

# Living with Finite Resources

Strategies for sustainable resource utilization

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# Introduction

**The Earth's resources are finite, making the importance of developing sustainable ways to operate increasingly urgent.**

It can be challenging for businesses to think long-term, but today's economic, social, and environmental opportunities and obstacles require it. Companies are now being confronted with the stark reality that they are operating on a planet with finite resources. Continuing to operate in this reality requires creativity and innovation, and leading companies are rising to the challenge by looking at how to manage natural resources differently, how to measure them more accurately, and how to develop products and processes that use them more efficiently. This new type of business thinking will ensure sustained growth that balances productivity and profitability with the planet and its people.

Growing interest in a circular economy — where products and services are designed for maximum resource utility, upstream and downstream longevity, and responsible end of life regeneration — is being driven by technology and innovation. Leading companies are already using digitization to enable smart manufacturing, which reduces natural resource consumption. Increasingly, product materials are being reimagined and developed using biomimicry, or reclaimed for reuse at end of life. Companies are taking leading positions on renewable energy buying, energy storage, and water and waste reduction solutions. The transition to circular design, everything-as-a-service business models, and reverse logistics are creating a path of systemic change toward a more sustainable world.

The increasingly favorable economics of responsibility are helping to drive this change. For decades, “green” solutions came with a high price tag. The tide is turning, however, and today, the direct costs of being green are frequently no greater than — or even substantially less — than non-green alternatives. Consider the cost of renewable energy, which has fallen dramatically in the past decade thanks to technological advancements, making solar power the least expensive form of energy in over 60 developing countries.<sup>1</sup>

## The business value of sustainability

According to a report from McKinsey, investments in businesses with sustainability strategies perform generally better than in those without.

“An investment of \$1 in 1993 in a value-weighted portfolio of high-sustainability companies would have grown to \$22.60 by the end of 2010, compared to just \$15.40 for a portfolio of low-sustainability companies,” according to the authors of the report.

Those high-sustainability companies also realized better return on assets (34%) and return on equity (16%).<sup>2</sup>





Indeed, the cost of inaction is driving many companies in industries ranging from manufacturing to mining to consider the value of a responsible approach to business. Without direct action in alignment with the science behind the 2015 Paris Climate Agreement, the planet is facing a 4 to 5 degree Celsius rise in global temperatures by 2100.<sup>3</sup> While the impact of this steady temperature rise may have little effect on companies today, leading organizations are recognizing that the ability to do business-as-usual in the long term will be futile without accounting for the full costs and externalities of a company's actions.

Today, thousands of companies consider the impact of their environmental footprint and resource availability when planning. A recent poll of Schneider Electric clients in Europe revealed that 82% consider resource scarcity and sustainability as key elements in their decision-making processes.<sup>4</sup>

Sensitivity to resource utilization — and the resulting impacts — have become most keen for companies as it relates to their energy use. Worldwide, industry is the largest consumer of energy, and therefore also the largest polluter. Increasing attention has been paid to the role that business can play in keeping the effect of emissions below 2 degrees Celsius. This paper explores the concept of corporate carbon accountability. It explains how leading companies are using solutions like utility-scale renewable energy and clean technologies to set and meet aggressive carbon reduction targets in line with leading climate science. It also describes how progressive companies are addressing other natural resource constraints, such as water.

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# Corporate carbon accountability

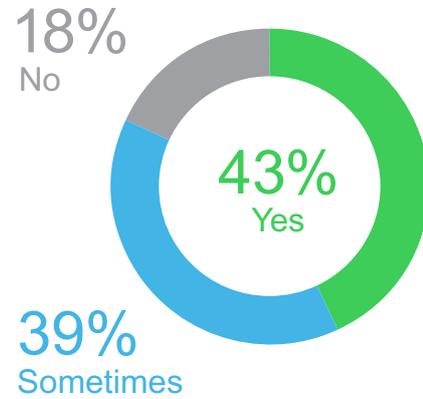
Recent pressure and scrutiny have focused on how companies, as the world's largest emitters, can take greater accountability for their role in creating — and more importantly, reducing — global warming. Carbon pricing, carbon reporting and disclosure, science-based targets, and efficiency programs are all mechanisms that businesses are using to address, and ideally reduce, their carbon footprint.

