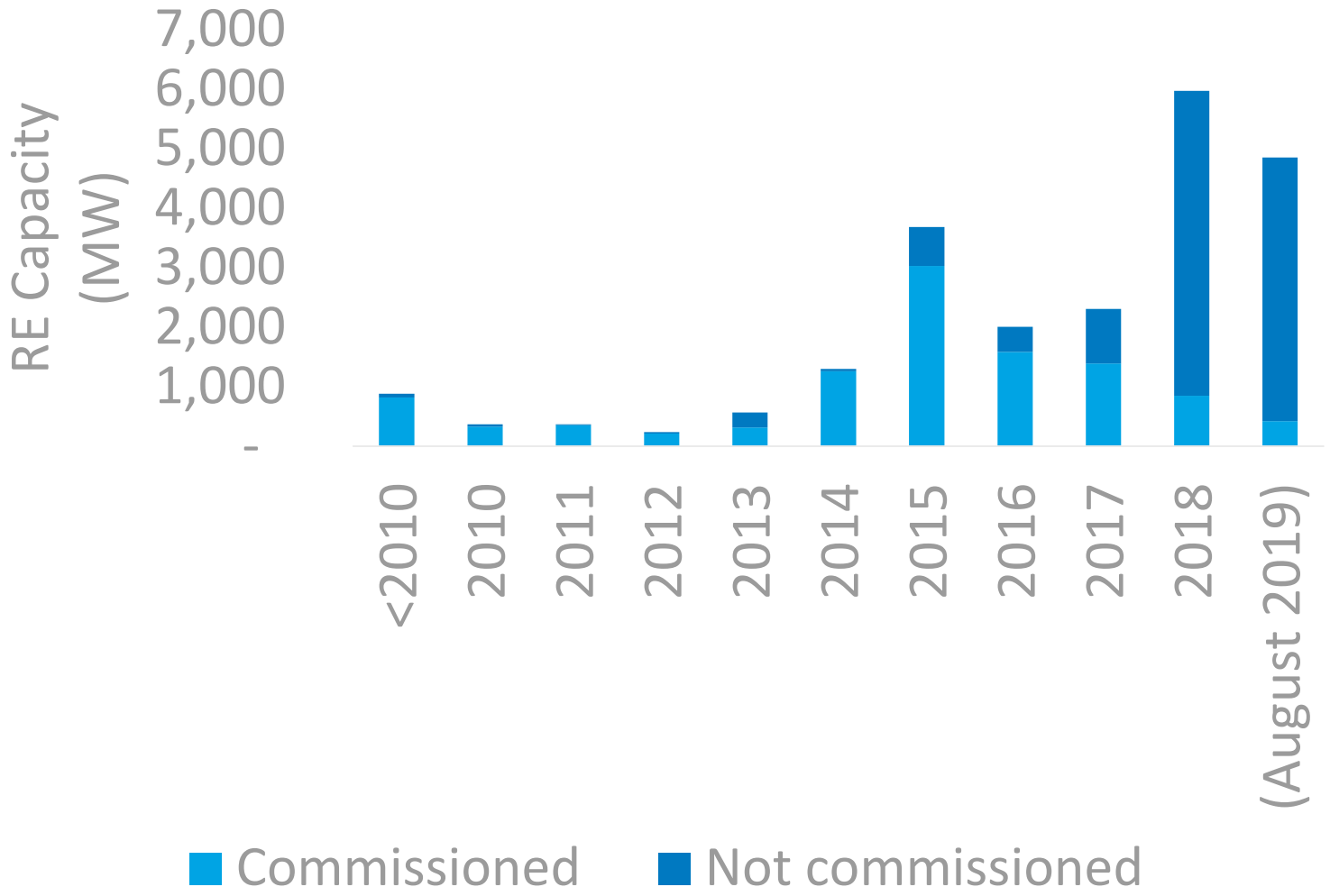
About **275 offtakers** procured about **23.5 million MWh** of green power through PPAs in 2018. PPA green power sales grew by about 19% from 2017 to 2018. These figures include only PPA sales where we estimate that the purchaser has retained the RECs.





