



Contours of the energy transition: Investment by international oil and gas companies in renewable energy

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ABSTRACT

International oil and gas companies are deploying a range of strategies to invest in renewable energy technologies and projects. By now, the IOCs have become substantive players in the renewables market, lending their scale and business expertise to deploying clean energy. But they have seen mixed success in their efforts thus far, and the models IOCs choose to follow as they become interested in deploying renewables are still emerging.

1. Introduction

The current energy transition is typically described as a move towards a cleaner, low-carbon system. This has implications well beyond power markets, and touches on liquids, heating and cooling, industrial demands, and transportation. This paper focuses on the role of the “oil majors” in this transition, as they are crucial to the current energy system globally, and likely to its future as well. As governments pursue increasingly ambitious initiatives to reduce greenhouse gas emissions and decrease their reliance on fossil fuels or diversify their energy economies, international oil and gas companies (IOCs) are confronted with the challenge of repositioning their business strategies. [McGlade and Ekins \(2015\)](#) estimate that one-third of current oil reserves and one-half of gas reserves need to stay in the ground to limit change in average global temperature to 2°C. Some scenarios of the [International Energy Agency \(2016\)](#) project that growth in oil demand will plateau around 2040, but current projections fail to achieve the carbon emission reduction targets of the Paris Agreements. Actions to mitigate climate change will thus pose a threat to IOC’s bottom line, with the potential to lower long-term demand for carbon-intensive energy sources, damage public relations, and raise costs of operation via carbon taxes and expenditure on emissions-reducing technologies ([IIGCC, 2010](#)). [Stevens \(2016\)](#) argues that such consequences may increase stranded assets, pressure corporate stakeholders to divest shares, and ultimately, threaten the profitability of oil and gas production.¹

IOCs are already witnessing pressure from shareholders. In 2015, shareholders of BP PLC, Shell PLC, and Statoil ASA voted almost

unanimously for companies to disclose the financial risk associated with climate change ([Macalister, 2015](#); [Clark, 2015](#); [Moss, 2015](#)). The Rockefeller Trust announced its divestment of shares in companies that own hydrocarbon assets in 2014 ([Goldenberg, 2014](#)). The World Bank has also decided to stop funding oil and gas projects after 2019 ([World Bank, 2017](#)). [R. Garcia et al. \(2014\)](#) argue that the petroleum industry will be increasingly measured by their ability to reduce their environmental footprint, engage with local populations in supply and distribution value chains, safely develop and implement technological innovations at scale, and diversify into new energy resources. In other words, IOCs will have to increasingly align their bottom line with promoting sustainability.

In response, IOCs have become substantive players in the renewables market, lending their scale and business expertise to deploying clean energy. In the last two years, several IOCs have pledged hundreds of millions of dollars to invest in renewables. For example, Statoil pledged \$200 million in 2016 to establishing an in-house venture capital arm that will expand its renewables portfolio beyond wind power ([Statoil, 2016](#)). Total SA appears to be the most ambitious of IOCs with an annual pledge of \$500 million in renewable energy ([Blas, 2015](#)). According to Bloomberg New Energy Finance, Total Energy Ventures was third among VC funds in number of green energy deals signed in 2016 ([Hirtenstein and De Beaupuy, 2017](#)). Total, however, may be overshadowed by Shell’s pledge to double its original annual investments of \$1 billion on clean energies through its New Energy Division ([Brown, 2017](#)). Even BP, after leaving the solar market in 2011, announced last December a \$200 million investment in Europe’s largest solar power developer, Lightsource ([Ward and Thomas, 2017](#)) Fig. 1.

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¹ Read more at the Oxford University programme on sustainable finance, accessible at <http://www.smithschool.ox.ac.uk/research/sustainable-finance/>.

Big Oil's Clean Energy Budget

Oil majors have allocated the following funds per year for renewable energy

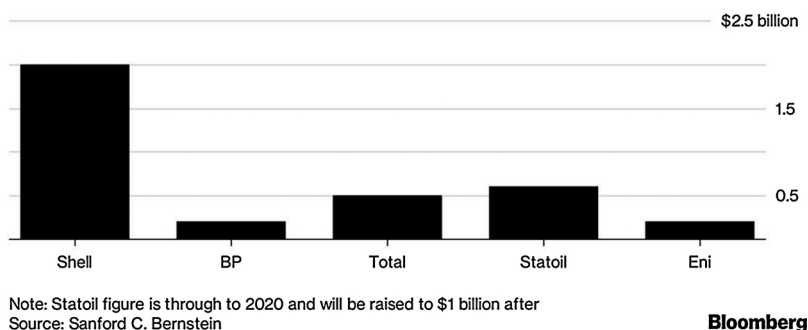


Fig. 1. Oil Major's allocated funds per year in renewable energy (Hirtenstein, 2018).

