

# Corporate Renewable Energy Procurement Monthly

This is the fourth issue of Bloomberg New Energy Finance's monthly analysis of corporate renewable energy procurement. It details recent global power purchase agreement (PPA) deals and provides market and deal updates in the US, Europe and India. This month's issue also includes an interview on corporate purchasing with Francois Sterin at Google.

## RECENT DEALS

Kyle Harrison – Analyst, Americas Insight

Off-taker	Project name	Country	Size (MW)	Current project owners	Our take
Amazon	Southampton Buckingham New Kent Powhatan Sussex	United States	233	Dominion Resources	Amazon is expected to purchase power from five PV plants in Virginia, all of which are owned by Dominion. The surge in activity from Amazon in 2016 has led them to increase their near-term goal to 50% renewable energy consumption by the end of 2017. <i>Date: 17 November 2016.</i>
General Motors	RES Cactus Flats Wind Farm	United States	50	RES Americas	General Motors' largest PPA to date, and its second virtual PPA in Texas. Altenex advised on the transaction, which will cover 6% of General Motors' global energy consumption. <i>Date: 18 November 2016.</i>
Avery Dennison Corp	Perryton Wind Farm	United States	20	Apex Clean Energy	Avery Dennison Corp is hedging 50% of its US energy consumption through a virtual PPA with Apex Energy for a wind farm in Texas. Avery Dennison Corp is expected to sign future deals in order to reach its 100% renewable energy by 2025 target. <i>Date: 5 December 2016.</i>
West Contra Costa Unified School District	SunPower West Contra PV Portfolio	United States	6.5	SunPower	West Contra Costa Unified School District is working with SunPower to install PV systems on-site at 34 buildings. The school district signed a 25-year PPA with SunPower, and will own all RECs associated with the project. <i>Date: 21 November 2016.</i>
Indian Railways	Indian Railways PV Portfolio Phase I	India	5	ReNew Power	Indian Railways announced its plan to procure 50MW of solar power through rooftop installations on its station buildings. ReNew was awarded a contract to own and operate 5MW of this target, which is expected to be spread out across nine cities. The tariff was fixed by reverse bidding and will provide power to Indian Railways for 25 years. <i>Date: 28 November 2016.</i>

Source: Bloomberg New Energy Finance. Note: This table represents the largest deals during the period of last issue to date.

## MARKET UPDATES

### AMERICAS (AMER)

Nicholas Albanese – Analyst, Americas Insight

#### Amazon expands solar portfolio in Virginia

Amazon Web Services (AWS), an Amazon subsidiary, announced plans in November 2016 with Dominion Resources to buy power for its Virginia datacentres from five new PV farms. Dominion will acquire four 20MW AC facilities from Virginia Solar LLC and one 100MW AC facility from Community Energy Solar, bringing online 180MW AC of capacity, and delivering 400,000MWh of power to PJM by the end of 2017. Dominion will own and operate the facilities as part of the Amazon Solar Farm US East portfolio, which already boasts an operational 80MW solar project. AWS and Dominion signed a long-term virtual PPA after regulators approved a new fluctuating retail rate. The rate provides renewable energy off-takers with a fixed all-in cost for power, eliminating price uncertainty and mitigating risk. Prior to this announcement, AWS had already signed nearly 1GW of US off-site wind and solar PPAs. AWS expects to utilise more than 40% renewable energy by the end of 2016 and has set a 100% long-term renewable energy goal. It buys power from renewable energy projects located in electricity grids that service AWS datacentres.

#### Microsoft signs its largest wind deal to date

In November, Microsoft made its largest purchase of wind energy to date, contracting bundled renewable energy credits

(RECs) from a 178MW wind farm in Kansas and unbundled RECs from two wind farms (59MW) in Wyoming. The Kansas wind deal is notable for its utilisation of an innovative contract structure – known as a proxy revenue swap – that ensures long-term predictable revenues and mitigates power generation volume uncertainty. The deal with the wind projects in Wyoming also sets Microsoft apart, as most corporate buyers of renewable energy have turned away from purchasing unbundled RECs. Microsoft signed another unbundled RECs deal in March, with a 20MW solar farm operated by Dominion Resources in Virginia. Having signed four deals in 2016, Microsoft has contracts with almost 500MW worth of US wind energy projects. Microsoft is now the third largest US corporate purchaser of renewable energy in 2016 after Google and Amazon.

#### Google set to achieve 100% renewable energy

Google will reach its global 100% renewable electricity goal in 2017, expanding beyond its 100% renewable electricity usage achievement in the US. It has been a top buyer of renewable energy since it signed its first off-site PPA in 2010. The company used 5,744GWh of power across the globe in 2015, and its electricity demand grew at a 20% CAGR over 2010-14. The tech giant consumes more electricity than any of its peers and has also experienced higher demand growth. Google's renewable energy goal is likely to remain a moving target.

