



# Tech Giants' Investments in Renewable Power Purchase Agreements Lead the Way

*Saving Money While the Sun Shines (and the Wind Blows)*

## Executive Summary

As major fossil fuel companies experience huge drops in market capitalization due to the oil price bottoming out, the spreading covid-19 pandemic and the consequential share market slide, major technology companies are instead facing their next boom.

At the end of 2019 the fossil fuel energy sector commanded just 4.3% of the Standard & Poor's 500 index (and probably just half of this today in March 2020), down from 25% in the 1980s, when oil and gas companies represented seven of the top 10 companies. Today there are none, with big tech giants commanding half of the top ten spots.

The largest players in ICT — Amazon, Apple, Facebook, Alphabet's Google and Microsoft — have been investing in renewable energy projects for some time, and have all committed to renewable energy targets.

Similarly, nine of the ten largest banks in the United States have committed to 100% renewable energy in their operations (and three are already there). Seven of them have set meaningful targets to provide sustainable, low carbon or renewable energy financing.

Both sectors have driven renewable investment by the global need to reduce carbon emissions, and at this current juncture with fossil fuel majors and markets collapsing around us, are likely to drive even further investment into low cost deflationary sustainable renewable energies.

While governments may be doing little, or worse — backtracking in the U.S. and spinning in aimless circles in Australia — corporate energy users are getting on with it.

**Renewable energy can be obtained cost-effectively and in a way that reduces future price uncertainty.**

Corporates use of renewable power purchase agreements (PPAs) and, to a lesser extent, direct investment in renewable energy projects has continued apace.

Companies do this partially to promote themselves as good corporate citizens to employees, customers, and increasingly, investors, but mainly because [it is simply good business](#): renewable energy can be obtained cost-effectively and in a way that reduces future price uncertainty.

This commentary surveys the progress in renewable energy investment in the ICT industry, including in the take-up of corporate renewable PPAs.

Last year saw a new record for corporate renewable PPAs in the U.S., with \$13.6 gigawatts (GW) of capacity contracted by U.S. companies under either PPAs or green tariffs.<sup>1</sup>

Sixty-nine American companies have now joined [RE100](#) — a global leadership initiative bringing together businesses committed to 100% renewable electricity. This compares to 31 companies in the United Kingdom, 10 in Australia, and 59 in the European Union. Some have quietly been 100% renewable for years, some have set ambitious targets and are meeting them, others have done little more than put a target in place.

Purchasing 100% renewable energy is a good step as PPAs lower costs while supporting investment in new renewable projects. For many firms it is just one element in the overall carbon emissions reduction picture: supply chain emissions from manufacturing processes and building emissions are often far larger sources.

But that picture is changing. As the pandemic continues and oil and stocks continue to suffer shocks, investment in renewable energy projects is the way forward now.

## ICT Goes Renewable

Information and Communications Technology (ICT) is in the supply chain of almost every organization, and is one of the industries that has the most to gain.

Cisco projects that internet traffic will grow at a compound rate of 26% a year up to 4.8 zettabytes (ZB)<sup>2</sup> by 2022 with mobile and video the fastest growing components of that traffic.

A 2015 study by ICT academic Anders Andrae forecast that the ICT sector could be responsible for 20% of all electricity consumption by 2030, with data centres and network transmission the main consumers.<sup>3</sup>

It's a huge sector, growing faster than any other, and electricity is one of the major costs for data centres. So, it's not surprising that the big global cloud players are getting ahead of the curve on renewable energy corporate PPAs.

