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Using renewable energy to drive supply chain innovation

A series exploring Industry 4.0 technologies and their potential impact for enabling digital supply networks in manufacturing.

Contents

Do you need renewable energy in your supply chain? Renewable energy resources, or "renewables" are naturally replenishing energy sources that can replace coal, oil, natural gas, and nuclear power across your supply chain with clean, safe, reliable power at low or zero carbon emissions.

Of interest because: potential to avoid risks and cost implications of fossil fuel price fluctuations and regulatory changes; attract customers, partners, and employees interested in corporate responsibility; drive corporate growth by keeping pace with competitors.

Could improve your supply chain by: decreasing long-term costs, providing price stability, mitigating future regulatory risk, enhancing brand value, driving new revenue, and improving employee engagement.

Why not? Requires careful upfront feasibility assessment, based on availability of resources and infrastructure, investment strategy and financial return, and secondary considerations such as reputation enhancement.

Deloitte recommends: With renewable energy more accessible and affordable than ever, evaluate your supply chain now for ways to switch to renewables such as solar, wind, biomass, geothermal, and hydro power to start realizing the benefits as soon as possible.

Deloitte Consulting LLP's Supply Chain and Manufacturing Operations practice helps companies understand and address opportunities to apply Industry 4.0 technologies in pursuit of their business objectives. Our insights into additive manufacturing, the Internet of Things, and analytics enable us to help organizations reassess their people, processes, and technologies in light of advanced manufacturing practices that are evolving every day.

What is renewable energy?

Overview

Renewable energy resources, or "renewables" are naturally replenishing fuel sources, most notably solar, wind, biomass, geothermal, and hydro power. Unlike nuclear power and fossil fuels (coal, oil, and natural gas), renewables provide clean, safe, and reliable power, with low or zero carbon emissions.

Recent developments and outlook

The share of US electricity supplied by renewables increased from 8% in 2007 to 13% in 2014. Renewables constituted 90% of the increase in electricity generation in 2015.[1] And zero-emission energy sources are expected to constitute 60% of installed capacity by 2040.[2]

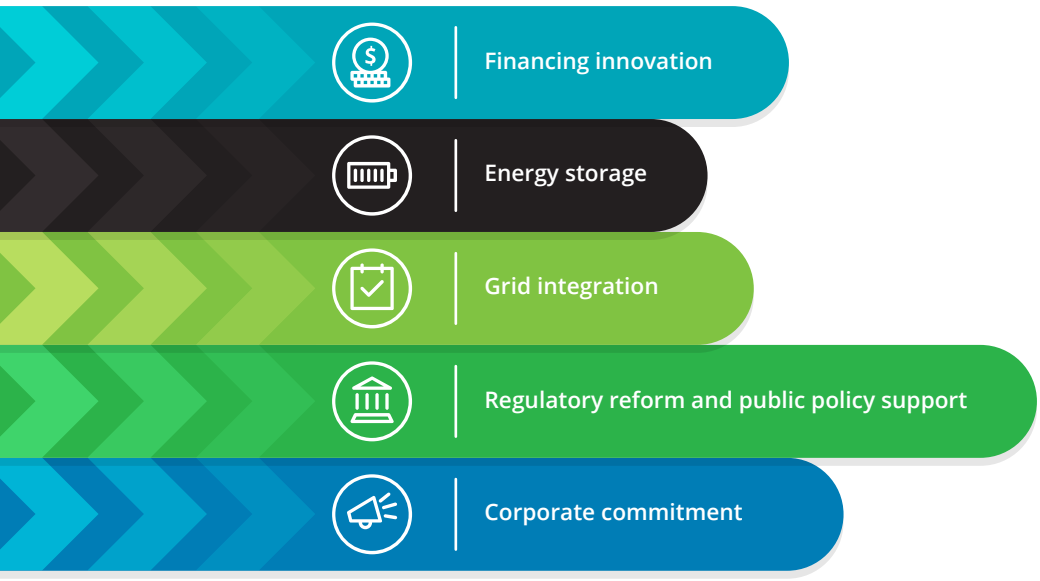
Overcoming traditional barriers has accelerated the pace of adoption and progress of renewables.

