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Climate Change: The Mega Trend Reshaping Economies and Markets

Key Takeaways and Beliefs:

- Climate change is transforming economies and markets, and it appears to be flowing through to stock prices. Companies with greater than 20% revenue exposure to environmental products or services—defined by the FTSE Environmental Opportunities Index—outperformed the traditional FTSE Global All Cap Index by 4.6% annualized over the past five years, as of August 31, 2021.
- Outperformance may continue, as multi-decade tailwinds from (1) government policy, (2) consumer buying preferences, and (3) technological advancements unfold.
- Technologies transforming the transitions are creating opportunities in renewable energy, food and agriculture, water, and waste, among other environmental industries.

The Mega Trend

Climate change is transforming economies and markets, creating long-term opportunities for companies delivering products or services that help reduce greenhouse gas (GHG) emissions (referred to as mitigation) and adapt to a changing climate (adaptation)¹. Here's a look at what is happening:

GHG emissions from five sources are causing the planet to warm at an unstable rate²:

- 31% Making things (cement, steel plastic)
- 27% Plugging in (electricity)
- 19% Growing things (plants, animals)
- 16% Getting around (planes, trucks, cargo ships)
- 7% Keeping warm and cool (heating, cooling, refrigeration)

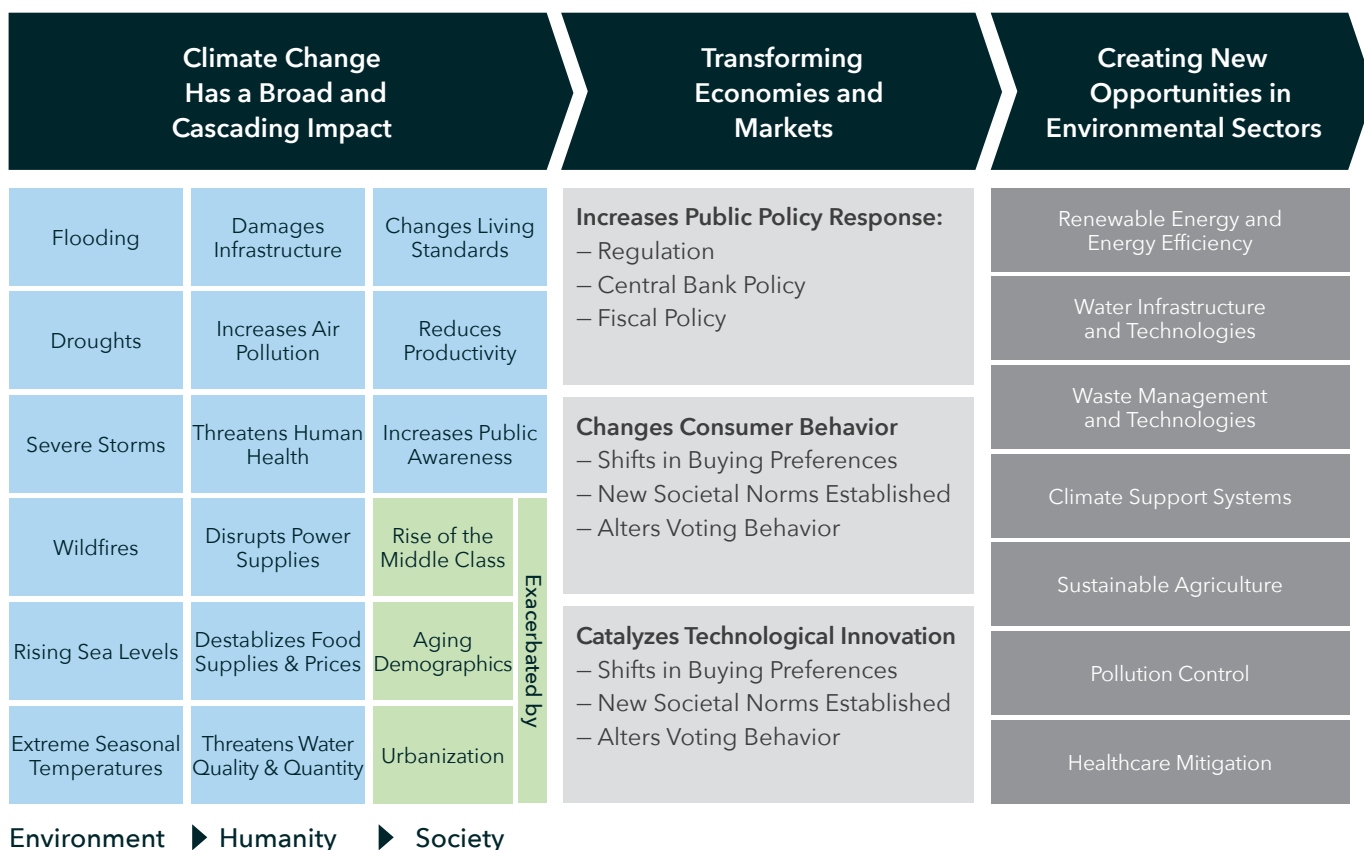
¹ For more information on the unprecedented transformation under way, reference the Intergovernmental Panel on Climate Change's (IPCC) Six Assessment Report published in August 2021. <https://www.ipcc.ch/report/ar6/wg1/>

