Atlantic Council

GLOBAL ENERGY CENTER

ISSUE BRIEF

Navigating the Energy Transition

International Oil Company Diversification Strategies

JANUARY 2019 DAVID KORANYI

INTRODUCTION

International oil companies (IOCs) are facing a set of interconnected challenges that will fundamentally affect their business models.

Energy markets and technologies are rapidly changing. The world economy will continue to need oil and gas in significant quantities, likely for a long time to come,[1] but the supply and demand picture is highly unpredictable due to the potential for major shifts in how energy will be produced and consumed in the coming decades.

Even as the demand for oil is unlikely to quickly diminish, low-carbon energy technologies represent new business opportunities and will take up a rapidly increasing percentage of the market. External competitors are also moving into the energy market to capitalize on these opportunities.

Oil and gas producers will likely face heightened public pressure to decrease their greenhouse gas footprints following the latest dire warning by the Intergovernmental Panel on Climate Change in October 2018 on the worse-than-expected consequences of even a limited change in average temperatures.[2]

This issue brief provides a macro picture of select IOC's strategic (re)-thinking and explores some of the strategies IOCs have undertaken to diversify their portfolios and prepare for the unfolding energy transition. It is an initial attempt to survey the spectrum of strategies and, as such, it does not analyze and evaluate the strategies in detail, nor does it capture the full picture across the energy sector. This approach is valuable for

The **Global Energy Center** promotes energy security by working alongside government, industry, civil society, and public stakeholders to devise pragmatic solutions to the geopolitical, sustainability, and economic challenges of the changing global energy landscape.

1 International Energy Agency, *World Energy Outlook 2017*, (Paris: OECD Publishing/IEA, 2017), https://doi.org/10.1787/weo-2017-en.

2 Intergovernmental Panel on Climate Change, *Global Warming of 1.5 °C*, an IPCC special report on the impacts of Global Warming of 1.5 °C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, Summary for Policymakers, October 2018, http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf.

providing a comparative overview and identifying topics for further research. The brief focuses on IOCs, mindful of the fact that national oil companies (NOCs), as well as smaller oil and gas sector players, are battling many of the same challenges.[3]

PRESSURES FACED BY THE OIL AND GAS INDUSTRY

The world is in a transition between an era dominated by fossil fuels and one focused on a low-carbon economy. While the speed, timing, and details of the transition are highly uncertain, the direction should be clear: toward a low-carbon future, due to the imperative to reduce greenhouse gas emissions to mitigate the impacts of anthropogenic climate change.

Despite the pressures of climate action, the speed of the transition is hard to predict due to the complexity of the energy sector, differences in policies and incentive structures, and the diversity of actors affecting outcomes. Historically, energy transitions have unfolded over decades or centuries due to path dependency, the cost and long lead times associated with infrastructure development, inertia created by existing infrastructure, incumbent leveraging influence, and the lengthiness of innovation diffusion, among other factors.[4] Full energy transitions, on average, have taken almost a century to unfold.[5] Coal has maintained its centrality in power generation for more than two centuries, and oil has been dominating transport since the mid-twentieth century.[6] The underlying complexity of shifting today's enormous energy system has arguably become more complicated, thus the transition may take a long time to unfold.

However, today's energy transition may happen much faster due to its fundamentally "managed," policy-driven nature intended to mitigate the impacts of climate change and combat the environmental and health damages caused by fossil fuels. Transition in the energy sector is also affected by innovation in other sectors, such as material sciences, biology, and computing, which all have the potential to further accelerate shifts.[7] Historically, there are examples of sectoral energy transitions that took place at a much faster rate, e.g., in the case of the rapid buildup of French nuclear power or the Dutch gas industry, the shift to widescale use of biofuels in Brazil, and the transition from kerosene to liquefied petroleum gas cookstoves in Indonesia.[8]

Past energy transitions had fundamental implications for incumbents, and in many instances led to their (typically slow) decay.[9] The tumultuous and almost century-long waning of the British coal industry is one such example.[10] However, transitions can be delayed or slowed down by incumbent industries deploying their considerable political lobby and market power. For example, the charcoal industry fought against coal and coke to preserve its preeminence in ironmaking throughout the nineteenth century in France and Germany, with considerable success in delaying the transition.[11]

A number of drivers impact the nature and speed of the current transition.

First among them is a technology shift, with new energy technologies maturing and costs dropping significantly, especially in the past five years. The rapid advancement in battery technology, for example, has

3 It should be pointed out that Equinor ASA, which is majority owned by Norway but for all practical purposes operates as an IOC, will be covered in this paper rather than the forthcoming work on NOCs.

4 Bassam Fattouh, Rahmatallah Poudineh, and Rob West, "The Rise of Renewables and Energy Transition: What Adaptation Strategy for Oil Companies and Oil-Exporting Countries?" Oxford Institute for Energy Studies, Paper 19 (May 2018), https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/05/The-rise-of-renewables-and-energy-transition-what-adaptation-strategy-for-oil-companies-and-oil-exporting-countries-MEP-19.pdf.

