It's Time To Re-Boot Green Electricity Plans

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Abstract

As the federal commitment to reduce global warming pollution stalls or is diminished under the administration of President Trump, voluntary actions to curb greenhouse gas emissions will become more important than ever. Fortunately, in the last few years, several new options have emerged for individuals and businesses to do that by buying more physical green energy. This paper reviews these options and argues that it is time for the industry to move beyond yesterday's green electricity products.

Traditional REC-based green energy plans were a novel and noble attempt to create a voluntary market for renewables. Yet, two decades later, their impact on nurturing green power has plainly diminished. As the market for renewable electricity has matured, a host of new options has developed – such as community shared solar, utility green tariff programs and direct purchase contracts – to deliver a more impactful, physically green product. The take up and expansion of these products should now be an urgent priority.

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It's Time To Re-Boot Green Electricity Plans

What is green electricity? It's a straight forward question, and one that usually conjures up a simple vision of spinning wind turbines or glimmering solar panels.

But if you ask someone how to buy the output of those windmills and solar arrays, the answer quickly gets complicated. They usually tell you that it involves Renewable Energy Credits (RECs). But, that's only part of the story you're told, because RECs aren't the same as electricity – they just convey the environmental claim, the zero carbon story. So, it depends on what you want to buy – RECs or electricity or both? Not sure? As we said, it's complicated – too complicated.

So perhaps it's time to re-boot the products underlying most retail green energy programs and how they are described.

Access to renewable electricity – the energy itself, not just RECs – is easier and more affordable than ever before. We don't need to fudge the story. It's time to get real, and stop arguing that buying RECs is the environmental equivalent of installing solar panels on your house, or contracting directly for the electricity generated by a windmill or solar farm through a green tariff or community shared resource provider.

It's time for the various players involved in the green energy industry to lay down some new (and simpler) ground rules that clearly drive demand for green power and don't confuse consumers.

A Brief History

How did we get to this state of affairs? A little history is helpful.

First, let's concede the obvious: On an electricity grid that is served by multiple generators using different fuels (wind, gas, coal, nuclear, etc.), it is not possible to distinguish or track electrons from a particular generator or guide them to a specific consumer. The laws of physics just don't allow that; it's not how electromagnetic flows work.

RECs were created to provide an accounting solution to this physical conundrum – a way to both track the production of green generators and assign the environmental benefits to specific consumers, regardless of the mix of electrons actually delivered to the consumer's premises.

Each REC is equivalent to one megawatt-hour (MWh) of electricity from a renewable generator and has a unique date and ID. RECs can also be traded; when sold separately from their corresponding electricity they are referred to as "unbundled" RECs.

RECs came into their own about twenty years ago when numerous states began to adopt renewable portfolio standards (RPS) to increase production from green sources. To ensure compliance with these new standards, utilities and other parties providing electricity services are typically required to own a

sufficient number of RECs at the end of each accounting year to meet the standard (usually as a percentage of total retail sales).[1]

Around the same time as these RPS programs took hold, a number of very well-intentioned innovators saw the opportunity to use RECs to create a voluntary market for green energy – a market that could both increase the money available for renewables and build wider popular support for clean power. Now anyone could "go green" simply by buying unbundled RECs to match one's electricity use. This new voluntary market grew quite rapidly spurred by surplus RECs (primarily from wind generators), tens of new REC brokers and utilities which offered their own REC-based green energy programs.[2]

These REC programs provided an easy alternative to installing onsite solar panels (which at the time were significantly more expensive). And they have been relatively popular. By last count voluntary REC sales totaled 78 million megawatt-hours (MWh). That reflects about 25% of total U.S. non-hydropower renewable generation and approximately 2% of total U.S. electricity sales.[3]

Moving Beyond RECs

So why change course now? There are at least three strong reasons:

1) there is scant evidence that voluntary REC programs are currently helping to grow the renewable energy market;

2) consumers are demanding better, less confusing access to "green" energy; and

3) there are now many ways for consumers to buy physical renewable energy and RECs together, which is more impactful, most of which directly link consumer purchases with the construction of renewable facilities.

Let's take a closer look at each of these reasons.

1) Examining the evidence: do voluntary REC programs boost the deployment of renewable energy?

To promote their green energy plans, REC suppliers frequently claim that their customers are helping to reduce the consumption of fossil fuels and associated pollution (for example, see Figure 1). Presumably these claims help to persuade many prospective customers to "go green."

[1] This article does not address state RPS policy. These compliance markets have been a much clearer success, fueled largely by the ability of utilities to make the commitments necessary to bring new resources online as needed.