Renewable energy is now more accessible and affordable than ever. The cost of the technology itself has decreased. New financing vehicles have improved access and lowered capital requirements. And favorable regulation in parts of the United States has provided incentives for selling excess supply back to the grid.

The United Nations Conference on Climate Change (COP21), which resulted in 195 countries approving the first universal, legally binding global climate deal on greenhouse gas emissions, underscores the growing influence policy has in shaping renewable energy growth.[3]

Overview	
Value drivers	• Clean reliable power • Insulate against fuel price volatility • Reduce risk of regulation impact • Lower long-term energy costs • Increase employee engagement • Improve revenue through brand enhancement
Scope	Supply power to all segments of the supply chain
Technology substitutes	Traditional fossil fuels (coal, oil, natural gas), nuclear power

Five key developments in renewable energy



Source: Deloitte Trends to Watch in Alternative Energy

In response to shifting public sentiment, many organizations are reviewing and modifying energy management initiatives, of which renewables are typically a core component. Corporations such as Apple Inc., and Kohl's are "going all-in" on renewables.[4] One hundred fifty four companies have signed the American Business Act on Climate Pledge, and eighty one companies have committed to pursuing 100% renewable energy through the RE100 initiative.[5]

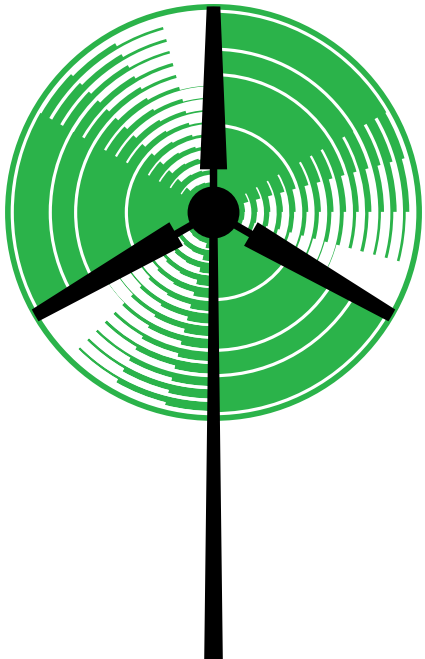
Renewable energy in the supply chain

Renewable energy can be used throughout the supply chain to decrease long-term costs, mitigate risk, drive new revenue, enhance brand value, and improve employee engagement. As technologies and regulations mature, companies should be re-evaluating their energy procurement strategy to take advantage of these potential benefits.

Benefits of renewable energy in the supply chain

Primary potential benefits

- **Produce clean and reliable power**
- **Insulate against commodity price volatility risk**
- **Mitigate potential implications (cost and reputational) from shifts in regulation**
- **Reduce long-term energy costs and energy spend (improves gross margins)**
- **Enhance revenue by unlocking opportunities for new products, services, or business models**



Value drivers for renewable energy

When treated as a strategic asset rather than a tactical expense, renewable energy can provide cost and risk benefits across the supply chain.

Renewable energy can provide a more predictable and consistent energy supply than fossil fuels, potentially with fewer associated risks such as commodity price volatility.[6]

Onsite renewables like wind and solar can be paired with storage devices and fuel cells to provide uninterrupted power to critical business operations and supply chain functions.

To achieve scale, many companies choose to procure offsite renewable energy through power purchase agreements (PPA), which offer electricity for a fixed price across typically 15-20 year contracts.[7] The shift from payment of monthly electricity bills to long-term energy procurement through PPAs moves energy from an overhead cost to a strategically managed direct material input, creating net-positive impacts on cost structure.

A procurement plan for renewable energy is also an active way to manage risk from regulatory changes. From COP21 to the 2015 U.S. Clean Power Plan, which proposes to cut carbon pollution from the power sector by 30% from 2005 levels, future government action on climate change could introduce new compliance requirements.[8] Investing in a clean energy plan now may provide a head start on managing potential future regulatory changes.

