

Tuesday, Nov. 14, 2017

## **Accelerating and Scaling Corporate Renewable Energy**

*GM blueprint summaries clean-energy strategies for companies of all sizes*

**DETROIT** — More companies are realizing the economic opportunity in addressing climate change, such as new revenue streams, cost savings and reduced risk. For General Motors, this action also aligns with its values – one of which is to create sustainable solutions that improve communities. The company believes the future is electric and its teams are thinking holistically about product and energy strategies so that cleaner cars drive on a cleaner grid, providing benefits to its customers.

GM pledged to meet its electricity needs at all of its global operations with renewable energy – such as wind, sun and landfill gas – by 2050. By the end of 2018, it will surpass the 20 percent mark. The commitment represents all the facilities where the company pays utility bills, which includes both manufacturing and non-manufacturing buildings leased or owned by GM.

The following summarizes GM’s blueprint for accelerating and scaling a renewable energy plan. It is intended to help companies of all sizes and industries create efficiencies, gain internal support and drive progress. Topics detailed include:

- Practical tactics to help gain companywide support
- Tips to determine the best renewable energy mix
- Best practices to scale efforts and reach goals faster
- Resources for further learning and engagement
- Trends and future outlook for corporate renewable energy use

### **The Business Case**

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Renewable energy use at GM makes business sense. A decades-long approach to sourcing renewable energy has produced lessons learned that helped the company further reduce its environmental footprint and save \$80 million along the way.

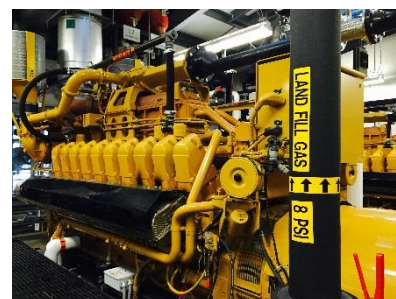
Today, GM saves \$3 million annually from using renewable energy, a number the company expects to increase as more projects come online. Some benefits of using renewable energy include:

- *Price stability:* Renewable energy translates into lower and more stable energy prices for the long term, reducing the price volatility caused by external threats like geopolitical risks and natural disasters. Uncertainties in the market and temperature changes can greatly impact the cost of traditional energy. Wind energy is currently price competitive with traditional forms of energy and GM expects the price of solar power to continue to decrease as demand grows.
- *Cost savings:* Companies can save money through onsite investments in renewable energy, such as building solar arrays at facilities. Although GM cannot predict the future price of energy, based on a decades-long use of renewable energy, the company believes it will achieve a good return on new projects globally.
- *Societal benefit:* Using renewable energy helps a company better serve society by reducing environmental impact. This clean-energy pursuit benefits customers and communities through cleaner air while strengthening the business. GM’s strategy to invest in renewable energy projects in relative proximity of its footprint drives jobs and economic investment in those regions, further supporting communities where the company designs, builds and sells products.

## GM's Renewable Energy Journey

### *More than Two Decades Using Landfill Gas*

Contracting the use of thermal energy from the gas of nearby landfills served as GM's first renewable energy project back in 1993. Once the company saw the value at its Toledo Transmission plant, it started evaluating other sites in close proximity to landfills. GM expanded to two more sites – Fort Wayne Assembly that builds the Chevrolet Silverado and GMC Sierra, and Orion Assembly, home of the Chevrolet Bolt EV and Sonic. The company saves money as it can lock into a long-term price for clean energy as natural gas prices fluctuate. These landfill gas projects now deliver about \$3 million a year in savings.



In 2014, GM took it a step further at Orion and Fort Wayne by investing in electrical generation equipment to convert landfill gas into electricity onsite, essentially allowing the company to act as its own utility. It saves on energy costs while reducing greenhouse gases. Gas that would have been flared at the landfill is now redirected into the facility to create electricity for building vehicles.

Although GM's renewable energy commitment encompasses its electricity needs, the company is looking into renewable thermal energy opportunities in boilers at several of its facilities building off experiences using landfill gas. GM recently joined the [Renewable Thermal Collaborative](#).

### *A Decade Using Solar Energy*

More than a decade ago, GM moved into solar energy. The company's distribution center in Rancho Cucamonga, California was the first solar project over 1 megawatt in the U.S. when it began operating in 2006. A year later, GM leveraged government Feed-in-Tariff programs in Europe promoting rooftop installations, installing 12 megawatts of solar arrays at an assembly plant in Spain.



Today those efforts have scaled and GM is now host to solar arrays at 24 facilities, including over 10 megawatts installed in the U.S. and over 30 megawatts installed in China. The arrays are a visible proof point of the company's clean-energy commitment. GM also uses solar charging at about 200 parking spaces for its employees' electric vehicles.