5 Roger Fouquet, "Historical Energy Transitions: Speed, Prices and System Transformation." *Energy Research & Social Science*, 22 (2016), 7-12.

6 *A US Strategy for Sustainable Energy Security*, Atlantic Council Strategy Papers (with a foreword from former US Defense Secretary Chuck Hagel), March 4, 2016, http://www.atlanticcouncil.org/images/publications/AC_SP_Energy.pdf.

7 Benjamin K. Sovacool and Frank W. Geels, "Further Reflections on the Temporality of Energy Transitions: A Response to Critics," (2016) sro.sussex.ac.uk/72015/3/Sovacool%20Geels-Transitions-22-August-Final.pdf.

8 Sovacool and Geels, "Further Reflections on the Temporality of Energy Transitions."

9 Fouquet, "Historical Energy Transitions."

10 Ibid.

11 Fouquet, "Historical Energy Transitions."

The Google logo is spelled out in heliostats (mirrors that track the sun and reflect the sunlight onto a central receiving point) during a tour of the Ivanpah Solar Electric Generating System in the Mojave Desert near the California-Nevada border February 13, 2014. The project, a partnership of NRG, BrightSource, Google and Bechtel, is the world's largest solar thermal facility and uses 347,000 sun-facing mirrors to produce 392 Megawatts of electricity, enough energy to power more than 140,000 homes. Credit: REUTERS/Steve Marcus

created the possibility of affordable electric vehicles with substantial range and fast charging options. A Barclays study estimated a nine million barrels-per-day drop in oil demand from today's level if electric vehicles make up one-third of the car market by 2040.[12] At the same time, while electric vehicles may spread rapidly in terms of light-duty or personal vehicles, major questions remain with respect to heavy-duty vehicles and trucking. Additionally, there is little indication that an electric future is in sight for long-distance aviation or the maritime space. Nonenergy use of petrochemicals will also likely remain a persistent driver of significant oil demand for decades to come.[13] Energy developments in Asia will be of critical importance, as Asia has been predicted to be the center of both oil demand growth and the adoption of clean and disruptive technologies in the transportation sector in the decades to come.[14] As a result, prognosis on oil and gas demand, prices, and timelines for "peak demand" vary dramatically.

A second major driver is changing market fundamentals: the combined actual and potential effects of new energy-technology cost reductions on the supply side and shifting consumer preferences on the demand side, placing an increasing premium on low-carbon energy products in more market segments. The clean-energy disruption has already arrived in the electricity sector, where the majority of investments[15] in the past three years went into renewables.[16] Major procurers of energy such as Google, Amazon, Apple, and Walmart are shaping energy markets by prioritizing renewables in power-purchasing agreements. Oil companies are not immune to these trends, as most recently evidenced by ExxonMobil Corp.'s August 2018 request for proposals

12 "Electric Cars Will Wipe Out Oil Demand Equal to Iran's Output by 2025, Barclays Says," *CNBC*, October 5, 2017, https://www.cnbc.com/2017/10/05/electric-cars-could-cut-oil-demand-roughly-equal-to-irans-output.html.

13 International Energy Agency, *The Future of Petrochemicals: Towards More Sustainable Plastics and Fertilisers*, (Paris: OECD/IEA, 2018) https://webstore.iea.org/the-future-of-petrochemicals.

14 Robert J. Johnston and Lily Ghebrai, "Asian Energy Transition: Moving the Oil Market One Step Closer to Peak Demand?" Atlantic Council Issue Brief, January 2018, http://www.atlanticcouncil.org/images/Asian_Energy_Transition_web_0108.pdf.

15 International Energy Agency, *World Energy Investment Outlook 2018*, (Paris: OECD Publishing/IEA, 2018), https://www.iea.org/wei2018/

16 Pilita Clark, "The Big Green Bang: How Renewable Energy Became Unstoppable," *Financial Times*, May 18, 2017, https://www.ft.com/content/44ed7e90-3960-11e7-ac89-b01cc67cfeec.

from solar or wind power suppliers in order to buy renewable energy to power its Texas facilities.[17]

Consumer preferences also affect government and international policies, the third major driver. Overall, government policy is already playing a much more important role than in past transitions. So far, most national governments have prioritized affordable energy usage and mobility for their citizens and have undertaken only cautious measures on curbing greenhouse gas emissions, with minimal impact on IOC business models. However, policy shifts are increasingly driven by growing societal concerns about issues such as air pollution and other environmental concerns, shifting priorities in urban planning, and, of course, climate change, even if greenhouse gas emission reduction considerations are not (yet) the primary driver of the energy transition. As the devastating impacts of climate change become clearer, governments may decide to adopt more assertive mitigation policies against fossil fuels, accelerating the shift. More than 1,200 pieces of legislation connected to climate action—compared to around sixty just two decades ago—were passed and are in effect around the world.[18] The United Kingdom, France, India, and China have announced plans to limit sales of cars with internal combustion engines (ICEs) within the next two decades, and much more forceful policy interventions may be in the offing. Policy shifts in a major market such as China can send a strong signal to the rest of the world, with significant implications for corporate value chains and business models.