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## EUROPE, MIDDLE EAST & AFRICA (EMEA)

Janis Hoberg – Senior Analyst, EMEA Policy and Finance

### EU reform on GOs a threat to corporate PPAs

The EU winter package proposal includes a revamp of the EU system for electronic certification and tracking of renewable energy generation and consumption through Guarantees of Origin (GOs). First fully established in 2009, GOs have helped countries with fuel mix disclosure, utilities with green tariff offers and corporates with sourcing accredited renewable power. The Commission now aims to restrict GO issuance for developers, to projects without government subsidies – a regulation currently in place in countries such as Germany and Ireland.

Under the proposal, projects with financial support would still generate GOs, but these would be allocated via auctions. The revenue would help offset renewable energy subsidy costs to the public. The proposal effectively bans the ‘double compensation’ of providing financial support and GOs to projects – a trend that has lent itself to corporates signing long-term PPAs.

## ASIA PACIFIC (APAC)

Justin Wu – Head of APAC

### India: the hotbed for corporate renewable energy procurement in APAC

India appears to be the largest corporate procurement market in APAC and continues to see strong growth. The momentum is being driven by:

1. *Rising power prices:* retail tariffs have risen by 56% in FY 2010-17. A commercial consumer with 30kW connected load is paying \$120/MWh while an industrial consumer with a load of 50kW is being charged \$105/MWh by the utilities.
2. *Favourable grid regulation:* most states are now implementing net-metering policies for rooftop solar. For utility-scale projects, concessional transmission (wheeling) charges exist for clean energy. Banking of power is also allowed for renewables – the grid acts as a large storage system and excess energy generated by a corporate’s project on a day is absorbed by it, and returned on another day of low generation (with a small fee).
3. *Falling costs of renewables (particularly solar):* capital costs of utility-scale projects have fallen by over 30% in the last four fiscals. The reduction could have been sharper if the Indian rupee had not depreciated by more than 14% from April 2014 to November 2017, partially nullifying the fall in module prices sold in dollars. Renewable energy service company firms building rooftop solar (where capital costs are higher than utility-scale projects) are able to offer PPAs in the \$70-100/MWh range (more details on rooftop-solar).
4. *A relatively open power market:* as a power consumer, multiple choices exist to procure clean energy.

When considering Table 1 and the definition of ‘corporate procurement’, we do not add the last two categories (projects owned by the corporates) to market sizing. Therefore, by March 2016, the corporate procurement market in India totalled about 1,700MW. Large independent power producers (IPPs) in India are now building dedicated projects for corporate consumers. For example, CLP India is working on a pipeline of 230MW and offering PPAs to industrial and commercial clients.

### Corporate PPA boom in Europe faces challenges

Corporate PPAs in Europe are on course to triple in volume this year. Deals in newer markets such as Norway and Ireland have pushed contracted volumes above one gigawatt in 2016 (Figure 3). The largest driver behind this rapid growth is activity by US corporates, such as Google and Facebook, beginning to power their European datacentres with renewables.

However, the future of corporate PPAs is uncertain, given the policy reforms underway in many countries. One hotspot, the UK, is seeing cuts in subsidies for renewables, while another – Norway – faces a subsidy deadline. Meanwhile, there is a continent-wide move to auctions as the preferred way to allocate subsidies. The combined result will be less new capacity with government support available for corporate off-take deals.

For more details, see *Corporate PPAs, guarantees of origin and grid parity* (web | terminal).

Moreover, the rooftop solar model is seeing strong growth. Hence, we estimate that this market will cross 2,000MW by the end of this year.

### Apple partners with Goldwind in China

On 7 December 2016, Chinese wind turbine maker Goldwind announced that it will form a joint venture through its subsidiary Tianrun with Apple on wind power projects in China. Tianrun will transfer 30% of the equity of 285MW of wind farms currently under development to Apple. Like many of its peers in Silicon Valley and abroad, Apple has committed to powering its operations with 100% renewable energy; in 2015, some 93% of its worldwide operations were run (or offset) with renewable energy. However, Apple faces a different challenge for truly ‘greening’ its operations from datacentre-heavy companies like Microsoft, Google and Amazon. While the company’s own electricity footprint is comparatively small, the full electricity footprint of its products is more significant, especially in China. Some 77% of its global footprint comes from suppliers.

Since October 2015, the company has announced two clean energy programmes in China. The first is aimed at expanding Apple’s clean energy commitments in the country via direct investments in solar projects. Since April 2015, Apple has invested in 210MW of PV projects at two locations. The second programme is aimed at driving Apple’s manufacturing partners to become more energy-efficient. Since November 2015, five suppliers (including Foxconn) have announced they will use wind or solar power for their factories that make parts for Apple products.

