Issue Paper
Plugging into a Cleaner Future

Domini
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In December 2015, representatives of 195 nations met in Paris to respond to the challenge of climate change — perhaps the most significant challenge the global community has ever faced. Although Paris did not produce a binding agreement, it achieved a historic degree of global unity around a single goal — limiting global warming to 2 degrees centigrade above preindustrial levels, with an aspirational goal of 1.5 degrees, the level many scientists believe is a safer ceiling to prevent catastrophic warming.

Many criticized the accord as inadequate to the challenge, but there is no question in our minds that it will move us all in the right direction, around a common goal. We believe we are seeing the beginning of the end for the dominance of fossil fuels.

In this report, we will address one aspect of the set of challenges presented by climate change — electricity generation — with a focus on solar and wind, two of the cleanest and most promising forms of renewable energy.

The cost of producing electricity from wind and solar has dropped significantly over the last five to ten years, and has started to reach price parity with the grid in various markets, including thirty countries and twenty U.S. states. Deutsche Bank predicts that by the end of 2017, solar energy will be at grid parity for most of the world. These trends, of course, will also depend on government subsidies and technological innovation. Today, wind and solar, combined, currently account for only about five percent of U.S. electricity generation. In comparison, renewable energy accounted for more than 25 percent of electricity consumption in the European Union, as of 2013.

Below, we provide a brief survey of some notable companies that are advancing the shift to renewable electricity generation around the world and across the value chain from manufacturers to electricity generators, financiers (banks and other investors, including yourselves), and consumers.

Wind Energy

The Domini Impact International Equity Fund is invested in some of the largest wind turbine manufacturers in the world, including “pure-play” turbine manufacturers as well as companies that offer a larger portfolio of renewable energy technologies, including solar power, hydropower and biomass.

Vestas (Denmark) is one of the world’s largest manufacturers of wind turbines, with a 12 percent global market share in 2014. In 2015, the company installed its products in 34 countries on five continents. Vestas makes the largest turbine in the world, standing 720 feet tall, more than twice the height of the Statue of Liberty. It produces enough electricity to power 7,500 average European homes, or 3,000 American homes, per year. Its great height allows wind farms to take advantage of faster wind speeds that occur at higher elevations.

China has become the world’s largest market for wind power. The Chinese government has pledged to produce 15 percent of all electricity from renewables by 2020. In 2015, the country installed over 28 gigawatts of new wind energy capacity and is aggressively expanding its investments in renewables. As a result, Vestas’ market dominance has recently been challenged by **Xinjiang Goldwind Science & Technology** (China, not currently held, but eligible for investment by the Domini Funds).

Companies like **Gamesa Corp Tecnologica SA** (Spain), have concentrated on pushing the envelope in terms of technology, developing turbines that work in low winds, high altitudes, cold climates and deep offshore.

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Gamesa has been a longtime leader in the field, largely spurred by incentives offered by the Spanish government. More recently, government reforms have cut subsidies and slowed its growth, but the company maintains significant market share in India and Latin America (especially Mexico) and has a foothold in China as well. The company was one of the earliest movers into emerging market countries.

Nordex Se (Germany) focuses on onshore turbines and has lately been designing turbines that are suitable for less windy sites (the "low wind" sector). Onshore wind is considered to be a leading area for the wind sector. The company has developed models with tall towers and long, slender blades, a better design for low wind. The company also has a significant presence in emerging markets, contributing to energy transitions most notably in Pakistan and Turkey.

Others companies, such as **Siemens** (Germany), have concentrated on affordability and convenience through well-proven designs and economies of scale. Offshore wind farms have grown in popularity because they're typically built out of sight, and the wind blows harder and more consistently at sea. For many years running, Siemens has been the leading manufacturer of offshore wind turbines. In 2014, the company accounted for 76 percent of new global capacity installed offshore and had a 9.5 percent market share of the global wind turbine market. For all their advantages, however, offshore wind farms are approximately twice as expensive as onshore wind farms. Siemens has focused on lowering the costs of offshore wind power and advancing the efficiency of turbine-to-grid connections. In addition to its wind power products, Siemens also develops small hydropower plants and sells solar power components.