Increasing the use of renewable energy in the supply chain also has the potential to increase revenue. Consumers increasingly choose to purchase from and invest in more environmentally and socially responsible companies. The Conference Board examined 12 S&P Global 100 companies and found a 91% increase in aggregate revenues from sustainable products and services from 2010 to 2013, outgrowing overall sales growth of just 15% over the same time period.[9]

Secondary potential benefits (intangibles) of renewables

- Enhance company culture and employee engagement
- Advance sustainability agenda and helps achieve sustainability goals
- Strengthen corporate reputation
- Drive corporate growth by keeping pace with competitors and signaling leading environmental stewardship to customers

Generally speaking, many of today's supply chains are still people intensive. Positive impact on corporate talent strengthens the case for adopting renewable energy: Company performance on sustainability issues can help attract and retain talent.[10] [11] Switching to renewable energy in ways that are visible to employees can help decrease attrition rates thus reduce training costs, increase in-house experience, and serve as a talent differentiator.

These talent-related, intangible benefits may be more difficult to quantify but are nonetheless an important consideration in renewable energy strategy decisions. Installing highly visible renewable energy technologies—solar carports in parking facilities, for example—is just one way companies can achieve intangible benefits from renewable energy.

Case study: International Manufacturing Co.

Over the past decade, a leading manufacturing company had realized savings through various sustainability innovations. Yet, as energy cost fluctuations continued to add pressure on gross margins, stakeholder expectations increased around environmental impact and transparency, and competitors responded with their own aggressive sustainability programs, the company looked to Deloitte to help develop a renewable energy strategy to drive advancement.

The end result was a strategy focusing on powering 100% of the company—all facilities, including manufacturing, distribution, retail, and office—from renewable energy. Implementation is now in progress.

Expected benefits of the 100% renewable energy goal:

- Estimated 5% reduction in total energy cost
- Highly visible strategy of mainly onsite and offsite generation, leveraging Renewable Energy Credits solely for locations where renewable energy is not feasible
- Unifies the company under one energy procurement strategy, spreading benefits across brands that would not have the scale to achieve the milestone alone
- Meets the growing sustainability expectations of the company's downstream partners: renewable energy will increase performance on procurement scorecards
- Demonstrates advanced commitment to the shared values of its products' end users, enabling the company to target market segments with environmentally focused branding

Criteria for evaluation and adoption

Operational considerations

To increase renewable energy use across your supply chain, start by developing an energy procurement strategy based on your company's profile and specific needs. The following five attributes can help shape your renewables strategy decisions and determine the potential overall return on your company's renewable energy investments.

Company size and energy profile

Renewable energy procurement options and constraints vary according to company size and energy profile, with smaller companies typically the most challenged.[12] Key questions in this category include:

- Do you represent a small (< $100M revenue), mid-cap ($100M-$500M revenue), or enterprise company ($500M+ revenue)?
- How much energy do you use each year?
- Is your company's energy profile chiefly purchased energy or do you rely more on onsite generation?

Facility profile

Energy procurement decisions should be based on facility type and whether it's owned or leased. Leased properties are typically more challenging: Installing onsite renewable energy is more viable when a company owns the building and has decision-making power as well as access to the roof, parking lot, and other real estate required for system installation.

Key considerations in this category:

- What types of facilities (laboratory, data center, manufacturing facility, distribution center, office, retail store) do you want to use renewables for?
- Are your company's properties majority owned or leased?

Locations and markets

Energy incentives and regulations vary among and within countries. What is viable in one country may not be in another; in the United States, for example, PPAs are only possible in states with deregulated electricity markets.

Facility locations and local markets will offer different options for available types of generation and ownership models. Basic questions in this category are:

- What countries do you operate in?
- Are your facilities concentrated in one state or country or are they distributed broadly worldwide?
- What renewables are available in your location(s)?
- How will regulations and business model options in each location impact your renewables strategy?

Investment

Renewable energy procurement can be heavily tailored to limit risk and overall investment. Even for companies in highly competitive, energy-intensive industries, renewable energy can be a good option that conforms to specific financial obligations and risk tolerance. Key questions:

- What investment considerations must be taken into account?
- What is the financial feasibility of new generation at a specific location?