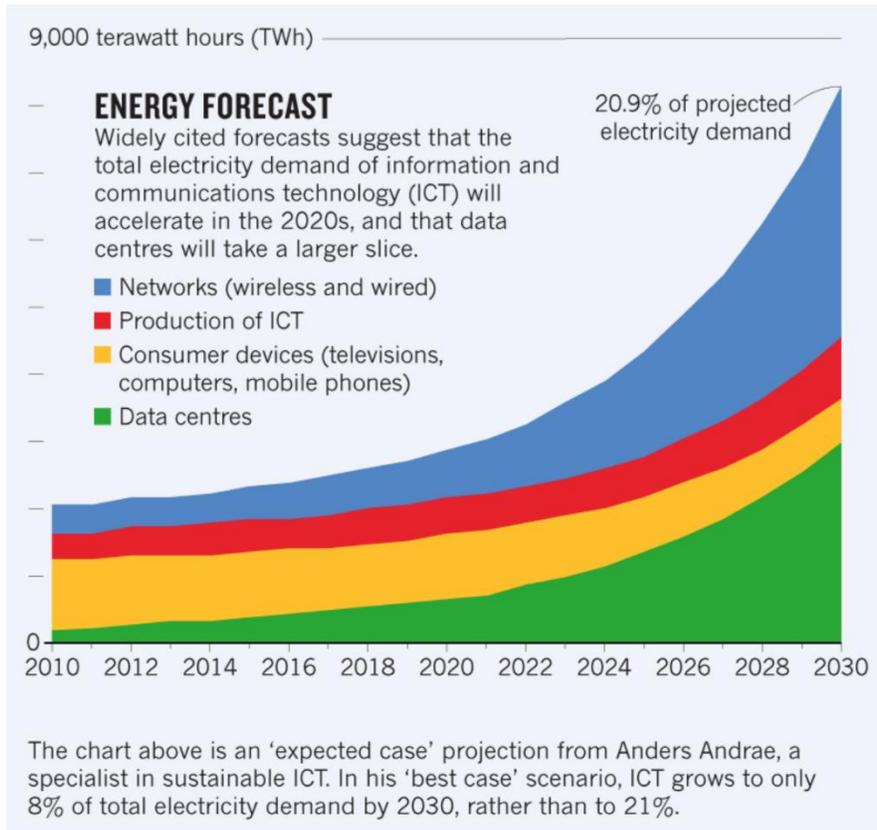
---

<sup>1</sup> BloombergNEF. [Corporate Clean Energy Buying Leapt 44% in 2019, Sets New Record](#). 28 January 2020.

<sup>2</sup> A zettabyte is 1 with 21 zeros.

<sup>3</sup> Nature. [How to stop data centres from gobbling up the world's electricity](#). 12 September 2018.

**Figure 1: Forecast Growth in Electricity Consumption by ICT Sector**



Source: *Nature.com*.

The largest players in ICT — Amazon, Apple, Facebook, Alphabet's Google and Microsoft — have all committed to renewable energy targets and have already taken significant steps, as described in the following table.

**Figure 2: ICT Commitments to Renewable Energy**

	Amazon <sup>2</sup>	Apple <sup>3</sup>	Facebook <sup>4</sup>	Google <sup>5</sup>	Microsoft <sup>6</sup>
Renewable energy commitment	80% by 2024 100% by 2030	100% achieved (April 2018)	100% by 2020	100% achieved in 2017	70% by 2023, 100% by 2025 (without PPAs)
Additional emissions commitments	Net zero carbon by 2040	23 Apple suppliers have also committed to 100%	Reduce emissions by 75% by 2020	Carbon neutral since 2007	Carbon neutral achieved in 2012 Carbon negative by 2030
Renewable capacity/usage <sup>7</sup>	1,600MW 4,600 GWh	626MW 1,800 GWh <sup>8</sup>	4,000MW 3,427 GWh	5,500MW 10,800 GWh <sup>9</sup>	1,900MW 5,500 GWh

In the U.S., Amazon has invested in “18 utility-scale wind and solar renewable energy projects that will generate over 1,600 megawatts (MW) of renewable capacity and deliver more than 4.6 million megawatt hours (MWh) of clean energy annually”. There is more in the pipeline and many more renewable projects outside the U.S.: for example, on the Kintyre Peninsula in Scotland. Amazon has also put rooftop solar on “more than 50 fulfilment centres and sort centres” globally.

