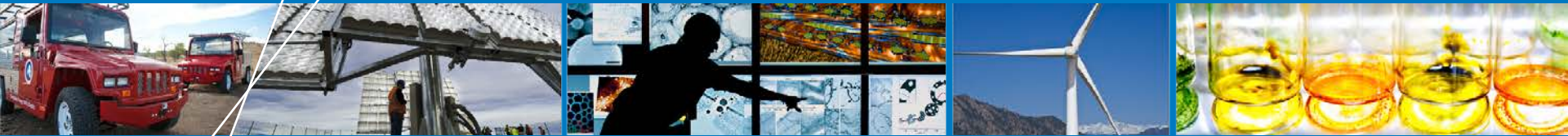


Corporate Renewable Energy Procurement



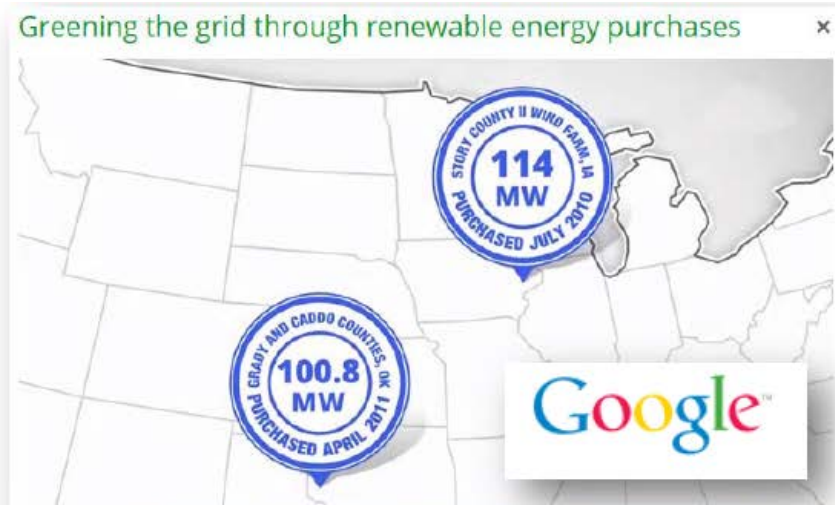
Lori Bird, NREL

September 7, 2016

Overview

- **Recent growth in corporate renewables procurement**
- **Corporate RE and carbon reduction commitments**
- **Types of procurement from off-site RE**
 - Corporations as energy resellers
 - Financial PPAs with off-site RE projects
 - Utility tariffs
 - Exiting utility
- **Conclusions**