International agreements also add to the pressures. Set by the United Nations General Assembly in 2015, Sustainable Development Goal 7 on ensuring access to affordable, reliable, sustainable and modern energy for all foresees a transition in the energy sector and advocates for the increased use of renewables. Though not binding, it provides an important blueprint for national policies and influences the thinking of governments and subnational units as well as companies within and outside the energy sector.

A fourth driver is investor and stakeholder pressure related to climate change. There is a growing campaign advocating for divestment from fossil fuels related to economic activities, and shareholders in many IOCs are making vocal demands for climate action. Investors pledging divestment range from Norway's sovereign wealth fund and American university investment funds to major insurance companies and pension funds. Funds committed to divesting from fossil fuels now account for more than $6 trillion, with pledges by nearly 1,000 institutional investors. IOCs such as Royal Dutch Shell PLC referenced divestment as a "material risk" to its business,[19] while the Bank of England warned of systemic financial-sector risks and called for carbon-footprint disclosures.[20] In some instances, investor pressure manifests itself in another way: due to the pessimistic assessment on future demand outlook, some investors are pushing companies to prioritize short-cycle investments, such as shale, due to the fear of long-term commercial viability and stranded assets. Many of the IOCs have also been the subject of lawsuits—none of which have been concluded to date[21]—brought by state and local jurisdictions, as well as NGOs and private citizens, alleging liability of the producers for billions of dollars of damages caused by climate change.[22]

17 Brian Eckhouse and Kevin Crowley, "Exxon Seeks Wind, Solar Power Delivery in Texas," *Bloomberg*, August 27, 2018, https://www.bloomberg.com/news/articles/2018-08-24/exxon-is-said-to-seek-wind-solar-power-delivery-in-texas.

18 Michal Nachmany et al., *Global Trends in Climate Change Legislation and Litigation, 2017 Update*, Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, May 2017, http://www.lse.ac.uk/GranthamInstitute/publication/global-trends-in-climate-change-legislation-and-litigation-2017-update/.

19 Damian Carrington, "Fossil Fuel Divestment Funds Rise to $6tn," *Guardian*, September 2018, https://www.theguardian.com/environment/2018/sep/10/fossil-fuel-divestment-funds-rise-to-6tn.

20 Pilita Clark, "Mark Carney Warns Investors Face 'Huge' Climate Change Losses," *Financial Times*, September 29, 2015, https://www.ft.com/content/622de3da-66e6-11e5-97d0-1456a776a4f5.

21 David Hasemyer, "Fossil Fuels on Trial: Where the Major Climate Change Lawsuits Stand Today," *Inside Climate News*, September 10, 2018, https://insideclimatenews.org/news/04042018/climate-change-fossil-fuel-company-lawsuits-timeline-exxon-children-california-cities-attorney-general.

22 Amy Harder, "Big Oil Teeters between Enemy and Ally in Climate Fight," *Axios,* June 4, 2018, https://www.axios.com/big-oil-teeters-between-enemy-and-ally-in-climate-fight-d78db1a3-775e-4185-a5ad-698a4d6dc85a.html?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top.

Amid these changes and pressures, IOCs are evaluating their strategies and weighing options for positioning themselves in the energy transition.

The core challenge for oil companies is to anticipate energy-sector disruptions amid uncertainty and adjust their business models to decarbonize their existing assets and integrate low-carbon assets into their portfolios. Timing is a critical element and a major dilemma. Adaptation strategies that lack ambition or come too late could lead to lost market opportunities and weakened competitiveness on new energy markets as competitors pull ahead. Yet making investment and acquisition decisions early comes with risks in the form of wasted resources and asset write-offs.[23] BP PLC invested billions of pounds in low-carbon technology, energy efficiency research and development (R&D), and green energy in the 1980s and 1990s, but eventually decided to abandon their efforts and focus on their core oil and gas business.[24] BP and Shell tried to diversify into renewables in the mid-2000s, with Shell moving into offshore wind and BP attempting to define itself as "beyond petroleum" by investing in solar and biofuels. These strategies were short lived mainly due to the high costs of immature technologies and the renewable energy markets at the time. Chevron Corp. invested in geothermal capacity in Indonesia, only to sell its operations in late 2016 due to unprofitability.[25] Another challenge was the lack of necessary technical and managerial skills to operate in a dramatically different market and regulatory environment, compared to upstream oil and gas development.[26]

DIVERSIFICATION STRATEGIES: A GRADUAL APPROACH

The majority of IOCs publicly acknowledge the challenges presented by the energy transition, though assessments of the severity of the changes and their imminence vary greatly. Some IOCs are cautiously preparing for potentially rapid changes in this energy transition and are experimenting with new technologies and forays into new sectors that could become new business models; others see any significant move beyond their core business competence as too risky, arguing that oil and gas demand will not collapse for a long time.

