International Oil Companies’ Low-Carbon Strategies: Confronting the Challenges and Opportunities of Global Energy Transition

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Abstract. The traditional petroleum industry has already sensed the rising pressure and challenges from the historical energy transition toward a low-carbon energy future. International Oil Companies as the leading peer group have more options to adapt to the new business climate and response with strategic moves. IOC’s Low-Carbon strategies can be summarized into three categories which include a shift towards gas production, and a direct involvement in low-carbon sector as well as collaboration with peers. IOCs have certain strengths in renewables and are confronting with opportunities driven by fast growing new energy electricity market and dramatically falling costs of solar PV and wind. However, IOCs are also confronting with risks and apt to weigh up the returns of renewables against oil and gas developments.

1. Introduction

Energy transition is a change in the global, regional and local energy mix. There have been two main energy transitions in history — from biomass to coal and from coal to oil and natural gas. The driving force in earlier transitions was the shift to more useful energy sources with better functionality at a lower cost. The current transition refers to the transition from today’s fossil fuel-based energy system to a more diversified and renewable energy-based system. It is different from the prior energy transitions in the aspect that one of the primary force behind it is the push to reduce greenhouse gas emissions generated by the burning of fossil fuels. Thus the transition not only will be a technological fix but will require some combination of economic, political, institutional and socio-cultural changes. [1] It is a common sense now that the energy transition is surely to come, although the transition is proved to be slow and concurrent with many uncertainties. According to International Energy Agency’s most recently issued World Energy Outlook 2018, the world is gradually building a different kind of energy system characterized by shifting supply, demand and technology trends. IEA forecasts a decline world share of fossil fuels’ in all its three scenarios. Notably in IEA’s Sustainable Development Scenario, the share of fossil fuels’ demand drops from 81% in 2017 to 60% by 2040 while the share of renewables rises from 7% in 2000 to 10% in 2017 and 30% by 2040 [2].

The traditional petroleum industry has already sensed the rising challenges from the energy transition, which derives not only from the quick development of renewables like wind and solar PV but also pressures from government policies and the general public. The old discussion of ‘peak oil’ has changed from ‘production peak’ to ‘demand peak’. Wood Mackenzie as one of the leading consulting companies in petroleum industry forecasts a global oil peak demand at 110 million b/d in 2036 [4]. Oil companies which pursue long-term sustainable development are wise to be well positioned in the new historical...
trend of energy transition, while their responses and strategic choices in itself can significantly influence the situation and timing of the energy transition.

2. Overview of International Oil Companies’ Low-Carbon Strategies

Traditional fossil-fuel based producers have faced growing pressure to respond and adjust to this new business climate of energy transition. However, the response from upstream oil and gas companies has varied significantly. For Independent E&P companies, the primary response has largely involved increased disclosure, including alignment with principles set forth by the Task Force on Climate-related Financial Disclosures in annual and sustainability reporting, as well as interaction with CDP, previously the Climate Disclosure Project. While the global integrated oil companies (In this paper refers to the peer group which includes BP, Chevron, ExxonMobil, Equinor, Eni, Repsol, Shell and Total.) have more options available than the other players due to much more sufficient capital, management skills and strategic views. Although the upstream oil and gas segment remains the central focus (generally accounting for 80-90% of corporate capex), they have increasingly sought to exploit their advantages with moves to diversify their portfolios to incorporate low-carbon energy solutions more directly with strategic concerns. However, the method and level of involvement in the low-carbon sector has varied considerably across the peer group. Generally the peer group’s low-carbon strategies can be summarized into three category.

One of the most general strategy adjustments among this group is a shift toward gas production. This strategic shift reflects efforts to position around the relative lower-carbon nature of gas as well as growing longer-term demand for gas. According to IEA, around 97% of gas consumed today has lower life-cycle emissions in density than coal. Electricity produced from gas that has been transported as liquefied natural gas (LNG) on average has 45% fewer emissions than coal. And natural gas is the fastest growing fossil fuel which is to overtake coal by 2030 and become the second-largest source of energy after oil and gas consumption is almost 45% higher in 2040 than today. [2] Notably, this trend has also resulted from a growing share of gas versus liquids discoveries in recent years. This strategic adjustment can be seen from the rising share of gas production. Almost all the companies in the peer group have taken this strategy to some extent. For the group, gas accounted for almost 46% of production in 2017 on average, up from 37% in 2005. Eni was the fastest growing one whose gas share grew from 34.5% in 2005 to 50.7% in 2017.