Corporate RE Purchasing Expanding



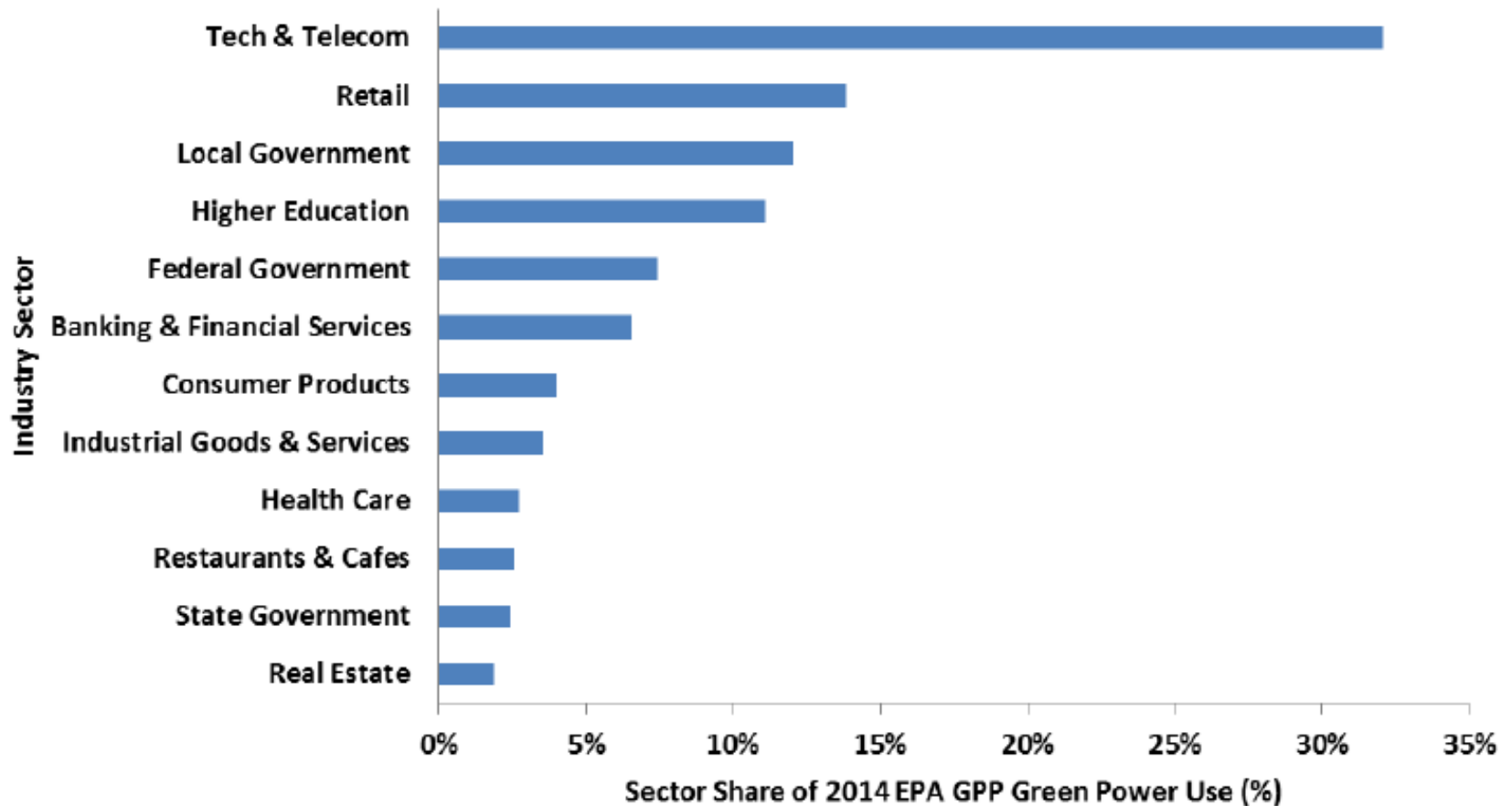
Corporate purchases represented significant fraction of new RE investment in 2015

Corporate Commitments to Renewable Energy are Rapidly Increasing; Making Headlines

- **43 companies** have signed the Renewable Energy Buyers' Principles, focused on providing new purchasing options to corporations located in regulated electricity markets. Signatories are up from 12 in 2014.
- **81 companies** will have signed the American Business Act on Climate Pledge; corporate specific targets include 100% renewable energy.
- **51 companies** specifically pledge to procure/purchase renewable energy as part of their commitment.



