

# Oil Supermajors' Trajectory Towards Renewables Needs to Scale Up and Speed Up

*Neither Shell nor Total on Track to Meet Their Climate Goals Without a Step Change*

## Executive Summary

Neither Shell nor Total is on track to meet their decarbonisation targets.

While Shell and Total are shifting towards renewables, around 90% of their capital continues to be spent on fossil fuels. Total's announcement last week of US\$15 billion of debt financing dwarves its investment this year in zero carbon energy. An analysis of the capital spending and asset portfolios of the two oil and gas supermajors shows that they are likely to fall short on their near-term renewables and carbon reduction targets and will need a major shift in strategies and capital spending plans to achieve their ambitious longer-term climate goals. At the very least Total and Shell need to direct more than half of their capital investment each year to zero carbon investment if they are to reduce their carbon intensity in line with their own stated targets.

Among the supermajors, Shell, Total and BP have new ambitious goals to be net zero carbon emitters by 2050. This report analyses Shell's and Total's strategies, their recent progress, and reviews the credibility of their newly elevated plans. We will review BP in a follow-on briefing note.

USD	Target	Progress	Capex (avg 2018-2020)	% Invested in Renewables (2018-2020)
Shell	2017-2020 \$4-6bn	~\$3bn	\$25bn	3-5%
Total	2025 25GW installed	6.6GW	\$18bn	10-14%

Shell and Total are both investing significant amounts of capital in a range of zero- and low-carbon activities.

Total, in particular, is rapidly becoming a major player in the renewable energy sector, with plans for over 10 gigawatts (GW) of solar and wind assets by 2023.

Shell has made a large number of investments in a broad range of technologies from acquiring residential battery supplier Sonnen to electric vehicle (EV) charging

networks. However, compared with its continuing investment in upstream and downstream oil and gas assets, this investment is small.

It is difficult to see how either company will achieve the massive transformation in carbon intensity they aim for without a fundamental shift away from oil and gas investment, by significant capital investment reductions and/or divestment of currently core business assets.

With scope 3 emissions larger than a mid-sized developed country (Shell's emissions exceed Australia's), net zero cannot be achieved without materially reducing investment in oil and gas and growing zero or low-carbon products faster in absolute terms than fossil fuels. Liquefied natural gas (LNG) will not solve their problems, though green hydrogen should help. The companies continue to stress the importance of carbon capture and storage (CCS) and natural carbon sinks even though these strategies offer marginal assistance at best.

To make the kind of business change required to deliver on their admirable net zero objectives, Shell and Total will need expertise and momentum they currently do not have. Restructuring their businesses to report renewables separately (as Shell has indicated it will do) and including in their board and executive ranks people with renewable energy and transformation experience is a critical first step. Total and Shell are on the right path, but they must make a step change in their capability and speed of delivery if they are to succeed and avoid yet more asset write-downs.

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## Supermajors' Net-Zero Emission Goals

Oil and gas supermajor Royal Dutch Shell (Shell) aims “to become, by 2050 or sooner, a net-zero emissions energy business.”<sup>1</sup> Its path to that goal includes reducing its net carbon footprint by 30% by 2035 and by 65% by 2050, in part by spending \$6bn on renewable energy generation up to the end of 2020, and then \$2-3bn<sup>2</sup> a year until 2025.

**Figure 1: Shell's Emissions Objectives**



Source: [Shell website](#).

Total, the world's fourth largest oil and gas company, pledges 25GW of installed renewable energy by 2025, to be net-zero in Europe by 2050, and to reduce its carbon emissions intensity by 60% or more by 2050.

Both companies have now clearly articulated that they accept climate science as a reality and realise the need for oil and gas companies to do their part in reducing global emissions.

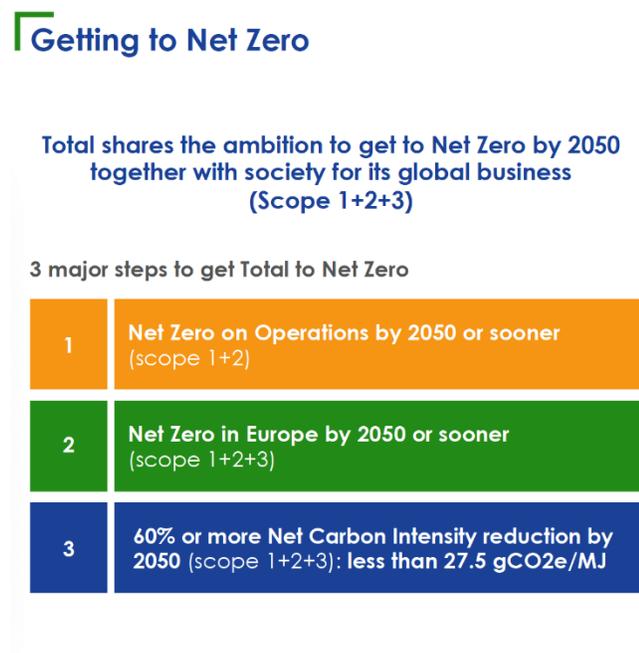
Since 2016, Total has sought to distinguish itself from its competitors “to become the responsible energy major.”<sup>3</sup> This involved committing to the UN Sustainable Development Goals and, in particular, integrating climate action into its strategy.

