



State of the Voluntary Green Power Market

February 21, 2018



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Speakers and Agenda

- Speakers:
 - Christopher Kent, Program Manager, U.S. EPA's Green Power Partnership
 - Eric O'Shaughnessy, Renewable Energy Analyst, National Renewable Energy Laboratory
- Agenda:
 - Basics of Green Power
 - Green Power Partnership Overview
 - GPP Program Data Summary
 - Status and Trends in U.S. Voluntary Green Power Market
 - Question and Answer session



What is Green Power?

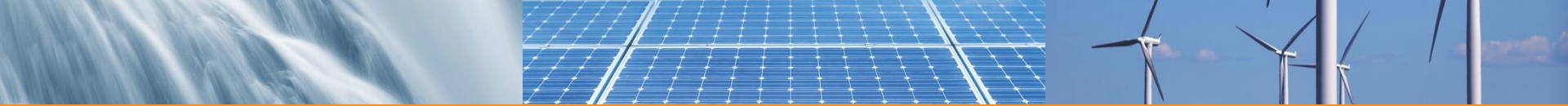
- Subset of renewable energy – representative of resources and technologies that offer the highest environmental benefit.
- Electricity generated from natural resources that replenish themselves over short periods of time, including the sun, wind, moving water, organic plant and waste material (biomass), and the Earth's heat (geothermal).
- Must be from “new” facilities placed into service within last 15 years.
- Must be from the “voluntary” market.



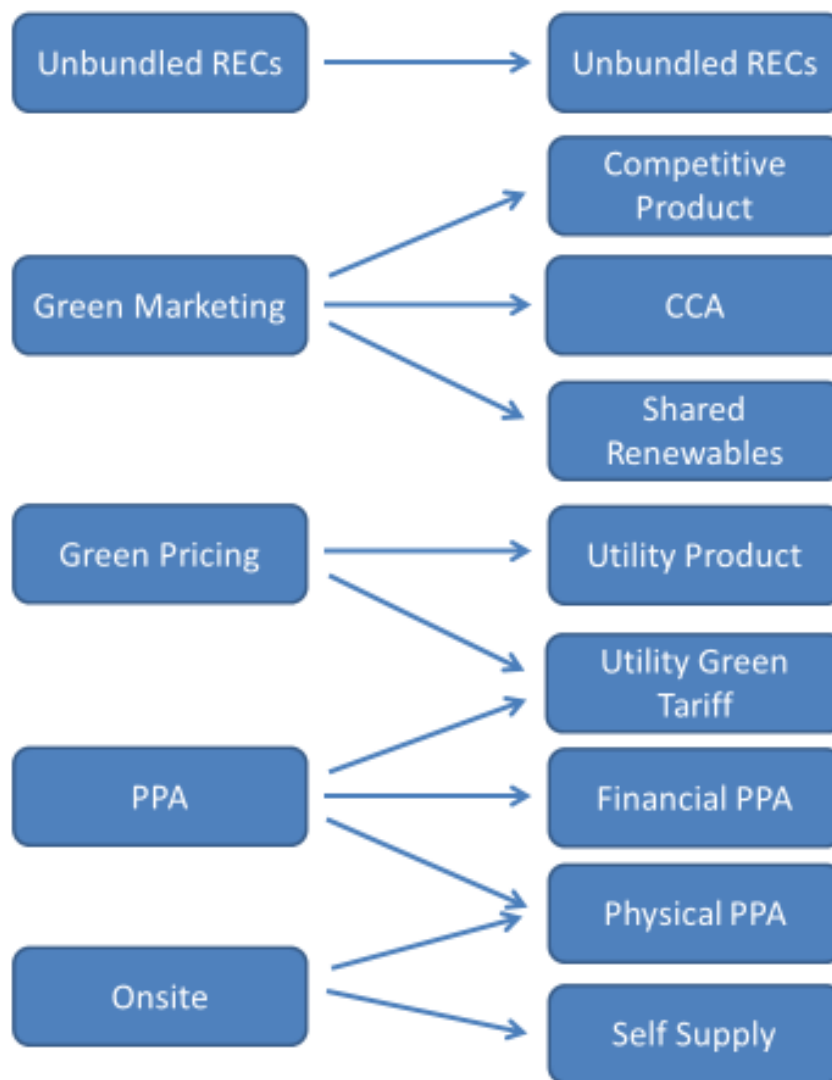
Supply Options

- **Unbundled Renewable Energy Certificates (RECs)**
 - RECs that are sold, delivered, or purchased separately from electricity.
 - RECs provide no physical delivery of electricity to customers and as such the customer is purchasing power from a separate entity than the one selling them the REC. Does not include the underlying electrons -> "unbundled"
- **Utility Supplied Green Power Products**
 - "Bundled" green power product offered by utility suppliers
- **Competitive Green Power Products**
 - "Bundled" product offered by competitive suppliers in electricity markets that are not traditionally regulated
- **On-site**
 - Produces both electricity and RECs from an on-site source (e.g. solar panels, wind turbine)
 - Can be a self-owned renewable system or an on-site PPA
- **Off-site Power Purchase Agreement (PPA)**
 - Usually a long-term contract to procure RECs and underlying electrons from a specific project, can be signed pre- or post-project development
 - PPAs can be "physical" or "financial" (also called virtual PPAs)





Evolving Product Categories





Renewable Energy Certificates (RECs)

- Tradable commodity produced by renewable electricity generators
 - 1 REC = 1 megawatt-hour (MWh) of renewable electricity
- Represent the environmental value of renewable electricity
- RECs prices are strongly influenced by voluntary market supply and demand, as well as by state RPS policies
- They may be bundled with power or unbundled
 - Are the only means of tracking the emissions benefits and environmental attributes associated with the generation from a renewable energy facility



Value Proposition to Companies

- Environmental
 - Addresses indirect GHG emissions (Scope 2 emissions)
- Potential Electricity Cost Savings and/or Stability
 - Reduce exposure to fossil fuel price volatility
- Economic Development
 - Job creation
 - Local/regional economic growth
- Demonstrate Leadership
 - Enhance image
 - Differentiate products/services
 - Improve employee morale/attract and retain talent



As a health care provider, we have an obligation to operate in a manner that supports health in our communities and reduces our environmental footprint. By renewing and expanding this wind power purchase agreement, Kaiser Permanente is increasing its investments in cleaner energy. It's the right thing to do for our communities, and it makes good business sense.