² Gates, Bill. *How to Avoid a Climate Disaster*. February 2021.

The result is increasing seasonal temperatures and extreme weather events, causing sea levels to rise and permanently change ecosystems, which in turn damages infrastructure, increases air pollution, threatens human health, disrupts power supplies, destabilizes food supplies, threatens water quality, and forces human migration. In response, shifting public policy, consumer behavior, and technologies are

creating opportunities in environmental sectors such as renewables, water, waste, energy efficiency, climate support systems, healthcare, food, and agriculture. We refer to this dynamic as the climate change flow through effect, and it appears to be impacting stock prices. As of August 21, 2021, the FTSE Environmental Opportunities Index, which measures the performance of global companies with at least 20% revenue

Sustainable Investing Landscape



exposure to environmental products and services, outperformed the traditional FTSE Global All Cap Index by 4.6% annualized over the past five years.

We believe that outperformance may continue as multi-decade tailwinds from (1) government policy, (2) consumers buying preferences and (3) technological advancements unfold.

1. Governments Expand Net Zero Pledges

Net zero carbon emission pledges now cover 68% of global GDP, up from 16% in 2019. To fulfill commitments and encourage the economic transition,

policymakers across the world are considering stimulus and regulations. Here are developments across four key regions³:

- **European Union:** The European Union is the global leader with binding policies and frameworks to achieve a 55% greenhouse gas emission reduction by 2030 and carbon neutrality by 2050. It is on track to become the world's first carbon-neutral continent. The objective is at the heart of the European Green Deal⁴.
- **U.S.:** In April 2021, the U.S. Administration announced its intention to achieve 50% emission

³ Taking Stock: A global assessment of net zero targets." Energy & Climate Intelligence Unit, March 2021.

⁴ For more information, reference the European Commission's Green Deal website: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

reduction by 2030 and net zero no later than 2050⁵. The country's commitment will cut across much of the federal government, with National Climate Advisor Gina McCarthy ensuring coordination over interagency processes. She is the domestic counterpart to John Kerry, who was sworn in as the Special Presidential Envoy for Climate to manage the U.S.'s role in global climate action. This is the first time in history that the National Security Council will have a function dedicated entirely to climate change. Additionally, the Securities Exchange Commission (SEC) named Satyam Khanna as the Senior Policy Advisor for Climate and ESG and announced the creation of a Climate and ESG Task Force.

- **China:** At the UN General Assembly in September 2020, President Xi Jinping pledged peak emissions by 2030 and carbon neutrality before 2060. Shortly after the announcement, Professor He Jiankun, Vice Chairperson of the National Expert Committee on Climate Change and Chairman of the Academic Committee of ICCSD, presented "China's Long-term Low-Carbon Development Strategy and Pathway."⁶ While encouraging progress, the lack of details causes some to question the viability of reaching the target.
- **Japan:** In October 2020, Japan's Prime Minister Yoshihide Suga pledged to put his country on the path to net zero by 2050. Japanese lawmakers declared a climate emergency in a symbolic vote, and the trade ministry named 14 industries in which investment would be required to decarbonize over the ensuing 30 years.

The EU, U.S., China, and Japan account for over half of the world's GDP and emissions⁷. In addition to being inextricably linked through trade, we believe that their spending plans and regulation will reshape industries and benefit companies operating in certain environmental markets.