Similarly, Google has been entering into renewable PPAs for many years and has been 100% renewable since 2017. Its portfolio of renewable energy, depicted in Figure 3 below, has grown at an increasing rate since 2016 (up 43% in 2019). However, it is not as fast as Google’s growth in data centre capacity.

**Google has been entering into renewable PPAs for many years and has been 100% renewable since 2017.**

Google has deployed a range of techniques, including most recently handing over power management of its global data centre fleet to artificial intelligence (AI) to wring maximum energy efficiency out of its operations, to drive its power usage effectiveness (PUE) as close as possible to 1 (where all power is used for useful computation).

Hyperscale data centres, such as those operated by Google, Amazon, Facebook, Microsoft and Apple, derive significant scale benefits and are more energy efficient than smaller scale competitors (or than in-house data centres) so migration to cloud

<sup>2</sup> Amazon market announcement. 24 October 2019.

<sup>3</sup> Apple market announcement. 10 April 2018.

<sup>4</sup> Power Technology. [Facebook agrees PPA on wind power project in Texas](#). 4 September 2019.

<sup>5</sup> Google. [Our biggest renewable energy purchase ever](#). 19 September 2019.

<sup>6</sup> Microsoft market announcement. 24 September 2019.

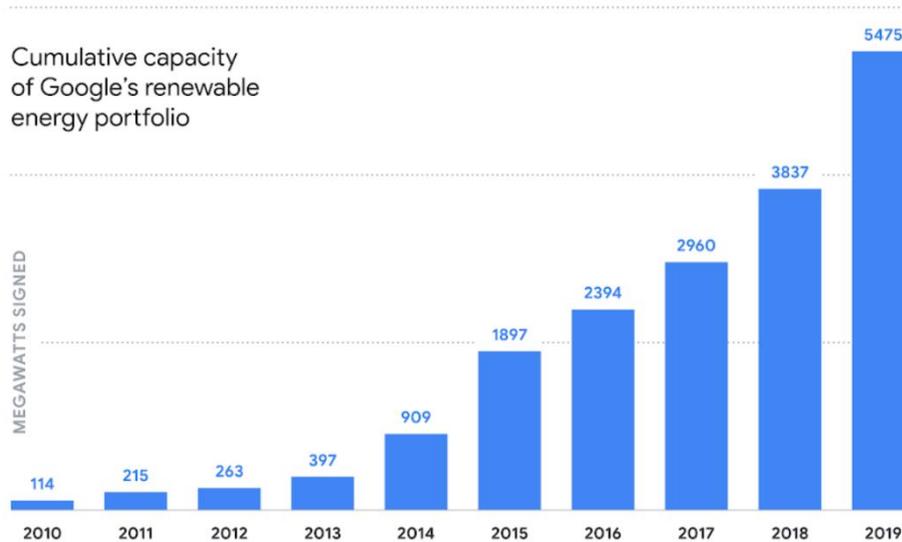
<sup>7</sup> Global PPA commitments.

<sup>8</sup> Estimated usage based on 33% capacity factor (average across ICT companies).

<sup>9</sup> Google Environmental Report 2019; Statista 2019.

technology services should improve electricity efficiency across the corporate sector.

**Figure 3: Google's Renewable Energy Portfolio**



Source: Google.

Facebook was late to commit to renewable energy but now seems on track to hit its 2020 target of 100%, as a result of large PPAs for wind in Texas and solar in Virginia, North Carolina, Oregon and New Mexico.

Microsoft goes further. It has offset carbon emissions entirely since 2012, with a mixture of PPAs and buying of renewable energy certificates (RECs). Its goal is to use 100% renewable energy by 2025, without financial instruments. This competitive striving is about appealing to two key stakeholder groups — Microsoft's huge number of clever, predominantly young employees and its customers. In the longer term that makes it a smart financial decision — when a company makes the kind of margins Microsoft does, with the level of surplus cash the business generates, an investment in reducing its emissions to give it an edge in hiring the best and brightest and in convincing consumers to choose Microsoft over Apple or Google or Amazon makes financial sense. In addition, of course, it is an

**Facebook was late to commit to renewable energy but now seems on track.**

investment to improve the reliability and lower the cost of a key operating input.