<sup>1</sup> [Shell website](#). 16 April 2020.

<sup>2</sup> All currency figures are US\$ denominated unless otherwise noted.

<sup>3</sup> [Total website](#). Accessed June 2020.

Figure 2: Total's Emissions Objectives



Source: Total 1Q FY20 Results Briefing, 5 May 2020.

But Total's strategy is not altruistic. CEO Patrick Pouyanné has stated (quoting the International Energy Agency) that demand for electricity is expected to grow faster than demand for fossil fuels.<sup>4</sup> The company is betting that, by executing better than its competitors in the electricity sector, Total will generate better returns, reduce its stranded asset risks in incumbent businesses, and retain investors in light of the fossil fuel energy sector being the worst performing equity market sector globally over the last decade. As he says, "It's not a shift, it's a genuine ramp-up."<sup>5</sup>

In his time as Shell's CEO, Ben van Buerden has moved slowly from emphasising Shell's mature upstream and downstream assets, highlighting the societal equity in providing energy to the half of the world's population that doesn't have access to oil and gas, and emphasising that it is governments' responsibility to deal with carbon policy, to now articulating a bold decarbonisation ambition for Shell. This year, in response to questions about its slow progress against its target of \$6bn investment by the end of 2020, Shell stated it plans to spend \$2-3bn per year on its New Energies strategy between 2021 and 2025.<sup>6</sup>

Addressing greenhouse gas (GHG) emissions is especially challenging for oil and gas

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> NS Energy. [Royal Dutch Shell could be set to miss out on its green energy targets](#). 3 January 2020.

companies. They have significant scope 1 and 2 emissions<sup>7</sup> but these pale in comparison with their scope 3 emissions; that is, the GHG emissions caused when customers use their products.

Shell's total annual emissions in 2019 of 656 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub>-e) and Total's of 458Mt CO<sub>2</sub>-e rank them among the most significant contributors to the build-up of greenhouse gases in the atmosphere.<sup>8</sup> By comparison, Australia's total GHG emissions (not including exports) are 530Mt CO<sub>2</sub>-e a year.

It is important to note that, while Shell aims to be globally net-zero by 2050 or sooner, Total's current aim is global, but it only has in its "3 major steps to get Total to Net-Zero"<sup>9</sup> an objective to make its European footprint net-zero. Total makes 40% of its revenue outside Europe<sup>10</sup> so it is yet to commit to steps to address GHG emissions from this key part of its business.

**Total's and Shell's total annual emissions rank them among the most significant contributors to the build-up of greenhouse gases in the atmosphere.**

## **Strategies to Reduce Emissions**

Shell and Total both acknowledge they plan to continue to produce and sell fossil fuels to 2050 and beyond.<sup>11</sup> To meet their goals, they aim to convert their customers' energy usage from fossil fuels to a lower-carbon mix over time. This is implicit in their carbon intensity goals.

Total's commitment is to reduce its carbon intensity across all its products by 60% by 2050. Shell plans to reduce the carbon intensity of the products it sells by 30% by 2035 and by 65% by 2050.

As stated in Shell's 'Net Carbon Footprint Ambition',<sup>12</sup> reducing its carbon footprint comes from three activities:

1. Lowering the carbon intensity of energy products—from transitioning

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<sup>7</sup> Scope 1 emissions are GHG emissions caused directly by their business activities, such as methane emissions that occur during extraction of oil and gas. Scope 2 emissions are GHG emissions caused by inputs to their business activities, such as electricity.

<sup>8</sup> Shell Sustainability Report 2019; Total, "Integrating Climate into our Strategy". 2019.

<sup>9</sup> Total's website. Accessed July 2020.

<sup>10</sup> Energy Intelligence. Oil Takes Back Seat in Total's Future. 12 June 2020.

<sup>11</sup> Shell website. Accessed June 2020; Total AGM CEO presentation. June 2020.

<sup>12</sup> Shell website.

customers from fossil fuels to electricity in homes, transportation and industry, to adding low carbon biofuels to jet fuel.

2. Improving the efficiency of energy products and their use (vehicles, planes, machines, buildings).
3. Dealing with the GHG emissions that cannot be avoided—storage in natural carbon sinks (forests) or carbon capture, use and storage (CCUS).

This means any GHG emissions produced by Shell's business activities must be offset by, in the words of Total's CEO, Patrick Pouyanné: "carbon sinks that are essential to achieving carbon neutrality, namely nature-based solutions and carbon capture, utilisation and storage."<sup>13</sup>

### *How Do They Plan to Achieve These Objectives?*

Shell and Total have similar strategies to achieve their objectives:

- Improve the emissions efficiency of their current operations;
- Invest more in fossil gas than oil;
- Invest in renewables (wind and solar assets as well as battery technology, hydrogen distribution and mobility technology);
- Rely on carbon, capture and storage (CCS) and carbon sinks to cover any gaps.

Shell said it would spend \$1-2bn a year between 2017 and 2020,<sup>14</sup> and then \$2-3bn a year between 2021 and 2025<sup>15</sup> to grow its renewables business as well as reducing its net carbon footprint by 3-4% (from its 2016 baseline) by 2022.