[2] "Green Power Newsletter Number 8." July 2001, Ed Holt, The Regulatory Assistance Project. http://www.raponline.org/wp-content/uploads/2016/05/rap-greenpowernewsletterno8-2001-07.pdf

[3] "Status and Trends in the U.S. Voluntary Green Power Market (2015 Data)." October 2016, Eric O'Shaughnessy, Chang Liu & Jenny Heeter, National Renewable Energy Laboratory. http://www.nrel.gov/docs/fy17osti/67147.pdf

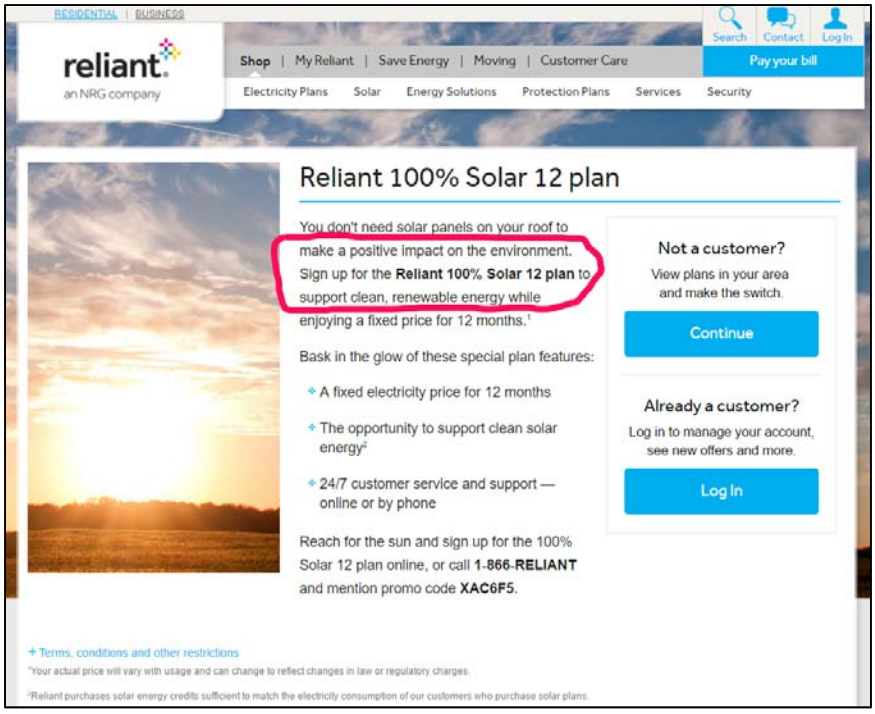

Figure 1: Example of how green plans are typically marketed

The Center for Resource Solutions (CRS), parent of the REC-certification entity Green-e, recently authored a fact sheet entitled "How Renewable Energy Certificates Make a Difference." It puts the case as follows:[4]

> *Each consumer's choice makes a difference by sending a market signal. The impact that voluntary renewable energy markets and REC purchases actually have on the supply of renewable energy depends on levels of demand. More demand will drive development of renewable energy across the market faster.*

That sounds logical but green markets are more complicated than this chain of reasoning suggests. Notably:

a) REC sales typically represent less than five percent of the market value of a generator's associated electricity sales.[5] Hence, while the additional revenue stream may marginally improve the profitability for generators, REC sales (without a long-term purchase contract for electricity) are unlikely to make a decisive difference for developers seeking project financing.[6]

b) The pace of renewable generation in recent years has far outstripped the growth of the voluntary REC market. This divergence plainly suggests that modest increases in the demand for

[4] "How Renewable Energy Certificates Make a Difference." March 7, 2016, Center for Resource Solutions. http://resource-solutions.org/site/wp-content/uploads/2016/03/How-RECs-Make-a-Difference.pdf

[5] Aside from some state-specific solar RECs, which are a special case, non-compliance market RECs are generally available for less than $2/MWh.

[6] "The Role of Renewable Energy Certificates in Developing New Renewable Energy Projects." June 2011, National Renewable Energy Laboratory. http://apps3.eere.energy.gov/greenpower/pdfs/51904.pdf

RECs has had a limited impact, if any, on the production of additional RECs per se which are a by-product of the huge growth in the physical production of green electricity.

Significantly, national REC prices have been stagnant despite ongoing voluntary green energy sales growth, as shown in Figure 2.

