



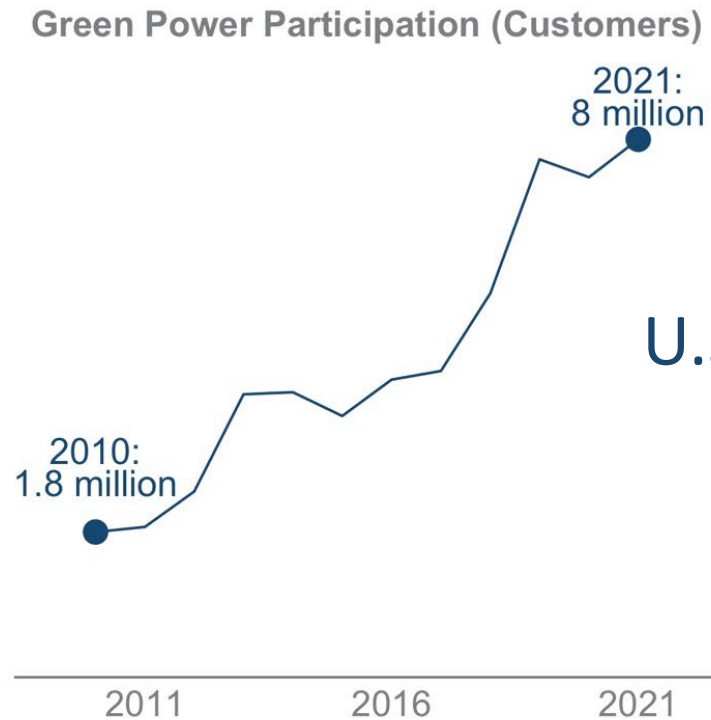
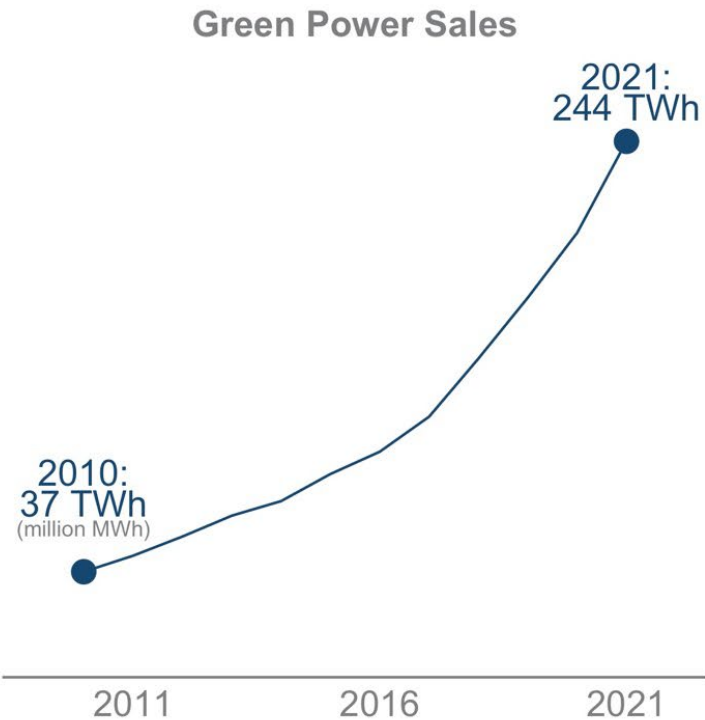
Status and Trends in the Voluntary Market (2021 data)

Eric O'Shaughnessy, Clean Kilowatts LLC

State of the Voluntary Green Power Market
Green Power Partnership Webinar
February 23, 2023

The Big Picture

In 2021, about **8 million customers** procured about **244 million MWh** of renewable energy through green power markets.



That represents about:

39%

U.S. non-hydro renewable energy sales

6%

of U.S. retail electricity sales

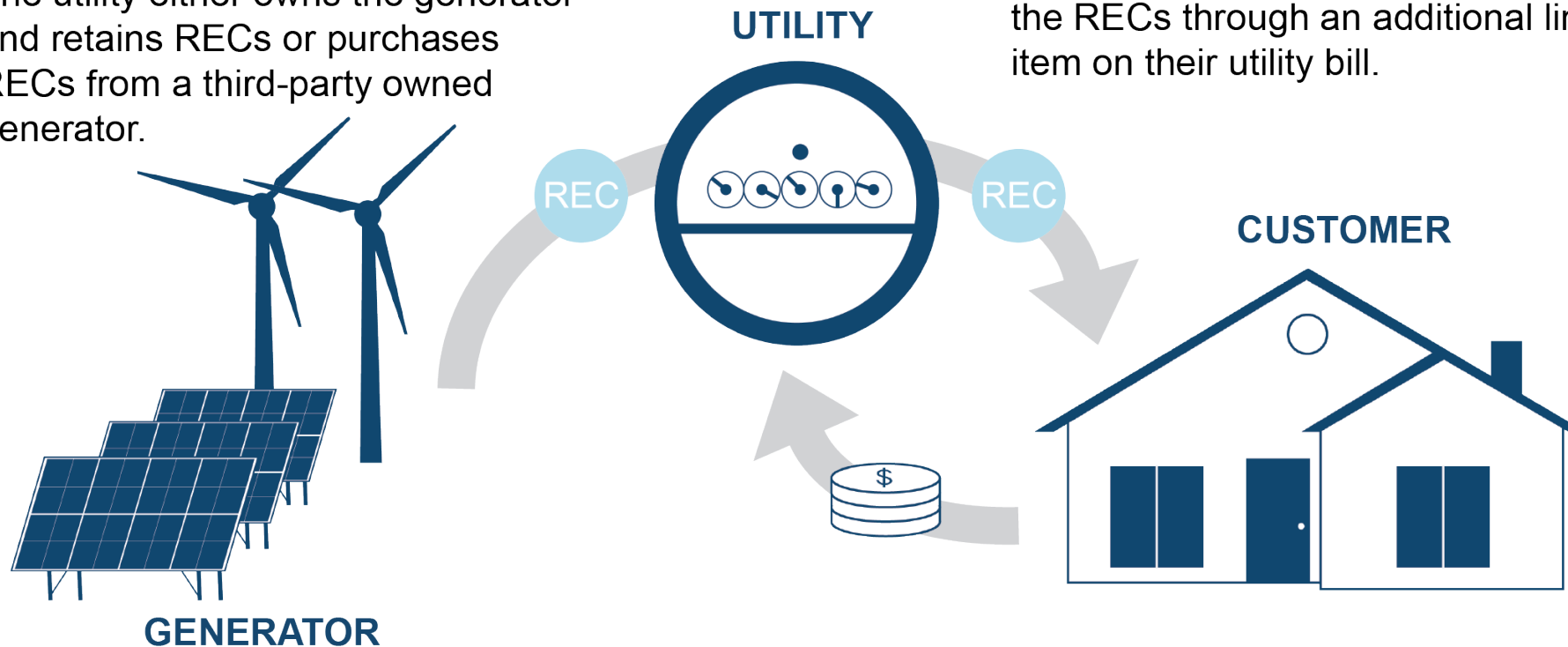
Total green power sales and participation 2010-2022

