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Fueling the energy transition: Opportunities for financial institutions

As renewable-energy sources proliferate, power grids become smarter, and industries electrify, strong financial partners will play a critical role in providing funding for a capital-intensive sector.

by Sven Heiligtag, Jan F. Kleine, and Andreas Schlosser

May 2019

Renewable energy is the future—for industry, for the environment, and for society as a whole. It is high on the global agenda and crucial to meeting the world's carbon-reduction goals. Moreover, renewable technologies are not just clean, they are fast becoming the cheapest form of power generation in many markets.

However, renewable energy is only one piece of the puzzle. Other pieces include the reengineering of infrastructure to create a smart grid, the electrification of entire industries, and the introduction of e-mobility across the transport sector. Meanwhile, digitization, the emergence of smart devices, and the smart grid are opening up possibilities for consumers to gain direct access to the market. For instance, households equipped with solar photovoltaic cells can feed any surplus electricity they generate into the grid, thereby acting as both producers and consumers (or "prosumers," as they have been dubbed) of energy. Other households are using smart meters to adjust their consumption in line with current market price or the time of day, another example of smart demand and supply management.

Energy and technology companies have naturally been preparing for these developments for some time. But what about businesses in other industries—businesses that have both means and social responsibilities? More specifically, what role could financial institutions play in the energy transition and the emerging energy landscape?

This article sets out to provide preliminary answers to that question. Although it focuses mainly on Europe, many of the opportunities discussed are applicable in other regions too. To set the context, we identify the global trends shaping energy markets, then we examine six promising areas of opportunity for financial institutions to explore.

How is the energy landscape developing?

Today's energy industry is in transition, being shaped by a set of powerful global trends.

Growth in global energy demand is slowing

As living standards in developed Western economies rose dramatically between 1950 and 2000, global energy demand increased by a compound annual growth rate of almost 3 percent a year. Between 2000 and 2015, demand continued to grow at more than 2 percent a year, with much of the growth fueled by rapid industrialization in China. However, this growth rate is expected to halve (to less than 1 percent a year) over the next 15 years and halve again (to 0.5 percent a year) between 2030 and 2050.[1]

As demand growth slows, predicting demand will become more difficult. The centuries-long link among industrial advances, higher energy consumption, and GDP growth is breaking down. Environmental concerns and commercial imperatives have helped spur the development of innovative technologies for non-carbon-emitting power generation and drive massive improvements in energy efficiency. Load factors[2] and fuel efficiency have more than doubled since the beginning of this century.

Demand for electricity will grow seven times faster than for other energy sources