Proximity and visibility

Renewable energy has the potential to be a highly visible corporate responsibility statement. This is becoming increasingly important as stakeholders such as downstream customers have become more vocal in their expectations, and even more so as employees and customers align with more responsible corporate environmental action.

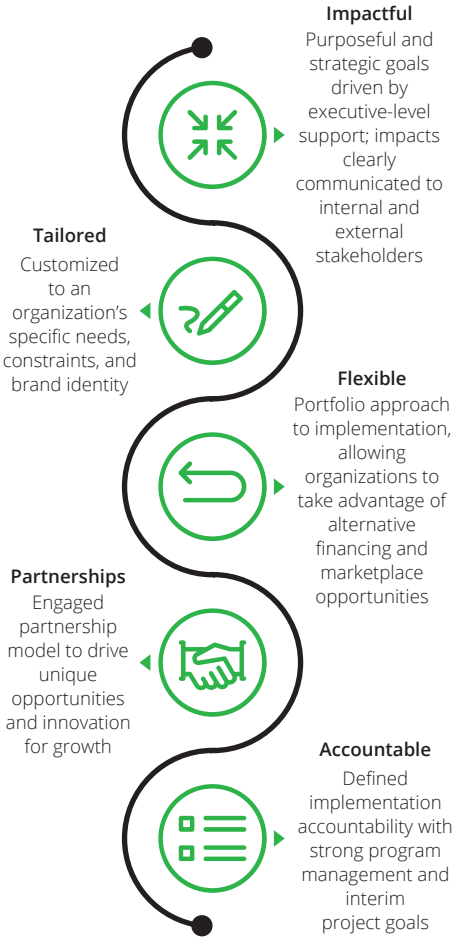
Many companies adopt renewable energy in an effort to be more socially responsible. Selecting a highly visible location for the system may be more important in this case than the actual renewable energy type, as long as the financials and technical viability are sound.

- Is the visibility of a renewable energy system important to your company? Why?
- Are there other non-financial or strategic measures that could provide value?

Framework for decision making

Renewable energy success factors

Leveraging industry leading practices can help define and facilitate implementation of an optimal renewable energy strategy. Goals for driving renewable energy in the supply chain should match your company's overall vision, goals, strategy, and ability to implement and continuously improve.



Investment impact matrix

Renewable energy investments should be prioritized to achieve energy procurement and sustainability goals. While renewable energy can pay dividends in many ways, it is important to work towards the optimal portfolio for your company's profile and specific operational considerations in order to achieve desired benefits.

The dividends realized for each of the four key value driver areas above will differ based on the magnitude and type of renewable energy investments you make. Returns, or derived benefits such as an energy portfolio that creates positive cash flows and reduces long-term energy costs, should be strategically managed to create the desired position.

Renewable energy procurement options

Once you have established the desired outcomes for increased adoption of renewable energy in the supply chain, you can begin to evaluate procurement options and determine which best suit your organization's goals. In addition to the three methods presented below, other financing and purchasing options for renewable energy include sponsor or tax equity, green funds, and community solar.

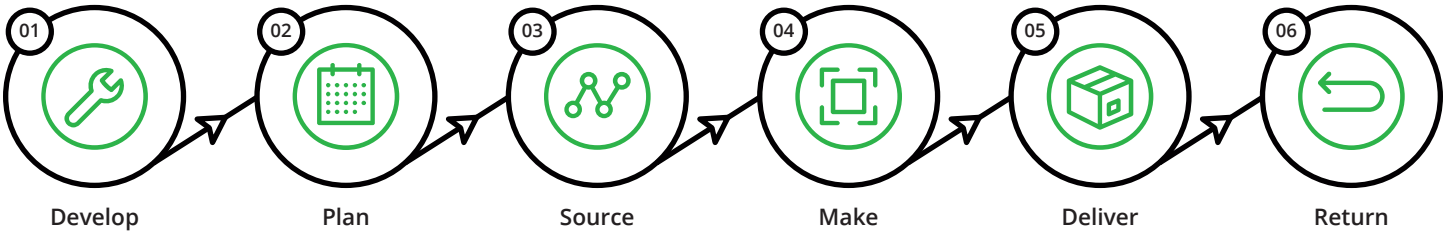
These options do not exist in silos. Companies can pursue one or a combination—a hybrid approach is often the norm. The key takeaway is that today's renewable energy leaders can and should tailor investment decisions to their company's individual energy profile and corporate goals.