Most IOCs are taking a gradual approach. They continue focusing on their core business, but they leverage their core competencies and assets to cautiously diversify into low-carbon assets. The approach offers flexibility to ramp up diversification over time and to look into commercially viable ways to decarbonize their fossil-fuel assets.

However, there are differences in the extent to which companies are venturing into new energy technologies and innovation. The table below provides a cursory glance at what select IOCs are doing in the clean-energy space.

23 Fattouh, Poudineh, and West, "The Rise of Renewables and Energy Transition."

24 Terry Macalister, "BP Dropped Green Energy Projects Worth Billions to Focus on Fossil Fuels," *Guardian*, April 16, 2015, https://www.theguardian.com/environment/2018/sep/10/fossil-fuel-divestment-funds-rise-to-6tn.

25 Enrico De La Cruz, "Indonesia, Philippine Groups Acquire Chevron's $3 Billion Geothermal Assets?" *Reuters*, December 23, 2016, https://www.reuters.com/article/us-chevron-sale-geothermal-idUSKBN14C0OW.

26 Paul Stevens, *International Oil Companies: The Death of the Old Business Model*, Chatham House, May 2016, https://www.chathamhouse.org/sites/default/files/publications/research/2016-05-05-international-oil-companies-stevens.pdf.

ASPECTS OF IOC ADAPTATION EFFORTS*

	Scale of Investment Into Low Carbon	Renewables and Low Carbon Services/ Products	Battery Technologies	EV Charging	Clean Energy R&D	Natural Gas	Internal Cost of Carbon	Cutting Emissions
BP PLC	$500 million in low carbon activities, BP Ventures invested $400 million into start-ups and joint ventures	Ethanol from sugarcane, biopower from bagasse, wind and solar, developing carbon neutral products, aviation fuel from waste; Butamax, blending butanol into gasoline	BP Ventures investment of $20 million in ultra-fast charging battery developer StoreDot	Acquisition of UK provider Chargemaster, cooperation with FreeWire mobile charging station provider	Carbon capture, utilization, and storage (CCUS) projects in Algeria, United Arab Emirates	To reach 60% of total output by 2019	$40/ton, stress testing $80/ton	Zero net growth in operational emissions out to 2025, sustainable reduction of 3.5 million tons of CO2 emissions annually by 2025
Chevron Corp.	$1 billion in CCUS, Chevron Technology Ventures, $100 million Future Energy Fund "to invest in breakthrough technologies that enable the ongoing energy transition to a greater diversity of sources."	Small-scale wind, solar, geothermal and biofuel pilot projects, diesel fuel in California containing up to 20% renewable biomass-based diesel	N/A	Investment into ChargePoint	Over $1 billion spent on CCUS research and development, 29 MW solar-thermal enhanced oil recovery facility, the world's largest	Major investments into LNG in Australia	Price varies by geographic location depending on the existing and expected level of regulation	General commitment to "manage" GHG emissions, reduction of flaring by 26.2% since 2013, minimizing methane emissions
Eni S.p.A.	1.8 billion euros between 2018-2021	Biofuels, solar photovoltaics, wind and hybrid projects in Africa and Asia, bio-based chemicals	Co-operation with Ocean Power Technologies on subsea battery charging	Framework agreement to install high power-chargers for electric cars at Eni service stations with IONITY, a joint venture between Daimler, Ford, BMW and the Volkswagen Group	$50 million investment into Commonwealth Fusion System, in partnership with MIT, with potentially more to invest	Significant investments into gas in Egypt, East Africa, Indonesia	$40/ton	43% unitary direct emission reduction by 2025, 80% reduction in fugitive methane emissions, zero routine gas flaring
Equinor ASA	$500 million a year on clean energy projects, Equinor Energy Ventures investing $200 million	Offshore wind, solar, hydrogen, CCS, 15-20% of portfolio in new energy by 2030	Batwind offshore battery-storage solution, Convergent energy-storage asset developer	Investment into Chargepoint, EV charging network operator	25% of research funds going to new energy solutions and reducing emissions by 2020, focus on geothermal, hydrogen	Major gas producer from Norwegian continental shelf, major supplier in Europe	$50/ton	Target: 3 kg CO2/barrel of oil equivalents (boe)

* A full list of chart reference material can be found in the End Notes to this issue brief.