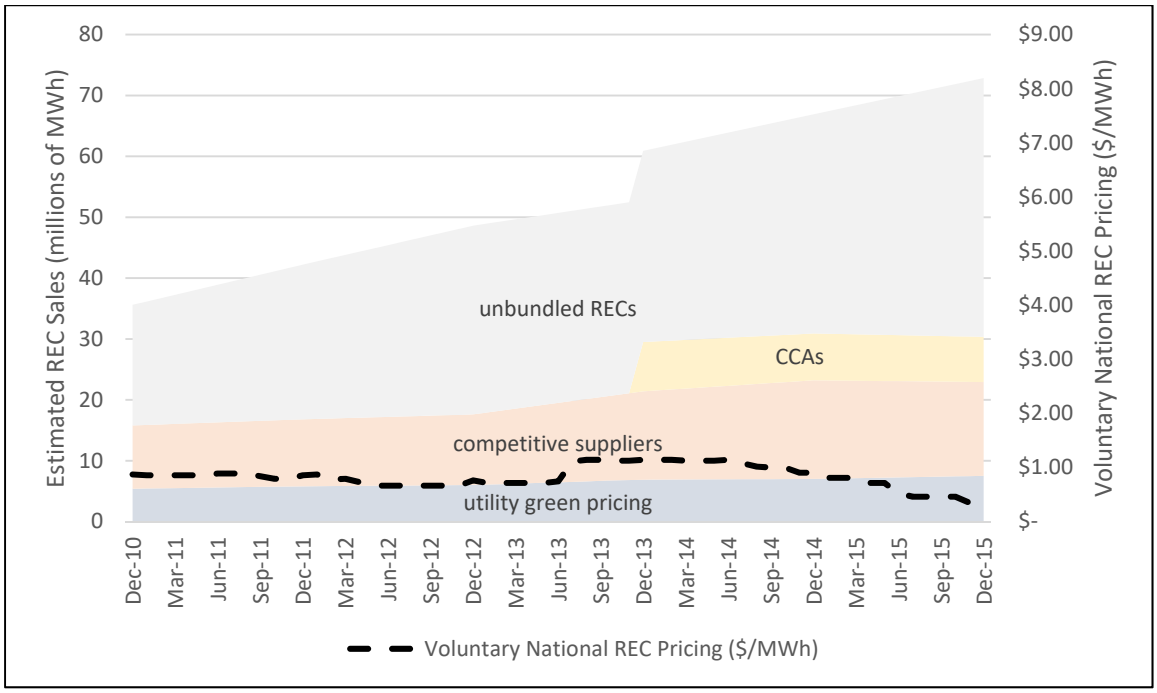

Figure 2: Voluntary REC Sales and National REC Pricing[7]

We believe this illustrates a market where increased consumption is being driven not by demand (as posited in the CRS quote above) but instead by an excess of REC supply. Why is there a REC glut? Figure 3 shows the even more robust uptick in new renewable generation, which far surpasses cumulative RPS compliance needs.

[7] Figure combines NREL data reported in "Status and Trends…" report cited in FN3 with REC pricing from Marex Spectron data, available from the U.S. DOE Green Power Network: http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=5. Note that voluntary REC pricing differs from compliance market pricing, where spot prices can vary widely between states, especially for solar RECs. Also note that this pricing data is shown for indicative purposes only: there is little price transparency in voluntary REC markets, where most transactions are conducted bilaterally and prices are not reported; pricing also varies more significantly when regionally sourced.

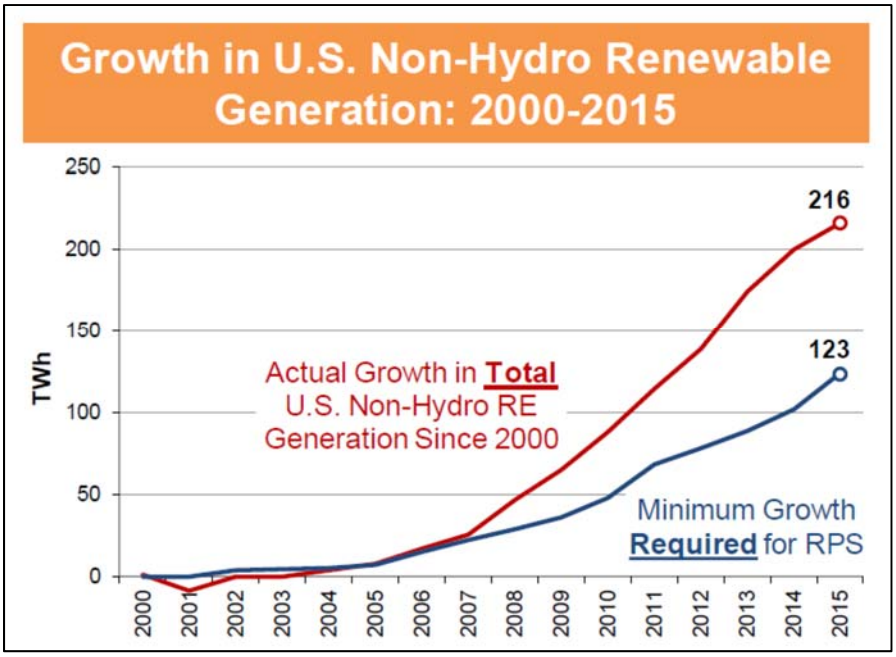

Figure 3: Renewable Generation and RPS Requirements[8]

There are a variety of reasons why new renewable generation is coming online at a much faster clip than needed just to meet state mandates. Some are being built by utilities in advance of future RPS needs. Others are simply economic purchases due to rapidly decreasing costs as well as an industry-wide desire to capture the full value of the wind/solar tax incentives before their expirations.