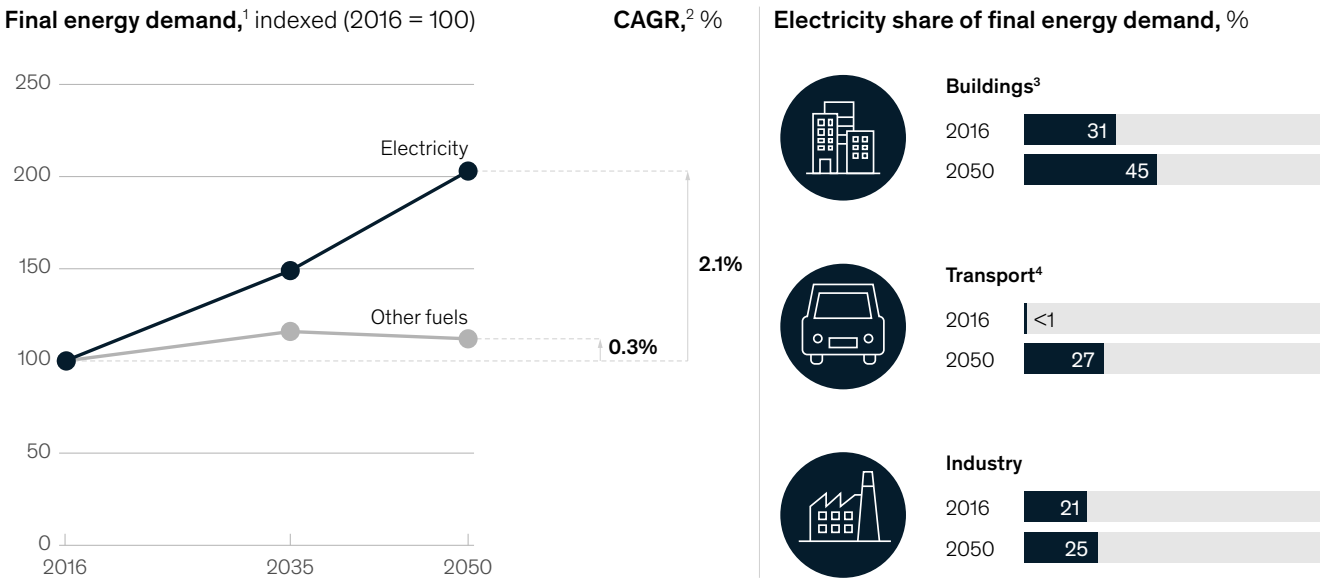
Perhaps the single biggest argument for the importance of renewable energy is that, for the foreseeable future, demand will grow far more quickly for electricity than for any other energy source. The growth rate for electricity already exceeds those for oil, gas, and coal, and by 2050, it is expected to be seven times higher than the average for other fuels (Exhibit 1).

[1] IEA energy balances (historical); Vaclav Smil, *Energy Transitions: History, Requirements, Prospects*, Santa Barbara, CA: Praeger, 2010; "Global energy perspective," Energy Insights by McKinsey, December 2017.

[2] A load factor is defined as the average demand during one period divided by peak demand in that period. It is a way of assessing the steadiness of electricity consumption over a specific period. Generators prefer a higher load factor because it increases predictability.

Exhibit 1

Demand for electricity is growing seven times faster than for other fuels.



[1]Final energy demand is defined as total demand by end users, excluding energy consumed by energy industry itself.
[2]Compound annual growth rate.
[3]Residential buildings in Organisation for Economic Co-operation and Development countries in Americas and Europe.
[4]Passenger cars, trucks, vans, buses, and two- and three-wheelers.

Source: *Global energy perspective 2019: Reference case*, January 2019, McKinsey.com

The primary driver of this growth is the electrification of the construction, transport, and industrial sectors. Oil-, diesel-, and gas-fired power generation is being gradually replaced by renewable-based power generation. In addition, as industries digitize, they experience a massive rise in data flows, data processing, data storage, and server capacity, increasing their power requirements and contributing to the widening gap between demand for electricity and demand for other fuel sources.