- Ramé Hemstreet, Kaiser Permanente





Green Power Partnership Overview

- Summary
 - The U.S. EPA's Green Power Partnership is a voluntary program that encourages organizations to use green power.
- Objectives
 - Reduce U.S. greenhouse gas emissions
 - Expand the voluntary green power market
 - Standardize green power procurement as part of best practice environmental management
- Program Activities
 - Provide technical assistance and tools on procuring green power
 - Provide recognition platform for organizations using green power in the hope that others follow their lead
- ~1,700 Partners are purchasing >45 billion kWh annually



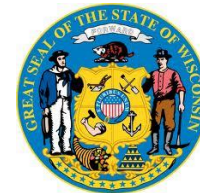
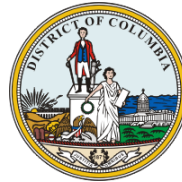
Partnership Requirements

- EPA supports Partners' procurement of green power by offering advice, technical support, tools and resources, and recognition.
- Partners agree to procure green power and provide an annual update.
- In return, EPA commits to:
 - Provide public recognition
 - Provide procurement and communications assistance, as requested
 - Provide a brief description of the Partner's green power use on EPA's website

	Partnership Benchmark
If your annual electricity use is:	You must, at minimum, use this much green power:
Over 100,000,000 kWh	3% of your use
10,000,001-100,000,000 kWh	5% of your use
1,000,001-10,000,000 kWh	10% of your use
Under 1,000,000 kWh	20% of your use



EPA's 1,700 Green Power Partners



Helping Leverage Organization's Green Power Use

- **Credible Benchmarks & GHG Quantification**

- Metrics for "How much green power is enough?"
- Definition of eligible renewables & products
- Carbon footprint reduction guidance and calculations

- **Planning & Implementation Resources**

- Purchasing strategy guidance
- Marketing and communications support

- **Recognition**

- Top Partner Lists
- Use of the Partner mark
- Green Power Leadership Awards
- Promotional opportunities

- **Best Practices & Innovation**

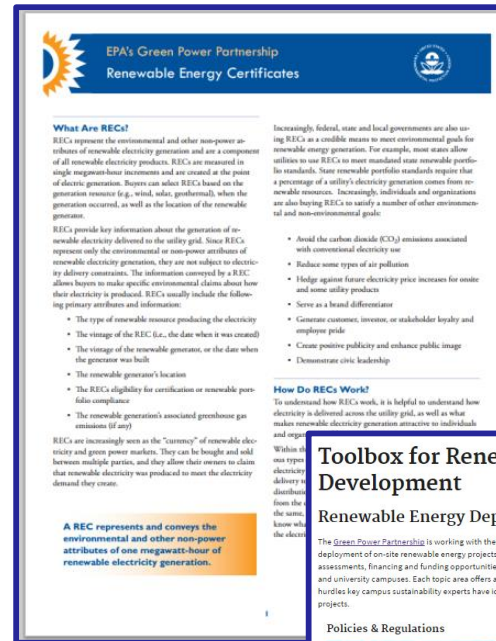
- Collaborative solar procurement
- New contract mechanisms



Program Resources for Procuring Green Power

The Partnership Offers:

- Toolbox for Renewable Energy Development
- Guide to Purchasing Green Power
- Screening tool
- Resource Library
- Webinars showcasing best practices
- Issue whitepapers



**EPA's Green Power Partnership
Renewable Energy Certificates**

What Are RECs?
RECs represent the environmental and other non-power attributes of renewable electricity generation and are a component of all renewable electricity products. RECs are measured in single megawatt-hour increments and are created at the point of electric generation. Buyers can add RECs based on the generation resource (e.g., wind, solar, geothermal), when the generation occurred, as well as the location of the renewable generation.

RECs provide key information about the generation of renewable electricity delivered to the utility grid. Since RECs represent only the environmental or non-power attributes of renewable electricity generation, they are not subject to electricity delivery constraints. The information covered by a REC allows buyers to make specific environmental claims about how their electricity is produced. RECs usually include the following primary attributes and information:

- The type of renewable resource producing the electricity
- The timing of the REC (i.e., the date when it was created)
- The timing of the renewable generation, or the date when the generation was built
- The renewable generator's location
- The REC's eligibility for certification or renewable portfolio compliance
- The renewable generator's associated greenhouse gas emissions (if any)

RECs are increasingly seen as the "currency" of renewable electricity and green power markets. They can be bought and sold between multiple parties, and they allow their owners to claim that renewable electricity was produced to meet the electricity demand they create.

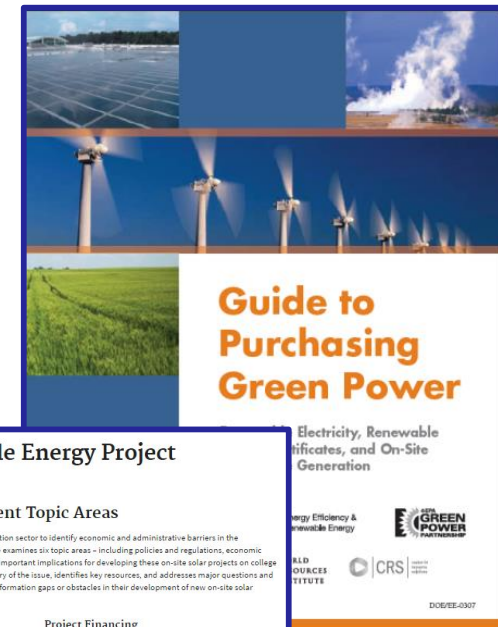
A REC represents and conveys the environmental and other non-power attributes of one megawatt-hour of renewable electricity generation.

Increasingly, federal, state and local governments are also using RECs as a credible means to meet environmental goals for renewable energy generation. For example, most states allow utilities to use RECs to meet mandated state renewable portfolio standards. Some renewable portfolio standards require that a percentage of a utility's electricity generation comes from renewable resources. Increasingly, individuals and organizations are also buying RECs to satisfy a number of other environmental and non-environmental goals.

- Avoid the carbon dioxide (CO₂) emissions associated with conventional electricity use
- Reduce some types of air pollution
- Help offset future electricity price increases for onsite and some utility products
- Serve as a brand differentiator
- Generate customer, investor, or stakeholder loyalty and employee pride
- Create positive publicity and enhance public image
- Demonstrate civic leadership

How Do RECs Work?
To understand how RECs work, it is helpful to understand how electricity is delivered across the utility grid, as well as what makes renewable electricity generation attractive to individuals and organizations.