Voluntary Market Segments

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.



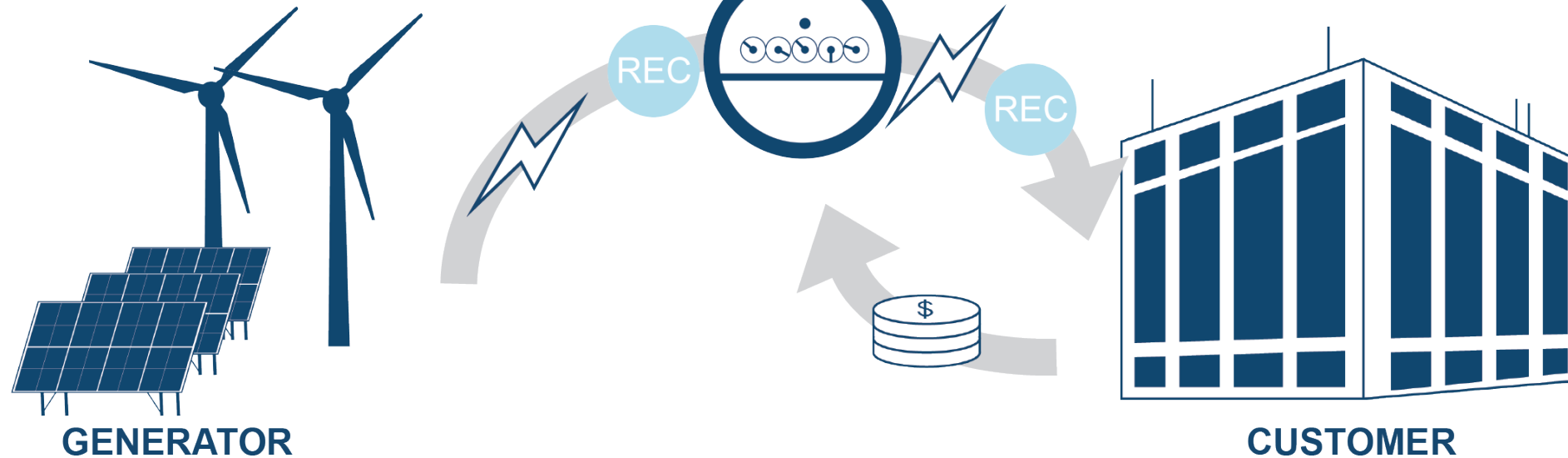
Basic utility green pricing program structure

Specific program structures vary

Utility 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.



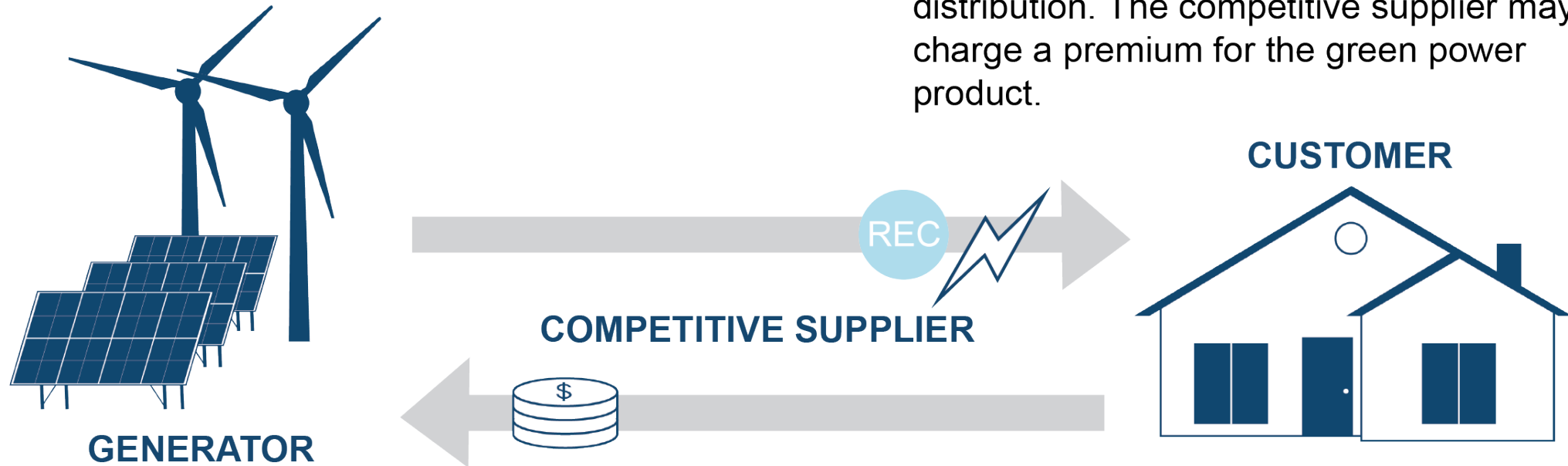
Basic utility renewable contract structure

Specific program structures vary

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.