## Carbon Pricing

Carbon pricing is an accounting system that places an economic incentive on emission reductions. Two common forms of carbon pricing are emissions trading systems and carbon taxes.

In recent years, numerous governments have introduced pollution taxes aimed at bolstering sustainability by reducing emissions, and these have typically impacted businesses. For example, energy was relatively cheap in the latter part of the 20th century and even large users viewed energy costs as simply part of the cost of doing business. However, reducing energy use quickly became a goal for many UK companies in 2001 when the government initiated a climate change levy on energy supplied to businesses. The specific goal of this tax was to help the country meet its emission reduction commitments that had come from the Kyoto protocol. Accordingly, higher taxes were levied on higher polluting fuels and dropped to zero for energy from renewable sources.<sup>5</sup>

These so-called carbon taxes have helped to spur corporate momentum on measuring and managing energy use to avoid taxation — or, in some cases from non-governmental organizations (NGOs) scrutiny and pressure. The result has been innovation in technology, as manufacturers have responded to the demand for switching and distribution equipment with usage-tracking capabilities, and an exponential increase in the number of companies annually disclosing their carbon emissions.



Do you consider resources scarcity or sustainability when evaluating projects?

Figure 1 - Source: Schneider Electric, "Perspectives Conference in Berlin Presentation," 2017



According to the World Bank, when governments adopt some form of carbon pricing “they begin to capture what are known as the external costs of carbon emissions – costs that the public pays for in other ways, such as damage to crops and health care costs from heat waves and droughts or to property from flooding and sea level rise – and tie them to their sources through a price on carbon.”<sup>6</sup>

Today, 47 carbon pricing initiatives have been implemented or are scheduled for implementation around the world. Valued at \$52.2 billion, they cover 14.6% of global greenhouse gas emissions.<sup>7</sup>

### Carbon Reporting & Disclosure

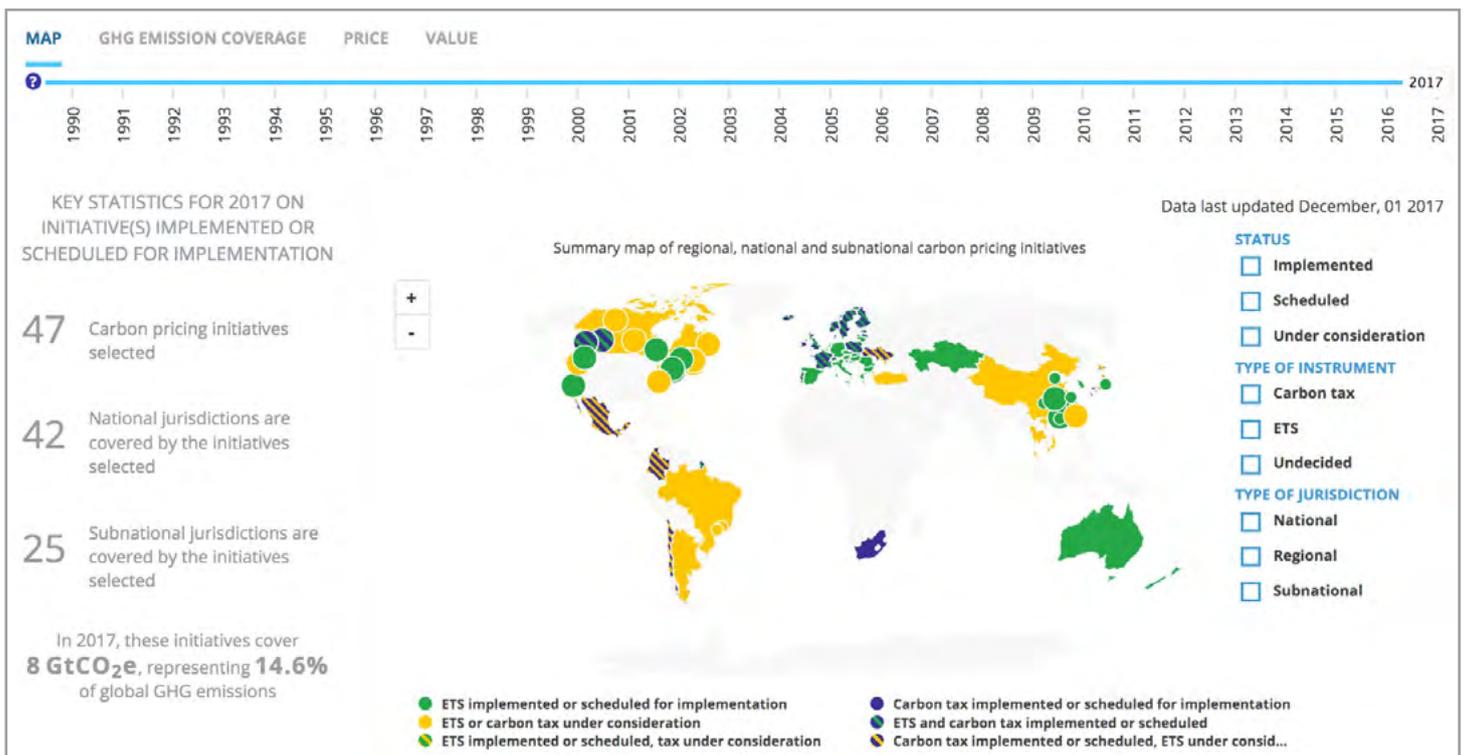
Annually, over 5,000 global companies report their carbon emissions to CDP, the world’s largest repository of voluntary emission data. CDP acts on behalf of investors to manage trillions of dollars in long-term investments based on the environmental performance of participating companies over time. The impacts