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Guide to Purchasing Green Power

Electricity, Renewable Certificates, and On-Site Generation

Energy Efficiency & Renewable Energy

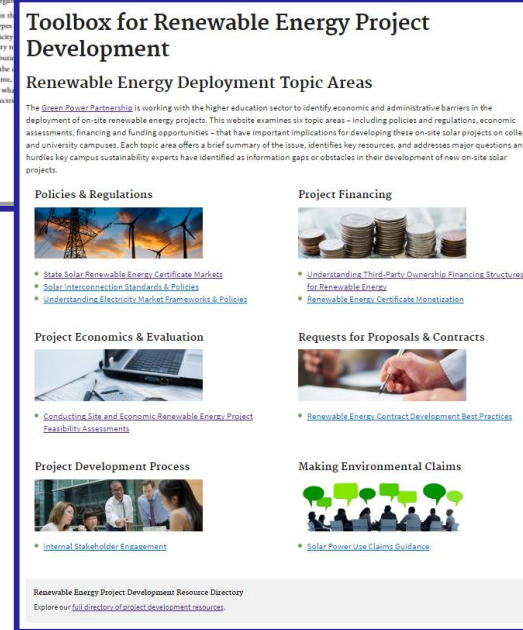
U.S. GREEN POWER PARTNERSHIP

U.S. DEPARTMENT OF ENERGY

U.S. ENVIRONMENTAL PROTECTION AGENCY

CRS

DOE/EE-0307



Toolbox for Renewable Energy Project Development

Renewable Energy Deployment Topic Areas

The Green Power Partnership is working with the higher education sector to identify economic and administrative barriers in the deployment of on-site renewable energy projects. This website examines six topic areas – including policies and regulations, economic assessments, financing and funding opportunities – that have important implications for developing these on-site solar projects on college and university campuses. Each topic area offers a brief summary of the issue, identifies key resources, and addresses major questions and hurdles key campus sustainability experts have identified as information gaps or obstacles in their development of new on-site solar projects.

- Policies & Regulations**
 - State Solar Renewable Energy Certificate Markets
 - Solar Interconnection Standards & Policies
 - Understanding Electricity Market Frameworks & Policies
- Project Financing**
 - Understanding Third-Party Ownership Financing Structures for Renewable Energy
 - Renewable Energy Certificate Monetization
- Project Economics & Evaluation**
 - Conducting Site and Economic Renewable Energy Project Feasibility Assessments
- Requests for Proposals & Contracts**
 - Renewable Energy Contract Development Best Practices
- Project Development Process**
 - Internal Stakeholder Engagement
- Making Environmental Claims**
 - Solar Power Use Claims Guidance


Renewable Energy Project Development Resource Directory
Explore our full directory of project development resources.

New Resource – Supply Options Screening Tool

- Easy-to-use spreadsheet tool
- Available at: www.epa.gov/greenpower/procurement-tools-resources

Green Power Supply Options Screening Tool

The purpose of this tool is to help organizations identify possible green power supply options that are available to them. To learn more about the various supply options available in the renewable energy market, visit: <https://www.epa.gov/greenpower/green-power-supply-options>



DIRECTIONS

Answer the screening questions using the drop-down menus. Your answers will help identify possible supply options based on your organizational details as well as federal, state and utility policies. To learn more about each of the supply options and whether it works for your organization, click on the respective link in the results section at the bottom.

SCREENING QUESTIONS

Please answer the following questions by selecting an option from each drop-down menu:

1. Is your organization a for-profit or a non-profit organization?	Non-profit	▼
2. In what state does your organization operationally consume electricity?	View State's Policy Landscape >>	▼
3. Is your organization open to procuring renewables from offsite projects outside of your state or the grid-region where you operate?	Yes	▼
4. Is your organization willing to commit to a long-term energy purchase/use of 10+ years?	Yes	▼
5. Does your organization use more than 40 million kWh per year of electricity?	Yes	▼
6. Does your organization have investment grade credit?	Yes	▼

RESULTS: Your Organization's Supply Options

Following is a listing of green power supply options and whether they are viable for your organization based on your answers to the screening questions. Click the links to learn more details about the different procurement options, including considerations and policy implications.

Project-Specific Supply Options					Retail Supply Options			
Onsite Self Supply	Onsite Power Purchase Agreement	Offsite Physical Power Purchase Agreement	Offsite Financial Power Purchase Agreement	Community Solar	Utility Green Tariff	Utility Green Power Product	Competitive Green Power Product	Renewable Energy Certificates
Very Likely	Very Likely	Unlikely	Very Likely	Potentially in the Future	Possibly	Very Likely	No	Yes



EPA's Top Partner Lists

Green Power Partnership National Top 100

Released on January 22, 2018



The National Top 100 list represents the largest green power users within the Green Power Partnership. The combined green power usage of these Top 100 Partners amount to almost 39 billion kilowatt-hours annually, which represents approximately 85 percent of the green power commitments made by all EPA Green Power Partners.

- [\[National Top 100 \]](#)
- [Top 30 Retail](#)
- [Top 10 Federal Government](#)
- [Top 30 Tech & Telecom](#)
- [Top 30 College & University](#)
- [100% Green Power Users](#)
- [Top 30 K-12 Schools](#)
- [Fortune 500® Partners List](#)
- [Top 30 Local Government](#)
- [Long-term Contracts](#)
- [Top 30 On-site Generation](#)



Partner Name	Annual Green Power Usage (kWh)	GP % of Total Electricity Use*	Organization Type	Providers (listed in descending order by kWh supplied to Partner)	Green Power Resources
1. Microsoft Corporation	4,557,278,000	100%	Technology & Telecom	Sterling Planet ² , Enbridge LLC, EDF Renewable Energy, Black Hills Corp., Renewable Choice Energy ² , On-site Generation	Solar, Wind
2. Intel Corporation	4,152,034,623	100%	Technology & Telecom	Renewable Choice Energy ² , 3Degrees ² , On-site Generation, PNM	Biomass, Geothermal, Small-hydro, Solar, Wind
3. Google Inc.	1,763,588,904	47%	Technology & Telecom	MidAmerican Energy ² , NextEra Energy Resources ² , Grand River Dam Authority ² , Northern Wasco County PUD, On-site Generation	Biogas, Small-hydro, Solar, Wind
4. Kohl's Department Stores	1,429,423,791	115%	Retail	3Degrees ² , Carbon Solutions Group ² , Renewable Choice Energy ² , On-site Generation	Solar, Wind

2017 Green Power Leadership Award Winners

Excellence in Green Power Use
Capital One
Clif Bar & Company
Equinix, Inc.
Google Inc.
Microsoft Corporation
TOTO USA / Morrow, Georgia Facility
University of California
University of Tennessee, Knoxville
Green Power Partner of the Year
City of Houston, Texas
L'Oréal USA

