

Corporate Renewable Path: Market Tools and Criticisms

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Business interests in renewable energy investment have surged from the last decade. Many corporations around the world have adopted elaborate measures to meet ambitious sustainability targets. As of 2020, 235 companies from various sectors pledge to rely exclusively on renewable energy to accelerate change towards zero-carbon grids on a global scale. Responding to IPCC's call to limit global warming to 1.5 degrees Celsius, many others also set goals to reach net-zero or at least reduce cumulative emissions by being more energy efficient and using lower-carbon energy products. Committed to reducing environmental impacts from the company's operational activities and product supply chain, corporations are adding momentum to the society's transition toward a cleaner energy system. However, despite all the ambitious goals declared by C & I players, details regarding their actual behaviors and procurement progress released publicly are not supportive enough for people to fully understand their sustainability claims. Environmentalists criticize that companies might be doing just the least work to fulfill their social responsibilities but benefit from the overstated reputation earned through public commitments; some may also make controversial decisions on renewable energy or innovative technologies development, struggling between shareholder values and public image. Depending on different corporation goals, external market rules and operation models, there are various market tools available for a company to arrange for a successful emissions management plan. This report will briefly introduce the variations in each approach and state how specific method has been condemned inefficient.

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Market tools for a successful emissions management plan

Energy efficiency improvement

Once setting a sustainability target, companies may consider approaching renewable energy merely a path of sourcing clean electricity supplies. However, take measures first to improve company's energy efficiency as much as they can and use low carbon intensity products should be preliminary steps. For example, General Motors (GM), one of the world's largest motor-vehicle manufacturers, committed to meet the electricity needs of its worldwide operations with 100% renewable energy by 2050. Other than transiting to clean sources and pursuing electrified vehicles, efficiency management was an essential part of its strategy. Tied closely to compensation for plant managers, GM's plan is to evaluate critical energy and environmental performance indicators such as energy used per vehicle produced of each plant. If one of the managers fails to meet the efficiency target, they need to explain the reason to global leaders. In this way, employees throughout the organization are engaged to put energy efficiency as an operational priority. The intangible benefits have enabled GM to both save operating expenses and reduce electricity loads to transit toward renewable energy sources more easily. Besides, this manufacturing company also upgrades its facility equipment, installs LED lights, and improves assembling efficiency to control the level of energy use.

Another strategy – Treasure Hunts also helped GE Renewable Energy to involve energy efficiency into the company culture. Employees are trained to identify opportunities in the facility where energy resources are needlessly in use and thus can be saved. By executing these small but influential changes in their daily works, the company managed to reduce wasted energy and save millions of electricity costs.

Source clean energy for electricity use – Go 100% renewable

The power generation industry is a significant carbon emissions contributor in the world. For companies committed to reducing environmental impacts of their enormous electricity use, investing in and using green power to diversify electricity source is a good option.

- One most straightforward way is to build distributed energy projects onsite at the company's location. Electricity generated from solar panels or wind turbines can directly serve onsite load, thus offsetting carbon-intensive electricity usage and saving transmission or distribution loss. These company-owned projects are most often installed in states that allow net metering policy, which enable customers to sell surplus electricity back to the grid and spin meters backwards to save energy cost. There exist risks when the rooftop system or wind turbines fail to perform well as designed, thus impairing cost savings or project returns. However, as a simple and straightforward way to claim clean power, onsite gener-

ation has been widely integrated into many companies' renewable energy portfolio. As of 2020, the top 30 onsite generators (corporations, universities, or governments) contribute to 1.8 billion KWh of green power annually, which can provide electricity use in more than 168,000 average American households. For example, Apple has 29% of its total electricity use from onsite renewable resources like biogas, small-scale hydro and solar. IKEA, an international home supplies retail business, also supplies 19% of its total power use from biogas and solar resources. In 2019, Amazon successfully installed 50 solar rooftop systems on its fulfillment network buildings to offset as much as 80% of a single fulfillment facility's annual energy need. These onsite projects are usually visible to all customers and employees, which also help conveying the company's sustainability philosophy.