ASPECTS OF IOC ADAPTATION EFFORTS

	Scale of Investment Into Low Carbon	Renewables and Low Carbon Services/ Products	Battery Technologies	EV Charging	Clean Energy R&D	Natural Gas	Internal Cost of Carbon	Cutting Emissions
Exxon Mobil Corp.	$1 billion/year on R&D	Focus on algae, biodiesel, with a 10 thousand barrel per day target by 2022, large-scale involvement in existing CCS, 22.5% of world operating CCS capacity involves the company	N/A	Investment into EV charging under active consideration	Major investment into clean energy R&D, focusing on algae-based transportation fuel, research partnerships with 80+ academic institutions, including MIT, Princeton, Stanford, and Nanyang on clean energy R&D	Largest gas producer in the US market since the purchase of gas producer XTO in 2009, major investments into LNG, gas plays in Qatar, Papua New Guinea, Mozambique	Various levels according to jurisdiction	"Dedicated to reducing emissions from operations," reducing flaring and venting, committed to reducing methane emissions as member of OGCI, increasing efficiencies across the value chains, using co-generation to drive efficiency in power production for own facilities
Royal Dutch Shell PLC	$1 billion to $2 billion a year	Off-grid, weak-grid solar sector through Shell Ventures, microgrid developer GI, demand response solutions provider MP2, Shell Energy Inside—energy services of buildings	Axiom Exergy thermal storage, Sonnen home storage	Acquisition of NewMotion, an electric charger company with 30,000 plus installations across Europe	Multiple programs to support innovation, such as Shell GameChanger, Shell Ventures and Shell TechWorks in gas, biofuels, solar power, water treatment, CO_2 management and energy efficiency	Gas a priority since the 1990s, over 50% of output, LNG, gas-to-liquids, petrochemicals	$40-80/ton	Halving emissions by 2050
Total SA	Total Energy Ventures invested $160 million, $1.59 billion acquisition of majority stake in Direct Energy, an electricity retailer, and $284 million minority stake in wind energy company EREN, acquisition of GreenFlex, a company specialized in energy efficiency	20% of energy output from low carbon by 2035, ownership of solar panel manufacturer SunPower, investments into fuel cells, microgrid, CO_2 recycling	Focus on solid-state batteries, $1 billion for French battery maker Saft in 2016, stakes in Ionic Materials, Aquion Energy, Sunfire	Acquisition of G2 mobility and partnership with Nexans	Focus on natural gas and CCUS	Major part of the portfolio, big focus on LNG	$30-40/ton	Focus on reducing flaring, methane emissions

KEY TAKEAWAYS

First, the scale of investments in low-carbon technologies varies greatly between IOCs, but this investment remains a fraction of overall investments for all IOCs. By and large, all IOCs are continuing to bank on sustained oil and gas demand and are proceeding cautiously when it comes to more ambitious diversification away from their core business. Even Shell, the most bullish of the IOCs on the speed of the low-carbon energy transition—CEO Ben van Beurden predicted peak oil demand could occur by 2025[27]—spends less than 10 percent of its annual investments on renewables. Other IOCs invest at even lower rates.

Second, there are major geographical differences in company strategies. IOCs headquartered in Europe, namely BP, Shell, Equinor, and Total, tend to be more bullish when it comes to new energy investment and diversification strategies, while US-based IOCs view clean energy market developments conservatively, adopting more of a wait-and-see approach to emerging technologies and recognizing the inherent risks involved in being relatively early movers.

Third, most IOCs have been on a major shift toward natural gas, which for some dates to the 1990s[28] and for others began more recently. This is partly due to the recognition of the growing role of gas in electricity generation and its potential role as a bridge fuel to a low-carbon future,[29] and partly due to the difficulty in gaining competitive and easy access to oil reserves. Shell, BP, and Eni have been very dynamic in their diversification strategy to build up a gas value chain, banking on growing global gas demand and building up a portfolio of electricity-generation assets powered by gas. BP is on track to overtake Shell and Total in terms of the share of gas in its overall output, which is anticipated to reach 60 percent by 2019.[30] American companies have also invested heavily in gas. Exxon purchased unconventional gas producer XTO in 2009 for $41 billion,[31] and natural gas accounts for about 14 percent of Chevron's value.[32]

As part of the diversification effort, most IOCs also focus on increasing the role and expanding the value chains of their chemical operations, banking on the increasing need for hydrocarbon products in the petrochemical sector.[33] IOCs have also been emphasizing the rationalization of their downstream portfolios and consolidating refinery capacities in anticipation of more moderate demand growth or even decline.