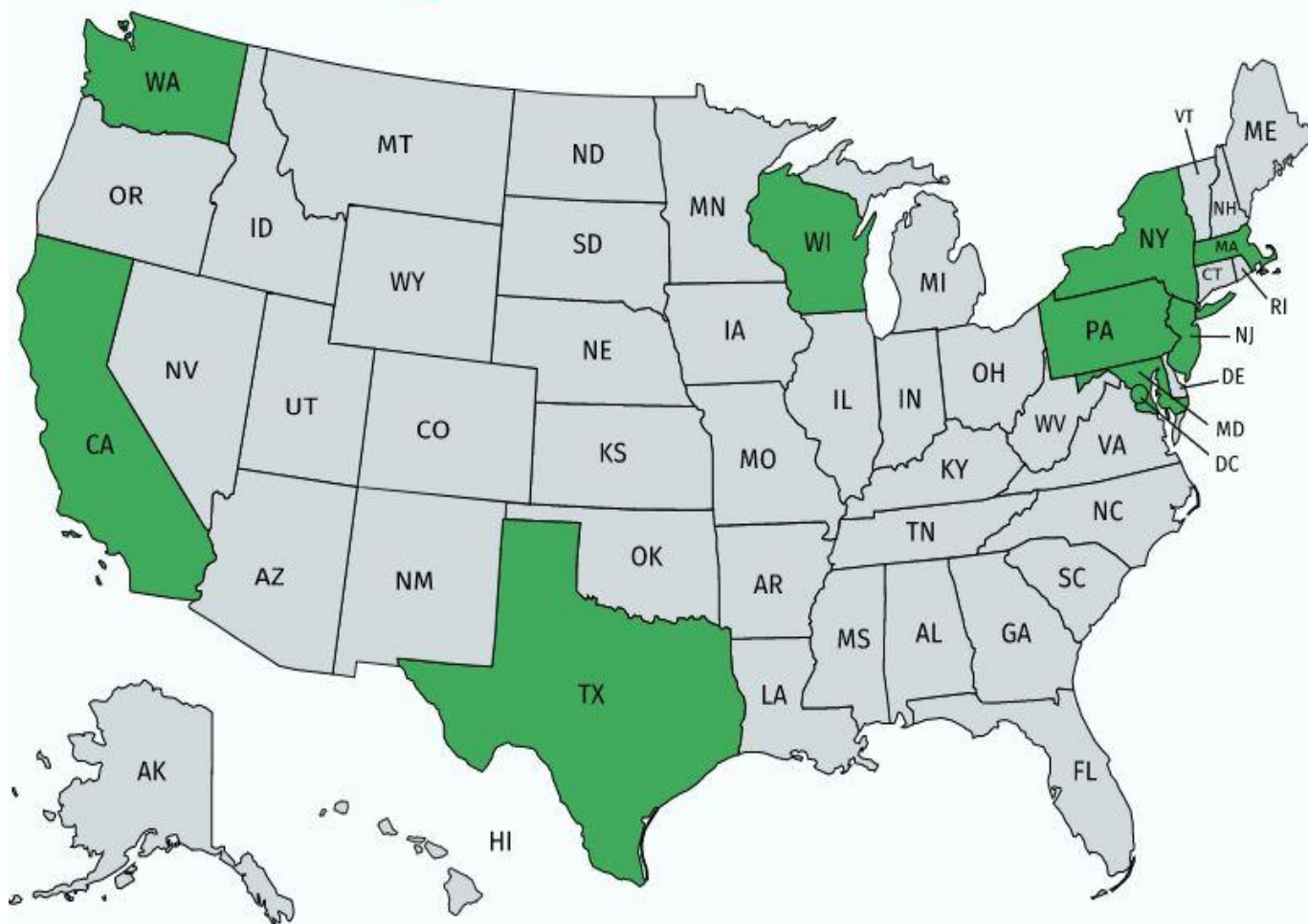
Direct Project Engagement
Amphitheater Public Schools
Apple Inc.
Intel Corporation
Iron Mountain Information Management, LLC
Lockheed Martin Corporation
Stanford University
University of Missouri
Victor Valley Wastewater Reclamation Authority
Green Power Community of the Year
Bainbridge Island, Washington



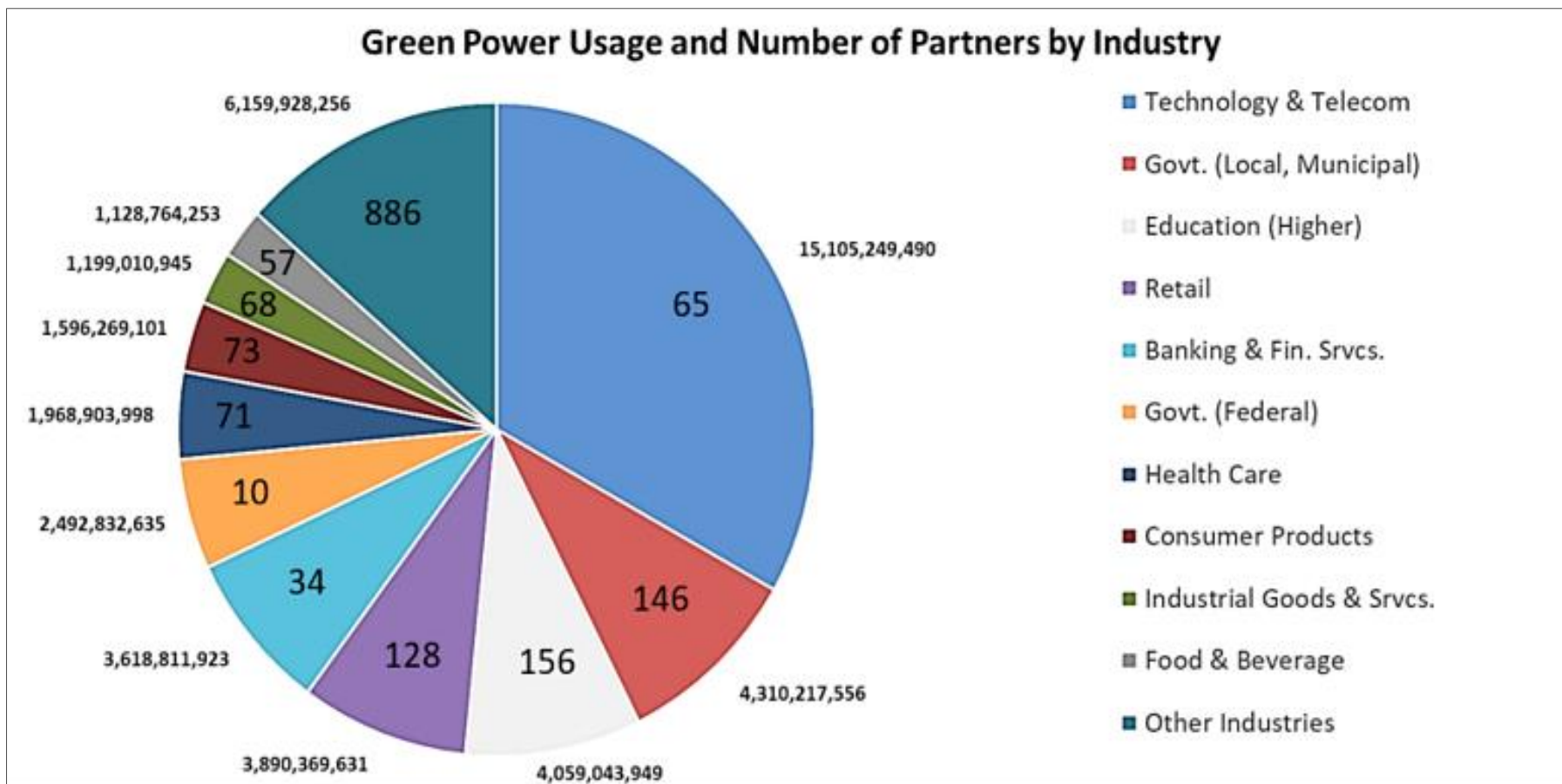


Top Green Power Usage by State

State	# of GPP Partner	Total GP Usage (kWh)
CA	203	11.2 B
WA	51	5.8 B
NY	107	3.6 B
TX	429	3.6 B
DC	66	3.5 B
WI	62	2 B
NJ	30	2 B
PA	64	2 B
MA	48	1.3 B
MD	75	1 B