Regardless, for the new generation not needed for RPS compliance, it is reasonable to assume that the RECs will be dumped on the voluntary market for whatever added revenue they might fetch. Most developers are willing to take whatever marginal value stream might result. The point is simply that today, most renewable energy projects are being built regardless of pricing dynamics in the voluntary REC market, which is essentially left to digest the surplus by-product of the massive buildout that is underway.

c) Given the above, it is not surprising that there appear to be no studies by actual economists that would support the blanket statement that 'REC purchases drive development of renewable energy'. In fact, at least one study has found that no empirical evidence exists to support these claims.[9]

In that regard, it is also worth noting that RECs are most likely not ordinary goods, but rather an example of what economists would describe as a luxury good – i.e. an item where demand increases with income. Those in the industry would like to assume that increasing demand will

[8] "Renewables Portfolio Standards Supporting U.S. renewable energy growth." Galen Barbose, October 18, 2016, http://www.resource-solutions.org/images/events/rem/presentations/2016/Barbose.pdf

[9] "Probabilistic decision model of wind power investment and influence of green power market." December 2013, Michael Gillenwater, Energy Policy, Volume 63, Pages 1111–1125. http://www.sciencedirect.com/science/article/pii/S0301421513009737

increase price and thereby income to developers to re-invest in new projects. This hope-based marketing doesn't reflect reality, where consumers faced with higher prices for their luxury goods may just buy less of them.

Finally, because green energy plans per se do not appear to have a significant impact on new renewable generation development, or the grid dispatch of renewables, a group of leading GHG accounting practitioners and academics reject the use of RECs to claim emissions reductions.[10]

2) Consumers are demanding better, less confusing access to "green" energy

Large corporate buyers are leading the way. As of September 2016, 62 companies, representing over 45 million MWh of annual demand by 2020, have signed on to the Corporate Renewable Energy Buyers' Principles to demand better access to renewable energy – and that means bundled energy and RECs.[11]

> *"We are increasingly interested in access to bundled energy and REC products. Unbundled RECs do not deliver the same value and impact as directly procured renewable energy from a specific project or facility."*
>
> -"Corporate Renewable Energy Buyers' Principles." http://buyersprinciples.org/principles/

The nation's largest energy consumer, the U.S. Government, is likewise pursuing more meaningful alternatives. Since 2013, the Federal agencies have been directed to prioritize sourcing renewable power directly from on-site or off-site facilities and to essentially consider purchasing stand-alone RECs as last-resort means of meeting their renewable energy targets.[12]

The Illinois Attorney General has also weighed in, deciding in a recent consumer fraud investigation that consumers deserve more clarity. In the Illinois case, the retailer investigated by the state's consumer fraud office was advertising that its green product was generated exclusively from renewable energy sources. Investigators, finding the electricity provided was actually the standard industry practice of pairing unbundled RECs with generic grid purchased power, found it to be misleading to Illinois consumers. The state's voluntary agreement with the retailer required it to change its marketing practices and to disclose more clearly the product's composition.

New legislation in California similarly seeks to give users a clearer picture of the electricity sources and RECs offered by their utility or alternative provider. AB 1110, signed into law in September 2016, requires annual disclosures from all retail electricity suppliers in the state to separately report unbundled RECs from the electricity sources being provided to their customers; retailers must also include calculations for the associated greenhouse gas emissions intensity.[13]

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[10] "Open Letter Rejecting the Use of Contractual Emission Factors in Reporting GHG Protocol Scope 2 Emissions." February 12, 2015, https://scope2openletter.wordpress.com/

[11] http://buyersprinciples.org/

[12] Presidential Memorandum -- Federal Leadership on Energy Management. December 5, 2013, https://www.whitehouse.gov/the-press-office/2013/12/05/presidential-memorandum-federal-leadership-energy-management

[13] AB-1110 Greenhouse gases emissions intensity reporting: retail electricity suppliers. California Legislative Information, http://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=201520160AB1110

While much is now left to the California Energy Commission to implement, underlying the changes are some familiar themes: 1) consumers are too often confused about the differences between electricity and the use of credits; 2) electricity from specified sources can be (and in fact are regularly) contractually bought and sold; and 3) suppliers can and should do a better job of communicating what they are actually delivering to their customers.