Of these ICT giants, Apple may currently have the most significant impact on overall emissions action. Apple achieved 100% renewable energy usage (in 2018) and has encouraged 23 suppliers to take that step. Apple has also agreed to take a new “green aluminium” from Elysis, a joint venture between Rio Tinto and Alcoa, the two biggest aluminium producers in developed world. The ability to command a premium for low carbon materials — or potential buyer pressure for low carbon processing — has the potential to significantly change metal markets.

**Of the ICT giants, Apple may currently have the most significant impact on overall emissions action.**

IBM has committed to 55% renewable energy procured globally by 2025, as has HP Enterprise, and Accenture has committed to 100% renewable by 2023.

## **It's Not Just What You Do, but the Way That You Do It**

The early movers on renewable energy acquired RECs and promoted their efforts to improve the renewables mix in the grid. However, it has become a key source of differentiation in the last few years as to exactly how much “additionality” a company is contributing to the overall supply of renewable energy through its commitments. Consequently, there has been a marked increase in direct investment in renewable energy projects, especially co-located (or closely located) to energy-hungry facilities such as data centres, factories and breweries.

Anheuser-Busch (ABInbev) advertises its renewables assets (at huge expense during the 2019 Superbowl), making the direct relationship with renewable energy an important part of its brand identity.

If all the RE100 companies contracted under PPAs meet their commitments globally, BloombergNEF estimates they would generate 105GW of new solar and wind power construction.<sup>10</sup>

## **Competition Is a Powerful Motivator**

It is interesting to note how similar many industry competitors' commitments are.

In the giant part of the ICT sector, there is clear trend to PPAs and direct investment across the developed world and a move to least-cost locations.

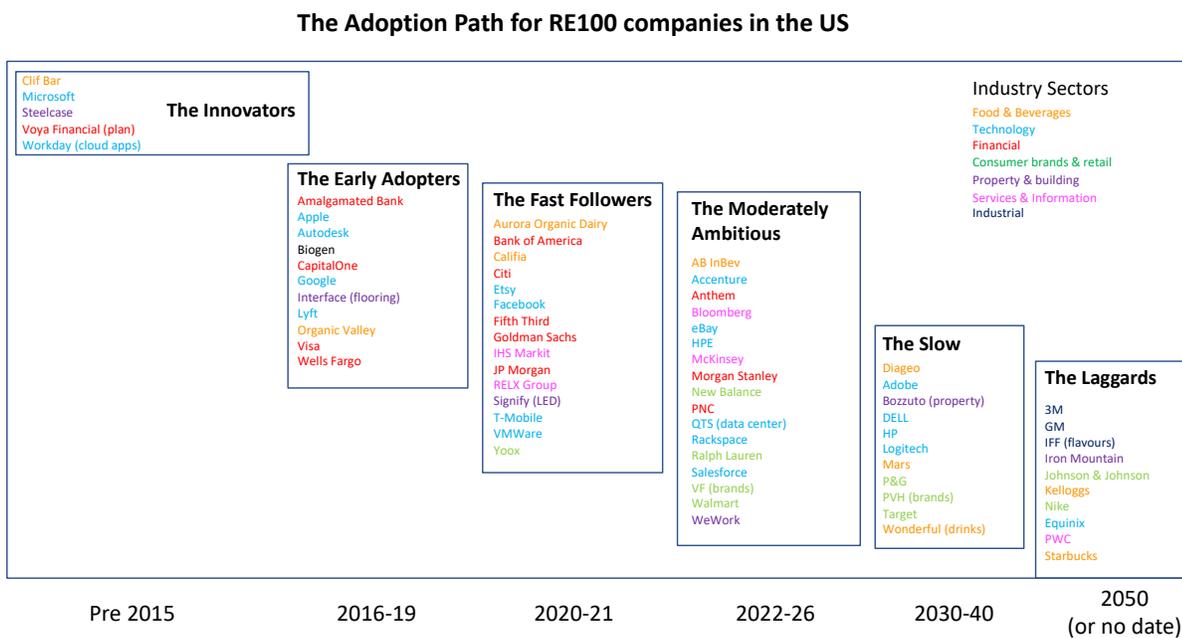
---

<sup>10</sup> BloombergNEF. 28 January 2020.