- When resources and space become unavailable or limited, companies may turn to large-scale offsite projects. By contracting with distant renewable projects located in places with richer solar or wind resources, companies can possibly cover their entire electricity consumption with clean energy. The common way to contract offsite renewable energy is through power purchase agreements (PPAs). Companies can take two forms of energy: physical or virtual. In a physical PPA, offtakers create contracts directly with third-party power providers in the same grid region, who own, manipulate renewable projects, and then sell generation output specifically to the acting company's facilities. Energy-intensive facilities like large data centers operated by technology giants are active participants in local PPAs: Facebook created its biggest 138MW wind project in Altoona, IA to power the Iowa data center; Microsoft signed a 20-year PPA with a 110MW wind farm in Texas to support its San Antonio Texas data center; and Amazon contracted with multiple small-scale solar and wind projects in Virginia to serve its largest AWS data center in the state. The time horizon of cooperation, contract amount and electricity selling price is negotiated in each contract. Though the fixed electricity price might exceed current market rate, the contract price usually provides a hedge to offtakers against future electricity fluctuations.

However, since electricity delivery involves transmission and distribution authorities, physical PPAs are almost exclusively limited to competitive retail markets. In regulated markets, where companies are not allowed to purchase electricity from third-party renewable generators, virtual PPA works better. In this case, companies agreed to purchase a project's output at a fixed price rather than directly contract for power. The produced electrons will mix with generation from other fossil fuel power plants in the grid located near the power generator and be delivered to the wholesale market. Due to VPPA's inherent location-independency, any offtaker, despite the company scale and market condition, can turn to promising renewable projects outside its region and pursue optimal economies of scale. This superiority also attracts companies with widely dispersed loads in de-regulated market. The price structure of VPPA is called contract for difference (CFD), where com-

panies will receive revenues from project developers when open market price exceed the contract price and compensate differences to developers when the situation reverses. This mechanism, involving floating market price, embed more risks in the contract. Therefore, plenty of factors that can impact future electricity pricing need to be inspected before creating the agreement, which makes VPPA slightly more complicated. Same to onsite generators, in both types of PPAs, companies make marketing claims and report emission reductions through a renewable energy certification (REC), which signifies the holder had contributed to one MWh of electricity from clean resources. In any contract, generators manage to inject real green energy into the grid while companies who either buy and use the green power or solely finance the project claim the associated RECs to meet its sustainability goal. Even though did not physically consume the green electricity, offtakers in a virtual PPA, who essentially finance an additional renewable project, could count the environmental benefits toward their renewable targets. Among all companies, tech giant Google has been at the forefront of corporate PPAs trend (see **Figure 1**). In 2010, Google signed the first PPA with NextEra to buy 114MW of wind power in Iowa for 20 years. The next year, another 100.8MW wind project in Oklahoma was contracted. From 2010 to 2017, when Google claimed to reach 100% renewable, it has aggregately signed more than 2.6 GW of green power around the world. By expanding the scale of PPAs in business industry and making its methods publicly available, Google helped establishing new models for green power purchasing that many other corporations have followed. Between 2012 and 2015, corporate purchasing of renewable energy among the nation grew by more than 30 times, significantly transforming the clean energy industry.

- Another way for C & I customers to purchase renewable electricity in states where retail choices are not authorized is Green Tariff through local utilities. Green tariff describes an arrangement where the company can procure clean energy from its utility, who contracts with other third-party renewable generators to pass green power into the grid and receive a specific tariff rate from companies. By tapping into utilities' strengths in power generation and delivery, green tariffs allow more companies to opt into clean power without involving in complex transactions of wholesale PPAs. While companies who request renewable energy supplies could receive physical renewable power from utility's transmission and distribution network, non-participating utility customers are spared from shifted program costs and project risks.