of climate change, driven by unchecked greenhouse gas emissions, represent a real threat to investors and business continuity. Through its annual corporate and supply chain reporting and disclosure program, CDP ensures that emission reductions are an integrated part of business strategy. Companies can use the CDP reporting process, and the feedback provided by CDP, to continue to advance their carbon reduction efforts.

### Science Based Targets

While companies have been setting carbon reduction targets for more than a decade, these targets were typically only based on organizational aspiration, and not climate science. The growing understanding that deep reductions in emissions will be necessary to avoid the worst impacts of climate change has led an increasing number of organizations to set targets based on science through the Science Based Targets initiative (SBTI), a non-profit organization that helps companies target and achieve emission

Figure 2 - Summary map of regional, national and subnational carbon pricing initiatives. (Source: carbonpricingdashboard.worldbank.org/map\_data)





By using technology to drive efficiency, companies realize increased operational effectiveness and reduce manufacturing and supply chain waste.

reductions. More than 350 global organizations have joined SBTi, with an average of two new companies joining every day.<sup>8</sup>

### Efficiency Programs

As carbon pricing and disclosure in its various forms relies on self-reported data, it is more important than ever for businesses to know and understand how they are using energy, and how they can reduce that utilization. Technology plays a critical role in helping to identify the data responsible for driving these streams, and the digitization of electrical supply and distribution systems is making this possible. Some examples are:

- **Wide area networks.** These networks link a variety of smart devices distributed throughout electrical distribution networks, providing communications and security infrastructure as well as enabling users to track energy consumption.
- **Advanced metering infrastructure.** This new generation of meters is improving the accuracy of collecting energy usage information while providing a mechanism to both inform and empower utility customers as they choose better energy consumption patterns.
- **Meter data management systems.** This software focuses on properly managing and integrating all meter-generated data: historical data for analysis, as well as billing, power quality, and system events data. This integration tool is the hub that shares data with other critical applications such as customer information systems (CIS), and customer relationship management (CRM) systems.

Newer equipment has built-in communication capabilities that enable remote data collection and, frequently, system control as well. But what about the vast installed base of electrical distribution systems that predate this higher technology?

Leading suppliers have addressed this hurdle by developing retrofit and upgrade solutions that bring new monitoring and

### A shining example of efficiency in action

The Earth Rangers Centre for Sustainable Technology is a prime example of how effective monitoring and control systems can be in reducing the demand for energy and other resources. Located just outside Toronto, Canada, the Earth Rangers facility is the headquarters for this conservation organization for kids.

Schneider Electric partnered with Earth Rangers to provide building automation, metering, security, and lighting controls for the organization's new facility, which earned LEED® Gold certification for new construction. Earth Rangers soon decided to go even further in providing an environmental showcase by making additional reductions in energy use and carbon emissions, in pursuit of a LEED Platinum for Existing Buildings certification.

Implementing an advanced energy management system that leverages existing real-time monitoring and control systems allowed facility operators to monitor actionable energy information. This includes data from the facility's 80 subsystems and energy loads, including solar panels, an onsite water treatment facility, and earth tubes for geothermal heating and cooling. The information is presented in a single "facility scorecard" that is easily understandable to building operators, managers, and the general public.