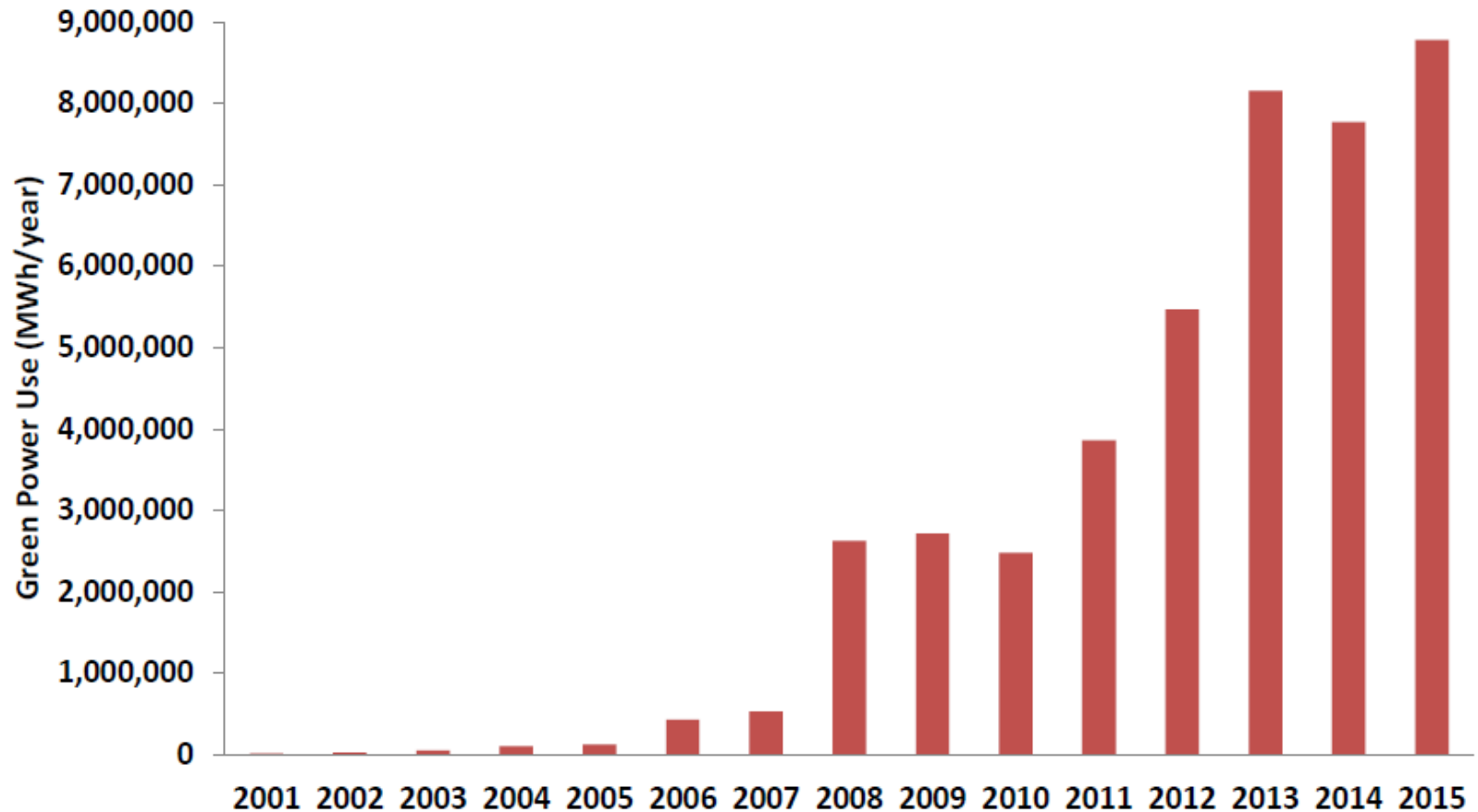
Corporate Procurement by Sector



Technology and telecom industries are leading sector in terms of volume of renewable energy purchases, based on participation in EPA Green Power Partnership

Source: US EPA; Miller et al 2015

ICT Sector Procurement of Renewables



Substantial growth in purchases by ICT in recent years

Sources: US EPA; Miller et al. 2015

Largest RE Purchasers - Tech Companies

Company Name	Total Renewable Energy Use (MWh)	% Renewable Energy of Total Electricity Use
Intel Corporation	3,061,547	100%
Microsoft Corporation	1,363,235	50%
Google Inc.	879,153	38%
Apple Inc.	491,000	83%
Cisco	425,153	40%
Hewlett-Packard	280,560	14%
Dell Inc.	225,238	45%
Sprint	176,005	6%
Texas Instruments Incorporated	138,210	11%
EMC Corp	113,000	16%
International Business Machines	105,952	4%
Adobe Systems	98,697	234%
Yahoo Inc.	98,280	16%
Verizon Communications	89,000	1%
Sony Corporation of America	88,329	37%
SAP America	86,000	100%
Datapipe, Inc	75,190	100%
Applied Materials	75,000	34%
Motorola Mobility	62,260	100%
Advanced Micro Devices, Inc.	54,089	50%

Sources: EPA; Miller et al. 2015

Renewable Energy and Carbon Goals

Table 4. Renewable Electricity and Carbon Reduction Goals for Leading ICT Organizations