In sum, traditional green energy plans tend to confuse customers about what they are purchasing and how they can actually make a difference. So perhaps it's time to discontinue these programs, or, at the very least, start marketing them in more honest terms.

In a nascent market, REC-based green energy plans often represented the only real option for green consumers. Despite the drawbacks they provided a way to popularize green power and offered some extra revenue stream to generators, even if marginal.

But the renewable energy market has now grown by leaps and bound and, indeed is today the leading source of new power generation in the U.S. Given this sea-change in the market, why claim that REC-based green energy plans are the environmental equivalent to installing solar panels on your house or a purchase agreement for the output of an off-site wind farm. It's time to match retail green power programs to the times and move beyond stand-alone RECs.

3) Better options are now available

As noted above, both solar and wind are getting dramatically cheaper and are increasingly competitive with conventional technologies (despite persistently low natural gas prices). That has made renewables the predominant source of new-builds around the U.S.[14] These important trends are unlocking a variety of alternatives for delivering physical green power (not just RECs) to end-users:

Solar financing for on-site solar

While still a significant investment, the standardization of finance offerings has made installing solar panels increasingly viable for consumers with suitable roof space. Both residential and business customers now have wide access to options like solar loans and third-party ownership structures. These options provide a large and growing number of end-users the option to go solar for no money down and immediately save money on their electric bill.[15]

[14] See, for example:
"The falling costs of US solar power, in 7 charts." David Roberts, August 24, 2016, Vox, http://www.vox.com/2016/8/24/12620920/us-solar-power-costs-falling
"2015 Wind Technologies Market Report." Wiser, Ryan H., and Mark Bolinger, August 2016, Lawrence Berkeley National Laboratory, https://emp.lbl.gov/publications/2015-wind-technologies-market-report
"Levelized Cost of Energy Analysis 9.0." November, 17 2015, Lazard, https://www.lazard.com/perspective/levelized-cost-of-energy-analysis-90/
"Solar, natural gas, wind make up most 2016 generation additions." March 1, 2016, U.S. Energy Information Administration, http://www.eia.gov/todayinenergy/detail.cfm?id=25172
[15] See, for example:

Community solar

Where barriers (roof age, orientation, shade, etc.) limit the viability of onsite solar, community solar programs are emerging as a great opportunity for customers. These programs also offer an alternative to customers that don't want to install solar onsite, as well as for renters and businesses that lease office space.

In community solar projects, participants commit to provide upfront or ongoing monthly payments for a defined share of the project (a specific capacity or number of solar panels). Projects are predominantly administered by utilities, and participants generally receive credit on their monthly utility bill for their portion of the project's output. They also receive the benefits from access to greater economies of scale than small rooftop installations.

These programs can be adapted to work in a wide variety of utility market structures (including co-ops and munis). They can also be an especially useful option for traditionally regulated utilities to improve customer relations and compete against other distributed generation offerings.

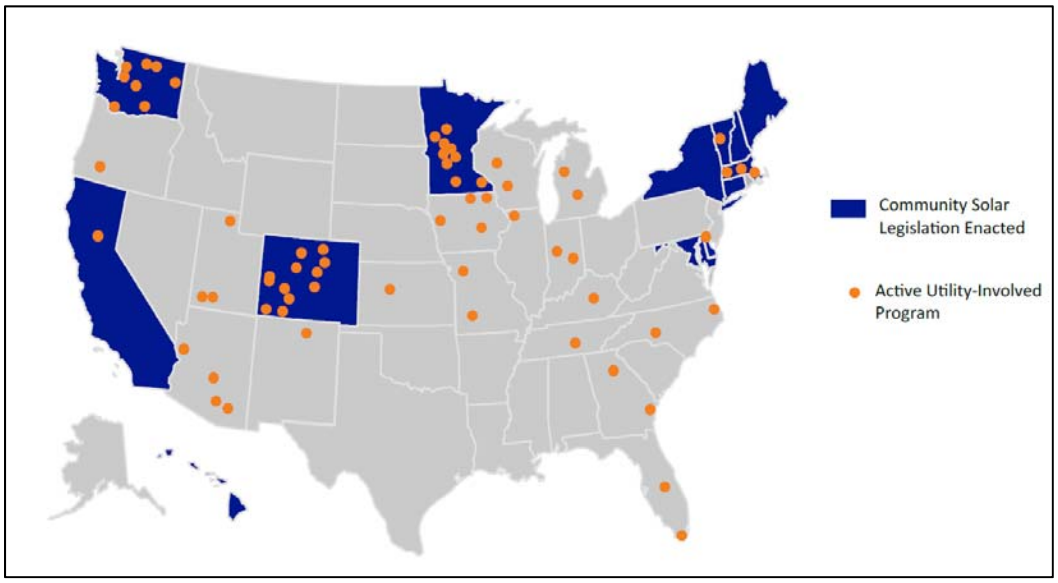

Figure 4: Community solar programs gaining momentum[16]