Renewables are becoming cheaper than fossil fuels

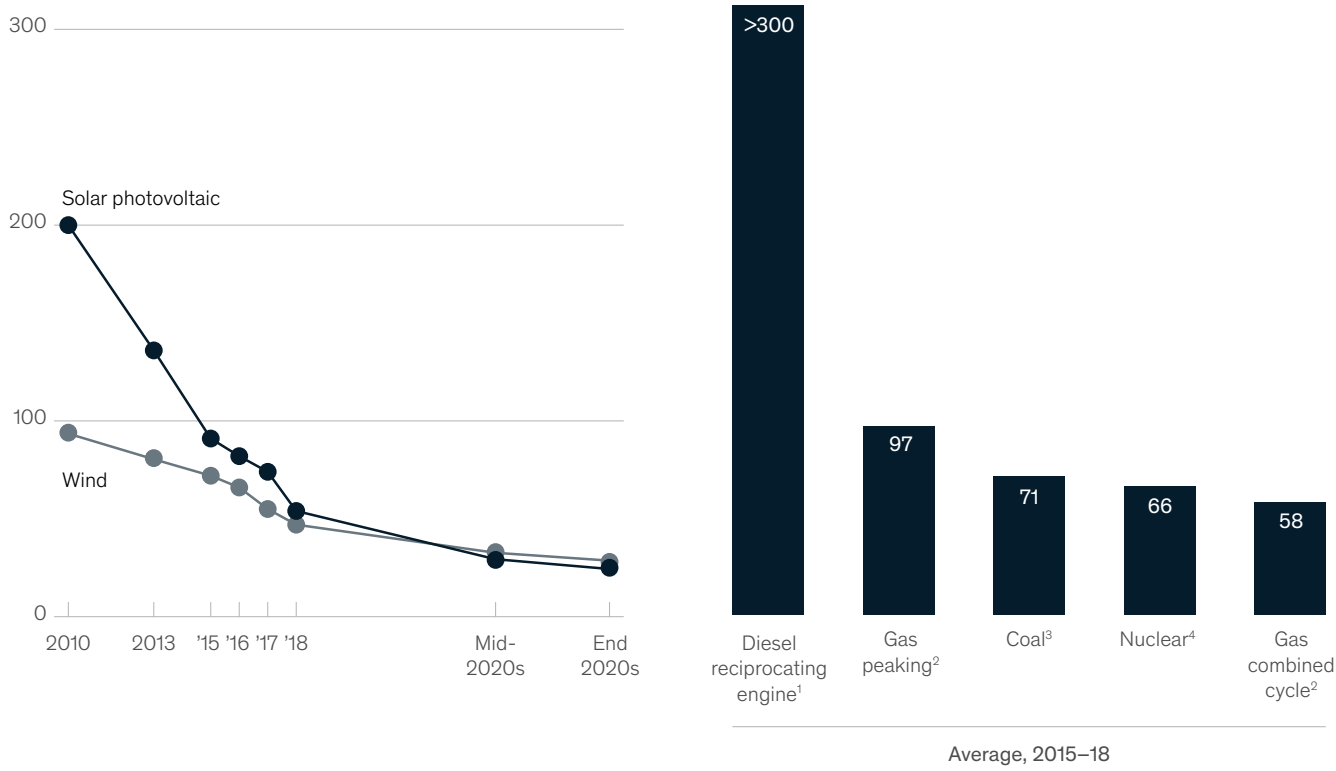
One of the biggest drawbacks of renewable energy used to be its generation cost. Solar and wind energy could not be generated at utility scale without government support. However, the costs of both solar and wind energy are now below the cost of traditional fuels, and they are likely to fall further over the next decade, giving renewables an even bigger cost advantage.

In the United Kingdom, for example, newly constructed onshore-wind power generation is already cheaper than existing gas and coal capacity, for which the only cost is fuel. Costs of new offshore-wind and new solar-photovoltaic power generation will follow suit by 2030. Germany has already reached this point for all renewable technologies, and other countries in Europe and beyond are on a similar trajectory (Exhibit 2). Thanks to these economics, solar and wind power generation will grow five to ten times faster than any other power-generation technology will in the next few years.

Exhibit 2

Renewables will become the cheapest generation technology.

Levelized cost of electricity in Germany, € per megawatt-hour, full cost



[1]Fuel price for oil equivalent €19.6 per megawatt-hour thermal.
[2]Fuel price for gas equivalent €25.9 per megawatt-hour thermal.
[3]Fuel price for coal equivalent €10.9 megawatt-hour thermal.
[4]Fuel price in uranium gas equivalent €3.7 per megawatt-hour thermal.

Source: Bank for International Settlements; *Global energy perspective 2019: Reference case*, January 2019, McKinsey.com; IRENA - International Renewable Energy Agency; Statistisches Bundesamt (Destatis)

This shift is exerting pressure on incumbents' business models and tempting new entrants—both start-ups and established companies from related industries, such as technology and oil and gas—into the market. In response, incumbents are reorienting themselves, with the German energy giants making particularly radical moves. E.ON and RWE have split their companies into two entities: traditional energy generation and future energy system (grid, renewable, and customers). Then both companies went a step further. RWE brought together its traditional- and renewable-generation groups, while E.ON integrated its grid and customer businesses to focus on the parts of the value chain beyond energy generation. Other incumbent energy companies, such as Denmark's Ørsted, Italy's Enel, and Spain's Iberdrola, shifted their investment focus toward renewable energy resources at an early stage.