This venture in wind farms with Goldwind appears to be part of Apple’s announced first programme of directly investing into renewable power projects. Unlike corporate procurement programmes in other countries, Apple will not directly purchase the output from these wind farms. The current structure of China’s power market makes renewable direct power purchases difficult. Investments in renewable projects are therefore part of an indirect offset strategy. For more on this deal and Apple’s strategy in China see our Research Note (web | terminal).

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## INTERVIEW: European PPAs have “been more of a learning process”, but are likely to grow in number, says Google’s Sterin

*Google will soon be powered 100% by renewable sources, says Francois Sterin, its director of global infrastructure. Since this interview Google has, in fact, announced it is set to reach 100% in 2017 for its global data centres and corporate offices\*. Even though Google is a leading procurer of renewables through PPAs, Sterin himself acknowledges that “there is no one-size-fits-all approach” and, actually, a range of approaches including PPAs and utility partnerships has been the key to its procurement success. In this Q&A, Sterin discusses Google’s strategy for renewable procurement, and some of the successes in, and barriers facing, its global corporate renewable procurement strategy.*



Francois Sterin. Source: Google.

**Q: Google has set itself the goal of sourcing 100% renewable electricity. When do you think you are going to achieve this?**

**A:** We have been very busy undertaking a lot of projects. We are now the largest corporate buyer of renewables in the world, at more than 2.5GW. Not all of those projects have delivered yet but they will, so we are well on our way. I have nothing to announce today but it is [reaching 100% renewable electricity] going to be very soon!\*

**Q: Google has used a range of methods to purchase renewable electricity, including PPAs and offsets. It has also brought new projects to the market through direct equity investments. What works best for Google and why?**

**A:** There is no one-size-fits-all approach, and it instead depends on the market. We have been quite successful with PPAs in the US and in Europe. We have also undertaken a lot of partnerships with utilities, such as Eneco in the Netherlands and Duke Energy in the US, to use their green tariffs. In addition, we have helped to create some of those green tariffs through policy efforts in the US. We are trying to find ways that make it [purchasing renewable electricity] cost-effective, and ensure we achieve additionality, with projects close to our data centres where we consume the power.

**Q: How are Google’s PPAs distributed globally?**

**A:** The majority of our PPAs are still in the US, as the major part of our load is there. If you look at the 2.5GW capacity number I referred to, almost 2GW are in the US, in regulated markets. 500MW are in Europe.

**Q: How different is it transacting a PPA in Europe than in the US?**

**A:** For the majority, the discussion with the developer is the same, but the regulatory framework is quite different. Although there are subsidies on both sides, some of these subsidies, like the feed-in tariff in Europe, make PPAs less interesting to developers. Therefore, we have had a tendency to go to jurisdictions where they need PPAs and where the regulatory framework is supportive. As PPAs are more common in the US, people are more experienced with them.

PPAs are only just coming to Europe. In terms of transacting

with a counterpart in Europe, it has been more of a learning process, as previously you would typically have had a utility taking up the power. In the US, for instance, more than half of new wind capacity has been taken up by corporates and not utilities. There are market dynamics and practices that are coming to Europe that are already used in the US.

**Q: What has Google’s strategy been for renewable electricity procurement in EMEA?**

**A:** We have adapted our global strategy to EMEA. For example, with our data centre in Finland, it makes sense to make these PPA deals in the Nordics [Nord Pool is a linked power market]. We do not necessarily need to have on-site generation. Specifically, data centres consume too much energy to just have an on-site project, although we can have them for a small fraction of the load. But we do need a project that is in the same grid as the data centre. Then we want new and additional projects – where our involvement makes a difference.

**Q: You have mentioned success in renewable electricity procurement in the Nordics. What has worked well there?**

**A:** We have done a lot of PPAs in the Nordics. In Finland, up until now, there has been a generous feed-in tariff, whereas in Sweden there has not been one. There have also been a lot of large, fully consented projects, [with developers] who were eager to find new partners in Sweden. It was an interesting journey there, ending with the corporate being seen as a bankable partner – so these were good synergies. We do not necessarily want to operate the asset, so investors have also come in and seen the opportunities. In Finland, where we have the data centre, it has been an interesting dynamic where we could partner with a utility.

**Q: Outside of the US, where do you see the next hotspots for corporate procurement of renewable energy?**

**A:** I am hoping Europe. When you look at the numbers, the US dwarfs Europe by quite a large amount. I would say with subsidies shifting and the movement towards tenders, corporates might be a bit more involved in the process. I think corporate procurement will grow in the remainder of Western Europe and then maybe the rest of Europe after that.