In the food and beverage sector, organic and health-orientated companies (such as Clif Bar, Organic Valley, Aurora Organic Dairy and Califia) are either already fully renewable or have committed to be so by this year. Older brands such as Mars and Kelloggs have committed to 2040 and 2050, respectively. In the beer sector, focus is on direct and co-located projects. Industrial sector companies are the last to move, with 3M and GM offering 2050 commitments.

Figure 4 shows the spread of time commitments to 100% renewable by the U.S. RE100 companies.

**Figure 4: RE100 Commitments to 100% Renewable Electricity by Year**



## It's All Good, But...

Not surprisingly, there is a correlation between profit margins and the rate of adoption of renewable energy.

The newer, higher margin industries, in particular, are making huge capital investments or contractual commitments to improve cost certainty and to bring down electricity input costs in their supply chains. On the other hand, electricity intensive industries with lower margins and less freedom to deploy capital are

focusing more on efficiency gains and making smaller steps towards renewable energy. These sectors can also benefit hugely from PPAs: the more electricity-intensive an industry, the larger the financial saving by locking in long-term lower prices. There is still concern over reliability of supply (with insufficient firming of

renewable energy) but a virtual PPA can avoid that problem: the electricity will still come from the grid.<sup>11</sup>

PPAs can also cover over significant carbon emission intensity and deflect attention. Amazon, for example, has a huge and global supply chain that is responsible for many times more emissions than Amazon generates within its corporate sphere. The same is true for IT hardware manufacturers such as Apple, DELL and HP, and retailers like Walmart and Target. Greenpeace has noted that, for all their laudable efforts in investing in renewable energy projects, Amazon and Google provide AI tools to improve oil and gas companies' fossil fuel extraction analysis.

**The more electricity-intensive an industry, the larger the financial saving by locking in long-term lower prices.**

Banking and finance is perhaps the most important example of a sector that has committed significantly to renewable energy but is slow to address its profound contribution to emissions. Nine of the ten largest banks in the United States have committed to 100% renewable energy in their operations (and three are already there). Seven of them have set meaningful targets to provide sustainable, low carbon or renewable energy financing. On the other hand, they all continue to provide huge amounts of financing for the oil and gas sector, as shown in Figure 5.

---

<sup>11</sup> Virtual or synthetic PPAs are a financial instrument to protect the buyer from power price fluctuations.

**Figure 5: American Banks and Sustainability**

Bank	Assets <sup>12</sup>	Renewable Electricity Commitment <sup>13</sup>	Renewable Energy Financing <sup>14</sup>	Fossil Fuel Financing 2016-18 <sup>15</sup>
JP Morgan Chase	\$2.76T	100% by 2020	\$200B by 2025 (average \$25B per annum)	\$196B
Bank of America	\$2.43T	100% by 2020 15.77TWh	\$300B in RE finance by 2030	\$106B
Citi	\$2.01T	100% by 2020	\$100B Environmental Finance Goal (build up to \$100B across all finance products)	\$129B
Wells Fargo	\$1.94T	100% since 2017 62GWh from solar PPA	\$200B sustainable finance commitment (\$23B in first year)	\$151B
Goldman Sachs	\$1.01T	100% by 2020 PPA with NextEra	\$150B in finance by 2025 \$750B in finance and investment over next 10 years	\$59B Restrictions on new coal-fired power (without CCS)
Morgan Stanley	\$903B	100% by 2022 and carbon neutrality	\$250B in low carbon financing by 2030	\$66.9B
US Bancorp	\$488B	None	\$1B in 2018 to finance 1.5GW of RE projects	n/a
PNC Financial Services	\$309B	100% by 2025	n/a	n/a
TD Bank	\$393B	100% since 2010 (RECs)	CAD\$100B by 2030	\$74B
Capital One	\$379B	100% since 2018 400GWh	\$7B in RE projects since 2015	n/a

Notwithstanding that companies may continue to operate in ways that add to greenhouse gas emissions, take-up of renewable energy is a positive step and should be encouraged.