The company's global solar footprint is equivalent to 145 football fields and GM has the second-highest percentage of solar use among all commercial users in the U.S. While the company will continue to leverage renewable installations where it financially pencils out, off-site wind energy also comes into play.

### *Investing in Wind through Power Purchase Agreements*

GM made its [first Mexico wind deal](#) in February of 2015, followed by one in the U.S. [10 months later](#) enabling its assembly plant in Texas to build up to 125,000 trucks a year using renewable energy.

Another 10 months after that, GM executed its [then-largest](#) deal in November of 2016, purchasing enough wind power to equal the electricity needs of 16 of its U.S. facilities, including business offices in Fort Worth and Austin, Texas, a major assembly and stamping complex in Arlington, Texas, and 13 parts warehouses east of the Mississippi River.



In 2017, GM inked a deal to power the electricity of all of its [Ohio and Indiana](#) manufacturing facilities – including those that build the Chevrolet Cruze and Silverado and GMC Sierra light-duty pickup trucks – with wind energy.

These wind power purchase agreements make a good dent in GM's 100 percent renewable energy goal. For example, the 200-megawatt virtual power purchase agreement in Indiana and Ohio doubles GM's current 199.8 megawatt of sourced renewable energy capacity.

## GM's Path to 100 Percent

GM uses roughly 8.5 terawatts hours of electricity to build its vehicles and power offices, technical centers and warehouses around the world. The company developed a four-pillar strategy to ensure that volume of electricity comes from 100 percent renewable energy sources by 2050, while benefiting the business through top-line growth, bottom-line improvements, and reduced risks.



### 1. *Focus first on energy efficiency*

The first step is continuing to maximize energy efficiency through investments in new technology and daily efforts to conserve electricity in facilities. By reducing energy use overall, there will be less electricity needs to be covered by renewable sources.

Using an energy management system to conduct real-time monitoring helps reveal opportunities to further conserve. GM's two-pronged approach includes an internal system for tracking utility consumption and the company's own Energy OnStar program that monitors real-time usage.

GM spends about \$20 million annually on these energy efficiency and power demand projects, while also leveraging performance contracts as another tactic to achieve energy reduction goals with financial benefits. This is where a company does not use its own capital to pay for projects, such as a large-scale LED installation; rather a supplier or utility handles the financing while the company reaps the energy savings.

### 2. *Procure renewable energy*

A portion of the renewable energy mix will come from physical and virtual power purchase agreements, which offer significant amounts of power to help scale use. GM will also install onsite renewable energy projects in the form of solar arrays and landfill gas projects. As it builds or renovates buildings, the company will integrate renewable energy where feasible.

GM continues to look at new opportunities, such as community solar. In this case, a developer builds a large-scale solar installation for a group of residents that may not have means to host an array on their own properties. In this case, GM would serve as a user of that clean energy.

### 3. *Pursue energy storage*

The sun does not always shine and the wind does not always blow, so energy storage is a reliable way to tackle the intermittency challenge. GM has rich expertise in battery and fuel cells. The company operates the largest battery systems lab of any automaker in North America and leverages its global capabilities and resources to better understand these technologies in a variety of deployments, including, for example, the potential to reuse batteries after their first life in a vehicle. This enables holistic thinking of how GM's energy and product strategy interconnect, and advances a more circular economy.

GM is doing this at its Milford Proving Ground data center office, where [used Chevrolet Volt batteries](#) power the building. GM collected five batteries from out-of-service vehicles and re-certified them for continued use. Even after a Chevrolet Volt vehicle has been retired, up to 80 percent of its battery storage capacity remains. A solar array works in parallel with the batteries to achieve an expected net-zero emissions result annually, feeding more energy back to the grid than is consumed.



GM is looking into how it can possibly monetize energy storage and provide ancillary services to the grid, like reactive power, demand management, peak shaving and frequency regulation. This helps the grid operate in a more efficient manner through distributed energy.

There is also potential in vehicle-grid integration strategies, where customers have the opportunity to charge their electric vehicles when renewable energy is available. This maximizes the efficiency of an intermittent resource, creating demand and using excess electricity that may otherwise be curtailed.

#### 4. *Supporting policy decisions*

Working with utility stakeholders is a key pillar for GM's energy and transportation strategies and a way to create positive multiplier effects across the business. GM sees green tariffs – working with electric utilities to allow companies and customers greater access to source electricity from renewable sources through a fixed rate – as a significant part of its renewable energy plan. As utilities replace aging generation technology and invest in next-generation energy solutions, they can sell that renewable energy to companies with sustainability targets to help power their electricity needs. Through this process, the utility transfers the renewable energy credits to them. This is an effective route for both utilities and companies to scale renewable energy resources and ultimately provide price stability for all with the potential to reduce costs in the future. Adoption of non-fuel-dependent wind and solar effectively removes the price volatility equation.