A recent announcement from NRG Energy demonstrates exactly how community solar is a great fit for big business and residential consumers alike.[17] And importantly, one conventional green

"72% of US Residential Solar Installed in 2014 Was Third-Party Owned." Mike Munsell, July 29, 2015, Greentech Media, http://www.greentechmedia.com/articles/read/72-of-us-residential-solar-installed-in-2014-was-third-party-owned

"As More Corporations Go Solar, How Are the Deals Structured?" Omar Saadeh, April 20, 2016, Greentech Media, http://www.greentechmedia.com/articles/read/corporations-go-solar-increasingly-through-third-party-financing

[16] "Community Solar Program Design Models." November 2015, Solar Electric Power Association, http://www.solarelectricpower.org/media/422096/community-solar-design-plan_web.pdf

[17] Business and Residential Demand Strong for Affordable Community Solar in Minnesota: NRG Reaches Renewable Energy Agreements with Flagship National Business Customers. September 27, 2016, Business Wire,

energy retailer, CleanChoice Energy (formerly known as Ethical Electric), is innovating and working to prove that community solar can work in competitive electricity markets as well.[18]

Community solar is growing rapidly and by one estimate is projected to be adding more than 500 MW annually by 2020.[19] Most of the initial growth is expected to occur in a handful of trailblazing states – California, Colorado, Massachusetts, Minnesota and New York. But 89 percent of utilities surveyed by the Smart Electric Power Alliance were either offering or planning/researching/considering a community solar program.[20]

Offsite PPAs

For large offsite users fed up with their lack of access to quality renewable electricity, a trend has emerged – spurred by corporate leaders such as Google, IKEA and Walmart, a growing number of companies are contracting directly with renewable generators for the output of entire wind or solar farms via Power Purchase Agreements (PPAs).

What started as a novelty has become a major driving force in developing new wind and solar farms in several markets across the U.S. According to the American Wind Energy Association, these non-utility customers accounted for 52 percent, or 2,074 megawatts (MW), of all the wind power contracts signed in 2015.[21]

While the pace of corporate PPAs has slowed in 2016, it is clear that off-site PPAs have become one important tool for large companies to source green power and meet their sustainability targets. The Business Renewables Center represents this community and has become a clearinghouse for info on corporate PPAs. Figure 5 graphs the deals that have been announced to date.

http://www.businesswire.com/news/home/20160927005390/en/Business-Residential-Demand-Strong-Affordable-Community-Solar

[18] "Ethical Electric to Use $2.5 Million Award to Make Solar Accessible to Hundreds of Thousands of Americans." September 14, 2016, https://ethicalelectric.com/news/making_community_solar_accessible_to_all/

[19] "US Community Solar Market to Grow Fivefold in 2015, Top 500MW in 2020." Mike Munsell, June 23, 2015, Greentech Media, http://www.greentechmedia.com/articles/read/us-community-solar-market-to-grow-fivefold-in-2015-top-500-mw-in-2020

[20] 2015 Utility Solar Market Snapshot. July 2016, Smart Electric Power Alliance, https://www.solarelectricpower.org/about-sepa/sepa-news/press-releases/sepa-issues-2015-solar-market-snapshot.aspx

[21] "Big brands and other emerging customers signed for more than half of new wind power capacity contracted in 2015." April 7, 2016, American Wind Energy Association, http://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=8711