Beyond gas, companies in this group have pursued particular strategies focused directly on new energies to position their portfolios for a lower-carbon energy landscape. This has included reduce in emissions from existing oil and gas operations; sale of the assets with high carbon emissions and environmental pollution; research and development (R & D) within the low-carbon energy space; direct

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Data Source: Wood Mackenzie [3]

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acquisitions within the renewables, energy storage, alternative transportation, biofuels, and power generation and distribution sectors; or direct investments via in-house venture capital funds.

Table 1. Global Integrated Oil Companies: Current activities in the new energy sector.

| Current development focus and/or stated part of current strategy | BP | Chevron | Eni | Equinor | ExxonMobil | Repsol | Shell | Total |
|---------------------------------------------------------------|----|---------|-----|---------|------------|--------|-------|-------|
| Reduce direct operational emissions                           |    |         |     |         |            |        |       |       |
| Solar                                                          |    |         |     |         |            |        |       |       |
| Wind                                                           |    |         |     |         |            |        |       |       |
| Biofuels                                                      |    |         |     |         |            |        |       |       |
| Geothermal                                                    |    |         |     |         |            |        |       |       |
| Hydropower                                                   |    |         |     |         |            |        |       |       |
| Power transmission/distribution                               |    |         |     |         |            |        |       |       |
| EV/battery/charging infrastructure                           |    |         |     |         |            |        |       |       |
| Carbon capture, utilization, and storage                       |    |         |     |         |            |        |       |       |

Current development focus and/or stated part of current strategy
Existing area of research and/or discussed as potential investment area

Source: HIS Markit [3]

Moreover, these companies have also pursued low-carbon strategies by collaboration with peers. This has involved the creation of organizations such as the Oil and Gas Climate Initiative (OGCI). OGCI includes the entire peer group, and targets $1 billion in investment over the next decade to reduce greenhouse gas emissions. Another example is the World Bank’s “Zero Routine Flaring by 2030” initiative, which includes BP, Eni, Equinor, Repsol, Shell, Total and other Global Integrateds as well as governments.

Notably, the level of involvement in the low-carbon sector has varied considerably across the peer group. The European companies are more exposure to new energy sector via direct investment, whereas the US-based companies are generally centred on improving efficiency and emissions reduction from oil and gas operations or alternative energy R&D. For example, Norway based Equinor is the leading pioneer of low-carbon strategy among the peer group, which has already fostered its competitiveness in offshore wind. As a reflection of its commitment to broadening beyond fossil fuels, the company changed its name from Statoil to Equinor in May 2018. Equinor has outlined potential investment within New Energy Solutions of $500–$750 million per year between 2017 and 2020, and $750 million to $1.5 billion annually between 2020 and 2025. The company has indicated that existing projects within its New Energy Solutions portfolio can generate returns of 9–11%. Longer term, Equinor is targeting its New Energy Solutions segment to comprise a 15–20% share of corporate capex by 2030 (compared with an estimated 4% in 2016). Comparatively, US-based ExxonMobil’s emphasis to date has been cantered on oil and gas operations or alternative transportation fuels and the total investment since 2000 is about $8 billion which has been mainly focused on improving efficiency and emissions from upstream oil and gas operations [4].

3. International Oil Companies: Advantages, Opportunities and Risks in Renewable Energy

3.1. Advantages in Renewable Energy

The renewable energy space is extremely competitive, however International Oil Companies have certain strengths or advantages that should position them to succeed in new energy sectors. Wood Mackenzie has summarized these strengths into 5 key points [5].

First is IOCs’ tolerance for above ground risks. The IOCs are accustomed to doing business in challenging parts of the world and managing the related risks. Some of the best opportunities for the IOCs to succeed in renewable energy could lie in less accessible emerging or non-investment-grade...
markets, where large-scale projects could potentially be deployed and competition is less intense. Sub-Saharan Africa and Middle East renewable markets are two examples.

Second is IOCs’ strong balance sheets. Operating in riskier markets will mean project finance is harder to come by, more expensive, or higher rates of equity will be required. Having sufficient balance sheet strength to finance projects without debt will be an advantage. The IOCs should also be well positioned to participate in mega renewable energy projects, where they can more easily deploy large amounts of capital than smaller players.

Third is IOCs’ project management and engineering expertise. Renewable energy generation projects typically have a much lower level of technical complexity than upstream oil and gas developments, however, experience with operating offshore will clearly be an advantage for the majors in the offshore wind space.

Fourth is IOCs’ Geographically diversified portfolios and established relationships with governments. Renewable energy opportunities are global and most of which are active across all continents. Having local teams and established relationships and supply chains will be an advantage in emerging markets.

Fifth is IOCs’ activeness in M&A. All of the IOCs have already established venture capital or new energy arms that may already have capital allocated for small-scale M&A or equity investments. All the IOCs have experience of large-scale M&A and would be able to acquire and integrate established market players if attractive opportunities arise.