Much of the PPA Capacity is Yet to be Commissioned

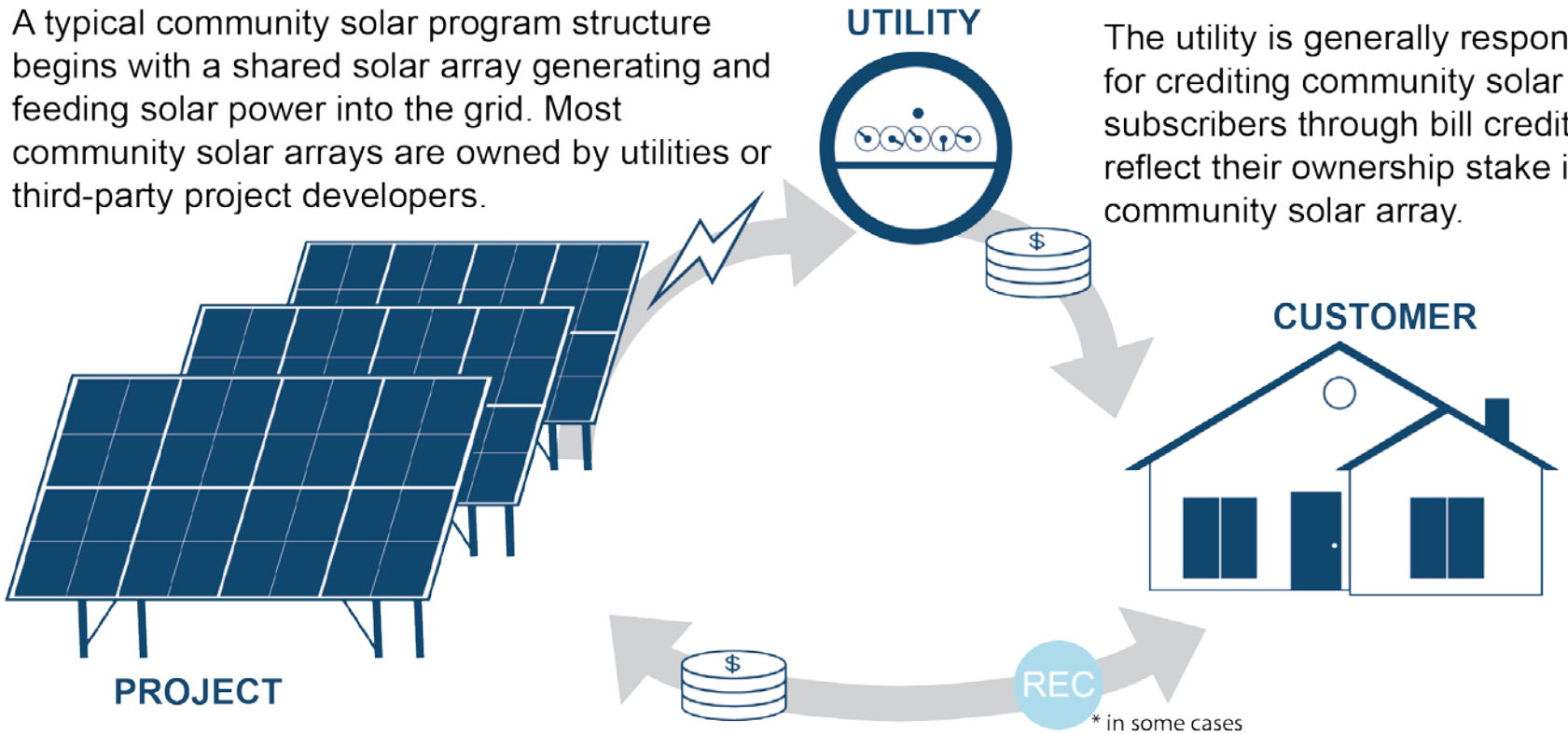
- Most PPA capacity signed in 2018 and 2019 has yet to come online, as would be expected based on standard construction cycles.
- However, some projects signed in 2015 and 2016 are also not commissioned; these projects may or may not actually be moving forward.



This figure includes projects with RECs retained by the customer or by the utility.

Community Solar

A typical community solar program structure begins with a shared solar array generating and feeding solar power into the grid. Most community solar arrays are owned by utilities or third-party project developers.