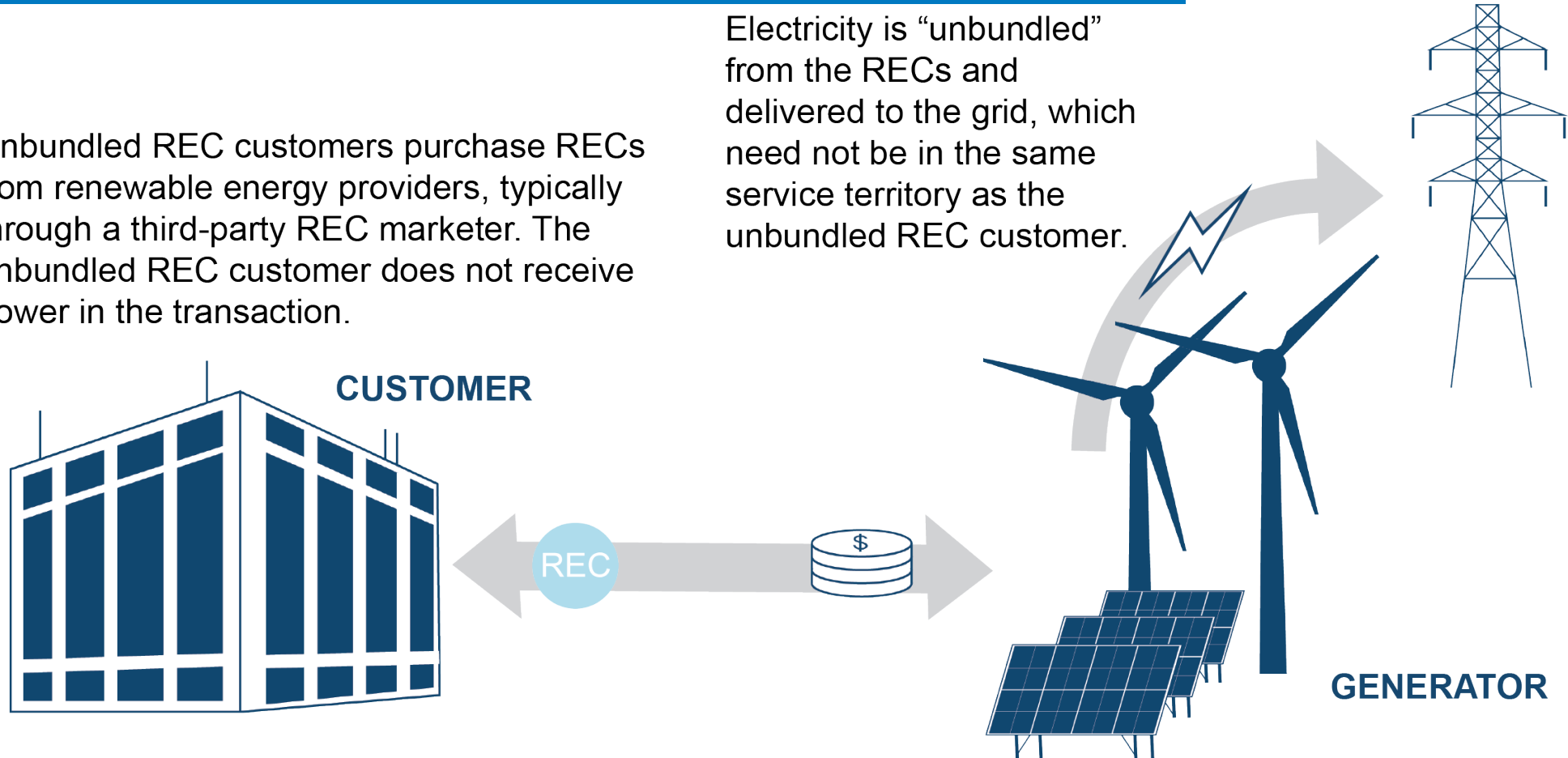
Basic competitive supplier sales structure

Specific program structures vary

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.