Company Name	Renewable Energy Goals	Renewable Energy Goal Year	Carbon Reduction Goals	Carbon Reduction Goal Year
Amazon	100%	Long-Term	None Specified	None Specified
Apple	100%	Long-Term	None Specified	None Specified
Cisco	25%	Annual Goal: 2013-2017 ^a	40%	FY17
Dell	50%	2020	50%	2020
eBay	8%	2015	10% reduction in carbon per transaction in 2013	2013
Facebook	100%	Long-Term	None Specified	None Specified
Google	100%	Long-Term	Carbon Neutral	Ongoing
IBM ^b	None Specified	None Specified	Third-Generation GHG Goals Upcoming	Upcoming
Intel	None Specified	None Specified	10% reduction per chip in GHG direct emissions	2020
Microsoft	100%	2014	Carbon Neutral	2014
Rackspace	100% (5% increase annually until goal attained (35% in 2013))	2026 (Based on 5% annual increase from 35% in 2013)	None Specified	None Specified
Sprint	10%	2017	20%	2017
Twitter	None Specified	None Specified	None Specified	None Specified
Vmware	Not Applicable	Not Applicable	40%	2050
Yahoo!	None Specified	None Specified	None Specified	None Specified

^aCisco is seeking to source 25% of its electricity usage annually from renewable energy from 2013 to 2017.

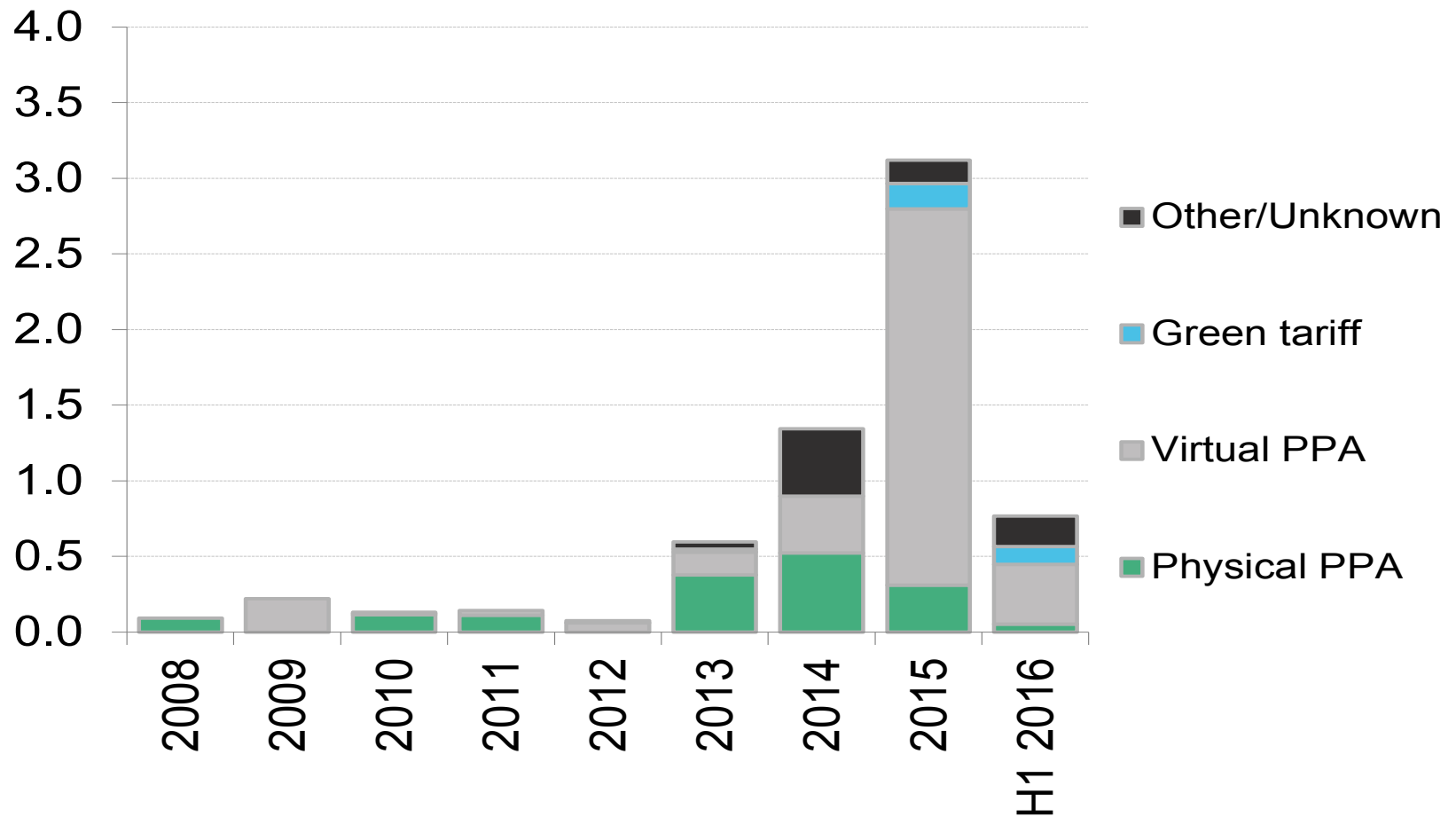
^bInformation is specific to IBM's Austin, TX; Costa Mesa, CA; and Foster City, CA facilities.