The utility is generally responsible for crediting community solar subscribers through bill credits that reflect their ownership stake in the community solar array.

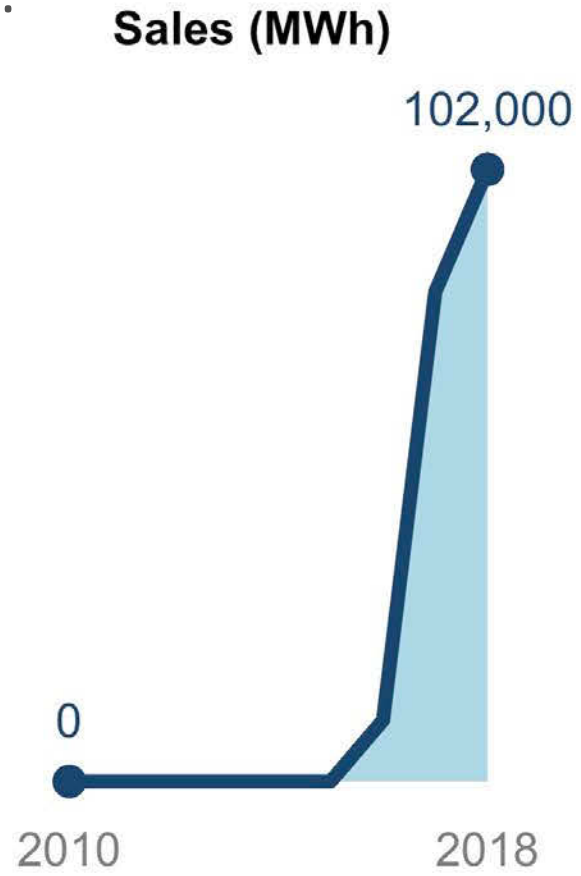
Community solar subscribers generally pay for their subscription through up-front purchases of capacity (kW) or output (kWh). In return, the subscribers receive bill credits and, in some cases, RECs. *However subscribers do not commonly receive the RECs, in which case their subscription is not a green power purchase.