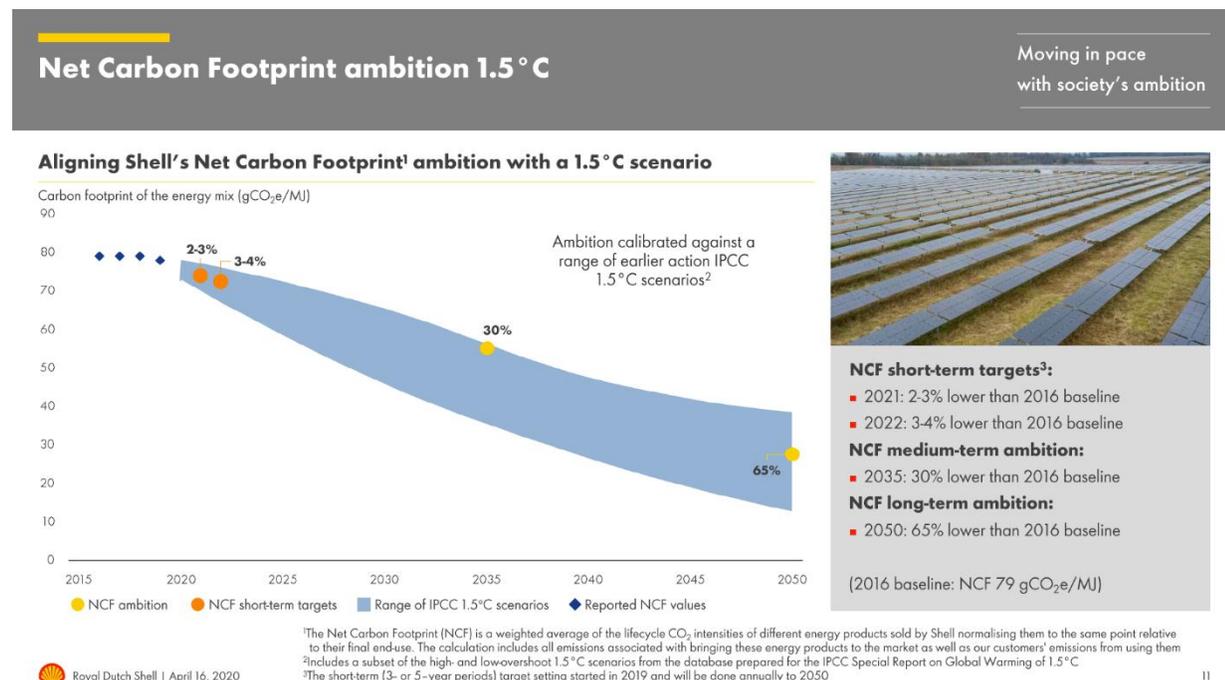
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<sup>13</sup> Patrick Pouyanné's [speech](#) to shareholders at the FY2019 AGM. 29 May 2020.

<sup>14</sup> Guardian. [Shell doubles up on green spending and vows to halve carbon footprint](#). 28 November 2017.

<sup>15</sup> NS Energy. [Royal Dutch Shell could be set to miss out on its green energy targets](#). 3 January 2020.

Figure 3: Shell's Path to 65% Lower Carbon Emissions



Source: Shell Responsible Investment Annual Briefing, April 2020.

Total is also focused on investing in renewables, aiming to have 25GW of renewable energy assets in operation by 2025 and at least 10 million residential customers using renewable energy. In addition, Total pursues emissions reductions in its operations, including by reducing routine flaring (by 80% by 2020 and eliminated entirely by 2030), and by reducing scope 1 and 2 carbon emissions to less than 40Mt CO<sub>2</sub>e (from 46 in 2015) by 2025.

Monitoring and reducing methane leaks and venting (termed 'fugitive emissions' by the industry) will play a key early role in building momentum, given decades of under-reporting, low-balling and inaction are now being revealed by satellite imaging.<sup>16</sup>

<sup>16</sup> Reuters. [Satellites reveal major new gas industry methane leaks](#). 26 June 2020.

## Reviewing Performance Against Their Objectives

### Total

Total has built its renewable capacity largely by acquisition:

- **2017:** Total paid \$267m for 23% of Eren, a French solar generation company, since renamed Total Eren. It has since increased its stake to 30% and has an option to acquire 100% in 2022.
- **2018:** Total paid \$1.7bn to acquire 73% of Direct Energie (then acquired up to 95% on market for a total outlay of approximately \$2.2bn), which operates as Total Quadran.
- **2019:** Total Eren acquired 100% of NovEnergia for \$1.12bn, and Total Quadran acquired Vents d'Oc, a major offshore wind operator with 200 megawatts (MW) of capacity, for an undisclosed price.
- **2020:** Total, also through Quadran, acquired 100% of Global Wind Power, an operator of 1,025MW of wind generation.

In addition, Total has grown its business through joint ventures and organic investment.