## Impact on the Electricity Sector

The growth of corporate PPAs supports increased investment in solar and wind generation. Approximately 10% of new projects are directly supported by corporate PPAs, with plenty of scope for more: there is an estimated 85GW of demand for

<sup>12</sup> Federal Financial Institutions Examination Council. 30 September 2019.

<sup>13</sup> Public statements made by banks.

<sup>14</sup> Ibid.

<sup>15</sup> RAN. Fossil Fuel Finance Report Card 2019.

capacity from US Fortune 1000 companies alone.<sup>16</sup>

It can be difficult for smaller companies to participate in PPAs because of the commercial effort required and their lack of bargaining power. However, as project developers get bigger and more sophisticated, intermediaries will begin to offer aggregated off-take products, opening up the market. LevelTen Energy in Seattle offers an interesting solution: a marketplace that connects renewable energy project developers with smaller customers. Eight U.S. states offer community choice aggregation, a model pioneered in 1997 whereby organizations can join to take advantage of aggregated PPAs.

The lower average prices available in renewable PPAs compared with traditional electricity buying will put added pressure on traditional commercial and industrial (C&I) electricity providers. One unintended consequence is retailers that lose revenue in the C&I sector seek to make it up by increasing residential prices. New Zealand's South Island has seen that as a result of the extremely low pricing negotiated by the region's largest electricity purchaser, Rio Tinto's Tiwai Point aluminium smelter. Competition regulators must focus on markets where retailers have this kind of pricing power to promote fairness in the system.

## **Can the Private Sector Save the World?**

It would be ideal if all the world were united in efforts to combat climate change and governments designed and implemented sensible, long term policies to ensure decarbonization by 2050. In the absence of that global cooperation, the private sector will do a good job of reducing emissions, but if governments can't show leadership, they should at least get out of the way. Instead, they must focus on ensuring an appropriate regulatory framework (ideally including a price on carbon emissions) to ensure competition, make certain that companies with environmental commitments stick to them, and not change policies constantly, unsettling the investment environment.

Dan Shreve, wind energy research analyst at Wood Mackenzie notes, "There's an enormous opportunity remaining. We view commercial and industrial demand as a centrepiece of our market outlook moving forward. It's a terribly important sector that's going to drive demand in the absence of any federal policy associated with renewables."<sup>17</sup>

---

<sup>16</sup> Greentech Media. [Sizing Up the Corporate Renewables Market](#). 21 August 2019.

<sup>17</sup> Ibid.

---

## About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

## About the Author

### Clark Butler

Clark Butler is an IEEFA guest contributor, and a corporate adviser with a background in the technology and finance sectors. In addition to being a director of and investor in technology and data companies, he is exploring technology and financing solutions to encourage investment in renewable energy solutions.

This report is for information and educational purposes only. The Institute for Energy Economics and Financial Analysis ("IEEFA") does not provide tax, legal, investment, financial product or accounting advice. This report is not intended to provide, and should not be relied on for, tax, legal, investment, financial product or accounting advice. Nothing in this report is intended as investment or financial product advice, as an offer or solicitation of an offer to buy or sell, or as a recommendation, opinion, endorsement, or sponsorship of any financial product, class of financial products, security, company, or fund. IEEFA is not responsible for any investment or other decision made by you. You are responsible for your own investment research and investment decisions. This report is not meant as a general guide to investing, nor as a source of any specific or general recommendation or opinion in relation to any financial products. Unless attributed to others, any opinions expressed are our current opinions only. Certain information presented may have been provided by third-parties. IEEFA believes that such third-party information is reliable, and has checked public records to verify it where possible, but does not guarantee its accuracy, timeliness or completeness; and it is subject to change without notice.