Fourth, all IOCs emphasize cutting greenhouse gas emissions from their core hydrocarbon activities by increasing efficiency. Emissions-reduction pledges have become a standard feature in IOC corporate strategies and investor presentations, though the levels of ambition and timelines differ quite significantly. Several IOCs and NOCs (Exxon, Chevron, Eni, BP, Shell, Total, Equinor, Occidental Petroleum Corp., Repsol, Saudi Aramco, China National Petroleum Corp., Petrobras, and Pemex) joined together to support the Oil and Gas Climate Initiative (OGCI), a voluntary initiative aiming to take practical actions on climate change and reduce the carbon footprint of energy value chains.[34] OGCI set up a $1 billion fund to support investments into reducing methane leakage; reducing CO2 emissions; and carbon capture, utilization, and storage (CCUS) projects.[35]

In anticipation of more ambitious government policies to reduce carbon emissions, all companies in this study

27 Tim Pearce, "Shell CEO Predicts Peak Oil Demand by 2025," *The Daily Caller*, March 8, 2018, https://dailycaller.com/2018/03/08/shell-ceo-peak-oil-demand-2025/.

28 Amy Harder, "Why Big Oil Is Slowly Turning Green," *Axios*, December 11, 2017, https://www.axios.com/why-big-oil-is-slowly-turning-green-1513388514-5b982f91-9e6f-4518-932a-b45dcf976818.html.

29 The IEA forecasts that the share of natural gas in the global energy mix will grow by 2% annually until 2020 and that liquefied natural gas (LNG) will grow twice as fast as overall gas consumption, accounting for around half of all gas traded globally.

30 Robert Perkins, "Majors Trim Oil Exposure in Shift to Gas," *S&P Global Platts*, March 9, 2018, https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/030918-analysis-majors-trim-oil-exposure-in-shift-to-gas.

31 Exxon Mobil Corp. and XTO Energy Inc. Announce Agreement, ExxonMobil news release, December 14, 2009, https://news.exxonmobil.com/press-release/exxon-mobil-corporation-and-xto-energy-inc-announce-agreement.

32 Trefis Team, "A Quick Snapshot of Chevron's Natural Gas Business," *Forbes*, June 25, 2018, https://www.forbes.com/sites/greatspeculations/2018/06/25/a-quick-snapshot-of-chevrons-natural-gas-business/#74249cd12c8c.

33 International Energy Agency, *The Future of Petrochemicals: Towards More Sustainable Plastics and Fertilisers*, (Paris: OECD/IEA, 2018) https://webstore.iea.org/the-future-of-petrochemicals.

34 OGCI, https://oilandgasclimateinitiative.com.

35 OGCI, https://oilandgasclimateinitiative.com/climate-investments/

The companies in the OGCI set their first collective target for reducing the intensity of average Upstream methane emissions, aiming to bring it down from 0.32 percent (2017) to 0.25 percent by the end of 2025, with the ambition of eventually reaching 0.20 percent. New York, September 24, 2018. Source: Eni S.p.A./Flickr

apply an internal carbon price ranging between $30 and $50 per ton, though in some cases the exact methods of application are not transparent enough to evaluate their effectiveness and impact on business models. Some companies, such as Exxon, Shell, Total, and BP expressed their support for the introduction of a carbon tax in the United States and even committed resources to lobby in favor of legislation promoting a $40 carbon tax to be redistributed in the form of dividends, developed by the Climate Leadership Council.[36]

Fifth, investment into renewables and low-carbon electricity-generation capacity is increasingly the norm among IOCs in Europe. Shell, BP, Total, and Equinor are at the forefront, and Equinor (formerly Statoil) even changed its name to reflect its shift in strategy and ambition, becoming a major player in offshore wind in particular. Offshore wind platforms require similar expertise to offshore oil and gas platforms, and the company is trying to leverage its advantage with managing complex manned or unmanned offshore projects in difficult marine settings.[37] Even if they have not changed their names,[38] most IOCs have made considerable efforts to rebrand themselves as "energy companies" as opposed to oil and gas companies, in order to cast themselves in a more positive and progressive light from a climate perspective and retain the ability to attract and retain talent from younger generations interested in participating in the energy transition.[39] Pressures to take a more progressive role in climate action increasingly come from the ranks of their own employees, particularly in the case of European IOCs.

Sixth, creating a corporate venture-capital fund to invest in start-ups in the new energy space has also become a widespread practice mostly in Europe, with

36 *Climate Leadership Council*, https://www.clcouncil.org

37 Columbia Energy Exchange, "Eldar Saetre: Innovation and Transformation Across the Energy Landscape," Columbia University, Center on Global Energy Policy podcast host Jason Bordoff speaks with the president and CEO of Equinor, September 17, 2018, https://energypolicy.columbia.edu/eldar-saetre-innovation-and-transformation-across-energy-landscape?utm_source=Center+on+Global+Energy+Policy+Mailing+List&utm_campaign=bd26b5dde3-EMAIL_CAMPAIGN_2018_09_17_01_41&utm_medium=email&utm_term=0_0773077aac-bd26b5dde3-102129405

38 In 1998, *British Petroleum* changed its name to BP.

39 Columbia Energy Exchange, "Eldar Saetre."

Shell leading the charge by setting up its venture arm in 1996.[40] BP, Total, Shell, and Equinor have been ramping up investments through their venture firms in the past few years.