**Figure 4: Total Investment in Renewable Energy (US\$M)**

Portfolio	2011		2016		2017		2018		2019		2020 to date		2023F		
	\$ invested	MW	\$ invested	MW	\$ invested	MW	\$ invested	MW	\$ invested	MW	\$ invested	MW	\$ invested	MW	
SunPower*	PV production	50%	1,300	n/a											
Sunzil	PV production	50%		n/a											
Eren***		23%			267	650		650	126	900				3000	
NovEnergia		100%						1,120	669						
Quadran (Direct Energie)	Electricity gen/retailer	95%					2200								
RE installed							550		1010	318	1200		2000		
RE Pipeline							2000								
Shams 1 solar farm	Concentrated solar	20%		109	109		109		109		109		109		
G2mobility	EV charging products	100%		100											
Lampiris	Belgian VRE retailers			224	n/a										
Vents d'Oc		100%							335	200	200		200		
Global Wind Power		100%									1,716	1025	1025		
Organic	14 projects	100%							191	114	114		114		
Total Solar International	SolarBay portfolio	100%									2,009	1200	1200		
	Powertis Spain JV	65%									871	800	800		
	Qatar JV	50%											800		
	Adani Green Energy	50%									510	2000	2000		
Saft**	Battery storage	100%		1100	n/a										
<b>Total annual investment</b>			1,300		1,424	267	650	2,200	550	1,771	1,693	5,424	3,646	7,701	4,600
<b>Cumulative investment</b>			1,300		2,724	109	759	5,191	1,309	6,962	3,002	12,386	6,648	20,087	11,248
Estimates															
\$ per MW invested			1.67												
												2025 aim:		25GW	

Source: IEEFA estimates, Total SA annual reports.

As shown in Figure 4, since 2018, Total has invested considerably more than \$1.5bn each year scaling up to an estimated \$5bn in 2020 so far in acquiring and growing its wind and solar assets.

Total also spent \$1.1bn in 2016 acquiring Saft, a French lead-acid and lithium-ion battery storage technology company.

Total has invested in a range of biofuel and bio-product technologies, as well as an early stage H2 mobility joint venture (together with Shell, Daimler, Air Liquide, and OMV). This joint venture aims to roll out 400 hydrogen stations in Germany along with 250,000 fuel cell vehicles. There are currently 83 stations (of which 23 are Total's) in operation as part of existing petrol stations.

## Comparing Performance to Rhetoric

Total has lived up to its promise of investing at least \$1.5bn per annum for the last two years.

With further growth through joint ventures in Spain (Powertis – 800MW, SolarBay – 1200MW), India (acquiring a 50% stake in Adani Green Energy's 2GW<sup>17</sup> of operating solar projects), and Qatar (800MW by 2023), Total has grown its capacity to 3GW in 2019 and over 6.6GW once the 2020 investments are operating. It currently has plans to install another 4.6GW by 2023.

In sum, Total is almost halfway to its 2025 objective of 25GW and has successfully acquired large-scale renewable infrastructure development capacity. No other major oil company is growing renewables this fast.

**No other major oil company is growing in renewables as fast as Total is.**

## Shell

Shell has articulated a similar strategy but has taken a different implementation approach to Total.

Shell has *not* announced a 'renewables under management' target like Total did. It has focused on investing in solar and wind projects rather than making the large acquisitions and joint ventures Total has done. As a consequence, Shell has invested in many projects but most of them are relatively small-scale and fragmented.

Shell's wind investments have been all (with the exception of MP2's wind generation) in offshore wind, a segment that fits well with Shell's offshore oil and gas expertise. The other main investment theme has been retail: broad-based retailers of renewable energy in the U.S. and the UK (ERM Power in Australia is a generic electricity retailer that specialises in the business segment).

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<sup>17</sup> This investment has spurred Adani Green Energy to lift its installed capacity target to 25GW by 2025. Adani media release. [Adani Green Energy Wins The World's Largest Solar Award; Leapfrogs Towards Goal of 25GW of Installed Capacity by 2025](#). 9 June 2020.

Figure 5: Shell's Renewables Investments 2017-2019 (US\$M)

Shell Renewables Investment	Ownership	Business type	Region	Capacity / Customers	Price
<b>2019</b>					
Sonnen	100%	Residential Batteries	Germany		169
Blauwind	20%	Offshore Wind	Netherlands	731	
NoordzeeWind	50%	Offshore Wind	Netherlands	108	
EDF Renewables	50%	Offshore Wind	US (New Jersey)		
EDPR	50%	Offshore Wind	US (Massachusetts)		
Cleantech Solar	49%	Solar retailer	India, SEA		
ESCO Pacific	49%	Solar developer	Australia	350	
EOLFI	100%	Offshore wind developer	France		
Greenlots	100%	EV charging and grid	US		
ERM Power	100%	Business electricity retailer	Australia		419
Limejump	100%	Digital energy platform	UK		
Green Star Energy (Hudson)	100%	Renewables retailer	UK	900k customers	
d.Light investment	minority	Solar products	US, global		
Powergen investment (with Sumitomo)	15%	Minigrid	Africa		
Orb Energy investment	20%	PV manufacturer	India		
<b>2018</b>					
Silicon Ranch	44%	Solar developer	US (Tennessee)		217
First Utility	100%	Renewables retailer	UK	825K customers	~200
Inspire Energy	100%	Renewables retailer	US		~200
MP2	100%	Renewables operator	US (Texas)	1,700	~200
Geli	minority	Energy storage software	US (California)		7
<b>2017</b>					
NewMotion	100%	EV charging	Netherlands		
Sunseap Group	100%	Solar supplier/retailer	Singapore		

Source: IEEFA compilation of information from Shell's annual reports and media releases.