2. Consumers Increasingly Prefer Sustainable Products

Some 79% of consumers are changing their purchasing preferences based on sustainability, according to Capgemini Research Institute, which surveyed 7,500 consumers across geographies and generations and

750 large organizations in the consumer products and retail sector⁸. Consumers practice sustainability-led behavior by buying brands with sustainability as a core value proposition, limiting single-use plastic, using energy efficient appliances, reducing meat consumption, and minimizing waste. The survey finds that consumers attribute positive emotions, such as feeling "happy" when buying sustainable products. Despite the evidence, only 36% of organizations believe consumers are willing to change their consumption habits based on social or environmental impact. This mismatch creates opportunities across the value chain of product design, sourcing raw materials, manufacturing, packaging, distribution, fulfillment, last-mile delivery, and recycling.

Alongside shifts in consumer preferences, investors are increasingly allocating to sustainable investment strategies, which may help support stock prices over the long term. According to Morningstar, total assets in sustainable open-end funds and ETFs jumped to approximately \$2 trillion in Q1 2021, doubling from the prior year. Meanwhile, assets in climate-aware funds nearly tripled from 2020 to 2019.⁹

3. Technologies Transforming the Transition

In 1620, the English scientist Francis Bacon designated printing, gunpowder, and the compass as the three breakthroughs that built the modern world. Throughout history technological innovation has advanced human intellect (e.g., paper, printing, and the Internet), enabled the Industrial Revolution (e.g., the steam engine and refining and drilling of oil), expanded the possibilities of physical infrastructure (e.g., electricity and cement), increased life expectancy (anesthesia, antibiotics, vaccines, and optical lenses), produced real-time communication (e.g., the telegraph, telephone, and radio), and transformed transportation (e.g., the internal combustion engine, steam engine, and airplanes)¹⁰. Below we highlight technological advancements that will support the transition to a net zero emission society.

- **Renewable and Alternative Energy:** In the book *Renewable Energy: A Primer for the Twenty-First Century*, author Bruce Usher underscored the implications of energy transitions from wood to coal to oil to nuclear and natural gas and highlighted

5 The White House announcement can be found here: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/>

6 Professor He Jiankun's presentation can be found here: https://mp.weixin.qq.com/s/S_8ajdq963YL7X3sRJSWGg

7 "Each Country's Share of CO2 Emissions." Union of Concerned Scientists, August 2021. <https://www.ucsusa.org/resources/each-countrys-share-co2-emissions>

8 "How sustainability is fundamentally changing consumer preferences." *Capgemini Research Institute*, 2020.

9 "Investing in Times of Climate Change." *Morningstar*, April 2021.

10 Fallows, James. "The 50 Greatest Breakthroughs Since the Wheel." *The Atlantic*, November 2013. <https://www.theatlantic.com/magazine/archive/2013/11/innovations-list/309536/>

- four key lessons from history: (1) Cost is the main driver of energy transitions. (2) Energy transitions are slow because of regulations, intransigent incumbents, and uncertainty about technologies. (3) Innovation accelerates the transition. For example, Watt's steam engine quickened the transition to coal. (4) Transitions have unforeseen and dramatic consequences. The transition from wood to coal catalyzed the Industrial Revolution. The next transition to renewable energy will likely be driven by point one, cost. The levelized cost of electricity (LCOE) is a standard metric to compare the cost of producing electricity and calculated over a project's lifetime. Unsubsidized solar and wind today has achieved an LCOE that is cheaper or competitive to the marginal cost of existing power generation, such as coal and natural gas.¹¹ The advances in renewable energy are also creating opportunities in energy storage, green hydrogen to reduce emissions in hard-to-abate industries, such as steel and cement, and low carbon transportation, to name a few. While this dynamic has been recognized by the market, consumer knowledge is lagging, and investable opportunities remain across the renewable energy value chain.
- **Food and Agriculture:** These four facts are important to note: (1) Food and agriculture account for 25% to 35% of global GHG emissions¹². (2) The world will need to increase food production by greater than 50% to feed nearly 10 billion people in 2050¹³. (3) 24% of all food produced is lost or wasted from farm to fork¹⁴. (4) In the U.S. alone, \$1.1 trillion was spent in 2019 on producing, processing, retailing, and wholesaling food. The costs jump to \$3.2 trillion when externalities such as human health and the environment are considered, according to The Rockefeller Foundation's True Cost of Food Report. This is an industry ripe for disruption. We believe that there will be opportunities for companies produce more with less, improve diet quality, and reduce food waste across agricultural, ingredients, consumer packaging goods, and food service categories. While there are few pure play publicly traded companies today, we speak with private firms at the forefront of innovation and believe that public market opportunities will expand in the years ahead.
 - **Water Management and Technologies:** Climate change exacerbates water stress, as rising temperatures lead to severe droughts, heavy precipitation, and flooding. Roughly 70% of the earth's water is used for agriculture, with the rest divided between industrial (18%) and domestic (11%) use.¹⁵ Advances in technologies such as membrane filtration have made large-scale industrial processes such as water desalination, which transforms ocean water to drinking water, more cost competitive enables consumer applications like point-of-use filtration possible. The application of variable speed pumps has eased energy consumption for pumping in applications such as wastewater treatment and reduced costs for residential pool use. Additional opportunities in applying digital solutions to water infrastructure include smart metering, remote water quality censoring, advanced leak detection, and water re-use for industrial and domestic applications.
 - **Waste Management and Technologies:** These three statistics are often overlooked: (1) Oil and gas make up more than 90% of plastic feedstock. (2) Approximately 6% of the world's oil production is used to make plastics.¹⁶ (3) Only 14% of plastic packaging is collected for recycling. The untapped potential for reusing plastic is estimated at \$50 billion-\$80 billion annually. Similarly, reusing steel and paper could generate \$70 billion to \$150 billion and \$30 billion to \$40 billion per annum, respectively¹⁷. Investable opportunities in collection, sorting, recycling, and reusing are expanding. One example is reverse vending, which involves depositing bottles in machines that return money. Reverse vending machines for beverage container recycling can increasingly be found outside of grocery stores across the world. One publicly traded company controls approximately 70% of the market. Other waste management and technology opportunities include developing biodegradable plastics at scale and converting non-recyclable waste into usable heat, electricity, or fuel referred to as landfill waste-to-energy.