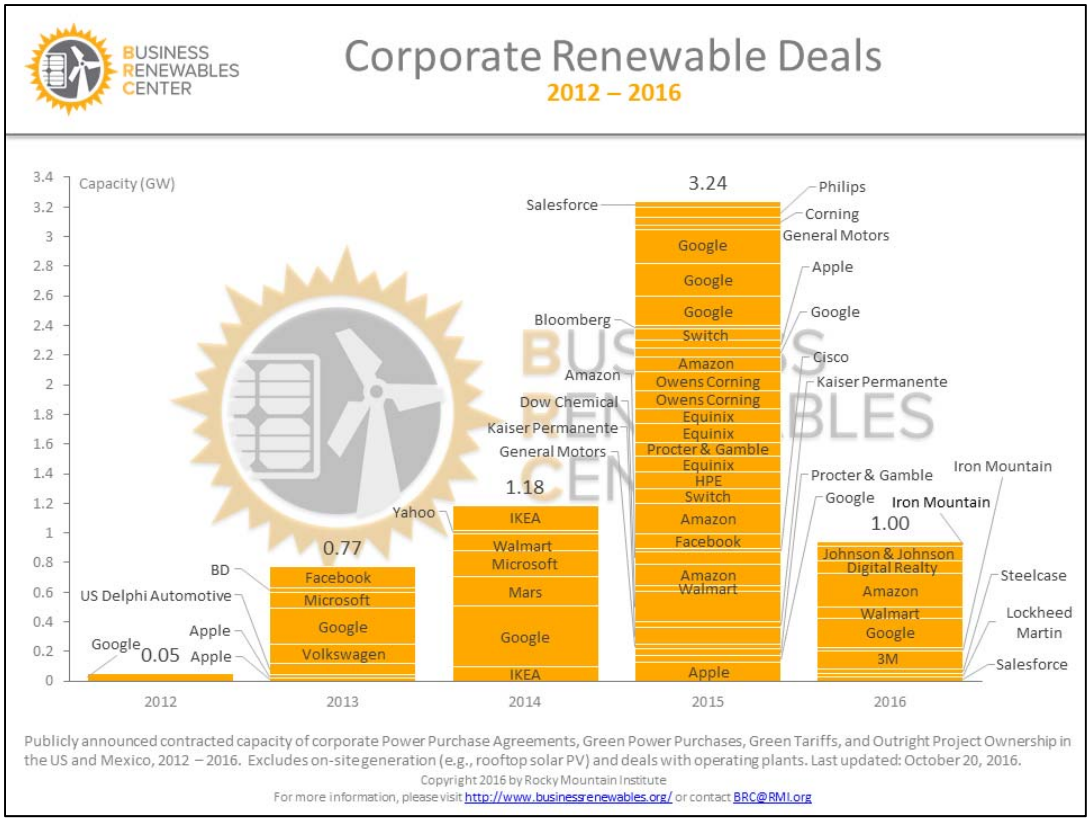

Figure 5: The BRC's corporate PPA tracker[22]

Green Tariffs

Corporate PPAs for the direct provision of energy are only possible in states with competitive electricity markets (where end-users can choose their electricity supplier and thread-in their new renewable supply). Financial-only versions of PPAs (also known as virtual PPAs or contracts for differences) are possible anywhere, and in fact many of the corporate PPAs signed to date are actually structured as virtual PPAs. However, there are several drawbacks to the financial-only structure, and many of the leading green buyers have expressed a preference for utilities to structure deals on their behalf.

A growing number of regulated utilities are answering the call and developing new 'green tariff' products. According to the World Resources Institute, there are currently 10 utilities offering 11 different green-tariff products, and corporate customers have already utilized them to contract for more than 450 MW of new renewables.[23] These include programs from some of the nation's

[22] More on the BRC is available here: http://www.businessrenewables.org/

[23] Green Tariffs Take Off in the US, Expand Access to Renewable Energy. Letha Tawney, Celina Bonugli and Daniel Melling, October 27, 2016, World Resources Institute, http://www.wri.org/blog/2016/10/green-tariffs-take-us-expand-access-renewable-energy

largest traditionally regulated utilities, such as Dominion Virginia Power, Duke Energy Carolinas, NV Energy and Rocky Mountain Power in Utah, as shown in Figure 6.

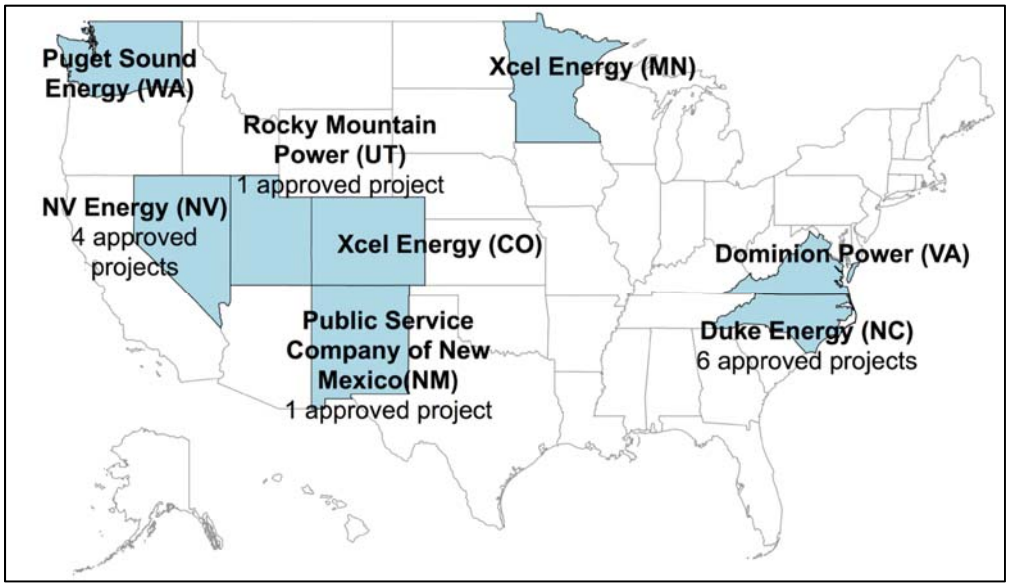

Figure 6: Utility green tariff programs[24]