Shell has also invested in hydrogen filling stations and EV charging stations in Europe and the U.S. This connects with Shell's competitive advantage as a fuel distributor with 44,000 petrol stations worldwide.

Shell ramped up its pace in 2019 and completed more renewables deals than any other oil company (by number of transactions). Yet the company is less than halfway to its 2020 objective and it is difficult to see how Shell will meet that goal, much less scale up to \$2-3bn per year from 2021 onwards, unless it materially changes its approach.

**It is difficult to see how Shell will meet its 2017-2020 objective unless it materially changes its approach.**

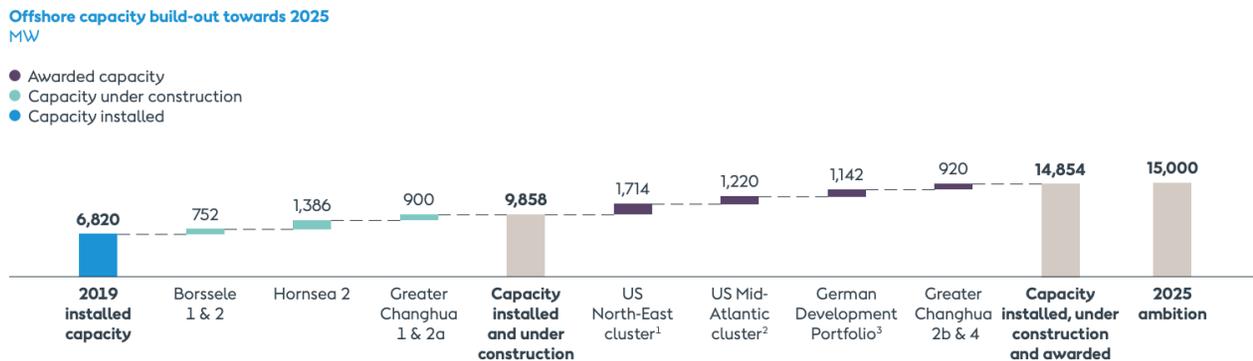
## Comparing Oil Supermajors With Renewables Competitors

### Ørsted

Ørsted, previously named DONG Energy, the Danish Oil & Gas Company, has also pivoted strongly to renewables. It has delivered a perfect case study in energy transition for the benefit of shareholders by being ahead of the curve and divesting fossil assets while there is still a ready market and before stranded asset risks are factored in.

Ørsted is now the world leader in offshore wind. In this segment alone, Ørsted has a plan for 15GW of installed generation capacity by 2025 (see Figure 6).

**Figure 6: Ørsted Offshore Wind Pipeline**



Source: Ørsted Annual Report 2019.

### NextEra

NextEra, the largest and best performing U.S. utility energy company, operates more than 15GW of wind energy and 3.25GW of solar energy (through its FPL and NextEra Energy Resources subsidiaries). It plans to add 3-4GW of wind energy and 1-2.5GW of solar energy generation capacity in 2020 (at Total's average cost of GWs, that could be as much as \$10bn of investment). NextEra also announced in April that it will spend US\$1bn on battery storage projects in 2021.<sup>18</sup>

NextEra's emissions objective is to reduce its absolute GHG emissions by 40% below its 2005 baseline, with almost twice as much electricity generation capacity.

<sup>18</sup> Greentech Media. [NextEra Looks to Spend \\$1B on Energy Storage in 2021](#). 22 April 2020.

## Iberdrola

Spain's largest energy group, Iberdrola, told the market it would invest €32bn in renewables between 2018 and 2022. At its February 2019 shareholder update, that amount was increased to €34bn.

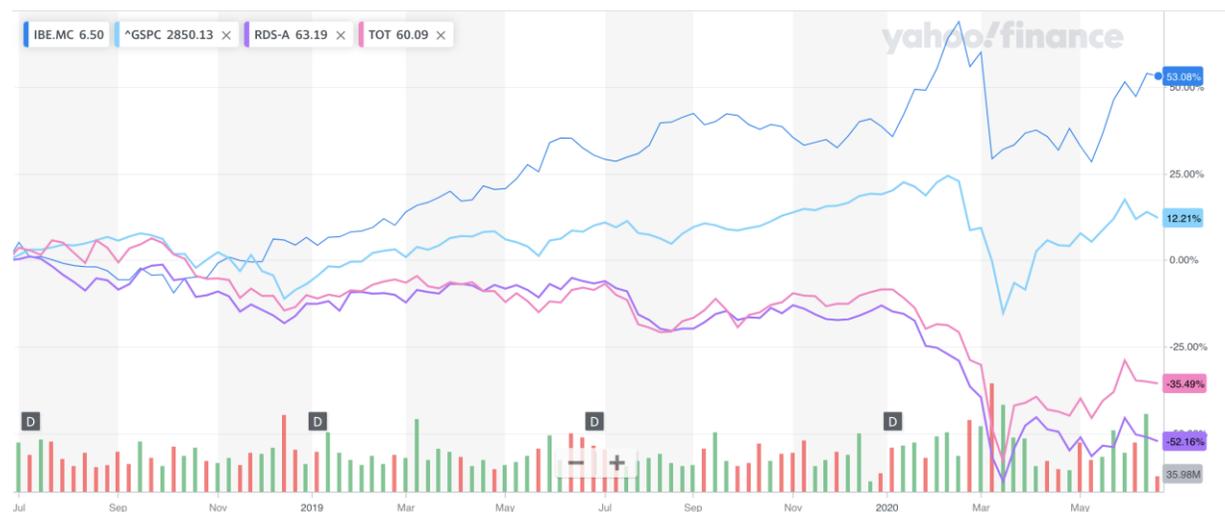
In its COVID-19 update on 1QFY20, Iberdrola confirmed it is on track to meet this objective, with €10bn planned for FY20 alone, and that there would be no interruption to construction or production as a result of COVID-19. It would meet its net profit and dividend outlook.