Beyond these strengths, IOCs’ R&D capability and long-term strategy view also can bring competitiveness in renewable energy space.

3.2. Opportunities and Risks in Renewable Energy

The global renewable energy market is growing at an exponential rate driven by favourable government policies and technological advance. For IOCs, solar PV and wind are the most promising sectors to step in due to its market scale and sharply decreasing costs as well as earning capacity. The oil Majors currently own less than 2% of operational global wind and solar PV projects, which has a lot of room for improvement.

In 2016, net capacity installations of wind and solar PV overtook conventional power generation capacity for the first time, and in 2017, almost 100 GWdc of solar PV and 50GWdc of wind was installed worldwide. Wood Mackenzie has forecasted solar PV and wind combined will account for 35% of global power capacity by 2035. Capital deployed in global wind and solar PV markets has exceeded USD $200 billion annually. The gap between global investment in oil and gas and renewables has now narrowed significantly. Wood Mackenzie has forecasted that investment in solar PV and wind will amount to 1,032 billion USD which account for 40% of the investment in global upstream oil and gas and is more than the double of the spend in the U.S. unconventional oil and gas sector between 2018 and 2022. By 2035, there will be over 3,700 GW of wind and solar PV installed worldwide, which will exceed oil plus gas at a share of 35% of global power capacity [5].

One of the most important elements that drives renewable energy’s exponential growth rate is the dramatically falling costs. PV and wind can already out-compete conventional technologies on cost and are only going to get cheaper. The average price of a PV module has fallen by over 90% since 2005. Wind and solar PV project costs are highly dependent on turbine and module costs, respectively. A key trend in both technologies is a move toward ever larger turbines or more efficient modules with higher power rating. This leads to a reduction in balance-of-plant costs, as fewer pieces of equipment are required for the same power output; as such, costs for labor, land wiring and cabling, and foundations will all fall. Capital costs for wind and solar PV projects will continue to fall too. Wood Mackenzie expects the most aggressive capex reductions in offshore wind, where increasing turbine sizes and project sizes will provide economies of scale. Offshore wind capex will fall from USD $4.52/W to $2.18/W for projects taking FID in 2022. For solar PV, module prices will decline rapidly in the second half of 2018 and into 2019 as a slowdown in the Chinese PV market. By 2022, global capacity-weighted PV capex will be USD $0.71/W, less than half the level of 2015.
Because of the falling costs, and the growing market prospect, solar PV and wind become more competitive and profitable than some conventional oil and gas projects. After economic modelling and assessment, Wood Mackenzie has drawn the conclusion that IRRs for renewable energy projects typically range from 5%-9%, but could be as high as 17% in scenarios with low capex and high power prices. These returns compare favourably with investments in oil and gas downstream operations, and the low-end of expected returns offered by upstream M&A and exploration while representing much lower risk investments. The IRRs for downstream oil and gas is 7% and 8-15% for exploration and M&A. Whereas, IRR for North America Onshore oil and gas is 33% which is far more beyond solar PV and wind [6]. Though renewable energy sectors have promising economic future in the long run due to huge space for costs reduction and favourable policy environment as well as public support. IOCs are still apt to think of investment returns first. However it is unwise to neglect the growth opportunity in renewables. IOCs need to develop their strengths in renewables and build up expertise and more diversified portfolios to hedge against any future erosion of the upstream value proposition and hardening investor sentiment towards carbon.

However there are also risks for IOCs to pursue a low-Carbon strategy. On the one hand, failure to recognize a transitioning energy landscape may lead to investments in certain types of hydrocarbons that ultimately yield suboptimal returns. On the other hand, moving too rapidly away from core businesses could weigh on returns into unfamiliar technologies with uncertain prospects for profitability. Furthermore, a rapidly transforming new energy sector creates its own level of stranded asset risk, because new innovations could bypass existing technologies and lead to unproductive investments in these newly obsolete technologies or resources. This challenge has been evident in the approach of several of the Global Integrated companies, many of which have opted to pursue small investments in a diverse array of technologies, as opposed to large investments in a few selected areas.

4. Conclusion
Though the timing of the energy transition is highly uncertain, oil and gas companies need to prepare for the possible accelerating energy transition toward a sustainable and low-carbon energy future. The IOCs has already take strategic responses to the new business climate with varied methods and levels but still in a cautious way. They are still getting to grips with the value proposition, weighing up renewables against oil and gas developments and the timing of any transition. This presents difficult capital allocation choices in the near term. The IOCs need to strike a balance between sustaining their core oil and gas business while keeping their options open in alternative energy. Whereas, the benefits of achieving first mover advantage will have to be weighed up against the danger of value destruction from an overly aggressive growth strategy. Yet leave it too late and the best opportunities may disappear and entry costs may be much higher.
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