Other less efficient options offered by utilities before green tariff are green power products and unbundled RECs (in contrast to bundled RECs created in PPAs, "unbundled" means owner hold renewable certification with no associated clean energy delivered – neither in holder's grid region nor in grids near project developer). The former option usually requires shorter-term commitments of individual customers to use a mix of renewable

Corporate Renewable Deals 2011 – 2016

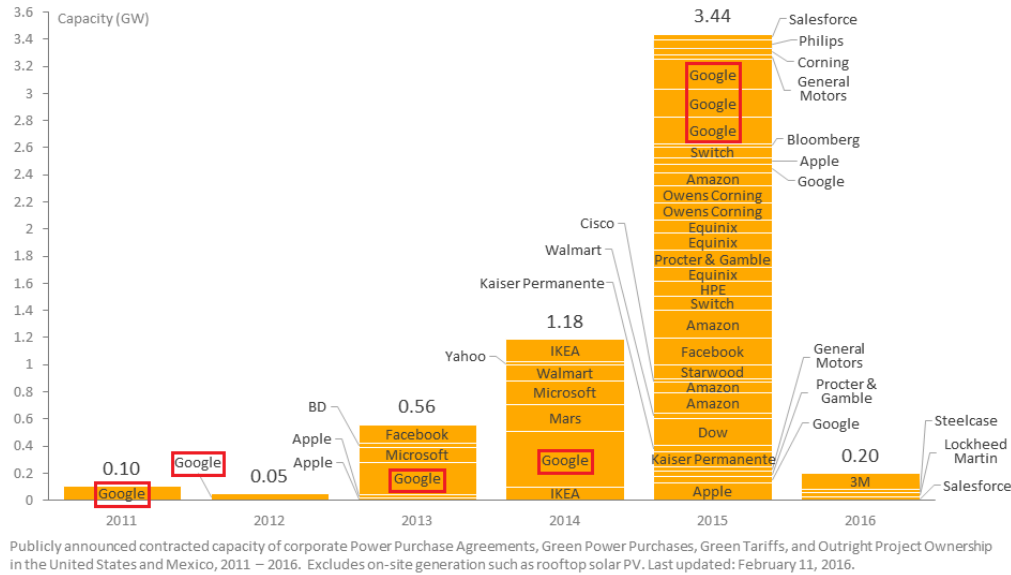


Figure 1: Google's pioneer role in corporate renewable procurement

electricity products, while the latter has been considered having little potential to drive the development of new renewable projects. Therefore, since the innovative green tariff first proposed in 2013, it has become an important way for corporations in regulated markets to purchase renewable electricity directly from the local grid. By 2019, utilities in 15 states have offered customers green tariff options to meet sustainability goals.

Offset carbon emission sources – Reach net-zero

Carbon net-zero and 100% renewable energy are not the same environmental targets pursued by corporations. While 100% renewable is often associated with the company's electricity consumption (Scope 2 emissions), net-zero encompasses all emission sources, both directly and indirectly, fallen into company's defined boundary (Scope 1, 2 and perhaps part of Scope 3 emissions). Emission-intensive oil and gas companies like British Petroleum, Total, and Shell all pledged to reach a net-zero goal by 2050. It usually requires less effort for the company to reach net-zero since combustion-based emissions are still allowed as long as companies manage to offset those emissions through innovative mitigation technologies. However, corporations committed to 100% renewable need to match each MWh of their electricity use with renewable resources like wind, solar and biomass, excluding nuclear. While efficiency improvement, clean power purchase and production enable significant electricity consumers like large tech compa-

nies, retailers, and manufacturers to green their electricity supply and go 100% renewable, other set of methods is also required for company to reach net-zero goal.