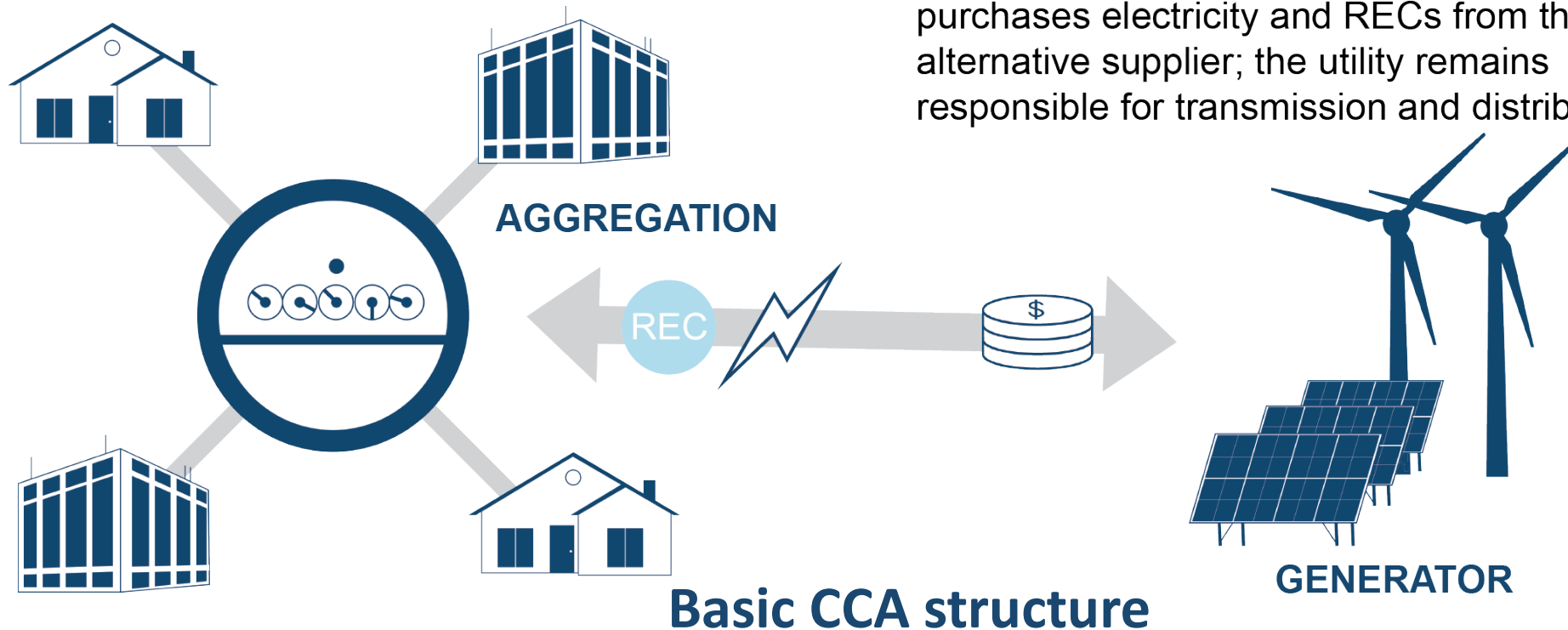
Basic unbundled RECs sales structure

Specific program structures vary

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.

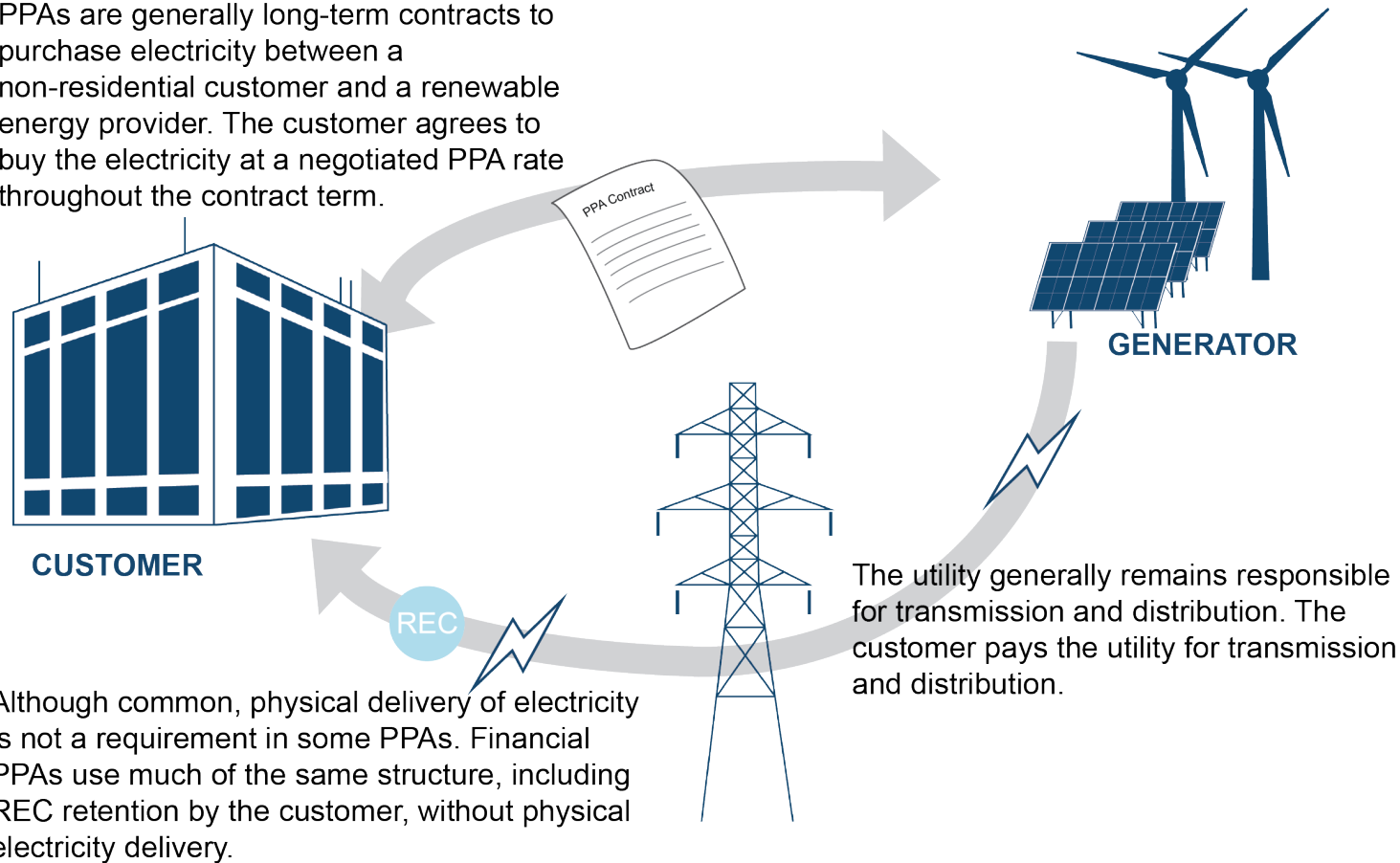
The CCA “switches” from an incumbent electricity supplier to an alternative supplier with a renewable energy product (though the switch may include a non-renewable product). The CCA purchases electricity and RECs from the alternative supplier; the utility remains responsible for transmission and distribution