	Onsite generation	Offsite generation	Renewable energy credits (RECs)[13]
Overview	Renewable energy solution located on the property of the end user of the generated energy	Renewable energy solution located away from the end user's property, whereby energy is purchased via contract from the generating party	Tradable energy certificates that represent 1 MWh generated from an eligible renewable energy resource located anywhere on the electrical grid
Energy impact	Direct	Indirect	Zero
Visibility[14]	High	Medium / low	Low
Difficulty of implementation	High / medium	Medium / low	Low

Key levers for renewable energy in your supply chain

Supply chain applications

Significant renewable energy opportunities exist at each stage of the supply chain.



Examples

01. Develop: Energy consumption is often high during design and prototyping activities due to the energy requirements of early-stage design equipment. Renewables can help reduce energy spend and impact, improving overall life cycle assessment (LCA) of products during this stage of the product lifecycle.
02. Plan: Improve forecasts and reduce exposure to commodity price fluctuation associated with traditional fossil fuels.
03. Source: Effectively shift energy from an overhead to direct material by sourcing a 15-year PPA for energy generated from an offshore wind farm.
04. Make: Decrease manufacturing-related operational costs and sensitivity to commodity prices by locking in cheaper, longer-term contracts for renewables.
05. Deliver: Reduce warehouse energy spend through onsite rooftop solar photovoltaics, and reduce transportation fuel costs through truck electrification technologies powered by the same system.
06. Return: Use material waste or unsellable organic products (food waste) to make energy using waste-to-energy technologies such as anaerobic digesters.

These examples are just a few of the many opportunities to advance supply chain with renewable energy. Opportunities exist in the end-to-end supply chain for cost reduction and value creation.

Motivation for action

The time for companies to assess their supply chains for renewable energy adoption is now. Access to renewable energy is better than it has ever been. Overall technology costs have decreased and new financing structures are providing flexibility for dynamic implementation. Through improving shifts in capital costs, technology efficiency, regulation, and public or other stakeholder opinion, the motivation—and momentum—for renewable energy is strong.

Renewable energy can be a significant source of value for many organizations. While each company that builds the capabilities to capture value from renewable energy must design a portfolio of investments tailored to its own organizational profile, making investments in renewable energy can have a profound, positive impact on their businesses.

Renewables convert traditional energy expenses into tangible brand value to potentially:

- Provide access to clean, consistent, and reliable power—an innovative and potentially disruptive force in an organization's operations and supply chain
- Propel a shift in energy procurement from simply transactional to strategic
- Hedge against financial and reputational risk
- Reduce price volatility
- Help enhance an organization's position as a sustainability leader

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Endnotes

1. International Energy Agency (Renewables have held steady at about 9.5% of total energy production in the U.S. since 2013)
2. Bloomberg New Energy Finance
3. http://newsroom.unfccc.int/unfccc-newsroom/finale-cop21/
4. Deloitte Trends to watch in alternative energy
5. As of October 6, 2016: http://re100.org/; https://www.whitehouse.gov/climate-change/pledge
6. Deloitte Analysis on the benefits of Power Purchase Agreements (PPAs)
7. Renewable Choice Energy
8. https://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-overview
9. https://www.greenbiz.com/article/green-product-sales-average-91-ge-dow-others
10. Deloitte Millennial Survey 2016
11. Embedded Sustainability by Christopher Laszlo and Nadya Zhexembayeva
12. Deloitte Resources 2016 Study
13. RECs may also be known as Renewable Energy Certificates, Green Tags, Tradeable Renewable Certificates, or Guarantees of Origin or Go Certificates (Europe)
14. Visibility to customers, consumers, investors, foundations, and other entities

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