Solar Energy

There are two distinct models for providing electricity from solar energy: centralized grid (often advocated by utility-scale users) and distributed grid, which often involves residential, community and commercial-scale users. Distributed energy systems are comprised of small-scale energy-generating devices (like rooftop solar panels) that allow for electricity to be produced onsite and consumed immediately, without drawing from the electrical grid. First Solar (United States) is primarily involved in the utility-scale solar market, as well as the commercial scale market, rather than rooftop solar installations. Utility scale solar refers to large-scale grid-connected solar installations.

First Solar has developed some of the largest solar farms in the world, and is the only major manufacturer of cadmium telluride solar panels in the United States. Although conventional silicon solar cells represent more than 90 percent of the solar power market, cadmium telluride panels offer advantages of lower cost and improved performance in high temperature environments such as desert areas, which is often the preferred site for large-scale solar photovoltaic (PV) arrays. Domini has engaged in discussions with First Solar's management about oversight of working conditions in its global manufacturing operations and supply chains, and its political activities. Recently, we convinced the company to begin public disclosure of its political contributions. Notably, the company chose to prohibit its trade associations from using its dues to make contributions to political candidates.

SolarCity Corp., the largest residential solar installer in the United States, designs, installs and leases rooftop solar systems. For a 20-year commitment, SolarCity will install panels with no money down. SolarCity's business model benefits from net metering, which allows homeowners with panels to sell back to the grid any excess electricity they don't use. This helps offset the cost of power when the sun isn't shining. The company also partners with other businesses, such as **Home Depot** and **Best Buy**, to promote residential solar PV systems. The company's focus is on marketing, financing and installing panels — not making them. It does, however, plan to open a manufacturing plant in Buffalo, New York, in 2016/17 to produce panels using a new type of silicon-based photovoltaic technology designed to produce more efficient panels at lower cost. We have been in contact with SolarCity to discuss their recent

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partnership with Grid Alternatives, a non-profit organization working to increase access to clean energy for disadvantaged communities throughout the United States.

Bringing Wind and Solar to Scale

Moving one step down the value chain, we come to companies that help to bring the electricity generated by solar panels and wind turbines to scale, by integrating these devices with the electrical grid. **SMA Solar Technologies AG** (Germany) is the world market leader for solar inverters, a device that converts the direct current (DC) generated by photovoltaic cells into alternating current (AC), which can be fed into the electrical grid or can be consumed at home.

Along with cost parity, one of the most persistent challenges the wind and solar industries are working to overcome is variability, which is creating the need for some level of backup power to offset times when the sun isn't shining or the wind isn't blowing. One solution to this problem is to diversify the sources of energy over a wider area by expanding the number of solar and wind installations. An individual wind farm can be extremely volatile, but groups of wind farms spread out over thousands of miles help to ensure that there is consistent power.

Improvements in batteries and other storage technologies are another way to counter wind and solar's intermittency. Many companies are working on solutions. **Tesla Motors Inc.**, (not currently held, but eligible for investment by the Domini Funds) best known for its electric vehicles, is the current technological leader in lithium batteries. The company is working on developing batteries for residential and industrial uses. In May 2015, the company introduced the Powerwall, a low-cost home battery pack designed to capture and store energy from wind turbines or solar panels. The reserves can be drawn on when sunlight is low, during power cuts or at peak demand times, when electricity costs are highest.

The company also unveiled the Powerpack, a battery block designed to help utilities smooth out their supply of wind and solar energy or to feed energy into the grid when demand increases. Although the technology is very new, Tesla's ever-ambitious founder Elon Musk believes that "two billion Powerpacks could store enough electricity to meet the entire world's needs." The company is currently building a battery factory with 1GW annual production capacity in Nevada to meet future needs for energy storage along with electric vehicles.

Electricity Generation

Unless you live entirely "off the grid", you purchase your electricity from a utility that generates energy from a diverse portfolio of sources, ranging from coal to nuclear and wind. Utilities produce more than 30 percent of greenhouse gas emissions in the United States, relying on coal for roughly 40 percent of their total energy requirements. As of 2014, coal burned for electricity generation accounted for 93 percent of all coal consumed for energy in the United States. We seek to avoid investment in any utility that derives the majority of its power from coal, and do not invest in utilities that are owners or operators of nuclear power plants, due to our serious concerns about safety, waste storage and the link between nuclear power and nuclear weapons globally.