Specific program structures vary

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.

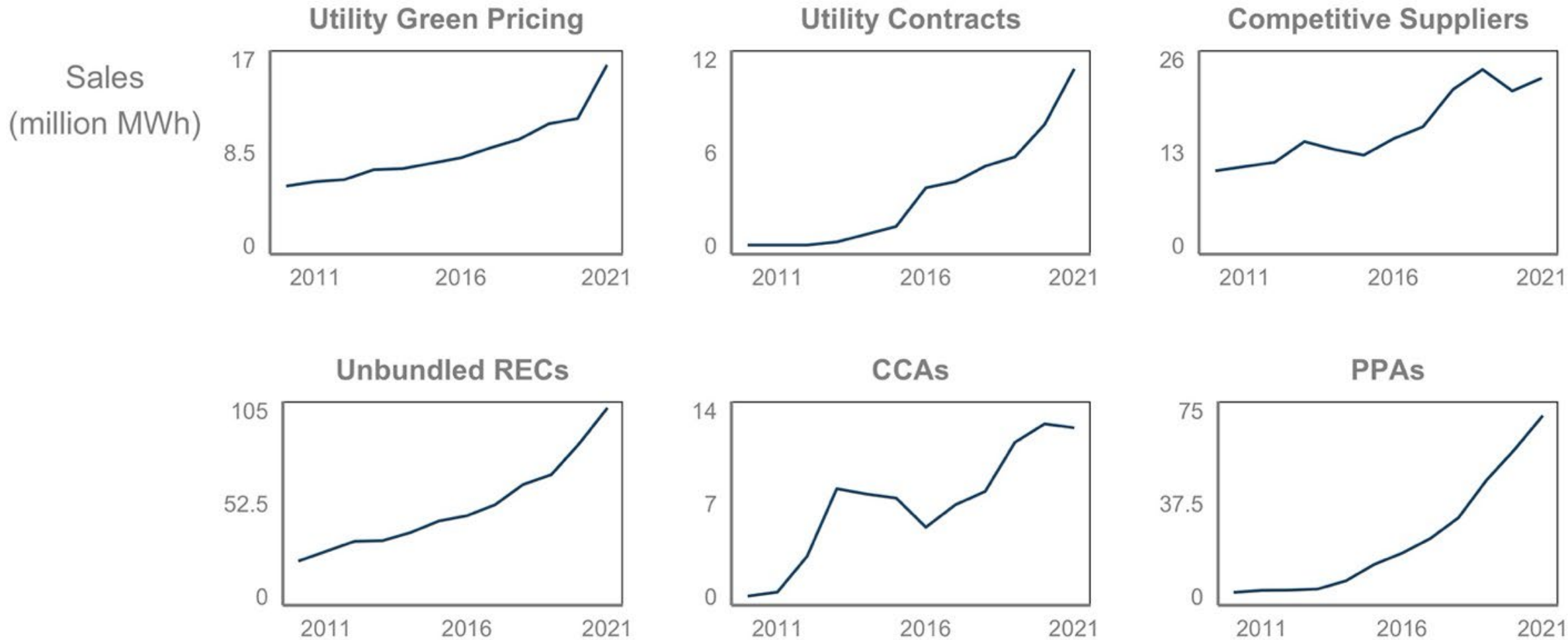


Basic PPA structure

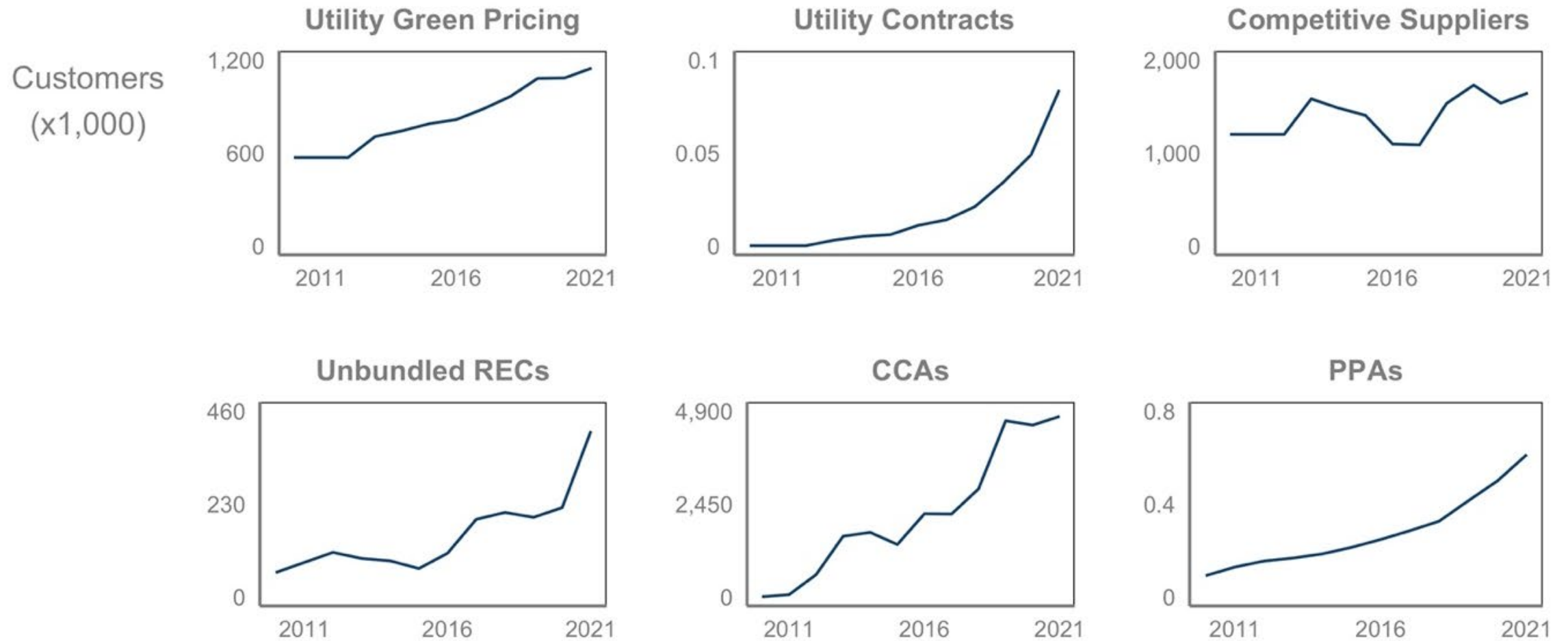
Specific program structures vary. See full report for a more complete description of the differences between physical and financial PPAs