While IOCs' published projections show global demand for fossil fuel products increasing for the next two decades, many have taken initial steps to managing climate risk. These include factoring potential climate change policies into stress tests (e.g. carbon tax in planning exploration and production projects), reducing holdings in fossil fuels (namely coal), reducing carbon emissions of operations (via carbon capture and storage technologies, eliminating flaring, increasing energy efficiency), and expanding operations in cleaner energy sources, such as natural gas and renewables (ExxonMobil, 2016; Royal Dutch Shell PLC, 2017; Statoil, 2017a,b; Total, 2017a,b,c).

Yet even with these promises to invest in renewable energies, the IOCs we reviewed appear to have dedicated only a small percentage of capital expenditures to expanding their renewable portfolio. In 2016, Shell reported a CAPEX of \$200 million (Shell, "Portfolio Resilience" 2016) on renewables—compared to its total CAPEX of \$80 billion (Shell, "Annual Report" 2016). Some IOCs have divested their holdings in renewables due to low returns on investment or to supplement up-front capital in light of low oil prices. For example, BP, once marketed as Beyond Petroleum, shut down its alternative energy headquarters in 2009 (Macalister, 2009) and did not pursue renewables for five years until its first consideration of wind farms in 2016 (Crooks, 2016). ExxonMobil maintains small investments in renewables, having only staked out algae biofuels and fuel cells, but chooses to focus more on funding small research projects rather than business ventures (Hirtenstein, "Exxon Green Projects" 2017). Chevron is one of the most passive of the IOCs in expanding its renewable portfolio as it has not provided any targets for future investments in clean energy (Chatterton, 2017). These publicly traded companies have a primary fiduciary responsibility to maximize shareholder value, and companies developing renewable materials, processes, or chemicals to date have generated only one-sixth of invested capital (Gaddy et al., 2017). IOCs with a stake in clean energy have described investing in renewables as a medium- to long-term strategy (Chatterton, 2017).

The remainder of this paper is organized as follows: Section 2 describes the methodology and the four primary business strategies in renewable energies identified. Section 3 offers a brief discussion. Section 4 concludes.

2. Methodology

This paper does not evaluate whether IOCs' business models are compatible with adopting renewable energies as such ventures are too nascent to allow for thoughtful judgments on their success. Instead, it summarizes the strategies IOCs have deployed to incorporate renewables into their operations in an effort to elucidate existing motivations, challenges, and opportunities. This review includes publicly disclosed investments (largely from gray literature) since the early 2000s. Due to the recent nature of investments, sources are taken from IOCs' press releases, annual reports, and websites, public databases of venture

capital funding, which are cross-referenced with news articles, media sources reporting investments, and SEC filings.

We have focused our attention on Statoil, Shell, Total SA, BP, Chevron, ExxonMobil, and Eni and analyze their activities in promoting solar, wind, and biofuels. Clean energy solutions include power plants, battery storage, hardware integrators, software, equipment leasing, and more. This paper adopts a modified version of the framework in Chesbrough (2002) and categorizes case studies according to two dimensions: (1) the degree to which startups' services are integrated into the investment company's operations (tight vs. loose) and (2) the degree to which the investment diversifies the IOC's business operations (passive vs. active). The first axis captures the extent to which investments in renewables are linked to IOCs' operational competencies and resources. A tight linkage, in contrast with loose, might indicate a high degree of integration of the startup's resources into the IOCs' distribution channels or manufacturing facilities. The second axis differs from the first axis in that it emphasizes the strategic objectives of the investment. For example, an IOC may invest in renewables that reduce the carbon emissions of an operation, but this does not necessarily shift its primary business model towards renewables. Such an example would indicate a passive degree of diversification. Although Chesbrough's framework applies solely to corporate venture capital investments, renewables are an emerging market from the perspective of IOCs, and thus it provides a useful analogy.

We categorize the most common types of investments in renewables as those that: (1) integrate renewable energy with oil and gas production, (2) extend expertise in oil and gas production to deploying renewables, (3) provide venture capital funding in innovative technologies and business models, and (4) explicitly aim to establish a vertically integrated value chain in renewable energy production. We include this framework to emphasize IOCs' challenges to find synergies between existing expertise and innovative new energy frontiers while extending their capabilities to new value chains, operational capabilities, and business models.

Degree of diversifying IOC's commercial business operations	Degree to which startups' services are integrated into the investment company's operations	
	Tight	Loose
Passive	Integrating renewable energies into oil and gas production	Venture capitalism
Active	Integrating oil and gas competencies into producing renewable energy	Building vertically integrated value chain in renewable energy

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