Demand and supply management and storage are increasingly being used to handle variability

A major limitation of renewable energy is its

intermittency[3]: wind and sunshine are not under producers' control. The inevitable variability in generation must be tackled indirectly either through industrial, commercial, and residential demand and supply management or through radically improved storage. One option is to repurpose electric-vehicle batteries for second lives as storage devices, for instance. Developments like this will support the emergence of a much more decentralized energy system with local small-scale generation that will complement today's largely centralized energy system.

Coal and oil will peak in the next two decades, while gas will grow moderately

The much-predicted death of fossil fuels is still some way off, especially outside Europe. Coal, gas, and oil will remain part of the fuel-supply mix for the foreseeable future, especially given the appetite for energy in developing economies in Africa, Asia, and the Middle East. Coal and oil are expected to peak within the next 20 years, while natural gas will grow moderately.

Current levels of oil production will not meet expected demand over the next 15 years. A McKinsey analysis shows that significant new production can be anticipated, even if the expected deviation from the two-degree-Celsius pathway triggers a carbon tax as high as $90 per barrel.

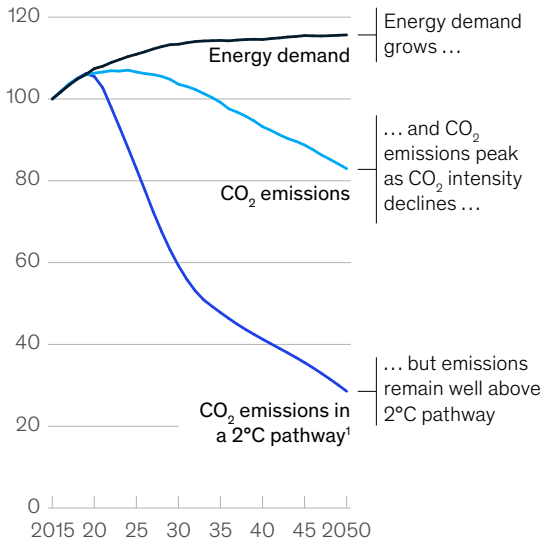
Carbon-dioxide emissions will plateau by 2030 but remain well beyond the desired two-degree-Celsius pathway

The historic Paris Agreement calls for a significant reduction in carbon emissions to hold global warming at no more than two degrees Celsius. In McKinsey's reference-case estimate, carbon emissions will plateau by 2030, but they will remain considerably higher than the level needed to meet the target two-degree-Celsius pathway (Exhibit 3). This increases the likelihood of more drastic political interventions triggered by deepening public awareness of environmental threats, as well as commercial interventions driven by economic considerations. A prime example is China's political turnaround to promote e-mobility, the use of renewables, and the closure of inefficient energy-intensive production sites to combat harmful urban pollution.

Exhibit 3

Carbon-dioxide emissions are expected to remain well above the two-degree-Celsius pathway.

Energy demand and CO_2 emissions and intensity, indexed, 2015 = 100, reference-case estimate



[1] IEA sustainable-development-scenario emissions pathway consistent with 1.5–2°C long-term global-average-temperature increase; extrapolated for 2040–50.

Source: *Global energy perspective 2019: Reference case*, January 2019, McKinsey.com; World energy outlook 2017, IEA, November 2017, iea.org

[3] Intermittency means that energy sources are not readily or continuously available for electricity generation. As the energy generated by renewables cannot usually be stored easily, the energy producers have little or no control over intermittency.

Under present policies for reducing carbon emissions, the world will be able to keep emissions stable only until 2050. Reductions in countries that are part of the Organisation for Economic Co-operation and Development will be offset by increases from developing countries as they industrialize. The net effect will be a continuing rise in the use of oil, coal, and gas in power production and transport globally.