Summary Trends

2021 Green Power Sales



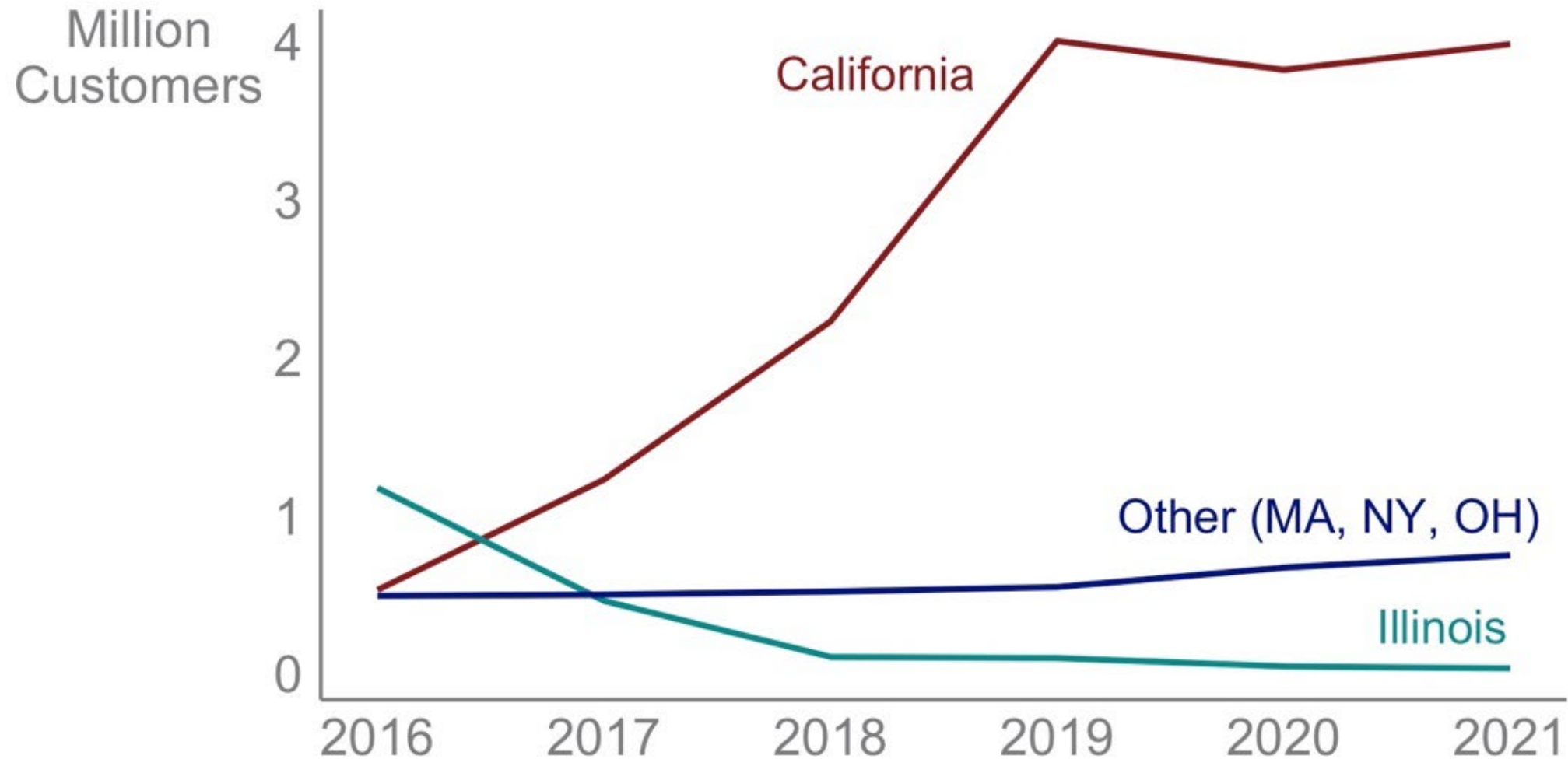
2021 Green Power Participation