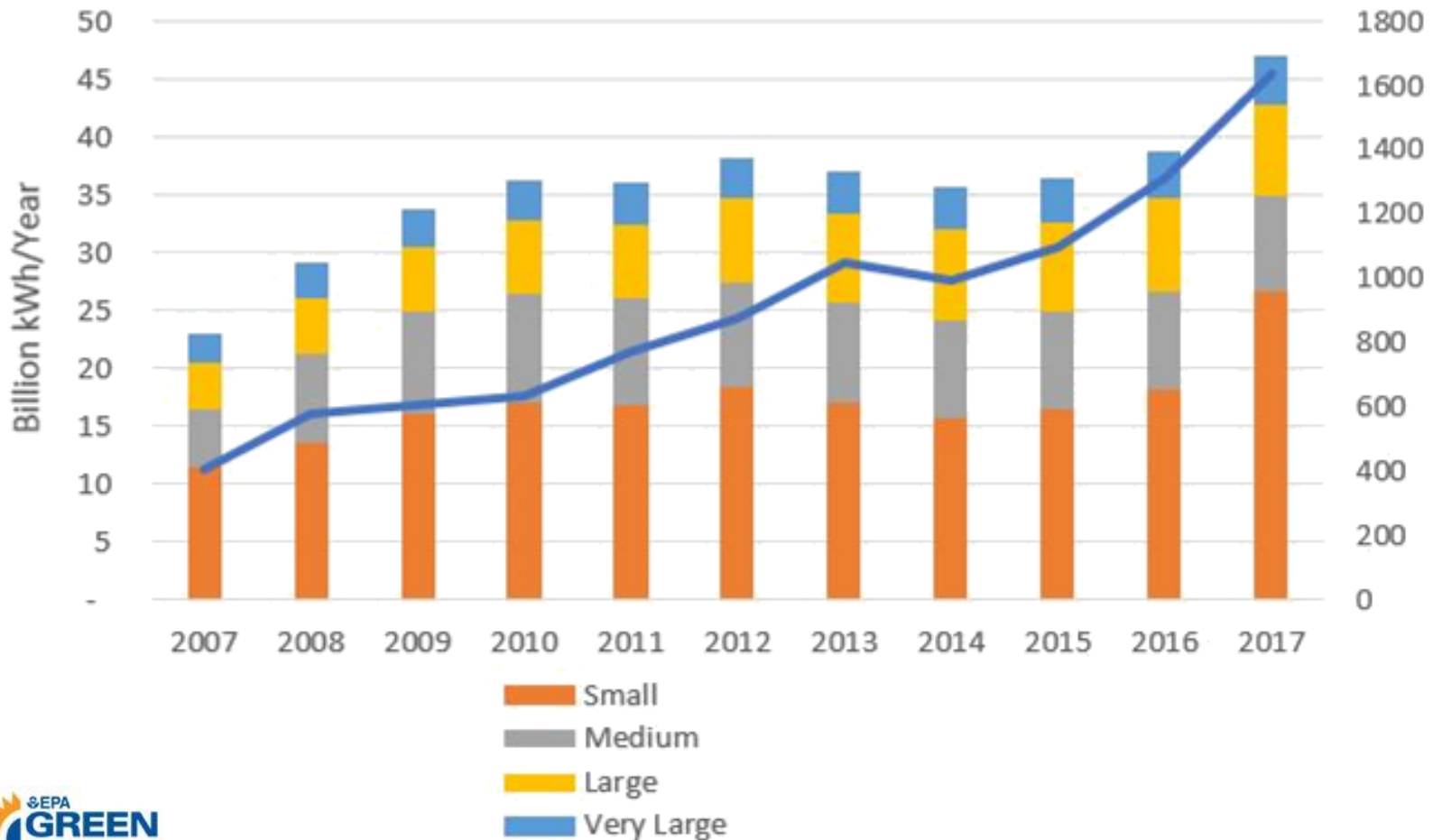


Green Power Usage by Industry



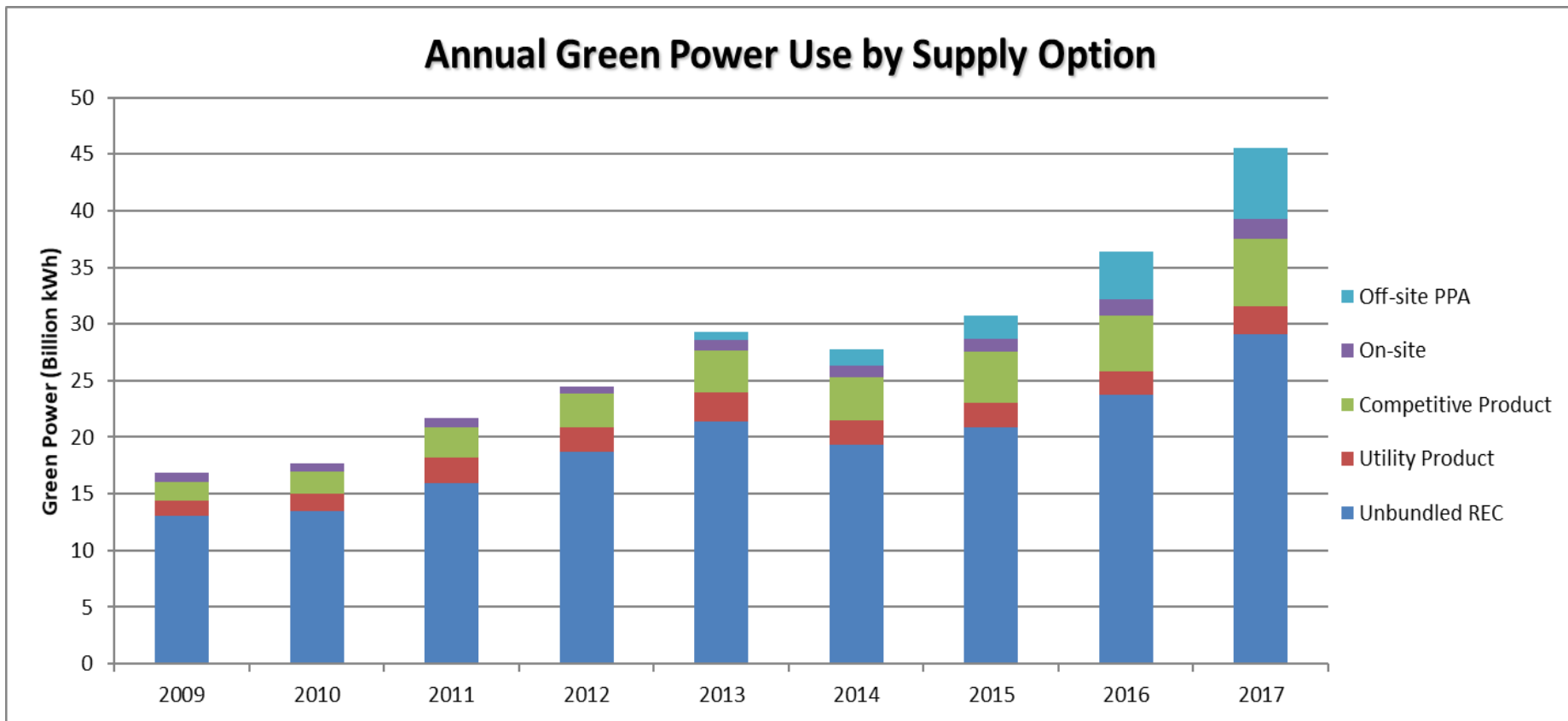


GPP Green Power Use and Number of Partners



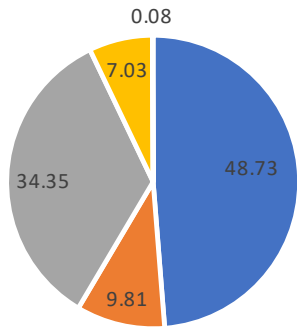


Annual Green Power Use by Supply Option



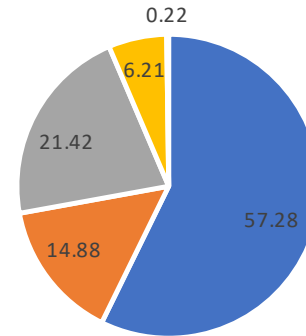
Green Power Supply Options by Benchmarks

Small Partners' Supply Breakdown



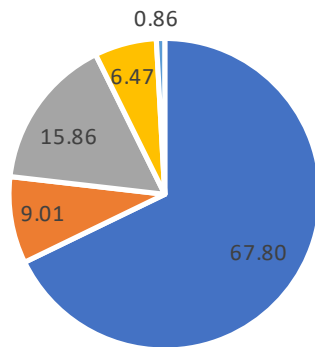
■ Unbundled REC ■ Utility Product ■ Competitive Product
