

THE HARD PATH TOWARDS SUSTAINABILITY: AN ANALYSIS OF THE NEW GREEN ENERGY GIANTS PERFORMANCE

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Abstract

The paper aims to evaluate the perspective of sustainability on the basis of past performances and current policies. In the path to decarbonisation, a significant role is played by investments for the transition of the global energy sector to renewables. Global consumption of clean energy has soared over the last decade, as companies more than doubled the amount of electricity they are able to produce using zero-emission technologies, like solar panels and wind turbines. Five years ago, clean power was still viewed as a fragmented business and the renewable energy market was an emerging market. Today, clean energy is considered such a safe bet that pension funds and insurers are competing to own large portfolios of solar and wind farms. In this paper, we propose to examine the performances of the new green fast-growing energy giants which, once modest utility companies, have emerged as global clean-energy “supermajors” and now rival the major oil companies in market value.

1. Objectives

Our main objective is to evaluate the perspective of sustainability on the basis of past performances and current policies. Starting from the “industrial revolution” in mid-eighties, humanity has experienced an extraordinary progressive improvement in standards of living. For about two centuries improvements had been mainly concentrated in Western Europe, North America and Japan. Since the last decades of the twentieth century growth expanded to some great other regions, particularly in Asia. Unfortunately, however, it is now getting clearer and clearer that this extraordinary growth of incomes and living standards could even threaten the survival of the human species. This is happening because the growth of last centuries has entailed a progressive increase in greenhouse gas in the atmosphere, with the consequence of increasing temperatures all over the world. Rising temperatures have been causing dangerous phenomena such as loss of sea ice and ice sheet mass, sea level rise, longer and more intense heat waves, shifts in plant and animal habitats. Such long-term climate trends could be extremely dangerous for the quality, and perhaps even the safety, of human life:

"We are faced now with the fact that tomorrow is today. Over the bleached bones and jumbled residues of numerous civilizations are written the pathetic words "Too late" (Martin Luther King, New York, 4 April 1967, quoted from Gollier and Tirole, 2015, p. 5)

"If no strong collective action is undertaken soon, climate change is expected to dramatically deteriorate the well-being of future generations. Although the precise consequences of our inaction are still hard to quantify, there is no question that a business-as-usual scenario would be catastrophic." (Gollier and Tirole, 2015, p.5)

"Climate change is one of the most challenging problems that humanity has ever faced. At stake are hundreds of millions of lives, innumerable species and ecosystems, the health and viability of the economy, and the future habitability of this planet" (Union of Concerned Scientists, <https://www.ucsusa.org/climate/solutions>).

"Global warming is one of the most serious threats to the planet and to future generations" (petition signed by more than 1,500 of the world's most distinguished senior scientists, including the majority of Nobel laureates in science).

"The world needs to get to zero emissions by 2050 if we're going to avoid a climate disaster. Solving climate change would be the most amazing thing humanity has ever done" (Bill Gates, 2020).

The main effects of climate changes have been highlighted by McKinsey (2020). After more than 10,000 years of relative stability, the Earth's climate has been changing very rapidly over the last century. Since the 1880s, the average global temperature has risen by about 1.1 °C. In absence of a strong decarbonisation, global average temperatures could reach about 2.3 °C above preindustrial levels by 2050; current actions to reduce emissions could delay this outcome to about 2080. Depending on the exact location, this can translate to an average local temperature increase of between 1.5 and 5.0 °C; the Arctic, in particular, is expected to warm more rapidly than elsewhere. Particularly dangerous would be increased temperatures in the Arctic, which could cause the melting of the permafrost with a strong release of greenhouse gases. This process would activate a feedback loop causing significant further warming, which could push the Earth into a "hot house" state, with frightening consequences. Most of the warming since 1850 has been caused by the rise in atmospheric greenhouse gas concentrations, in particular CO₂. CO₂ persists in the atmosphere for hundreds of years; in absence of large-scale actions to remove it, all of the warming that occurs will be nearly permanent.