As of last year, Iberdrola had 52GW of installed capacity, of which 76% was renewable (the remainder was fossil gas and 850MW of coal generation).

**In many ways, Iberdrola is the energy company Total and Shell say they want to become.**

In many ways, Iberdrola is the energy company Total and Shell say they want to become. As shown in Figure 7, Iberdrola's share price performance over the last two years (dark blue – up 53%) compared to Total (pink – down 35%) and Shell (purple – down 52%) confirms the market's confidence in its strategy.

**Figure 7: Two-Year Share Price Performance of Iberdrola vs Shell, Total and S&P500**



Source: Yahoo Finance.

## Shell and Total

Shell and Total have ambitions in the same ballpark as these more seasoned renewables investors, but their plans are, relatively speaking, far higher than their track records to date.

Both Shell and Total have much more capacity to invest in zero emissions industries than their plans to-date indicate. Though significantly constrained this year as a result of the combination of an historic contraction in demand caused by COVID-19 and a massive fall in the oil price caused partly by a Saudi Arabia/Russia dispute, Shell and Total have typically spent at least \$25bn and \$15bn per year respectively on capital expenditure, including organic growth and acquisitions.

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**Figure 8: Total SA Investments**

Gross investments	2017	2018	2019
Exploration & Production	10,005	13,789	8,992
Integrated Gas, Renewables & Power	3,594	5,032	7,053
Refining & Chemicals	1,734	1,781	1,698
Marketing & Services	1,457	1,458	1,374
Corporate	106	125	120
	16,896	22,185	19,237

Renewable Investments	2017	2018	2019
Acquisitions	267	2,200	1,455
Organic Investments			316
Gross Investments	267	2,200	1,771
% of Integrated Gas, Renewables & Power investments	7%	44%	25%
% of total investments	1.6%	9.9%	9.2%

Source: Total SA annual reports FY17-19.

Figure 8 shows that, while Total's renewables investment is substantial, it is a small percentage of total capital expenditure. The vast bulk of Total's capex continues to be directed to exploration and production. In 2017, Total acquired Maersk Oil, which brought in five new upstream projects and numerous other hydrocarbon and petrochemical investments. In 2019, Total focused investment on strengthening its LNG and deep offshore capabilities with the acquisition of Mozambique LNG, the launch of Arctic LNG2 in Russia and Mero 2 in Brazil, and acquisitions of new offshore licences in the United Arab Emirates (UAE). This followed the acquisition of

Engie's LNG assets in 2018, and investments in preparing for the 2019 start-ups of Ichthys in Australia, Yamal LNG in Russia, and the Cameron LNG project in the U.S. state of Louisiana.

Shell made a huge acquisition in 2015 to establish its fossil gas business by acquiring BG for \$52bn. This changed the nature of Shell's business and introduced a new segment – Integrated Gas (incorporating the New Energies business unit).

Shell's major diversification into gas just as the global gas price entered a multi-year meltdown put major financial stress on the overall business, significantly raising stranded asset risks.

Shell's acquisition spending the last three years has been modest and well below its traditional rate: \$688m, \$1.067bn and \$948m in financial year (FY)17–19, with \$559m forecast for FY20 (prior to its Q1 cutbacks). This renewables investment is very modest in the context that Shell has maintained a significant capital expenditure level of around \$25bn for the each of the last three years.

Shell's stated objective for investment in New Energies was 5-10% of annual capex. The Integrated Gas segment has consumed around 20% of total capex but, given Shell has continued to spend well over \$10bn a year in upstream capital expenditure, it is difficult to see how this constitutes a material transition in the average carbon intensity of its products. Integrated Gas has remained around 13% of total revenue since the acquisition of BG. In the first quarter of FY20, Shell's gas production was up 12% year-on-year but earnings from gas were down 16%. Overall earnings (on a constant currency basis) were down 46% on 1QFY2019.

**There is little question of Shell's capacity to invest in renewables at the levels it has promised.**

There is little question of Shell's capacity to invest in renewables at the levels it has promised. With the outlook for oil and gas worse than it has been for 10 years, and oil and LNG prices at decade lows, it would seem logical to emphasise New Energies investment, particularly in light of its zero commodity price risk and long term annuity-style earnings profile.

## **Will the Supermajors Achieve Their Objectives?**

Even with its first quarter cutback on capital expenditure, Total plans to maintain annual investment of \$1.5-2.0bn in renewables. Total will need to almost double its rate of investment from 2020 to 2025 to achieve 25GW of renewable energy. To be installed by the end of that year, the investment will need to be front-ended. However, moving from that interim objective to Total's carbon intensity target (60% reduction by 2050) will require a massive step up.