Small customer sales are concentrated in a few states



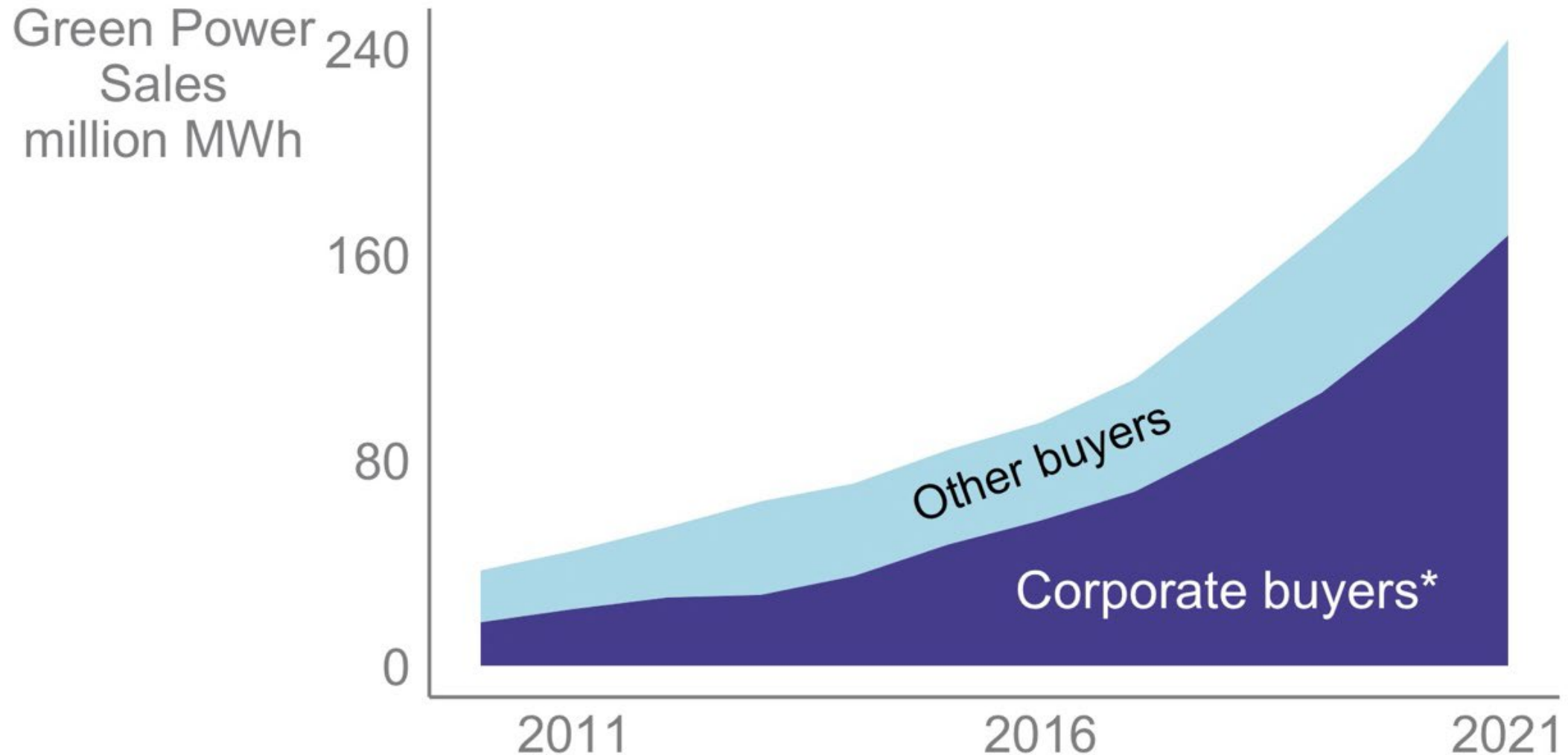
CCA activity has plateaued in recent years