Introducing Direct Purchasing

In addition to the list above, many end-users can now also buy direct renewable power – i.e. both RECs *and* electricity sourced directly from a generator without having to contract for the whole wind or solar farm.

[24] "Status and Trends…"

This concept has been brought to market by Renewable Power Direct (RPD). RPD works with renewable generators to source both RECs and the underlying physical power from a specific wind or solar facility and arranges delivery over the grid to the customer.[25]

It offers short term contracts sized to a buyer's needs. These flexible contracts for energy and RECs essentially let customers buy green energy "by the slice." There is no need to contract for the output of a whole wind farm or solar array for 12-15 years.

But wait, you might be thinking, isn't it impossible to differentiate and guide electrons from any particular generator on the grid? Yes, which is why electricity is commonly traded by establishing a contractual path of ownership from point A to point B across the grid. Hence, while it involves some extra work, RPD has created its own supply chain to source both power and RECs from an individual renewable generator and deliver them to end-users.

RPD's approach provides an option for companies where onsite solar installations are not practical or sufficient. It also offers an alternative to large offsite PPAs which aren't practical for the vast majority (even among many Fortune 500 customers). It is also more impactful when the full dollar value of a customer's electricity spend flows to renewable generators (and not just the small percentage for purchasing RECs).

RPD's approach has already gained traction with commercial buyers such as Intuit and Iron Mountain. The company is also focused on building a product for mass market customers as well, primarily by offering wholesale blocks of directly sourced green energy and RECs to retailers. The retailers, in turn, can then offer a real, physical

What about additionality?

If renewable generation was brought online directly as a result of a buyer's actions (for example, an individual or business that buys solar panels for their roof), one can say that the generation is "additional." But for the action, the specific facility would not have been built.

Additionality is great, though it is probably the wrong metric for measuring the effectiveness of green energy purchasing. It can miss or ignore someone's impact, and there can be a surprising amount of grey space around defining what purchases are truly additional.

Consider the buyer of a house that had solar panels installed a few years earlier. If the new homeowner continues to utilize them to provide power, is their impact not as green? They probably paid some premium, all else being equal, for a home pre-equipped with solar.

Many community solar programs could create similar questions. For example, if a regulated utility is directed by its commission to create a solar program and seeks subscribers after it has started construction on the project, are those customers responsible for bringing the new resource online?

Additionality is no less tricky for many corporate PPAs. Consider a commercial buyer that signs a PPA for a new wind farm, but concurrently signs a large long-term hedge agreement with a financial intermediary to protect against their long-term physical market risk. The financial institution becomes the key market maker for the project, and they will likely seek to offload their exposure onto other entities that are interested in hedging their physical power price risk. So who can claim additionality? The financial institution or their subsequent…

[25] RPD was founded with seed funding from an affiliate of the American Clean Skies Foundation (ACSF).

green product to their customers, thus moving beyond a REC-only product and differentiating themselves in the market.

It's time for a transition

REC-based green energy plans were a novel and noble attempt to create a voluntary market for renewables. Two decades later, their impact on nurturing green power has plainly diminished. The renewables market has grown up, providing a host of new options for delivering a deep, physically green product that includes RECs.

Yes, there are some locations where some or even all of these new options aren't available yet. But let's concentrate our efforts on bringing them everywhere, rather than telling consumers that the REC-based products of yesteryear are just as good. They aren't. They're often deceptive. And they distract attention from the next generation of green options. It's time to move on.

hedge off-takers?

Lastly, there are some PPA deals and on-site solar installations whose economics depend on liquidating the project's RECs because projects are located in states with compliance markets with more robust REC pricing. If a corporate buyer signs a PPA for a new solar farm in Maryland, but sells the solar RECs and (to claim they are still buying green energy) replaces them with cheaper, unbundled Texas wind RECs, can they still claim the additionality benefit of the new solar farm? Can the buyer of the solar RECs make any rightful claim?

In short, additionality tests can be problematic. Perhaps a better alternative is to follow the money. Give credit to parties that buy physical electricity as well as entities whose financing is critical to bringing a new facility online.