As temperatures rise, acute hazards such as heat waves and floods grow in frequency and severity, and chronic hazards, such as drought and rising sea levels, intensify. Because of the likely further increase over the next decades, the number and size of the regions most affected by substantial physical impacts will continue to grow, with negative effects on liveability, workability, food systems, physical assets, infrastructure services, natural

capital. The impacts of increasing temperatures will likely be nonlinear as thresholds are breached, in India, by 2030 nearly 200 million people could be living in regions with an average 5 per cent annual probability of experiencing a heat wave that exceeds the survivability threshold for a healthy human being. Ocean warming could reduce fish catches, affecting the livelihoods of about 800 million people who rely on fishing revenue. By 2050 the number of people living in areas with a non-zero chance of lethal heat waves could rise globally to about 1 billion.

The frequency of severe hurricanes is expected to double in some parts of the south-eastern United States and triple in some parts of Southeast Asia by 2040. Both are densely populated areas with large and globally connected economic activity. As the Earth warms, the spatial extent and share of time spent in drought is projected to increase. The share of a decade spent in drought conditions is projected to be up to 80 per cent in some parts of the world by 2050, notably in parts of the Mediterranean, southern Africa, and Central and South America. Climatic hazards are agents of disaster in terms of what they may do to human settlements or to the environment. The mild Mediterranean climate is expected to grow hotter.

In the path to decarbonisation, a significant role is played by investments for the transition of the global energy sector to renewables. From this perspective, our study will try to shed lights on the market of clean energy including the main players, production and consumption and the evolution of market values of the fast-growing giants. The behaviour in the stock market and a comparison with oil and gas energy giants will be also provided. We will further investigate the threat of increased competition coming from the same oil companies (e.g. Eni) that are trying to diversify their production into wind and solar power and the global hunt for places where the sun shines strongly and the wind blows steadily. The results of our work will permit to evaluate the difficulties in reaching the objective of limiting the increase of global temperature below 2C° with respect to the pre-industrial level (Paris Agreement). Renewable energy such as solar and wind can be generated without producing heat-trapping carbon dioxide. A global transition to these cleaner fuels is the only chance we have of avoiding the most catastrophic effects of climate change.

2. Methodology

The analysis is based on data collected from the World Bank and yahoo.Finance. Data of greenhouse gases arising from energy production (CO2 emissions) will be taken from International Energy Agency (IEA). After a descriptive analysis of the sector, an econometric estimation of GARCH models will allow us to assess the dynamics and volatility of stock returns of the new fast-growing energy giants and the world's largest publicly traded oil and gas companies.

3. Results

Attempts to tackle the dangers of global warming because of greenhouse gas (GHG) emissions started in 1992 with The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, (the "Earth Summit"). An important achievement was an agreement on the Climate Change Convention (United Nations Framework Convention on Climate Change UNFCCC), signed by 154 countries, which later on would have led to the Kyoto Protocol in 1997 and to the Paris Agreement in 2015. The Kyoto Protocol, which was signed in 1997 and which entered into force in 2005, was the first implementation of measures under the UNFCCC. The protocol was superseded by the Paris Agreement, which entered into force in 2016.

The UNFCCC seeks for the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the earth's climate system. The treaty established differential responsibilities for three categories of signatory states: developed countries, developed countries with special financial responsibilities, and developing countries.

Developed countries were called upon limiting their emissions of greenhouse gases to their 1990 levels. Developed countries with special financial responsibilities (developed countries with the exception of those in transition to democracy and market economies) were called upon to provide new and additional financial resources, to meet the costs incurred by developing countries in complying with their obligations. Because key signatory states were not adhering to their commitments, the UNFCCC was criticized as being unsuccessful in reducing the emission of carbon dioxide.

The Kyoto Protocol established legally binding obligations under international law, for developed countries to reduce their greenhouse gas emissions in the period 2008–2012. The 2010 United Nations Climate Change Conference produced an agreement stating that future global warming should be limited to below 2 °C relative to the pre-industrial level. In 2012 the Doha Amendment to the Kyoto Protocol established further obligations for the period 2013–2020. The US did not ratify the Kyoto Protocol, and Canada denounced it in 2012. Japan, New Zealand, and Russia have participated in Kyoto's first-round but have not taken on new targets for the second commitment period.

At the 2015 UN Climate Change Conference in Paris 196 countries agreed to aim to limit global warming to less than 2 °C, and try to limit the increase to 1.5 °C. At the World Economic Forum of January 2021 the UNFCCC launched the 'UN Race-to-Zero Emissions Breakthroughs', aiming to transform 20 sectors of the economy in order to achieve zero greenhouse gas emissions.