\*On Tuesday 6 December, some days after this interview, Google announced it is set to achieve its 100% renewable electricity milestone in 2017. More detail can be found on page 1.

Google is a member of RE100 – a collaborative, global initiative of influential businesses committed to 100% renewable electricity.



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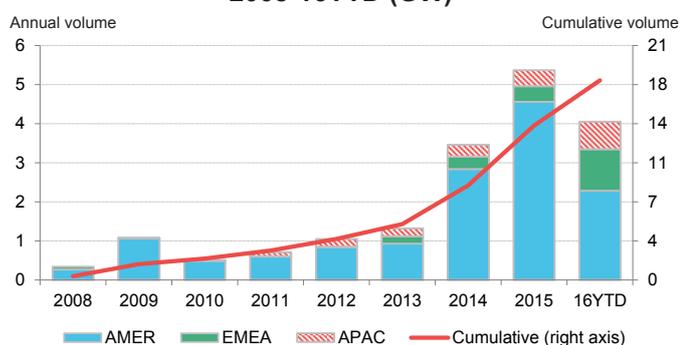
## DATA

**Table 1: Clean energy consumption options in India**

Project owners	Project location	Pros	Cons	Project / technology types	Market size March 2016* (est. MW)
Third-party/ IPP owned	At consumption site	- No upfront capex/opex requirement - Positive net-metering regulations - Falling PPA rates - No transmission & distribution grid (T&D) costs	- Long negotiations on PPA - Dealing with multiple power suppliers (utilities & renewable IPPs)	- Rooftop solar - Small scale ground-mounted solar - Biomass/ cogeneration	200
	Off-site	- No upfront capex/opex - Meeting larger portion of demand - Reducing PPA rates (solar)	- Long negotiations on PPAs - Dealing with multiple power suppliers - Risks of changes to T&D costs	- Utility-scale solar, wind, small-hydro or biomass projects	1,500
Self-owned by the consumer	At consumption site	- Positive net-metering regulations - Falling solar system costs - No T&D costs - No potential output curtailment - Tax benefits	- Upfront capex requirement - Self O&M/contracted O&M	- Rooftop solar - Small scale ground-mounted solar - Biomass/ cogeneration	1,500
	Off-site	- Meeting larger portion of demand - Tax benefits - Favourable wheeling & banking in some states	- Upfront capex requirement - Potential output curtailment - Self O&M/contracted O&M - Risks of changes to T&D costs	- Utility-scale solar, wind, small-hydro or biomass projects	2,000

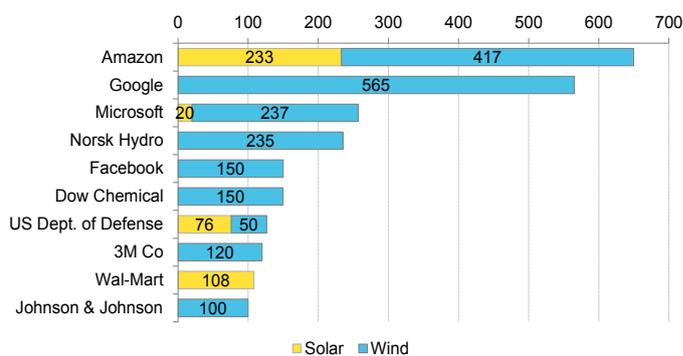
Source: Bloomberg New Energy Finance. Note: Market size is for March 2016, and is a conservative estimate.

**Figure 1: Global corporate PPAs by region and year, 2008-16YTD (GW)**



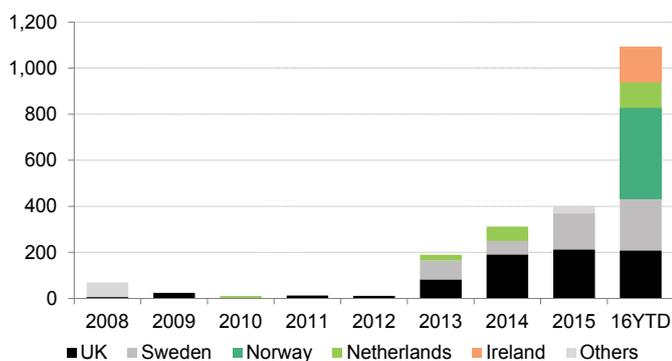
Source: Bloomberg New Energy Finance. Note: APAC capacity is estimated and will be updated on an ongoing basis.

**Figure 2: Top 10 corporate off-takers in 2016 (MW)**



Source: Bloomberg New Energy Finance. Note: These figures are subject to change and update as more information is made available.

**Figure 3: Corporate PPAs in Europe by country, 2008-date (MW)**



Source: Bloomberg New Energy Finance

**Figure 4: Locations of Apple's wind and PV assets in China**



Source: Bloomberg New Energy Finance