Earth Rangers achieved an additional 20% energy savings and earned the LEED Platinum for Existing Buildings certification. Today, the facility is 90% more efficient than the base design of the model National Energy Code for Buildings.<sup>9</sup>

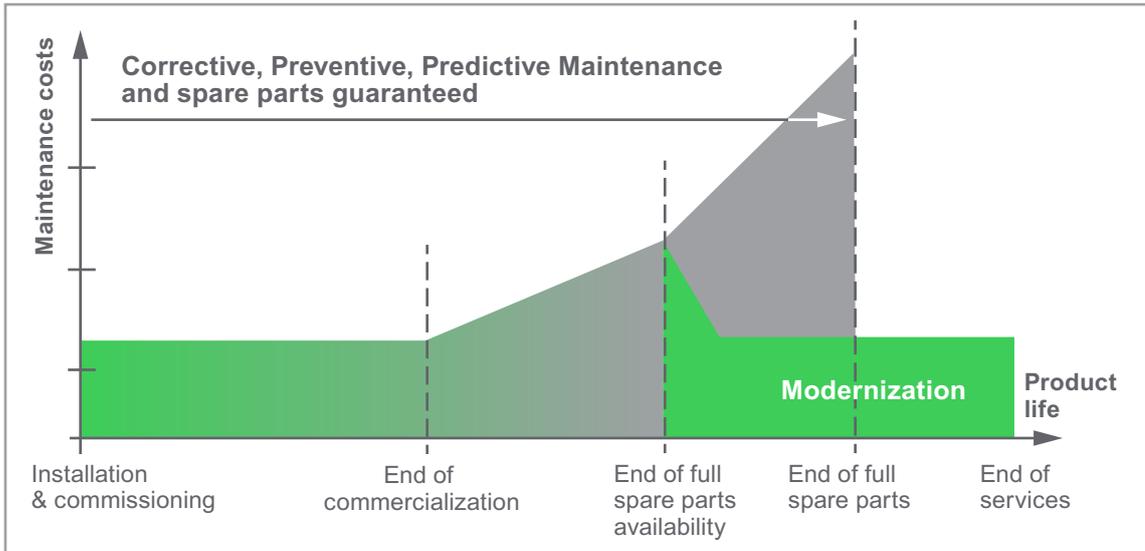


Figure 3 - Strategic partial or complete replacement of old equipment with new equipment extends electrical equipment's useful life and enhances availability and operational reliability. (Source: Schneider Electric, 2017)

control capabilities to older equipment that is otherwise still fit for service. This is critical, as switchgear typically has an expected service life of about 25 years.

The integration of vintage equipment into newer distribution networks can be achieved through programs that offer component-level upgrades for older switchgear. Replacing only what is necessary to upgrade specific functionalities while retaining the basic, installed equipment reduces waste, minimizes downtime, and provides significant life extension, saving as much as 95% of the cost of total replacement.<sup>10</sup>

By using technology to drive efficiency, companies realize increased operational effectiveness and reduce manufacturing and supply chain waste, which has a positive impact on both the bottom line and the company's overall environmental footprint, in addition to energy savings.

Technology like Schneider Electric's EcoStruxure™ Resource Advisor can also be used to help drive carbon reductions and efficiency improvements at an enterprise level. By providing companies with clear insight into the performance of their operations over time, goal setting and achievement are bolstered, and tracking of the impact of efficiency measures obtained.

A recent study published by GreenBiz and Schneider Electric found that 79% of companies have sustainability data collection projects underway, but that only 55% of those surveyed indicate that they have the right connected devices and software in place to act on energy and carbon savings opportunities when identified.<sup>11</sup> Clearly there continues to be room for companies to improve not only their technology, but the actions resulting from the data sourced from that technology.

### Worldwide energy use assessment and control

Entertainment and sporting venue operator AEG has facilities on five continents, including 22 of the world's top 100 arenas, and energy makes up its second largest operating expense. In 2007, AEG engaged Schneider Electric to perform a comprehensive assessment of its operational efficiencies and environmental impact. Using Schneider Electric's Resource Advisor to compile, consolidate, and display energy use data enables AEG to track 53 different types of data streams. This information allows AEG to reduce costs and environmental impact, in part by facilitating the purchase of renewable green power for its facilities and the site-level implementation of distributed energy resources.