Sources: CDP, company sustainability reports

Examples of Corporate RE Procurement

- **FERC-licensed:** Wal-Mart, Google, Apple
- **Utility tariffs or utility partnership:**
 - Dominion Virginia with the Commonwealth of Virginia and Microsoft;
 - Duke Energy Carolinas and Google;
 - NV Energy and Switch SuperNAP
- **Financial PPA:**
 - Amazon Web Services (80 MW in Virginia)
 - Cisco (20 MW in California), many others
- **Exiting utility:** MGM Grand/Nevada Power

Corporate Procurement Methods



From 2008 through H1 2016, nearly 60% of the PPA market was done through a virtual PPA model

Source: BNEF 2016

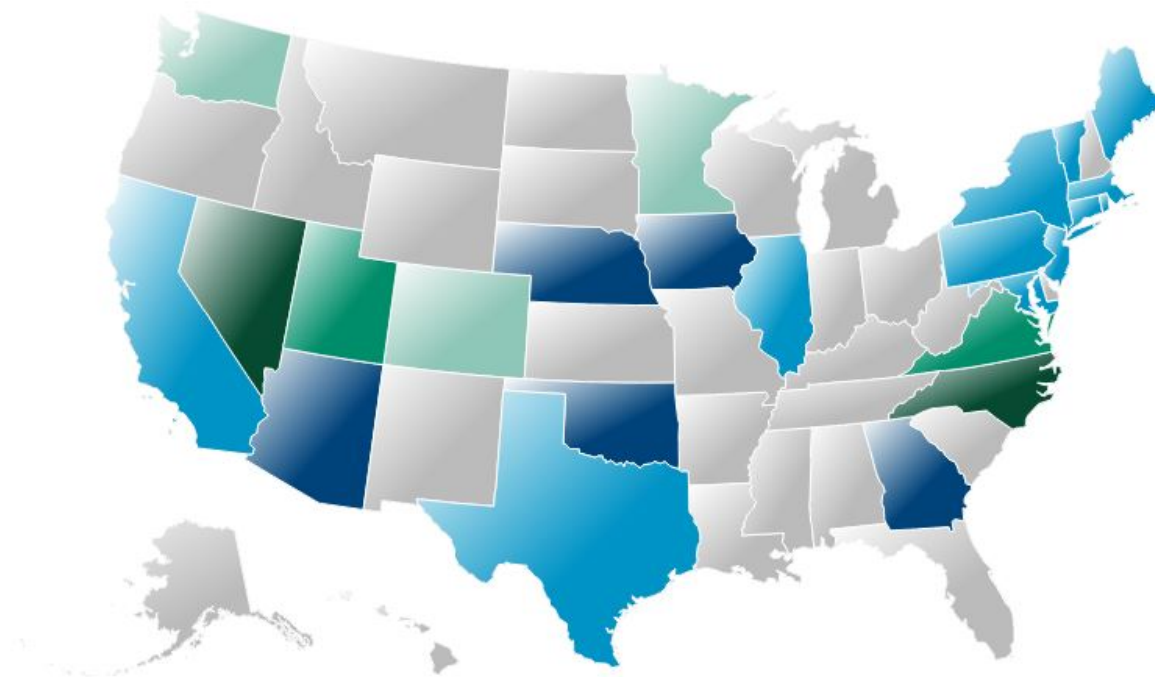
Corporations as Energy Resellers

- Some large corporations have decided to seek FERC approval to buy and sell wholesale electricity from RE
 - e.g. Wal-Mart, Google, Apple
- Company serves as off-taker for renewable energy project
- Takes title to energy and sells RE project output
- Creates separate subsidiary and FERC approval must be obtained (except for in ERCOT).
- This option can take considerable time and resources to develop