Before the 2015 United Nations Climate Change Conference, National Geographic Magazine argued that: "Since 1992, when the world's nations agreed at Rio de Janeiro to avoid 'dangerous anthropogenic interference with the climate system,' they have met 20

times without moving the needle on carbon emissions. In that interval we've added almost as much carbon to the atmosphere as we did in the previous century."

Data show clearly how over the three decades after the earth's summit in Brazil, both global temperature and atmospheric CO₂ have continued to grow at a very alarming pace.

3.1 Reducing carbon emissions: the role of the new Green Supermajors

In spite of increasing global temperature and atmospheric CO₂, some important success was achieved however as far as the production of energy is concerned. Over the last decade companies more than doubled the amount of electricity they are able to produce using zero-emission technologies, like solar panels and wind turbines. Five years ago, clean power was still viewed as a fragmented business and the renewable energy market was an emerging market. Today, clean energy is considered such a safe bet that pension funds and insurers are competing to own large portfolios of solar and wind farms. Four new green fast-growing energy giants, namely the American NextEra, the Spanish Iberdrola, the Italian Enel and the Danish Ørsted have emerged as global clean-energy "supermajors" and now rival the major oil companies in market value.

The decline of oil-and-gas titans —Exxon, Chevron, Shell, Total, and BP— over the past two years has been matched by the rise of the new green energy corporations previously semi-obscure utility companies. BP's stock market value was US\$83 billion in the late autumn 2020, after losing about 40% of its value. Conversely, Enel, Europe's largest utility, had a stock market value equivalent to US\$110 billion in the late autumn 2020 after a 23% rise in the past year. Like Exxon Mobil Corp., Shell and BP before them, the green companies have built global portfolios to meet growing energy demand, only with wind and sun rather than fossil fuels.

The main four companies—Enel, Iberdrola, NextEra Energy and Ørsted—prioritized the building or buying of clean-power plants when those assets were still considered alternative and expensive.

NextEra is the world's biggest investor-owned producer of solar and wind energy; it has enough renewable capacity to power Belgium. Enel is Europe's biggest utility. Its green power unit was founded in 2008, making it one of the veterans of the clean energy market. With its broad geographic reach, Enel is positioned to help a growing number of countries make the transition to cleaner grids. Based in Italy, it operates in more than 30 countries. Ørsted has shed its fossil fuel assets and expanded its clean energy business to develop projects around the world. The company runs about a quarter of the world's operational wind farms at sea and has projects in development that will roughly double its capacity by 2025. Iberdrola has been slowly building hydroelectric dams and onshore wind farms for years. Now it's aiming to be the world's biggest producer of green electricity. Based in Spain, it operates in countries including U.S., U.K., Mexico, Brazil and Australia.

The strategy has already made them the world's largest renewable energy producers by capacity, but they want to get even bigger.

Many of the biggest renewable companies started in fossil fuels but began investing in renewable power years, sometimes decades, ago. Figure 5 reports the percentage variation of installed capacity of the "Green Supermajors" over the years 2010-2020. Data show that installed capacity of the largest companies has grown by 207% - on average- since 2010.

Renewables, especially wind and solar, are taking a role of increasing importance in the energy industry. Renewables, indeed, are now the cheapest form of new electricity in most of the world, which helps explain why they're spreading in the majority of markets. Wind and solar supply about 9% of electricity globally and their share will rise to 56% by mid-century (according to Bloomberg NEF).

Over the long term, electricity is going to steal market share from other sources of energy. From this perspective, if the energy story of the 20th century was oil, then this will be the century of electricity.

4. Implications

The United Nations Intergovernmental Panel on Climate Change 2018 Report stated that "Limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society." However, notwithstanding the growth of the renewable energy market and the success of the green companies, we are still far from rapid and effective global shift towards decarbonisation. The main implication of the analysis is that, *rebus sic stantibus*, governments should seriously consider the risk of a progressive increase of global temperature significantly beyond the limit of 1.5 C° with respect to pre-industrial times. Our work aims to investigate how this risk could be reduced by accelerating the production of electricity generated using zero-emission technologies.