How can financial institutions participate in energy markets?

With renewables' high capital intensity, they are fueled by finance. In fact, the cost of capital is one of the biggest drivers of electricity costs. To be economic, the generation and distribution of renewable energy require very low costs coupled with high volumes.

Our experience in the industry indicates that many energy companies—more than two-thirds of the sample we canvased—are interested in doing business with financial institutions that have specialist knowledge of the energy sector. Moreover, evidence suggests these companies are not wholly satisfied with the services they receive from their current financial providers. This presents opportunities for other institutions to compete through targeted offerings.

We have identified six areas for financial institutions to consider if they wish to play an active role in the energy transition.

Explore renewables opportunities in Europe

Europe has been a hub for renewable energy from the early days. Modern wind energy was born in Denmark, home of Vestas, the world's largest wind-turbine manufacturer. Solar energy took off following Germany's Renewable Energy Sources Act in 2000. Renewables are central to the strategy of Europe's largest energy companies, including Denmark's Ørsted, Germany's RWE, Norway's Equinor, Portugal's EDP Energias de Portugal, Spain's Iberdrola, and Sweden's Vattenfall.

Yet despite the presence of so many powerful energy companies, strong financial business partners are relatively scarce. A few financial investors, among them Copenhagen Infrastructure Partners, Global Infrastructure Partners, and Macquarie Capital, are financing large capital-infrastructure investments. Other investors—including asset managers such as Allianz Global Investors and Macquarie Infrastructure and Real Assets, as well as a number of pension funds—are offering funding for corporate bonds or equity stakes in pursuit of more regulated returns.

Finance the renewables revolution

From 2018 to 2025, about 40 percent of annual global energy investments will go to renewables (Exhibit 4).[4] This translates into an investment of almost €300 billion—almost three times the investment in fossil-fuel generation. Another 40 percent of investments will be used to develop transmission, distribution, and storage infrastructure, and 6 percent will be spent on nuclear generation.

In Europe, most of the renewables investment will take place in France, Germany, Nordic countries, and the United Kingdom. The projects will be a mix of regulated and subsidy-free capacity in which generators are exposed to merchant price risk.[5] To make a successful transition to an industry with high financing needs and routine exposure to wholesale markets, the renewables sector will require financial expertise to complement its deep knowledge of the energy industry.

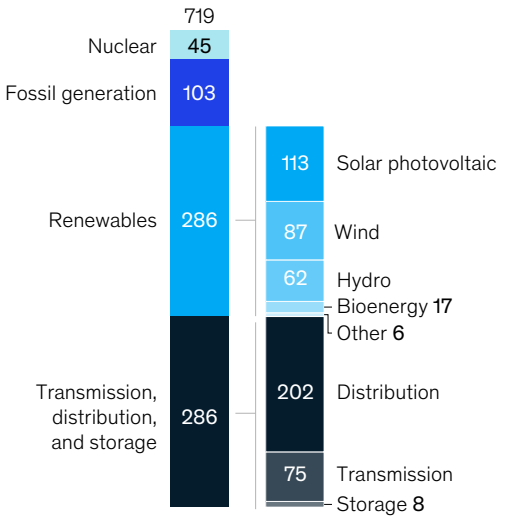
Financial institutions seeking to provide this expertise should first define a business strategy that plays to their strengths, such as capitalizing on their competitive capital-cost advantage over traditional energy companies. They will also need to boost their capabilities—for instance, by building

[4] *World energy outlook 2018*, IEA, November 2018, iea.org.
[5] For more, see Sven Heiligtag, Florian Kühn, Florian Küster, and Joscha Schabram, "Merchant risk management: The new frontier in renewables," November 2018, McKinsey.com.

Exhibit 4

Renewables will represent 40 percent of average annual global energy investments to 2025.

Estimated average annual power-sector investments globally,[1] € billion,[2] 2018–25



Note: Figures may not sum to listed totals, because of rounding.
[1] IEA new-policies scenario.
[1] Converted from original in 2017 dollars, using average exchange rate.