According to Energy Intelligence, renewable power will need to constitute a much larger percentage of Total's total product portfolio: "as much as 40% in 2050 compared to less than 5% now."<sup>19</sup> Patrick Pouyanné suggests "gas would remain constant at 40% but will involve 'a mix of natural gas and green gas produced from hydrogen or biogas.'"<sup>20</sup> Total currently has no plans to produce green gas at anywhere **near** the cost of extracting fossil gas. Even assuming the greening of Total's gas products, Total's 2050 objective will require 10 times the 25GW capacity in renewables, or between "one and two times Germany's annual consumption"<sup>21</sup> of electricity.

One advantage Total has is its disciplined approach to breakeven oil extraction. With a current breakeven figure of \$25/barrel, Total is expected to avoid many new oil projects that would meet the investment threshold of other oil majors. This will improve Total's resilience to sub-\$40 oil prices and possibly move the balance away from oil and towards renewables more quickly.

Pouyanné expects to be at "a 20-25% maximum" in renewable capital expenditure by 2030. There are significant uncontrollable factors in his strategy:

- He expects a carbon price from 2030 will accelerate the transition of Total's customers from fossil fuels to low carbon energy, thus driving Total's carbon intensity down faster;
- Total plans to remove 5Mt/CO<sub>2</sub>-e through CCS but other than projects in which Total is a passive partner (Sleipner and Northern Lights in Norway and its plans for Tees Valley in the UK), there has been little detail about how this would be achieved and, in any case, that represents less than 10% of Total's current scope 1 and 2 emissions;
- Natural carbon sinks are to play a significant role in offsetting oil and gas carbon emissions from Total's customers' usage – at \$100m per year investment, this will have very little impact and no information has been disclosed on how this would be scaled up.

Shell is in an even worse position. It will need to increase its current level of activity by orders of magnitude if it is even to meet its renewables capital investment target (\$2-3 bn per year from 2021).

Given Shell's recent preference for organic investment over acquisition (and its failure to make renewables acquisitions when it tries), it is hard to believe Shell can ramp up sufficiently to meet its 2035 and 2050 targets without undertaking a step change in

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<sup>19</sup> Energy Intelligence. [Oil Takes Back Seat in Total's Future](#). 12 June 2020.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

acquisitions, potentially funded by divestment of more peripheral fossil fuel development assets.

## *Cause for Scepticism*

There are three key problems hampering Shell and Total:

1. Cost of capital – higher than other renewables investors (a risk vs return trade-off);
2. Lack of expertise in renewable energy at board and senior management level; and
3. Reliance on CCS.

## **Cost of Capital**

Shell's cost of capital is higher than that of NextEra, Ørsted and Iberdrola.

Typically, oil and gas companies have a higher cost of equity (10-13% vs 7-10%) and an overall higher weighted average cost of capital (WACC) than utilities (7-9%) or renewables companies (5-7%)<sup>22</sup> due to the traditionally high profits and significantly higher risk associated with exploration and commodity energy price volatility. When long term infrastructure investors such as pension funds are factored in, Shell and Total could be materially outpriced in a competition for renewable generation assets.

In the bid for Eneco, indications are Shell (and its investment partner PPGM, a Dutch pension fund) reputedly bid €1bn less than the €4.1bn paid by Mitsubishi (and its 20% partner, Chubu Power Company).<sup>23</sup> With a WACC closer to 5% than 7%, Mitsubishi could take a more aggressive bidding position. The Eneco transaction also shows the growing global competition for limited renewable energy expertise, particularly at scale. IEEFA has long articulated that China has taken prime advantage of its early mover status as the global zero-emissions industry leader, undertaking a disparate, seemingly opportunistic range of international acquisitions over 2016<sup>24</sup> and 2017,<sup>25</sup> building on its domestic sector leadership.

Coinvesting with pension funds and other cheap sources of infrastructure equity might be a way of overcoming this disadvantage.

In addition, given their experience with managing political risk in Africa and South America, Shell and Total may be more competitive when pricing and implementing

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<sup>22</sup> Deloitte. [Overview of business valuation parameters in the energy industry](#). 2017.

<sup>23</sup> Zawya. [Shell's Eneco fail flags Big Oil's trick pivot](#). 25 November 2019.

[www.royaldutchshellplc.com, Why did Shell miss out on sale of Eneco?](#) 7 January 2020.

<sup>24</sup> IEEFA Report. [China Set to Dominate U.S. in Global Renewables Boom; \\$32 Billion in Overseas Investments in 2016 Alone](#). 6 January 2017.

<sup>25</sup> IEEFA Report. [China in 2017 Continued to Position Itself for Global Clean Energy Dominance](#). 9 January 2018.

renewable energy projects in these regions.

In general, however, Shell and Total will need to convince investors that lower equity returns<sup>26</sup> are acceptable as they transition to an entirely new, less volatile, more annuity-like business model.

An investor might well ask, why invest in Shell or Total to gain exposure to renewable energy when I could invest in NextEra, Ørsted or Iberdrola, or even ENEL or ENGIE, given these firms are far more advanced in the transition?