Seventh, all European IOCs are bullish on e-mobility and electric vehicles, buying up or partnering with electric-charging providers and expanding charging facilities, leveraging their retail networks in Europe. In Shell's case, this also stems from a more bullish outlook on the spread of electric vehicles (EVs),[41] while in most cases, it appears to be part of a hedging strategy to capture an emerging, albeit perceived to be marginal, market segment. This approach is only beginning to take hold in the United States, with Chevron's cautious investment into ChargePoint, and ExxonMobil's active interest in e-mobility.

Eighth, the further development of battery technologies is widely considered to be the potentially most disruptive factor for IOCs, as cheaper and more efficient batteries can speed up the deployment of electric vehicles, fundamentally affecting oil demand. The grid-scale deployment of batteries could also threaten the role of natural gas in electricity generation.[42] IOCs are closely watching this space, and some, like Total, BP, and Shell, are making smaller-scale investments in storage companies.

CONCLUSIONS

This issue brief offers a snapshot of IOC adaptation strategies. IOCs have diverging views on future market developments, the pace of the energy transition, about if, when and to what extent the role of oil will diminish, the ability of renewables and electric cars to penetrate the market, and the potential impact of clean energy developments on their business models. Yet, beneath the divergence, there is an underlying consensus that the threat to their core business model is not imminent, and a gradual approach to diversification is preferred for the time being.

At the same time more and more IOCs are identifying upside business opportunities for companies investing in new low-carbon energy technologies. European IOCs with more ambitious—if risky and potentially costly—diversification and acquisition strategies may find themselves at a critical advantage later. American IOCs are more conservative in their assessment of the impact of market shifts, government policies, declining low-carbon energy technology cost curves, and disruptive innovations in the energy space on their business models, but there are some recent signs that this approach may be changing.

The fundamentals of IOC business models and their ability to adjust to changing realities will be tested going forward.[43] Many IOCs have successfully reinvented themselves multiple times in the past. Time will tell which companies will benefit from the current energy transition and which ones will struggle to cope with the disruptions to come, and to what extent the oil industry can play a constructive role in developing a new, more climate-friendly energy system for the twenty-first century.

David Koranyi is a senior fellow for energy diplomacy at the Atlantic Council's Global Energy Center.

40 Karel Beckman, "Exclusive Interview: Mark Gainsborough, Head, Shell New Energies: 'We are further along than people realize,'" energypost.eu, June 21, 2018, http://energypost.eu/interview-mark-gainsborough-head-shell-new-energies-we-are-further-along-than-people-realize/.

41 Ron Bousso and Karolin Schaps, "Shell Sees Oil Demand Peaking by Late 2020s as Electric Car Sales Grow," *Reuters*, July 2017, https://www.reuters.com/article/us-oil-demand-shell-idUSKBN1AC1MG.

42 Mark Chediak, "The Battery Will Kill Fossil Fuels—It's Only a Matter of Time," *Bloomberg*, March 8, 2018, https://www.bloomberg.com/news/articles/2018-03-08/the-battery-will-kill-fossil-fuels-it-s-only-a-matter-of-time.

43 Stevens, "International Oil Companies: The Death of the Old Business Model."

END NOTES FOR "ASPECTS OF IOC ADAPTATION EFFORTS" CHART

Sources used for BP PLC:

BP PLC, "Advancing the energy transition," last updated 2018, https://www.bp.com/energytransition.

Tom Bergin, "Oil firms and carmakers diverge in costly debate," Reuters, December 6, 2016, https://www.reuters.com/article/us-oil-autos-projections-analysis/oil-firms-and-carmakers-diverge-in-costly-debate-idUSKBN13V18A.

Sources used for Chevron Corp.:

Chevron Corp., "Chevron 2018 Investor Presentation," last updated 2018, https://chevroncorp.gcs-web.com/static-files/666a32cb-f403-4c72-83dc-c921249906e6.

Chevron Corp., "Climate Change 2016 Information Request Chevron Corporation," last updated November 9, 2016, https://www.chevron.com/-/media/chevron/corporate-responsibility/documents/CDP-2016.pdf.

Sources used for Eni S.p.A.:

Eni S.p.A., "New solar energy technologies," last updated June 7, 2017, https://www.eni.com/en_IT/innovation/technological-platforms/renewable-energy/new-solar-energy-technology.page.

Eni S.p.A., "2018-2021 Strategy: Enhancing value through business integration and financial discipline," last updated March 16, 2018, https://www.eni.com/docs/en_IT/enicom/investors/2018/2018-2021-strategy/2018-2021-strategy.pdf.

Eni S.p.A., "Eni and MIT together for fusion power: Looking to the stars for clean, sustainable, and limitless energy," last updated June 15, 2018, https://www.eni.com/en_IT/innovation/technological-platforms/energy-transition/eni-mit-fusion.page.