In addition to boosting the company's sustainability, these resource efficiency measures are also smart business decisions. Since 2010, AEG has saved more than \$3 million through Schneider Electric's energy procurement program.<sup>12</sup>

# Using renewable energy and clean technologies to drive resource reductions

Perhaps the biggest shift in corporate resource management in recent years is the global pursuit of renewable energy, and, increasingly, other clean technologies. Driven by a rapidly falling price and clean power's zero carbon claims, companies are snatching up wind, solar, and geothermal power at record rates. According to recent Schneider Electric and GreenBiz research, 52% of companies responding to the survey reported renewable energy projects in process.<sup>13</sup>

In addition to the economic advantages now available with renewable energy, using clean power to diversify a company's energy supply portfolio also builds resilience against disruption. It offers customers more ways to manage and control costs, including greater opportunities for active energy management, facilitated by expanded digitization and connectivity.

There are typically four ways that companies can utilize renewable power. These methods differ depending on geographic location, but markets continue to open at rapid rates to meet growing global demand.

- **Energy attribute certificates (EACs).** Long considered the gold standard in renewable energy procurement, EACs are the certificates of origin for renewable power worldwide. They represent the environmental attributes of clean generation and may be traded in both voluntary and compliance markets. Although EACs do not typically convey material leadership for renewable power projects, these commodities underpin every renewable power trading market and provide a critical demand signal to these markets for the growth of renewable energy.

## Data Centers: Going all in for renewable energy

Many companies are now greening their energy and investigating on- and off-site renewable energy solutions. One example is Equinix, a global leader in interconnectivity, where Schneider Electric is helping the company achieve its goal of 100% renewable energy. The company buys energy strategically with utility audits and analysis for error resolution. Using PPAs has enabled Equinix to boost its use of renewables to 100% for North America and 82% of its global needs. This also resulted in a \$23.2 million cost savings.<sup>14</sup>



- **Offsite Power Purchase Agreements (PPAs).** Once relegated to the domain of utilities and governments, PPAs are now in common use by corporations. These contracts allow companies to work directly with project developers, in some cases bypassing centralized power distribution and transmission structures. The benefit to companies is a low, fixed price for power that may allow them to hedge against volatile energy fluctuations. The deals are complicated, however, and contain many risks that must be managed, so it is critical for any company considering a PPA to work with an energy buyer advisor like Schneider Electric's Energy & Sustainability Services.
- **Onsite, distributed generation.** While offsite PPAs are generally large-scale, they can be inflexible, and typically require the corporate buyer to demonstrate creditworthiness. Companies that need a smaller amount of renewable power, or who have rooftop real estate — such as a retailer — may be a good candidate for onsite, distributed generation, which typically takes the form of solar power. Onsite systems can be configured to meet the needs of the buyer, through a variety of contracting structures and both ground-mounted and rooftop panels. However, since these systems typically do not exceed a few megawatts (MW), most large companies will need to diversify with offsite PPAs and/or EACs.
- **Green tariffs.** Green tariff programs — which are common in Europe and growing in popularity in North America and elsewhere — allow companies to buy renewable power from their utility provider through a variety of different contracting mechanisms including tariffs, riders, and subscription programs. In all cases, the utility passes the benefits of renewable power purchasing along to its customers by matching the electricity purchased by the customer with renewable power.

It's important to realize that not all renewable power options are available in every geography and that restrictions such as regulation may inhibit companies from using renewables across the entirety of their load or carbon footprint. Global markets for offsite PPAs, for instance, include the U.S., Mexico, some countries in Europe, Australia, and India.

It's also critical to acknowledge that renewable power presents one of the clearest paths forward for companies seeking to consume energy responsibly and reduce their carbon footprints. Approximately half of global carbon reductions could be achieved with renewable energy,<sup>15</sup> with the International Energy Agency forecasting continued strong global growth through 2022.<sup>16</sup> Corporations have already been responsible for the addition of more than 12 gigawatts (GW) of new renewable power to the global grid, dominated by explosive growth in the American market, thanks to the U.S. wind power Production Tax Credit (PTC) and Solar Investment Tax Credit (ITC).