In parallel, vehicle-grid integration and services associated with transportation electrification provide complementary strategies to reimagining local distribution grids. Consider challenges like the "Duck Curve" seen in California, where the grid experiences a drop in load by midday given the amount of solar on the grid, followed by a surge late afternoon and evening as solar becomes less available. In this case, both stationary and transportation uses, coupled with energy storage, can systematically solve for renewable energy integration. GM customers could use their vehicles' embedded connectivity to receive signals from their utility to charge when these renewable sources are available. The company participates in such conversations, ensuring dialogue on policy decisions with California stakeholders.

This strategic look at how GM and its customers use - and can use - renewable energy helps address broader considerations. Where renewable energy options are still developing or scarce, GM may look at any portion of the four-pillar strategy to support efforts, and in the end, may purchase renewable energy credits. The company will work to ensure emerging economies develop renewable energy solutions and establish a mechanism to track consumption and credits. There must be tracking mechanisms that go along with the renewable energy generation to certify the trail and avoid double counting. Not all markets offer renewable energy sources. For this reason, it is key to work with local policymakers and regulators to help enable more clean energy options.

More than half of the states in the U.S. have a Renewable Portfolio Standard that requires utilities to increase the amount of renewable energy they send to the grid. In these areas, companies can enjoy greater access and demonstrate demand beyond business as usual.

Partnerships and collaborations, such as the Business Renewables Center, also help to influence policy that helps grow corporate renewable energy use.

### **Best Practices to Scale Efforts**

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1. *Ready, set, goal:* Start with a corporate renewable energy goal and identify a champion to help drive it and see it through. If it is a public commitment that the company reports progress against, there will likely be motivation to allocate resources and make it a priority.
2. *Look inside:* Leverage internal expertise at facilities; odds are there are electrical and mechanical engineers onsite or employees that have a passion to see renewable energy succeed. Use these resources to build a project to continue driving out cost.
3. *Consider the communications value:* When building internal consensus, look at other business benefits beyond a long-term, stable energy supply. Think about the education and visibility opportunities an acre of arrays would provide. That becomes a noticeable proof point for environmental commitment and can be more powerful than an ad on a billboard. On any given day, over 100,000 drivers see GM's solar arrays when they pass its Lordstown Ohio or Bowling Green Kentucky assembly plants.
4. *Seek legal, treasury and accounting advice:* Get good internal legal, treasury and accounting counsel. These professionals can support the language, track tax implications (especially if capital is involved), and properly account the nature of long-term power agreements. They can also help engage the right leadership needed to approve such arrangements. Establishing a monthly review process that includes members of these teams is key for continuity and collaboration between groups, and provides a forum to answer questions. The process becomes shorter after every negotiation, leading to deals turned around faster.
5. *Build new financial models:* Keep a close watch on the fuel and gas industry and use it as a benchmark when reviewing electricity costs. Many deals come with sizeable investments and long-term contracts that spread incentives and payments over many years, so it can help to develop new or modify existing financial models and forecasts for each deal.
6. *Phone a friend:* Talk to companies who have done this before. GM shares often with counterparts at technology companies to discuss challenges and get advice. Engage with the [Business Renewables Center](#) to connect with others doing similar buys. GM was one of the founders of this organization where members benefit from the shared knowledge of the industries involved.
7. *Collaborate with energy suppliers:* This is a driving principle of the [Corporate Renewable Energy Buyers' Principles](#), which are six criteria to help advance renewable energy procurement, such as longer- and variable-term contracts, streamlined third-party financing and access to new projects that significantly reduce emissions. The central ask is a collaborative process among all parties to make using renewable energy obtainable.
8. *Don't discount the discounts:* Maximize state and federal renewable energy incentives. Seek out what rebates and incentives are available in a given region, and use it to strengthen the business case. Overlay where the incentives are and where to get the biggest bang for the buck, and build the financial model around that. If a company has empty parking spaces or a big rooftop in that area, it could be a match.



## **Creating a Culture that Gets Deals Done: Tips to Gain Companywide Support**

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Sustainability circles often talk about the “three Ps” of the triple bottom line: people, planet and profit. GM uses this as a framework to evaluate company performance, leveraging it to develop solutions to a variety of societal and environmental challenges. However, it can take time to embed a sustainability culture into company DNA, requiring a “three P” method of its own: a pragmatic approach fulfilled through perseverance and supported by passion for sustainable solutions.