Eni S.p.A., "Memorandum of understanding between Eni and UNDP," last updated September 24, 2018, https://www.eni.com/en_IT/sustainability/cooperation-model/local-partnerships/undp.page.

Eni S.p.A., "Eni and IONITY sign framework agreement to install high power chargers for electric cars at Eni service stations," last updated October 25, 2018, https://www.eni.com/en_IT/media/2018/10/eni-and-ionity-sign-framework-agreement-to-install-high-power-chargers-for-electric-cars-at-eni-service-stations.

Tom Bergin, "Oil firms and carmakers diverge in costly debate," Reuters, December 6, 2016, https://www.reuters.com/article/us-oil-autos-projections-analysis/oil-firms-and-carmakers-diverge-in-costly-debate-idUSKBN13V18A.

"Released today: in depth look at climate-related financial disclosure across four major oil and gas companies," World Business Council for Sustainable Development, last updated July 9, 2018, https://www.wbcsd.org/Programs/Redefining-Value/External-Disclosure/TCFD/News/In-depth-look-at-climate-related-financial-disclosure-acrossfour-major-oil-and-gas-companies.

Sources used for Equinor ASA:

Equinor ASA, "Socially Responsible Investor Day" presentation, last updated May 4, 2018, https://www.equinor.com/content/dam/statoil/documents/newsroom-additional-documents/news-attachments/04may2018-statoil-sri-day.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top-stories.

Equinor ASA, "2020," last updated 2018, https://2030.equinor.com/en/2020.

Tom Bergin, "Oil firms and carmakers diverge in costly debate," Reuters, December 6, 2016, https://www.reuters.com/article/us-oil-autos-projections-analysis/oil-firms-and-carmakers-diverge-in-costly-debate-idUSKBN13V18A.

"Released today: in depth look at climate-related financial disclosure across four major oil and gas companies," World Business Council for Sustainable Development, last updated July 9, 2018, https://www.wbcsd.org/Programs/Redefining-Value/External-Disclosure/TCFD/News/In-depth-look-at-climate-related-financial-disclosure-acrossfour-major-oil-and-gas-companies.

Sources used for ExxonMobil Corp.:

ExxonMobil Corp., "Research and Development," last updated 2018, https://corporate.exxonmobil.com/en/energy/research-and-development.

ExxonMobil Corp., "2018 Energy & Carbon Summary: Positioning for a Lower-Carbon Energy Future" presentation, last updated 2018, https://cdn.exxonmobil.com/~/media/global/files/energy-and-environment/2018-energy-and-carbon-summary.pdf.

Tom Bergin, "Oil firms and carmakers diverge in costly debate," Reuters, December 6, 2016, https://www.reuters.com/article/us-oil-autos-projections-analysis/oil-firms-and-carmakers-diverge-in-costly-debate-idUSKBN13V18A.

Sources used for Royal Dutch Shell PLC:

Royal Dutch Shell PLC, "Innovation Through R&D," last updated 2018, https://www.shell.com/energy-and-innovation/overcoming-technology-challenges/innovation-through-research-and-development.html.

"Released today: in depth look at climate-related financial disclosure across four major oil and gas companies," World Business Council for Sustainable Development, last updated July 9, 2018, https://www.wbcsd.org/Programs/Redefining-Value/External-Disclosure/TCFD/News/In-depth-look-at-climate-related-financial-disclosure-acrossfour-major-oil-and-gas-companies.

Sources used for Total SA:

Karolin Schaps, "FACTBOX-Energy companies' investments in startups," Reuters, December 2, 2018, https://de.reuters.com/article/energy-startups-idUKL8N1DV3PQ?type=companyNews.

Total SA, *Integrating Climate Into Our Strategy*, May 2017, https://www.total.com/sites/default/files/atoms/files/integrating_climate_into_our_strategy_eng.pdf.

Total SA, *Integrating Climate Into Our Strategy*, September 2018, https://www.total.com/sites/default/files/atoms/files/total_climat_2018_en.pdf.

Total SA, "2018 At a Glance," last updated 2018, https://total.publispeak.com/2018-at-a-glance/#page=C.

"Released today: in depth look at climate-related financial disclosure across four major oil and gas companies," World Business Council for Sustainable Development, last updated July 9, 2018, https://www.wbcsd.org/Programs/Redefining-Value/External-Disclosure/TCFD/News/In-depth-look-at-climate-related-financial-disclosure-acrossfour-major-oil-and-gas-companies.

Atlantic Council Board of Directors

The Atlantic Council is a nonpartisan organization that promotes constructive US leadership and engagement in international affairs based on the central role of the Atlantic community in meeting today's global challenges.

Atlantic Council

1030 15th Street, NW, 12th Floor,
Washington, DC 20005

(202) 463-7226, www.AtlanticCouncil.org