Consolidated Edison, more commonly known as "ConEd", the dominant utility in New York, develops, constructs, owns and operates renewable energy infrastructure projects throughout the country. At year-end 2014, Con Edison Development had 446 MW of solar and wind projects in operation. At the end of 2015, ConEd reports that it is the sixth largest owner of operating solar capacity in North America.

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Meridian Energy (New Zealand) is the largest electricity generator in New Zealand. Most of the company's energy is generated via large-scale hydropower. Meridian has also developed ten wind farms in Australia and New Zealand, which generate enough electricity to power around 152,000 homes each year.

Financing Renewable Energy

In 2015, $329.3 billion was invested in clean energy globally, a 4 percent increase over 2014. This investment was primarily directed to large-scale projects, including a number of major offshore wind farms. The International Energy Agency estimates that an additional $36 trillion in clean energy investment is needed through 2050 — or an average of $1 trillion more per year — if we are to have an 80 percent chance of maintaining the 2°C warming limit.

We are therefore very interested in identifying notable renewable energy investors for our funds, such as **Banco Santander** (Spain), which was one of the largest financiers of renewable energy in the world in 2015. **ING Groep** (Netherlands) has financed several large renewable energy deals including Westermeerwind, a Dutch lake shore wind project that will provide enough energy for 160,000 homes a year. As of 2014, 43 percent of ING's project financing was directed to renewable energy (wind, solar, hydro and geothermal power). In our view, 43 percent represents a substantial commitment to renewables. In November 2015, the company chose to end financing for new coal-fired power plants and thermal coal mines worldwide. **Muenchener Rueckversicheregungs-Gesellschaft AG** (MunichRe, Germany), a leading reinsurance group, has been offering innovative insurance products specialized in renewable energy to meet increased demands, including performance guarantee insurance for long-term renewable energy contracts. The company has been outspoken about the risks of climate change for many years.

There are several other banks, including Goldman Sachs and JPMorgan Chase, that have made significant commitments to renewable energy, but are currently ineligible for investment by our funds due to unrelated concerns. In the past, when JPMorgan Chase was held by the Domini Impact Equity Fund, we helped to convince the bank to hire its first Director of Environmental Affairs, and to adopt a comprehensive policy addressing climate change. We were pleased to see the bank's recent announcement that it will no longer finance new coal mines around the world and will end support for new coal-fired power plants in "high income" OECD countries. A growing number of banks have made similar commitments. Domini has been participating in meetings with Citigroup (not currently approved for the Domini Funds) regarding its $100 billion commitment over the next ten years to clean energy investments. We also continue to participate in a multi-year dialogue with **PNC Bank** (United States), about its approach to climate risk. The discussions, which began with concerns about the bank's past involvement in mountaintop removal coal mining, include the direct participation of the company's CEO.

Investors in the Domini Impact Bond Fund are also playing a role in financing the transition to a low-carbon economy. We are particularly excited about the growth of the market for "green bonds", which are bonds designed to finance projects and activities that address climate change or serve other environmentally beneficial purposes. These environmentally themed bonds are rapidly growing as a new asset class, with issuers including supranational banks, governments, and corporate entities. The market for green bonds more than tripled in 2014, rising from only $3-5 billion per year between 2007 and 2012 to $39 billion in 2014. When evaluating potential green bonds for our fund, we favor investments such as those mitigating the impacts of fossil fuels in energy- intensive industries, promoting energy efficiency, or otherwise addressing environmental and social justice issues.

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In November, the Fund purchased a bond issued by **Southern Power Company** to finance existing or planned solar and wind power generation facilities in the United States. Southern Power Company derives 9GW of its total power output from renewables and gas burning facilities and does not burn coal or deal in nuclear power. Although Southern Company, the issuer's parent company, is ineligible for our portfolios because it is a large user of coal and owns nuclear power plants, we chose to purchase this bond due to the urgent need to finance renewable energy and stabilize the global climate. Our purchase is also a sign of support for other utilities that choose to transition their generation mix to lower-carbon fuel sources.

Purchasing Renewable Energy

Corporations in all industries can help to mitigate climate change and future carbon pricing risks by making commitments to convert their energy usage to renewables.