Utility green tariffs for large consumers

- Some utilities have new tariffs that allow large utility customers to purchase renewable energy from a specific facility in the utility service territory
 - instead of negotiating a PPA directly with a generator
- No single green tariff structure has emerged, but tariffs typically include
 - the energy and RECs,
 - a fixed or predictable price for energy,
 - protection from fuel charges,
 - and may or may not offer lower pricing than standard electricity
- These tariffs are different from traditional “green pricing”.
 - Green pricing typically sources from existing resources and comes at a price premium (e.g. 2 cents/kWh)
 - tariffs for large purchasers are substantially lower and sourced from new RE projects

Utility Corporate Tariff Offerings



Utility RE Deals

<http://buyersprinciples.org/corporate-re-strategy-map/>

- Green tariff and executed RE deal(s) through tariff
- Green tariff but no deal through tariff to date
- Considering a green tariff (either draft plan or proposal with the PUC)
- One-on-one RE deals between a company and utility, but no green tariff to date
- Electricity retail choice easily available (EIA)
- No known direct large scale RE access

* Offerings differ by utility within each state. Ensure your facility is served by the utility referenced.

** These are not just "RECs deals", but several are very close in structure

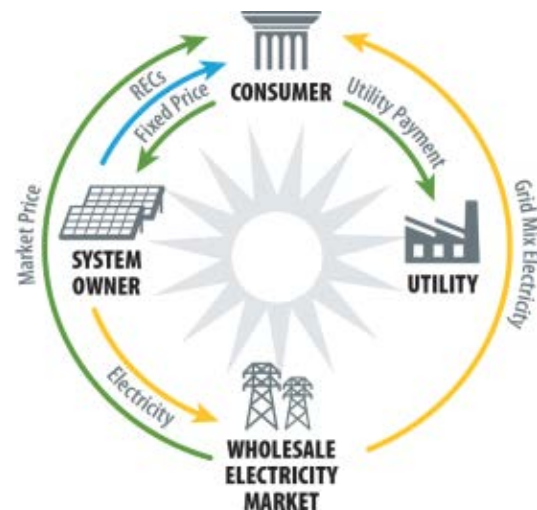
Source: World Resources Institute

Financial PPAs

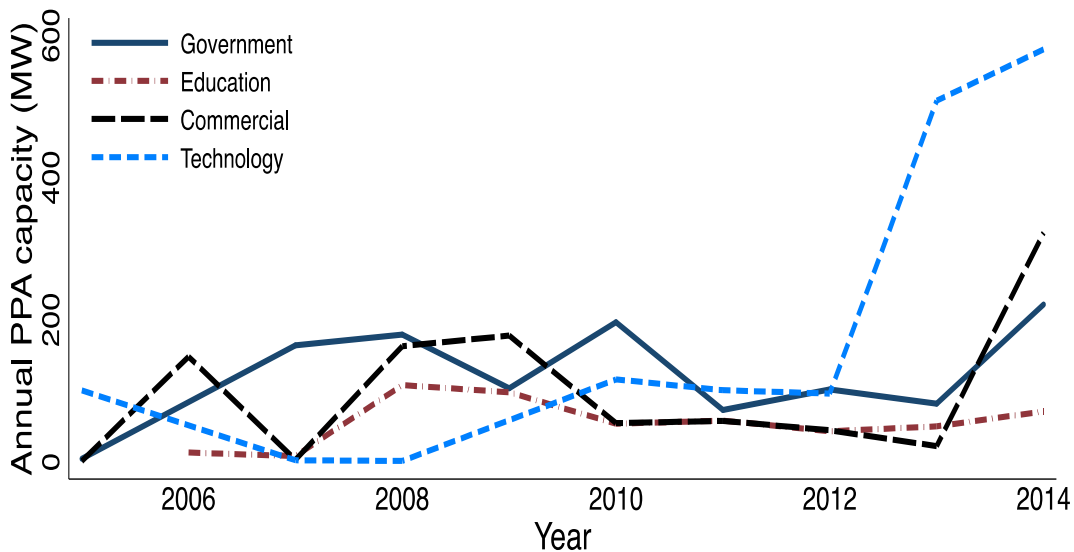
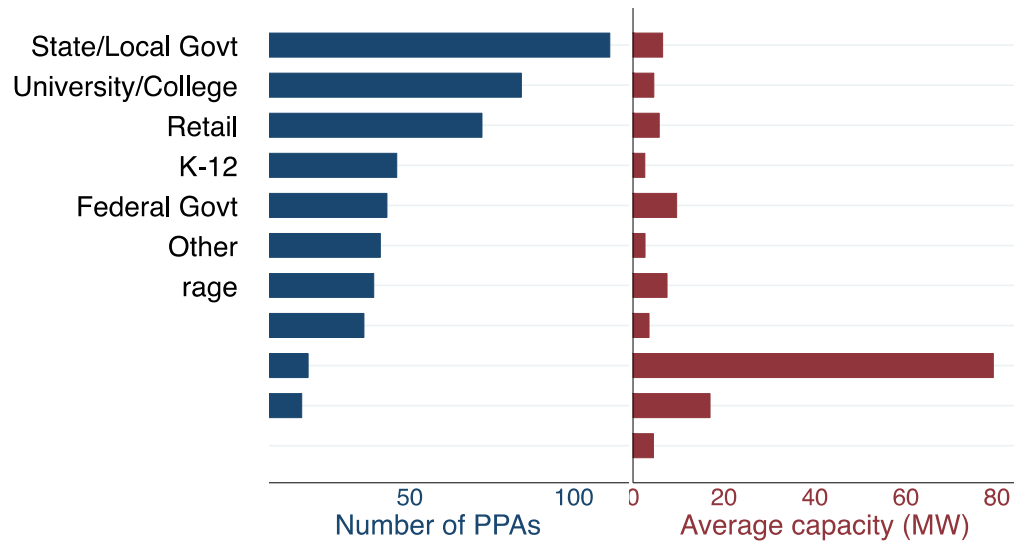
- **Also called virtual PPAs**
- **Renewable energy not physically delivered to purchaser but instead delivered to a wholesale market.**
 - Purchaser and renewable project owner agree on a set price for the generation over the long-term (e.g., 10–25 years).
 - Purchaser continues to buy electricity from the local grid (ie. competitive electric supplier or serving utility)
 - Renewable generation is typically sold into the wholesale spot market. If electricity is sold into market at a price higher than contract price, purchaser receives the difference. If the market price is lower, purchaser pays the difference.
- **For a financial settlement to provide an effective hedge against future electricity price volatility, purchasers look at the correlation between their consumption profile and the production profile of the generator**
- **Theoretically, a purchaser could be located anywhere in the U.S. and sign a financial settlement with a generator located in a competitive wholesale market; however, most transactions are in ERCOT and PJM.**