11 Levelized Cost Of Energy, Levelized Cost Of Storage, and levelized Cost of Hydrogen." Lazard, October 2020. <https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/>

12 Ritchie, Hannah. "How much of global greenhouse gas emissions come from food?" Our World in Data, March 2021. <https://ourworldindata.org/greenhouse-gas-emissions-food>

13 "Creating a Sustainable Food Future." World Resources Institute, July 2019. <https://research.wri.org/wrr-food>

14 Ibid.

15 Felter, Claire and Robinson, Kali. "Water Stress: A Global Problem That's Getting Worse. Council on Foreign Relations, April 2021.

16 "The New Plastics Economy: Rethinking the Future of Plastics and Catalyzing Action." The Ellen MacArthur Foundation, 2017. <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics-and-catalysing>

17 "Investor Presentation." Tomra, July 2021.

We believe that climate mitigation and adaptation solutions of the future will be led by early or established innovators as the pipeline of sustainable private companies expand and incumbents build solutions to address market pain points. According to research conducted by Bernstein Research in July 2021, 197 unicorn startups are valued at over \$1 billion and contribute meaningfully to one or more of the Sustainable Development Goals. A meaningful number of these firms might go public in the months and years ahead, expanding the opportunity for public market investors.

Conclusion: A Long-Term Investment Opportunity

Climate change is transforming economies and markets via changing regulations, shifting consumer preferences, and technological advancements. The impact on stock prices is noticeable as the FTSE Environmental Opportunities Index outperformed the FTSE Global All Cap Index by 4.6% annualized over the past five years, as of August 31, 2021. We believe that outperformance may continue as multi-decade tailwinds unfold and technologies advance. Investment opportunities of the future will be led by early or established innovators with the pipeline of sustainable private companies expanding and incumbents building products or services to address market pain points.

Rockefeller Climate Solutions Strategy: Seeking Alpha and Outcomes

Rockefeller's Climate Solutions Strategy launched in 2012 and offers a differentiated, often complementary approach to widely held larger cap, mainstream climate-aware strategies. Climate Solutions is a global equity, high conviction portfolio seeking public companies delivering climate mitigation or adaptation solutions across eight environmental themes: renewables and alternative energy, energy efficiency, water infrastructure and technologies, pollution control, waste management and technologies, climate support systems, food and agriculture, and health mitigation.

The strategy typically invests in pure-play companies, defined as having at least 50% of revenues dedicated to a climate mitigation or adaptation solution or a minimum of 20% revenue exposure if we believe that percentage will increase over time. Seeking to capitalize on the opportunity with early or established innovators, the all-cap strategy has plotted closer to the ACWI SMID, an index representing small and mid cap stocks globally. The investment team also leverages scientific research collaborators to help bridge the gap between science and investing. For example, RAM's decade-long collaboration with The Ocean Foundation (TOF) has been an important component of the investment process. Led by Mark J. Spalding, TOF brings its deep climate and ocean expertise to provide scientific validation and supports RAM's idea generation, research, and engagement process.

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