Utility green tariffs are poised for growth

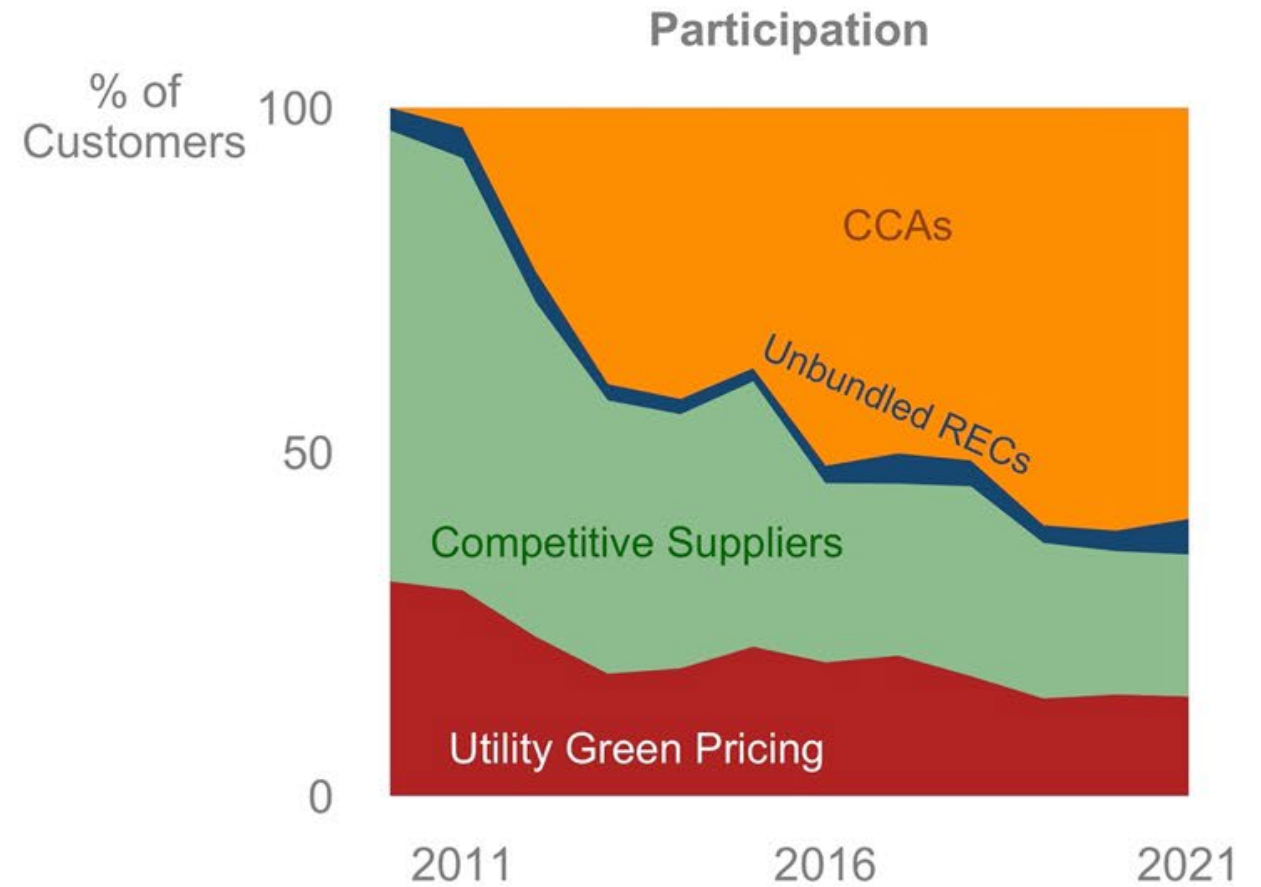
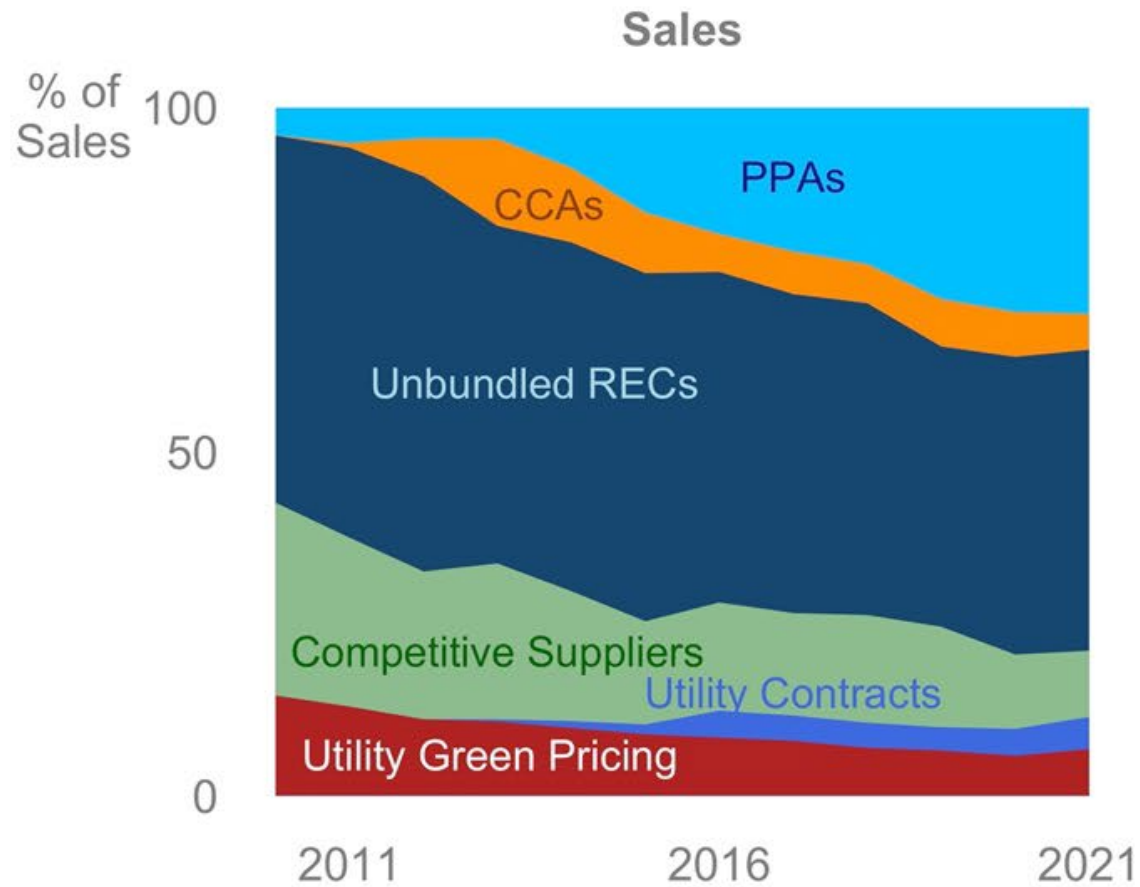


Corporate procurement continues to surge



* Based on data and methods described in O'Shaughnessy et al. (2021). The corporate share provides a rough estimate of corporate demand based on available procurement data.

Green Power Sales and Customers by Mechanism



NREL's Voluntary Market Research

Jenny Sumner

jenny.sumner@nrel.gov

303-275-4366

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

Thank you!

Eric O'Shaughnessy

eric.oshaughnessy@cleankws.com

www.nrel.gov

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