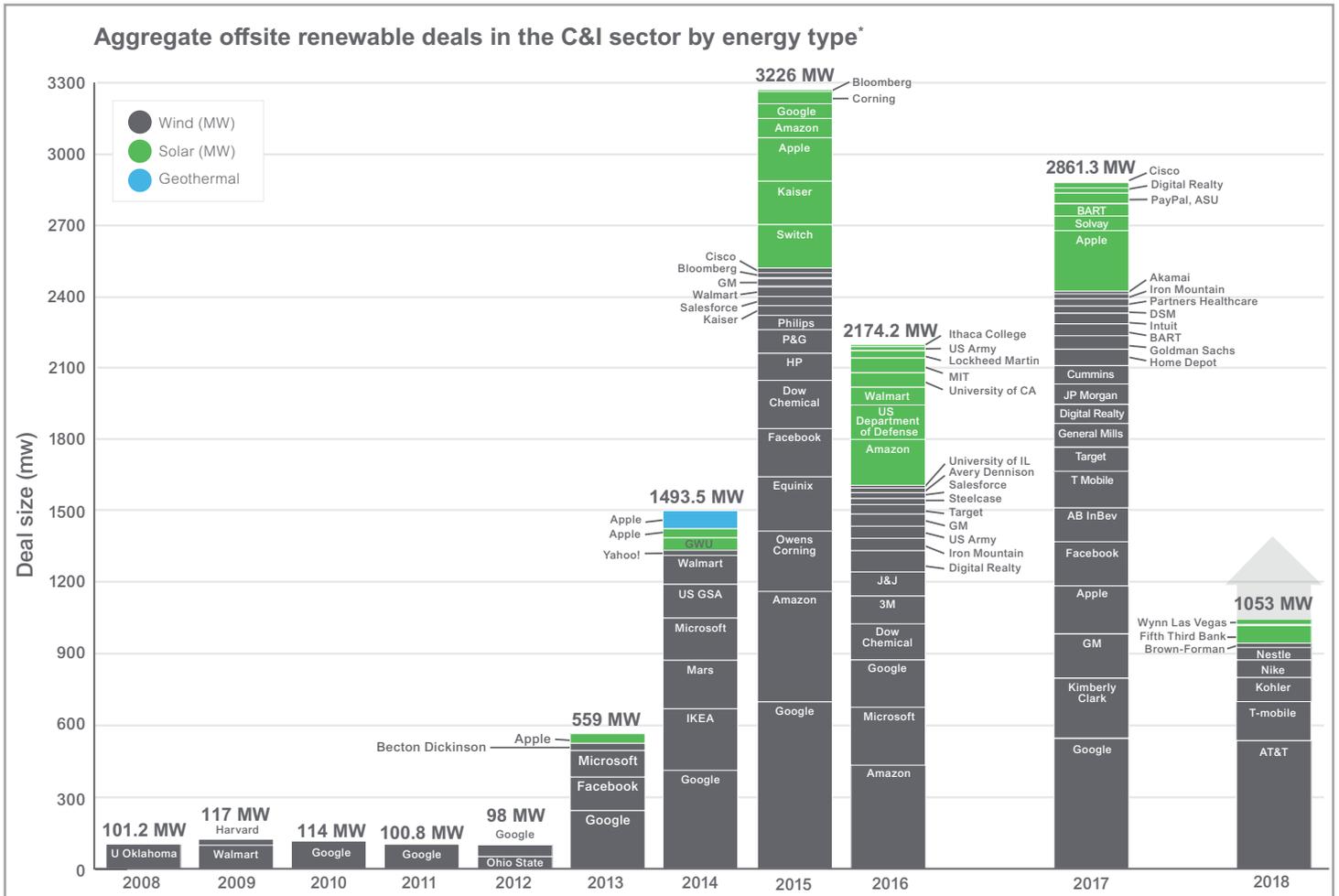
Once dominated by large tech companies, as shown in Figure 4, renewable power buying is now occurring across all industries. Consider:

- Target Corporation — one of the largest retailers in the U.S. — recently signed a long-term contract for 100 MW of new electricity generation capacity from a wind farm in Kansas, enough energy to meet the average power needs of 150 stores.<sup>17</sup>
- U.S.-based engine and generator system manufacturer Cummins, Inc. recently entered a 75 MW PPA to support the Meadow Lake Wind Farm in Indiana.<sup>18</sup>
- Philips<sup>19</sup> and Microsoft<sup>20</sup> are among the global corporations who have executed PPAs in the U.S. as well as in Europe, one of the fastest growing corporate PPA markets.