In 2012, the New York Times reported that internet companies are enormous users of electricity, primarily to power and cool their data centers. Data centers, which are typically run at maximum capacity to meet consumer demands for 24/7 access to information, used roughly 2 percent of all the electricity in the United States, according to the Times.

According to the most recent Bloomberg New Energy Finance Report, **Google** (Alphabet, Inc.) is the largest corporate purchaser of renewable energy globally, followed by **Amazon**. **Facebook** and **Apple** were also highlighted as "key players." Google has signed long-term purchase agreements for renewable energy covering 28 percent of its total electricity consumption. The company also obtains green power from the grid and on- site renewables, making the total share of renewables in its mix over 37 percent. The company wants all of its consumption to be from renewables by 2025. As of 2016, Google also maintained a substantial portfolio of investments in renewable energy projects, providing almost $2.5 billion to fund wind and solar projects with a potential to generate over 2.9GW, enough to power 500,000 homes.

We recently signed an investor letter to Google's CEO, raising concerns about the company's investment in the Turkana Wind Project in Kenya, a project that is being developed on communal land, allegedly without the full knowledge and consent of local indigenous pastoralist tribes. We are seeking to open dialogue with the company about its consideration of indigenous peoples' rights.

As of April 2015, approximately 25 percent of the power consumed by **Amazon's** global infrastructure came from renewable sources, and the company intends to reach 40 percent by the end of 2016. Amazon contracted for 80MW of solar and 458MW of wind in 2015. We welcome Amazon's renewable energy commitments and its decision to disclose this data, but continue to pursue a shareholder proposal asking the company to produce a more comprehensive sustainability report on an annual basis.

Approximately 35 percent of the electricity used to power **Apple's** data centers is derived from renewable sources. The company has also made ambitious commitments to green its supply chain. In October 2015, Apple announced the construction of 40 megawatts of solar projects in the Sichuan Province of China, producing "more than the total amount of electricity used by Apple's offices and retail stores in China, making Apple's operations carbon neutral in China." In addition to other investments in solar energy in China, Apple is also working to encourage its manufacturing partners to become more energy efficient and to use clean energy for their operations. As a result, Apple reports that it is "powering 100 percent of its operations in China and the U.S., and more than 87 percent of its worldwide operations, with renewable energy."

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Conclusion

Investing in renewable energy is more than simply buying shares in companies that make solar cells or wind turbines. Each of these technologies depends upon the entire range of companies discussed above, as well as sensible public policies to hasten the decarbonization of our electricity grids.

Climate change presents the most dramatic risks and opportunities for investors in the 21st century. Investing in renewable energy production and consumption is an important aspect of Domini's long-standing commitment to fight climate change. This report only focuses on one facet of our approach to climate change, however, an issue that drives many of our investment decisions, across industries. Climate change is also a persistent theme in our engagement with companies on many issues, including political accountability and deforestation, and with policy makers.

About Domini Impact Investments

Domini Impact Investments manages mutual funds for individual and institutional investors who wish to create positive change in society by integrating social and environmental standards into their investment decisions.

Visit www.domini.com or call 1-800-582-6757 to learn more.

The holdings discussed above can be found in the portfolios of the Domini Funds, included herein. The following companies discussed above are not currently eligible for investment by the Domini Funds: Citigroup, Deutsche Bank, Goldman Sachs, JPMorgan Chase and Southern Company. Facebook, Meridian Energy, Siemens, SolarCity, Tesla Motors and Xinjiang Goldwind Science & Technology are eligible for investment, but not currently held by the Domini Funds. The composition of the Funds' portfolios is subject to change.

An investment in the Domini Funds is not insured and is subject to market risks such as sector concentration and style risk. You may lose money. Investing internationally involves special risks, such as currency fluctuations, social and economic instability, differing securities regulations and accounting standards, limited public information, possible changes in taxation, and periods of illiquidity. The Domini Impact Bond Fund is subject to market risks, including interest rate, liquidity and credit risks. During periods of rising interest rates, bond funds can lose value. The Domini Impact Bond Fund currently holds a large percentage of its portfolio in mortgage-backed securities. During periods of falling interest rates, mortgage-backed securities may prepay the principal due, which may lower the Fund's return by causing it to reinvest at lower interest rates. Some of the Domini Impact Bond Fund's community development investments may be unrated and carry greater credit risks than its other investments.

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