 ■ On-site ■ Off-site PPA

Medium Partners' Supply Breakdown



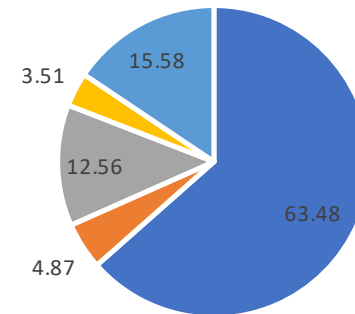
■ Unbundled REC ■ Utility Product ■ Competitive Product
 ■ On-site ■ Off-site PPA

Large Partners' Supply Breakdown



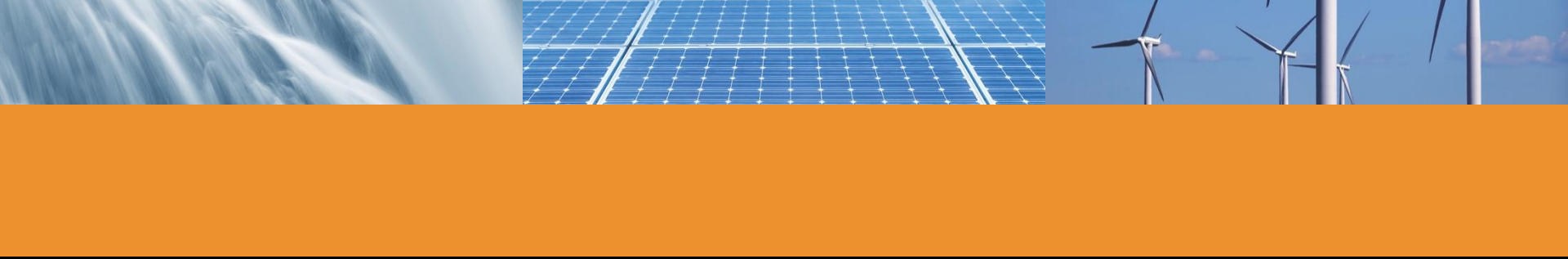
■ Unbundled REC ■ Utility Product ■ Competitive Product
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Very Large Partners' Supply Breakdown