- In 2017, Telstra became the first corporation to execute a renewable energy PPA in Australia.<sup>21</sup>

Renewable energy isn't the only way that companies are exploring clean technologies. Biofuels, fuel cell technology, battery storage, electric vehicles, microgrids, and other innovative solutions are also on the rise, thanks in part to declining prices and virtual tools like Blockchain.<sup>22</sup> Data center operator Equinix purchased 37 MW of fuel cells for its North American operations in 2017, and Montgomery County, Maryland — one of the largest U.S. purchasers of renewable power EACs — recently embarked on a project to install two advanced microgrids.<sup>23</sup>

Figure 4 - Schneider Electric Aggregated North American PPAs over the past decade (includes publicly announced deals from the U.S. and Mexico)



\*Based on publicly announced C&I offsite renewable energy deals (financial, virtual, green tariff, tax equity, etc.) in the United States. Excludes onsite PPAs. Last updated 03.12.18.



# Water: The next resource frontier

Companies are recognizing that responsible resource management must extend to water consumption and recycling, particularly those that rely on water to make their products. Coca-Cola, Kimberly-Clark, Starbucks, Proctor & Gamble, Gap Inc., and Nestle are among the global companies who understand the importance of water conservation and cleanliness, and over 2,000 companies reported their water data to CDP in 2017.

CDP has identified that water is a risk for almost every company in every industry sector, and water security affects over a billion people worldwide. The World Wildlife Fund (WWF) predicts that as much as two-thirds of the world's population may be impacted by water shortages as early as 2025.<sup>24</sup>

Improving efficiency of water consumption, and ensuring its proper treatment post-production, are two key ways that organizations can make a difference. It is less recognized that using renewable power is another way companies can affect water scarcity, as both wind power and solar power require little to no water to generate electricity compared to fossil fuel or nuclear generation, both of which rely on enormous freshwater withdrawals for both heating and cooling.

## Bottom Line

The responsible use of resources can positively impact a company's bottom line and reputation. It also ushers in a manageable way to address some of the greatest planetary challenges, including climate change and water scarcity.

New technologies and digitization can help companies be more efficient and less resource intensive, providing economic, environmental, and operational benefits.

The World Wildlife Fund predicts that as much as two-thirds of the world's population may be impacted by water shortages as early as 2025.



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# Learn more.

## At Schneider Electric, sustainability works.

Schneider Electric launched its sustainability approach in 2002. Since then, the company has grown to be a global leader, widely recognized as one of the most respected, ethical, and sustainable companies in the world.

On top of its own progressive approach to corporate sustainability, Schneider Electric's products, programs, and services lead the industry on environmental and social responsibility by addressing specific, pressing challenges in a customer-centric way.

- **ecoLabel Green Premium**, the self-declaring label program for Schneider Electric products that since 2008 has promoted compliance and transparency concerning use of hazardous substances, environmental impact, and end-of-life management.
- **Green Premium 2.0**, a new Schneider Electric environmental brand promise, redesigned to include value proposals tailored to different segments that will cover products, services, systems, solutions, and architectures.
- **ecoDesign Way**, our corporate commitment to designing all new products and solutions to reduce their environmental impacts throughout their life cycles.
- **ecoFit**, our field services and retrofit program designed to help customers extend the life of their medium- and low-voltage electrical distribution equipment through selective component upgrades and replacements.
- **Tailored Sustainable Connected Supply Chain 4.0 (TSC 4.0)**, a reimagined customer-centric strategy designed to be collaborative, lean, agile, project-driven, and fully flexible so we can improve our speed and responsiveness.
- **EcoStruxure™**, our next generation of active energy management and automation architecture, is driving innovation at every level to take full advantage of our connected products.
- **Energy & Sustainability Services (ESS)**, which is a trusted advisor to corporations worldwide on energy procurement, energy efficiency, renewable and clean technologies, and sustainability. Our ESS offer includes EcoStruxure™ Resource Advisor, our award-winning data management platform, and NEO Network™, our innovative global renewable energy transaction enabler.

Learn more at [www.schneider-electric.com/sustainability](http://www.schneider-electric.com/sustainability)

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