- Carbon capture and storage (CCS), which remove carbon from the atmosphere and safely store them back into the underground, is one of the most critical technologies for achieving company's net-zero targets. According to Global CCS Institute, CCS is the only clean technology capable of deeply decarbonizing major industries like steel, cement, natural gas processing and oil refining. This is based on the reason that for these hard-to-abate sectors, cleaner fuels, green electricity sources and energy efficiency are not feasible to address all emission cuts. CCS technology is needed to cover remaining emissions that are not convertible to renewables for reaching a net-zero carbon outcome. American company ExxonMobil is one of the leaders in developing next-generation carbon capture technologies. Since 1970, the company has cumulatively captured more than 40% of total world-wide CO₂ captured. In 2017, the company alone removed 6.6 million metric tons of CO₂ from the atmosphere for underground storage. Though the company did not make public commitments to reach the net-zero goal, it has intensively applied CCS technologies to mitigate greenhouse gas emissions from operations.
- Buying carbon credits to neutralize emissions is another solution for companies to reach a net-zero goal. A carbon credit, verified by third parties, signifies that greenhouse house emissions are one ton lower than they would have been if the credit purchaser had not invested in renewable activities aiming at reducing emissions. These projects usually include the development of alternative livelihoods and climate-friendly productive activities. By purchasing credits, companies can continuously emit combustion gas to the atmosphere while marketing claims that a specific amount of carbon emissions are removed from the environment through an offset project. For instance, oil and gas giant Shell pledge to tackle carbon emissions through a nature-based ecosystem offset program (see **Figure 2**). This program protects existing natural forest ecosystems to absorb and store carbon emissions and is credited to Shell for curbing CO₂ emissions. Noticeably, though workable in theory, the feasibility of such carbon credit projects varies, and it is hard to be fully tracked or validated. Therefore, buying carbon credits is usually envisioned as an interim solution before a company can establish scalable mitigation programs to reduce emissions.

Criticisms on corporate renewable energy business

With a mixture of market tools, businesses are increasingly taking actions against climate change and becoming more socially responsible. In 2019, approx. 19.5 GW of clean energy contracts were signed by more than 100 corporations from 23 different countries, up from 13.6 GW in 2018, and more than triple the number in 2017 (**Figure 3**). Such a strong uptrend

MEETING THE AMBITION: HOW SHELL COULD CHANGE

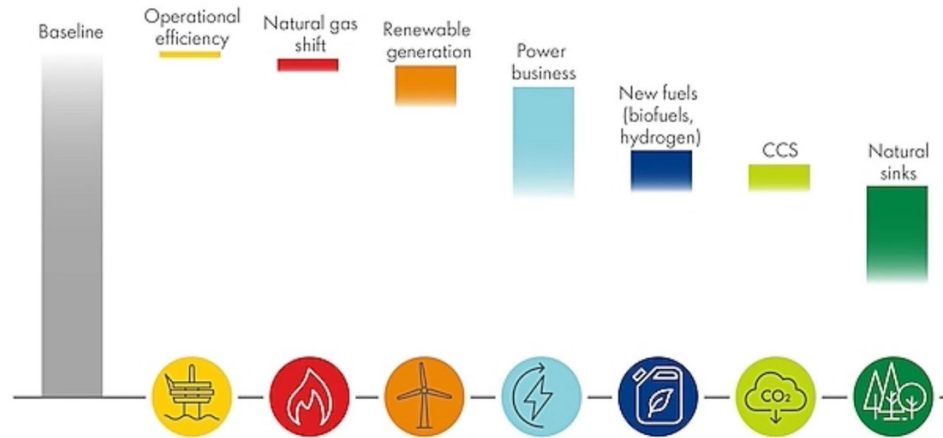
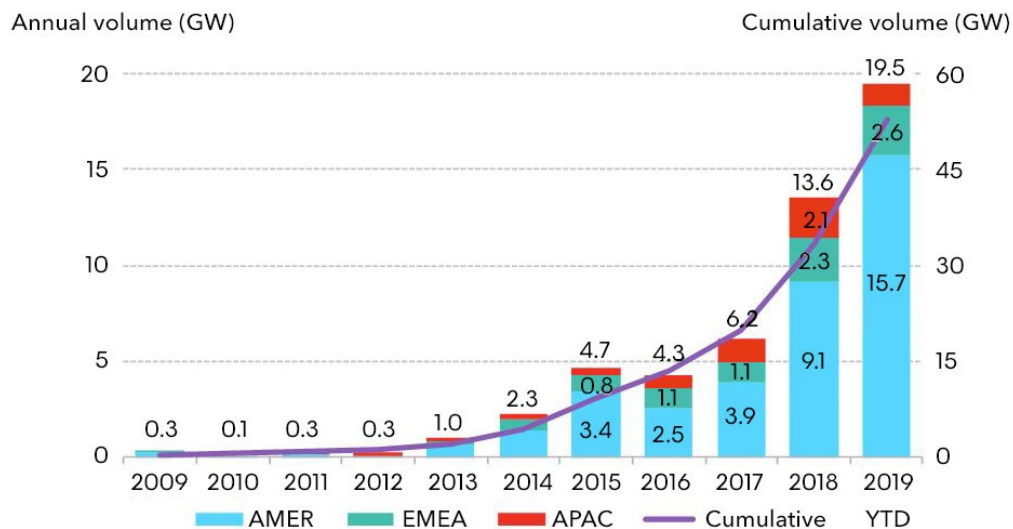