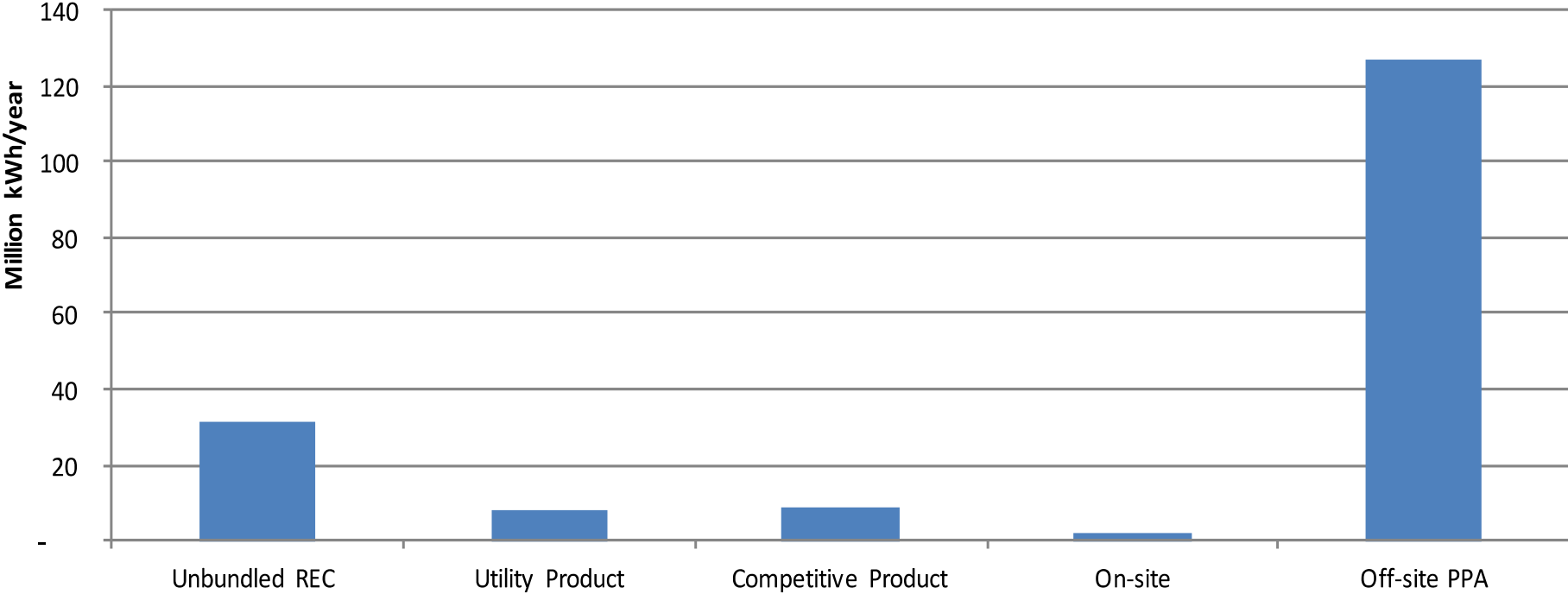


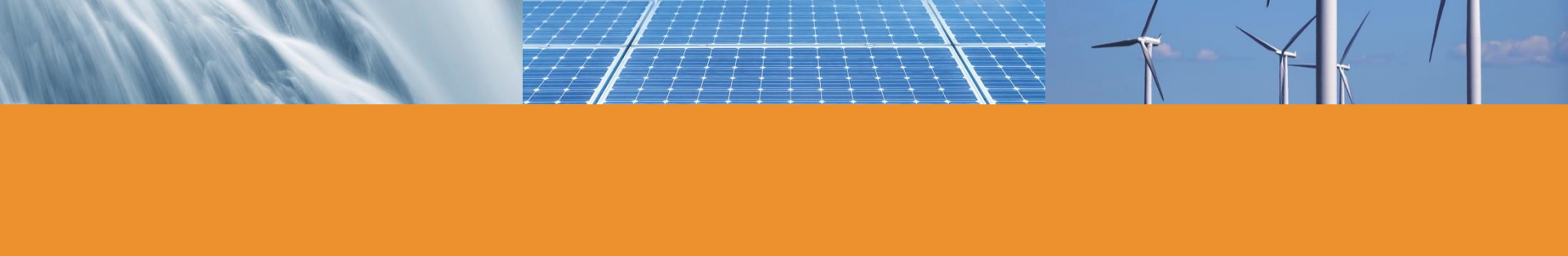
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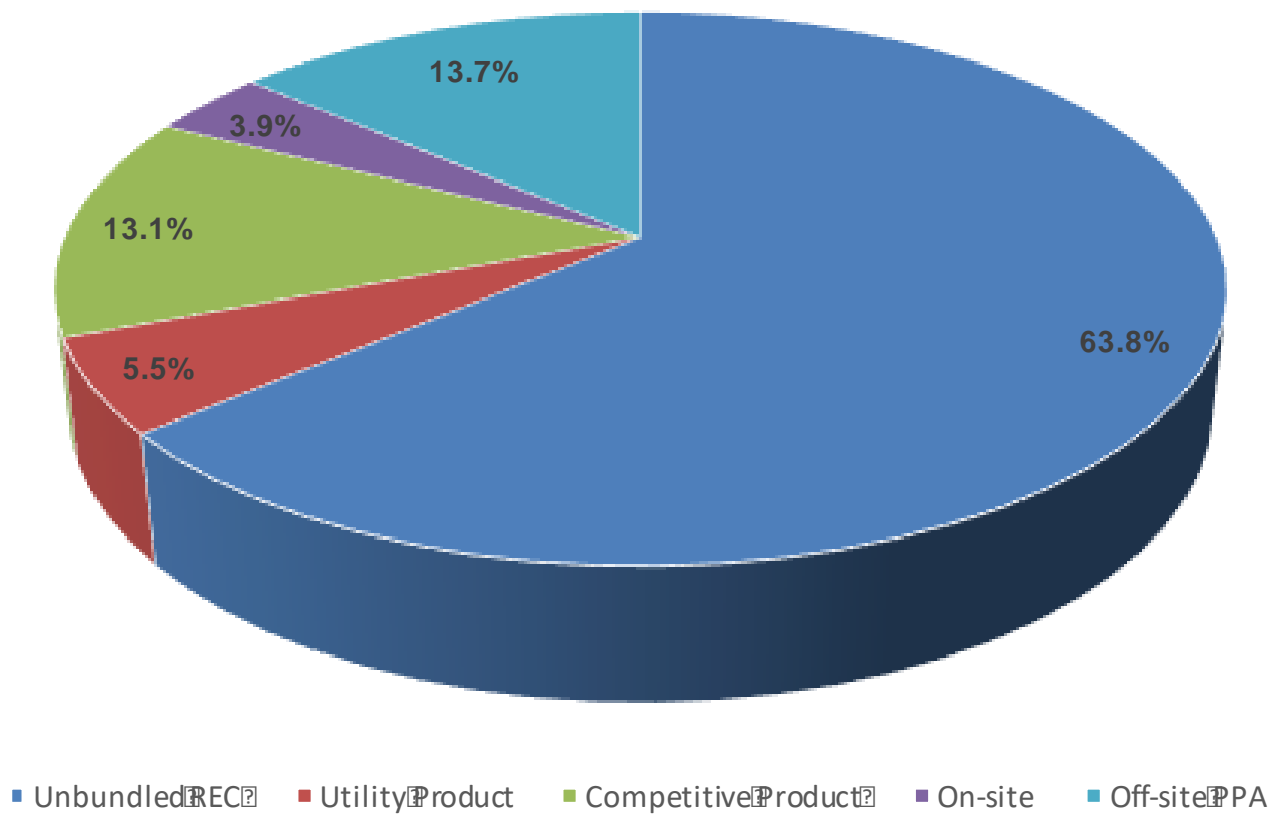