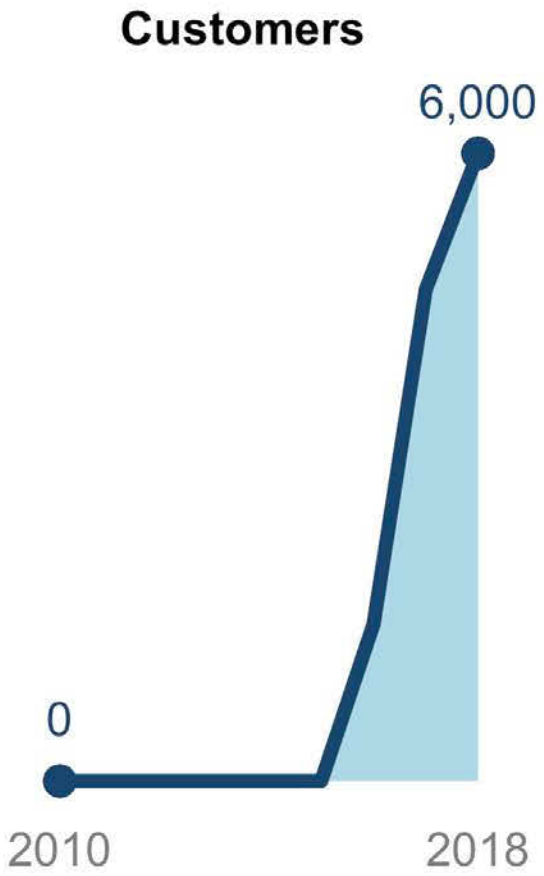
Basic community solar program structure

Specific program structures vary

Community Solar Trends

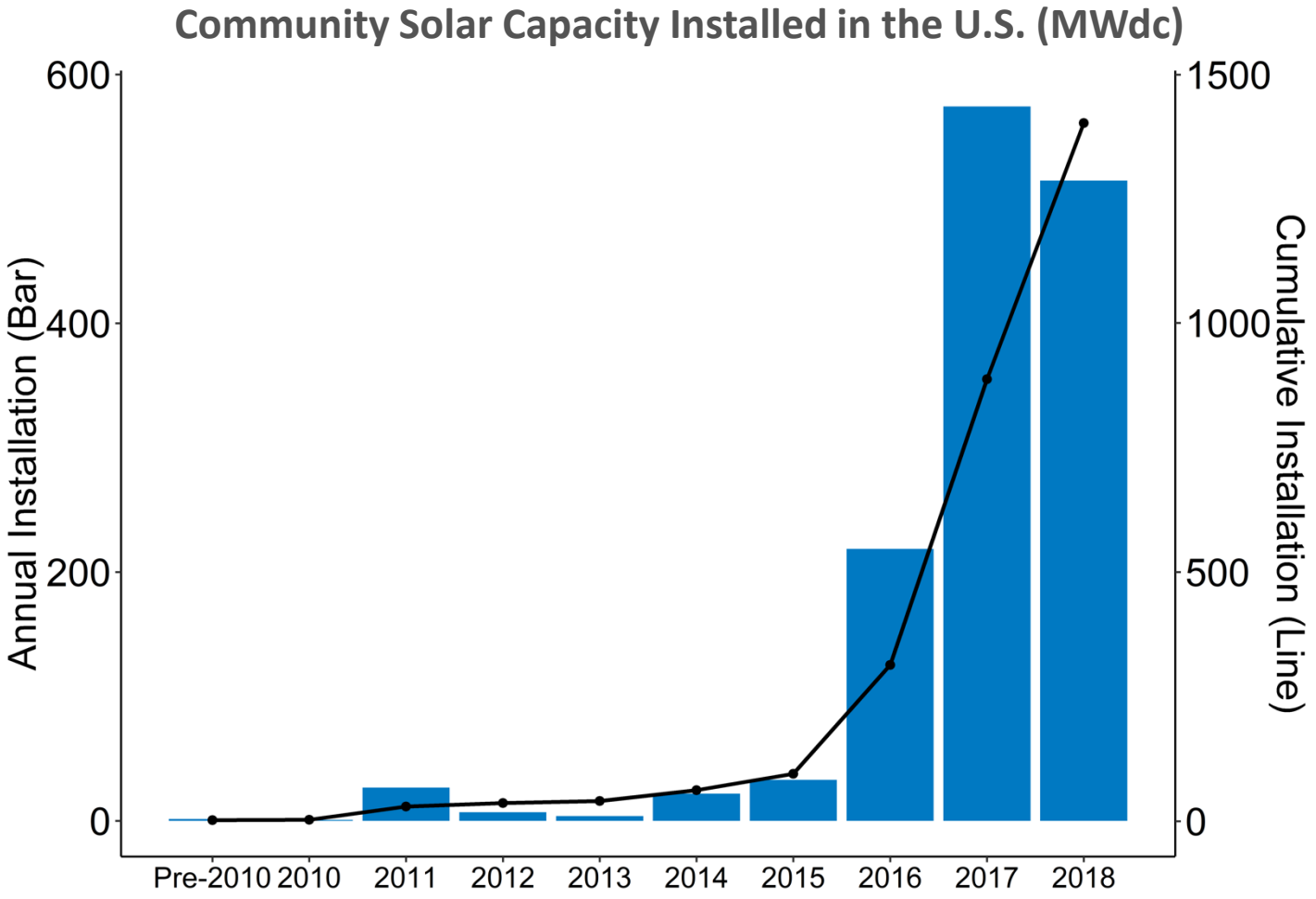
About **6,000 customers** procured about **102,000 MWh** of community solar green power in 2018.*





* Estimate is based on sales from programs that retire RECs on behalf of all subscribers. Estimate does not account for green power sales from other community solar programs. where subscribers elect to purchase their RECs.

Community Solar Capacity Updates



Data Source: U.S. Solar Market Insights 2018 Year-in-Review (GTM)

- **By the end of 2018, over 1.4 GWdc of community solar were installed.**
  - This figure includes projects with RECs retained by the customer or by the utility.
- **More than 2.1 GW of projects are in state interconnection queues, as of mid-2019.**
- **While growing, community solar represents a relatively small share of total U.S. solar capacity.**
  - As of end 2018, community solar represented 2% of cumulative installed PV capacity
    - ➢ 1.4 GW/64 GW

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]

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NREL/PR-6A20-74862

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