Source: Bank for International Settlements; *World energy outlook 2018*, IEA, November 2018, iea.org

teams that include industry experts in power markets, renewables, and large capital-expenditure programs, as well as investment professionals, and by establishing connections in cross-border power markets. In addition, they will need to ensure they have state-of-the-art tools and resources in areas such as long-term merchant-risk management.

Support the infrastructure of the future

Investing in infrastructure is as crucial as investing in generation capacity. Through 2025, infrastructure investments in Europe will reach €290 billion. Large investments are required to reinforce or replace grid infrastructure, connect the grid to local renewable-power-generation resources, introduce a smart grid to accommodate small-scale residential and commercial energy generation, and develop an electric-vehicle-charging infrastructure, among other things. The network of the future will allow a two-way flow of power to and from customers who are self-sufficient in power most of the time but take electricity from the grid when they need it.

All these changes will disrupt the energy industry's traditional business models and present attractive opportunities for investors. Large European energy companies will continue to be a driving force in the transition, but projects will need financing whether they receive subsidies or not.

Help incumbent utilities to restructure and transform

Several European utilities, including Alpiq, E.ON, RWE, and Vattenfall, have restructured their portfolios to separate their businesses into traditional and new energy. The March 2018 asset swap among RWE, E.ON, and innogy is indicative of the changes under way. The deal enables RWE to intensify its focus on generation and become Europe's third-largest renewables company, with more than 60 percent of the region's capacity for low-carbon generation. E.ON, meanwhile, is acquiring RWE's majority stake in its renewable-energy subsidiary innogy and shifting its profile toward the grid and customer solutions to meet the need for specialized downstream energy providers with the scale and efficiency to drive much-needed innovation.[6]

As more companies follow these examples and restructure, a number of partnership opportunities are likely to open up for financial institutions.

Advise on consolidation and divestment in the power market

After a dormant period, M&A activity in the energy sector has picked up considerably.

[6] Tobias Buck and Arash Massoudi, "Eon to acquire innogy in €43bn deal with RWE," *Financial Times*, March 10, 2018, ft.com.

The restructuring underway involves not only consolidation among European companies but also strategic M&A deals by Chinese corporations and financial M&As by more aggressive financial-sector investors, such as Australia's Macquarie and Canada's OMERS Infrastructure Management.

All this activity creates a need for financial advisers with knowledge of the energy sector. When RWE carved out innogy, for instance, financial institutions acted in an advisory role in what was the largest IPO in Germany for more than 15 years. The deal allowed RWE to separate its growth business from its legacy operations and create two entities with distinct portfolios and a clear strategic focus. RWE also gained more flexibility in dealing with funding needs, since it could use its shareholding in innogy as a liquid asset. Further value was unlocked through the separation of innogy from RWE's nuclear line of business, which carries unknown future liabilities because of the German government's requirement for the company to decommission nuclear power plants at its own cost.

Share in the growth of energy companies and financial sponsors

As energy companies—and especially renewables players, such as EDP Energias de Portugal, Enel, Iberdrola, Ørsted, and RWE—expand their global footprints, they offer a range of opportunities for major partnerships. Financial sponsors are playing an increasingly important role as balance-sheet owners of renewables assets, holding ownership of half of the M&A deals in the energy industry between 2015 and 2017 and more than two-thirds of the onshore-wind projects in 2017.

Financial institutions can provide capital at a lower cost, and they find the returns from energy projects more attractive than those from traditional alternatives, such as government bonds. But to capture the opportunities, they must be willing to enter unknown territory and take the time to understand it. That will involve building capabilities, infrastructure, and governance to support their activities in the energy industry, as well as developing the analytic skills and insight to identify opportunities as they emerge.

A successful energy transition requires expertise on the financial side as well as the industrial side. Such expertise is best developed not in isolation but through partnerships. Strong partnerships are based on trust, which grows with success and over time. The question for financial institutions is simple: Do we want to be a part of this new world?

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