Case Study: Yahoo

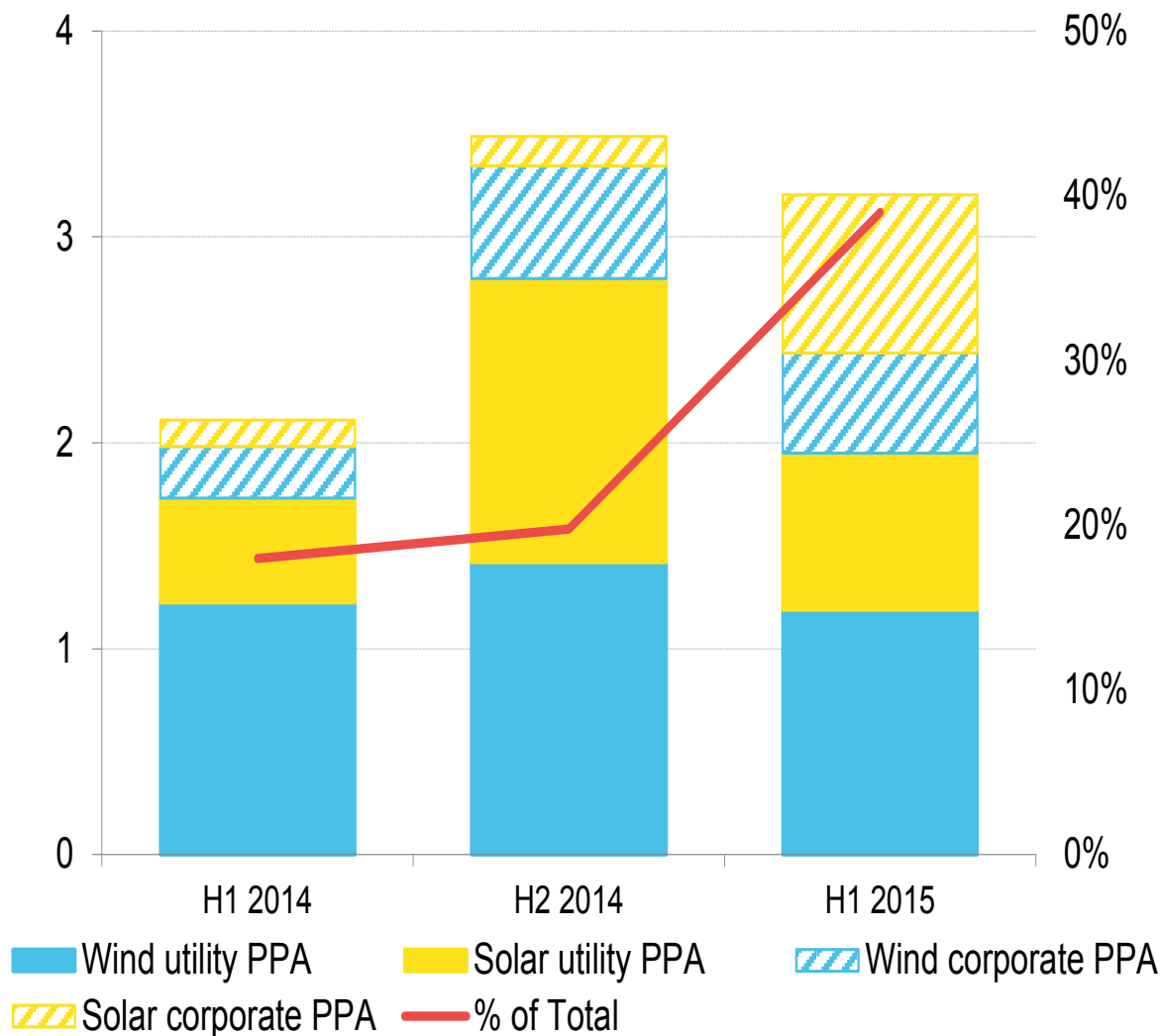
- System owner: Own Energy/NJRCEV
 - 48 MW wind farm in central Kansas
 - Yahoo is purchasing 23 MW of this project
 - Came online December 2015
- Consumer: Yahoo
- Wholesale electricity market: Southwest
- Utility: Local utility
- Motivation:
 - Meet sustainability/additionality targets
 - Found value in long-term fixed price and risk mitigation
 - For Yahoo data centers



State and Local Governments have signed the greatest number of PPAs; Average capacity of PPAs is greatest in the tech sector.



Non-utility purchases represented 40% of PPAs in 2015



On a GW basis, corporate (i.e. non-utility) buyers of wind and solar accounted for 40% of the market in H1 2015; an increase from 2014 levels.

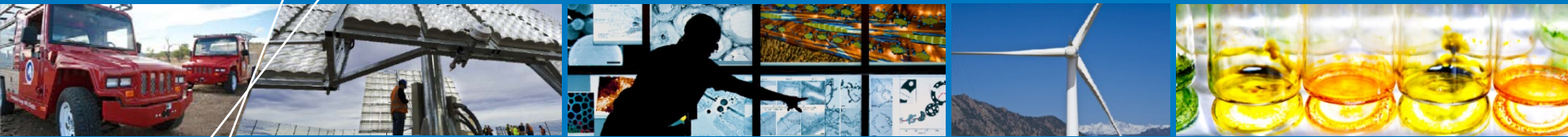
Source: Bloomberg New Energy Finance

Corporations Exiting Utility

- **MGM Resorts & Wynn file to leave Nevada Power**
 - MGM is 5% of Nevada Power electricity demand
 - MGM will pay exit fee of \$86.9 million
 - Early 2000s legislation allows large customers to leave grid as long as there is no impact on other ratepayers
 - MGM has RE goals; didn't think Nevada Power's green tariff was quick enough, also comes at a premium
 - Switch worked with Nevada Power's green tariff

Considerations for Tribes

- **Evaluate whether tribe can host a system in which the output may be sold to entities off-site**
- **Tribal RE projects can offer co-benefits**
- **Where can the RE project output be sold?**
 - Is there a utility tariff program in place?
 - Wholesale market?
- **Are there potential corporate or government buyers for project output?**



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