- *Be pragmatic:* Start by looking at the basics. How much electricity is needed, who needs to be engaged, which people can help get there, and which facilities, employees and communities can these deals support? A practical approach enables companies to gain further support from departments outside of the sustainability space, including finance and treasury, legal, policy, facilities and local utility partners. Getting the ear of all these corporate functions is a matter of consistently demonstrating the sound business approach – one that locks a company into stable energy prices and reduces risk through a diverse energy portfolio.
- *Be perseverant:* It takes perseverance to bring together teams within the company that may not traditionally work together. State the case for green power to each, running – and proving – the numbers. This leads to broken-down silos across the company and an acceleration of the use of renewable energy sources.
- *Be passionate:* Progress would not be possible without the dedication of a team that values sustainability and the benefits it brings to customers, business and communities. Leverage these and other external stakeholders and tap into their passion and growing expectations for improved corporate performance in the areas of environment, social and governance. External engagement is an effective way to help fuel and sustain the passion.

## **Resources**

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It is increasingly important to collaborate with local utilities, policymakers, government officials, renewable energy developers, technology manufacturers, and other companies and organizations who will help make renewable energy procurement more attainable. This is why GM is a founding member of the Renewable Energy Buyers Alliance, which helps grow corporate demand for renewable power and demonstrate that market demand to utilities.

Companies can also do the following to learn more and advance their clean-energy commitments:

- Pledge to go 100 percent through [RE100](#), a global group of businesses convened through The Climate Group and a partnership with CDP. Companies make a public commitment to match all of the electricity used across their operations with electricity produced from renewable sources, either sourced from the market or self-produced.
- Join the [Renewable Energy Buyers Alliance](#) and the Rocky Mountain Institute’s [Business Renewables Center](#) to interact with a likeminded community and find resources to help scale adoption of renewable energy.
- Join the [Renewable Thermal Collaborative](#) to learn from other companies about renewable heating and cooling, understand the problems in the market and overcome barriers. This collaborative is facilitated by the Center for Climate and Energy Solutions, David Gardiner and Associates and World Wildlife Fund, and is an initiative of REBA.
- Sign on to the [Corporate Renewable Energy Buyers' Principles](#) to help expand and streamline the opportunities for renewable energy procurement.
- Apply to be a corporate member of the [American Wind Energy Association](#) to engage with thousands of wind industry members and policy advocates, and receive access to relevant data.
- Become a member of the [Solar Energy Industry of America](#) for networking, educational webinars and market research access related to the solar industry.
- Participate in forums on topics such as California proceedings on [zero-emission vehicles](#), EV charging and energy storage, and join working groups on vehicle-grid integration.
- Take part in New York’s [Reforming the Energy Vision](#) to contribute thoughts on the grid of the future and the necessary distributed energy resources associated with it.

## **Summary & Future Outlook on Corporate Renewable Energy**

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### *Best Practices*

A few elements were key to making GM's renewable energy deals successful:

- Establishing a public-facing commitment
- Tying renewable energy to business strength, lower costs and mitigated risk
- Gaining internal support from finance, treasury, accounting departments
- Leveraging facilities management and energy engineers' expertise
- Sharing GM's renewable energy progress with new recruits and employees to grow excitement
- Developing relationships with stakeholders in the clean-energy community, from resource groups to developers and agents

### *Trends*

Advancements in technology, such as improved weather forecasting, increased use of artificial intelligence, blockchain, and the widespread use of drones to monitor transmission, distribution and generation resources, will greatly impact clean technology adoption.

As costs continue to decline and adoption of renewable energy use increases:

- Renewable energy will be key to helping more companies meet their science-based targets.
- Growth of green tariffs will continue, enabling deeper company engagement with utilities.
- Companies will further engage their supply chains in renewable energy goals.
- Companies and policymakers will help develop renewable energy structures in emerging economies.
- Technology advancements will continue, driving greater affordability of solar, storage and wind.
- Market reform will allow for better monetization of ancillary services, such as peak shaving, demand management, frequency regulation and reactive power.

### **About General Motors**

General Motors Co. (NYSE: GM, TSX: GMM) and its partners produce vehicles in 30 countries, and the company has leadership positions in the world's largest and fastest-growing automotive markets. GM, its subsidiaries and joint venture entities sell vehicles under the Chevrolet, Cadillac, Baojun, Buick, GMC, Holden, Jiefang and Wuling brands. More information on the company and its subsidiaries, including OnStar, a global leader in vehicle safety, security and information services, can be found at <http://www.gm.com>.

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