Figure 2: Shell's net-zero plan

significantly promotes renewable industry development, enabling companies to strengthen their reputation as environmental leaders and build positive brand impressions. However, plenty of critics and blurred boundaries are embedded in the claims.

- Given that the voluntary corporate renewable market does not require companies to disclose details regarding their clean energy production and purchase, the public is provided with insufficient information to understand what each company means in its renewable energy use statements. For instance, there are plenty of market tools available for companies to construct a successful 100% renewable management plan, and each of them contributes differently to the renewable energy market. Take renewable energy certification (REC) as an example: two types of certification can be found in the market – bundled and less expensive unbundled REC. The latter is to buy a few years' worth of RECs from some renewable projects independent of the associated electricity production. This represents only a fraction of the value of a typical power project, thus leaving developers to face market risks in electricity prices. In contrast, obtaining RECs through onsite generation or PPAs, which accompany real electricity flows, enables companies to provide stable and sizeable cash flow to renewable developers to bring new clean power projects further online. Having such a direct effect of adding new renewable generation to the grid is also called “additionality”, which is an important indicator of renewable procurement effectiveness. Thus, two types of RECs add a different level of momentum to a company's renewable business and stimulate the development of renewable industry in varying degrees. How-

Figure : Global corporate PPA volumes



Source: BloombergNEF. Note: Data are through 2019, reported in MW DC capacity. Onsite PPAs are not included. Australia sleeved PPAs are not included. APAC number is an estimate. Pre-market reform Mexico PPAs are not included. These figures are subject to change and may be updated as more information is made available.

Figure 3: Corporate renewable deals from 2009 to 2019

ever, few companies choose to specify the percentage of clean energy comes from each method in their sustainability reports. Therefore, comparisons across similar or diverse types of companies are hindered.

Moreover, companies that turn out to rely heavily on unbundled REC purchases are increasingly considered as insincerity, due to the diminishing value of unbundled RECs to green industry promotion. The thundering success of renewable energy projects over the last decade has left the market highly oversupplied and yields increasingly cheap RECs, which are so low-priced to have real impacts on new clean energy projects financing and investment when they're disassociated with physical electricity flow (i.e. unbundled REC). This is a real problem since what already makes unbundled RECs less valuable than bundled ones is their lack of financial additionality – offtakers are not ensured to financially help building extra new clean energy projects through a simple unbundled REC purchase. As prices continue to fall, the present-stage corporation investments embedded in unbundled RECs create even less social and environmental benefits as previous renewable projects. The cumulative purchases on such inefficient certifications also divert massive capital investments away from projects that genuinely alleviate climate change. Therefore, even though companies are gradually more committed to renewable energy goals, public

may criticize the effectiveness of their moves without clear statements declaring the source of each approach and more details.