Average Green Power Contract Size in kWh by Supply Option



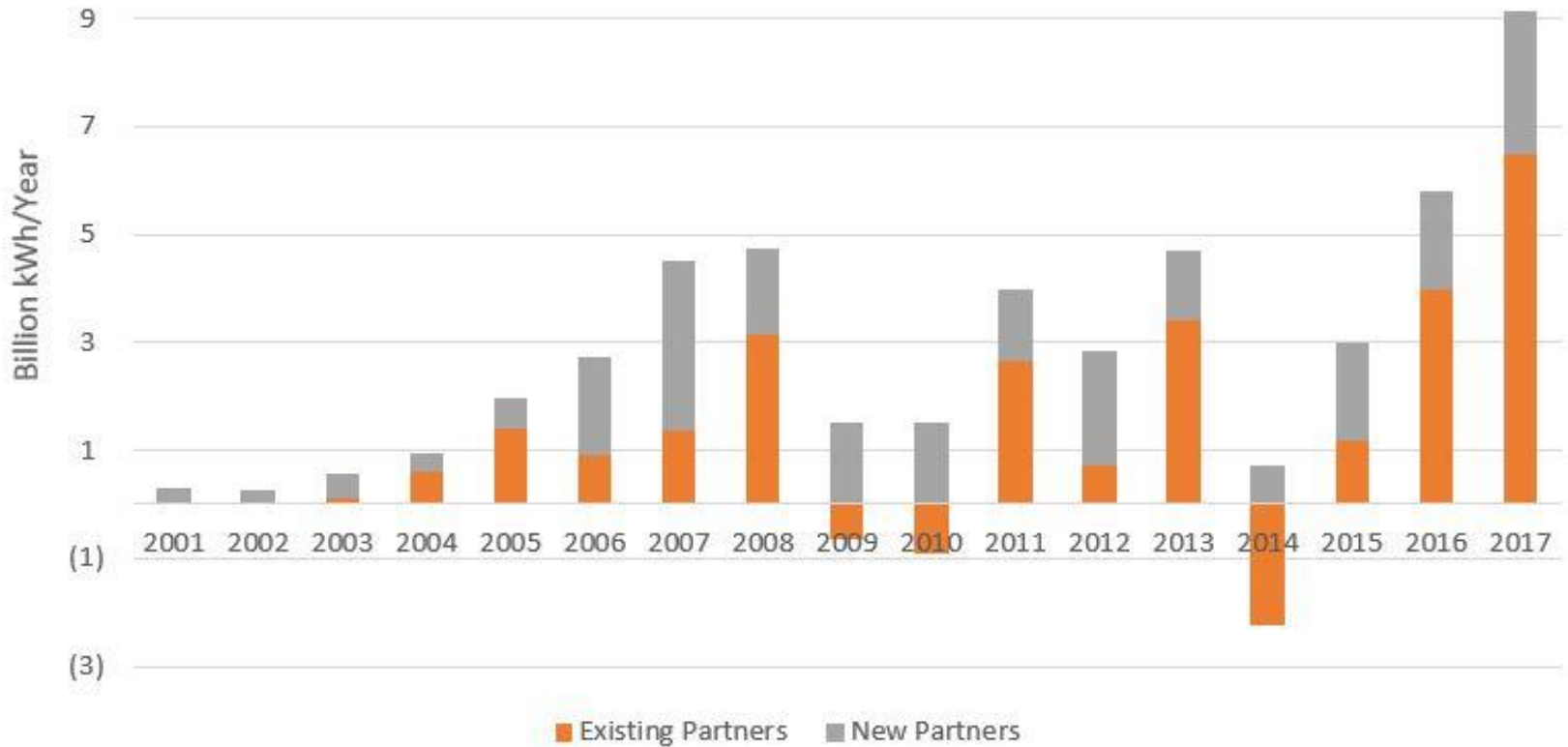


Program kWh by Supply Option - 2017



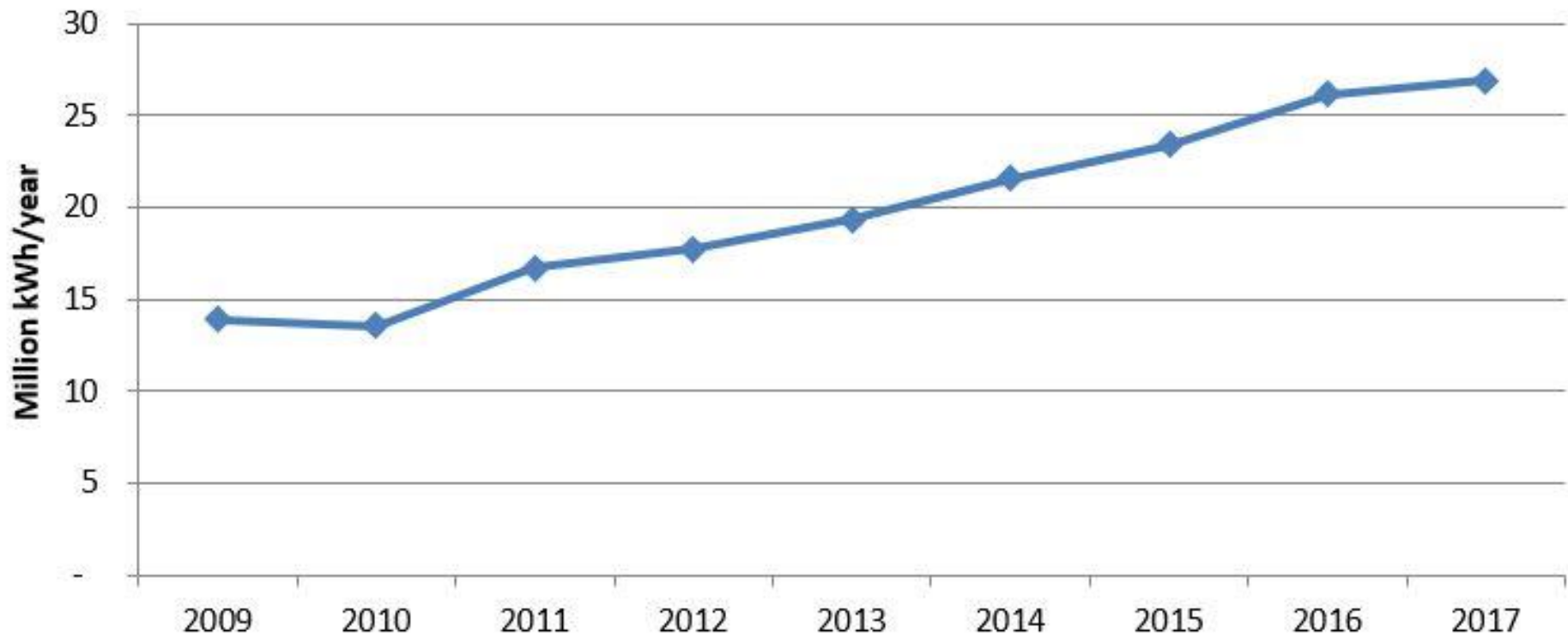
Program Growth

Green Power Growth from Existing and New Partners



Average Green Power Use by Partners

Average Green Power Use of Partners



Motivation

Why GPP Partners Use Green Power