- Different companies, even in the same industry, may have their approaches to what they account towards the use of renewable energy. Besides, since there exists little uniform standards or terminologies in the market, similar terms or statements in each corporation's renewable pathway can have different meanings, which would also possibly lead to misleading statements. Referring to the vast difference between bundled and unbundled REC, corporations' attitudes towards which are not always clear. While some companies count toward their goals RECs for renewable energy and explicitly state not to rely on unbundled RECs, others may choose not to use the "unbundled" terminology and treat all purchased REC the same. For example, Apple and Google are two tech giants who are now powered by 100% renewable energy. According to Apple's sustainability report, unbundled RECs are counted toward its renewable energy goal, though this is the last option to go when Apple-created projects are not enough to achieve the company's green power needs. However, in Google's clean energy strategy, the company never consider buying unbundled RECs. Directly leading to the conclusions that companies like Apple are trying to deceive public and scale back costs on renewable industry is unfair, even though considering the undermined impacts of unbundled RECs. However, the purpose here is to better understand to what extent each company devoted to making real impacts on the development of renewable energy market. Except for that, in terms of the meaning of "unbundled", IBM has a more specific definition. For IBM, unbundled RECs only point to those certifications sold into a different grid region rather than the customer's location. This is different from the commonly adopted standard to classify "unbundled" as disconnected with physical electricity flow. To actually be using the renewable electricity that the purchase of RECs helped to fund, IBM claimed that no "unbundled" RECs are used throughout the company's green power evolution.
- Like the criticisms on companies that pledge to reach 100% renewable but only purchase unbundled RECs, others which publicly committing to net zero goals are also under judgments for their controversial behaviors. Take influential oil and gas giants as an example, BP, Shell, and Total have all invested substantially in renewable projects and innovative clean energy technologies for the last decade. However, the sums involved remain very small compared to companies' spending on legacy carbon-intensive businesses. This thereby creates a potentially misleading impression about the nature of an oil company's business and the negative environmental impact of their energy products. Besides, motivations of the company's tiny move toward clean energy are worth exploring. In reaching net-zero targets, oil companies put great efforts into developing CCS technologies, removing emitted greenhouse gas and restoring them into underground warehouses. However,

the captured carbon dioxide was actually used to enhance recovery rate at company’s oil wells, which ultimately raises the emission level back again. And this is not the only case showing that oil companies are not only diverting a small proportion of capital investments on renewable energy area but also adopting a strategy to concentratedly invest in projects that are in line with its core “dirty” business. Therefore, while actively financing green power, investing in clean technologies, and putting up a shiny green facade before the public, some companies were essentially aimed at supporting operations, improving efficiency and reducing costs of the emission-intensive oil and gas projects. Environmentalists also sued oil giants for funding misinformation campaigns that cloud public perceptions of climate science, which have undermined real actions in mitigating climate change in the past half century. The process of making such misleading or even deceptively claims is known as Greenwashing, and oil companies have long been criticized for engaging in greenwashing activities despite their sustainability goals.

Discussion

Over recent years, increasingly corporations start to think deeply about what they can do to alleviate climate change and more towards approaches to help them mitigate as much greenhouse gas emissions as they possibly can.

For green electricity buyers, contracting both physical and offsite renewable PPAs has enabled them to substantially catalyze new wind or solar projects globally. The growing alliance of companies establishing similar sustainability commitments like RE100 and REBA (Renewable Energy Buyer Alliance) also signifies the continuity of a health procurement market. In consideration of all the controversies around corporation purchase and use of RECs, many companies also signed on to the Corporate Renewable Energy Buyers’ Principles to seek streamlined solutions for effectively buying green power. The principles outline six criteria that would help companies significantly justify their movements in the renewable industry, like greater choice in procurement options, access to new projects that reduce emissions beyond business-as-usual (bundled RECs), longer and variable-term contracts, etc. As of 2020, 78 companies, including Amazon, Samsung and Schneider Electric, have stepped forward to join the Buyer’s Principles, forming another collaborative alliance to promote renewable electricity generation. In the future, as more companies move to 100% renewable goals, the true competition should be to what extent each company really promotes the renewable industry. An emission management plan that stimulates real investment on renewable energy and truly displaces carbon-intensive combustion demands should be far more valuable, rather than the time of reaching 100% renewable and even the goal number itself.

For net-zero pursuers, aside from contracting renewable projects to source electricity use

and adopting energy efficiency programs, they may also need to invest in carbon capture technologies, buy carbon credits and build natural carbon sinks to remove or offset company's emissions to the atmosphere. Ideally, companies over the world direct massive capital on renewable PPAs and various carbon reduction projects to produce real impact on climate change mitigation. However, all companies should be careful about greenwashing. At the same time when these companies use green or sustainability to market their reputations, the public is more aware of the importance of a real, measurable, independently verified, and permanent project. The consequence of deceiving public about the company's true efforts on carbon reduction, both in terms of reputation and in economic terms, can be severe. And this should be of particular concern to oil and gas companies.