**China has taken prime advantage of its early mover status as the global zero emissions industry leader.**

## Expertise

Shell has very little top-level experience with renewable energy. While the board members have strong backgrounds in banking, retailing, oil and gas and government, there is not a single director with any significant experience in transformation of a business, technology and innovation or renewables.<sup>27</sup>

When it comes to evaluating the credibility of a proposed pivot to deal with the dynamic technology-driven disruption of global energy markets, breaking out of the group-think of highly experienced veterans of the incumbent fossil fuel industry will prove vital.

Before making investment decisions in new technologies and sectors spanning many billions of dollars, it would be prudent to refresh the board and senior management team with experts experienced in the areas Shell is moving into, rather than in the business of old.

**It would be prudent to refresh the board and senior management team with experts experienced in the areas Shell is moving into.**

Even where there has been clear technology leadership, there have been many hard investor lessons learned in the renewable energy and associated technology sectors over the last decade, reflecting the rate of technology change, lack of barriers to entry, and ongoing double-digit annual deflation.

The risk for investors in Shell and Total is that these companies risk repeating their financially costly mistakes (think Solyndra, American Superconductor Corporation, Sinovel of China, Suzlon of India, BrightSource Energy, SolarReserve, NRG,

<sup>26</sup> Consistent with their recent performance – without dividend yield of 2.6% and 5.7% respectively for Shell and Total and share buybacks worth \$25bn and almost €10bn respectively, their equity returns have been poor over 10 years – CAGR of -1% and 2%

<sup>27</sup> Royal Dutch Shell Annual Report 2019.

SunPower, Sun Edison, Carnegie Wave Energy, Geodynamics, Solazyme, Molycorp and Dow Chemicals' solar roof-shingles).

On the management team, there is no one with any significant experience outside Shell. The Projects & Technology Director, who has responsibility for Shell's climate strategy, is a 30-year Shell veteran who previously worked in exploration and production, while the Integrated Gas and New Energies Director has been with Shell since 1995 and has previously worked in gas. It is good news that Elizabeth Brinton, who took over as head of the New Energies division in April 2020, is not a Shell lifer and has a technology innovation background from Australia's AGL, PG&E, the Californian utility, and several start-ups in Silicon Valley.

Total is similar. Of the board members, only Maria van der Hoeven has any apparent exposure to renewable energy: she is on the board of the Rocky Mountain Institute and is a director of Innogy SE, the German energy firm (a subsidiary of E.ON). Total's other board members have broad-based experience in banking, mining, oil and gas, the auto sector and government. Similarly, the senior management team has no relevant experience in renewables or corporate transformation.

It is reassuring that Shell has announced a major restructure, including potentially putting New Energies into its own division.<sup>28</sup> The CEO may have recognised the need for expertise and objectivity. Van Beurden described the changes as "unprecedented" in an email to staff. That is not surprising since it cut its dividend this year (to 16 cents from a usual 47 cents) for the first time since World War II.

IEEFA questions whether Shell can successfully transform itself, with so little experience in change and almost no management experience outside Shell.

By contrast, Ørsted's board includes experience in renewable energy, private equity, shipping, oil and gas, banking and finance and corporate. There are three employee representative directors, two of whom have technical roles in the business. None of the appointed directors has been on the board for more than 6 years. The management team comprises 50% well experienced Ørsted engineers and 50% outsiders with a mixture of technology, private equity, consumer products and renewable energy experience.

One of the most difficult aspects of transformation for mature industries is bringing in outside talent to look at the problems with a different lens. The companies that are driving renewable energy transformation, such as NextEra Energy, have a diversity of expertise and backgrounds, often with a focus on change, and have the luxury of being at the global forefront of this disruption for the last fifteen years, allowing deeply entrenched inhouse knowledge.

Iberdrola has a management team dominated by engineers along with executives with investment banking, accounting, legal and electricity backgrounds. Its board includes directors with in-depth utility industry experience as well as economics, engineering, government administration and banking. It also has an electricity focus,

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<sup>28</sup> Recharge news. [Oil supermajor Shell in 'comprehensive redesign' for clean-energy future](#). 10 June 2020.

as opposed to a fossil fuel mindset. Iberdrola was at the forefront of this technology rollout in Spain, suffering but learning from the early lessons of investing in the rapid deployment of technologies at scale well before they have reached commercial competitiveness (like Germany in solar PV, Spain led the world in developing concentrated solar thermal).

## **Carbon Capture and Storage**

Both Total and Shell emphasise the role that carbon capture and storage (CCS), carbon sinks and a carbon price play in their ability to meet their long-term net-zero objectives.

Figure 9, taken from Shell's own website, shows directionally how Shell could meet its long-term decarbonisation goal. Although this is not intended to be a precise chart, the proportion of the reduction attributed to "natural sinks" (ie. planting trees) and CCS is noteworthy. Patrick Pouyanné, the CEO of Total, has stated, "We have the technology to capture and reinject carbon. The real question is how to do it in a way that is economically sustainable. That brings us back to the issue of carbon pricing."<sup>29</sup> In relation to CCS for coal-fired power generation, Pouyanné said, "... I know that people advocate for clean coal, but frankly, clean coal means a lot of CCS, and I would like to see where the CCS technologies are."<sup>30</sup>

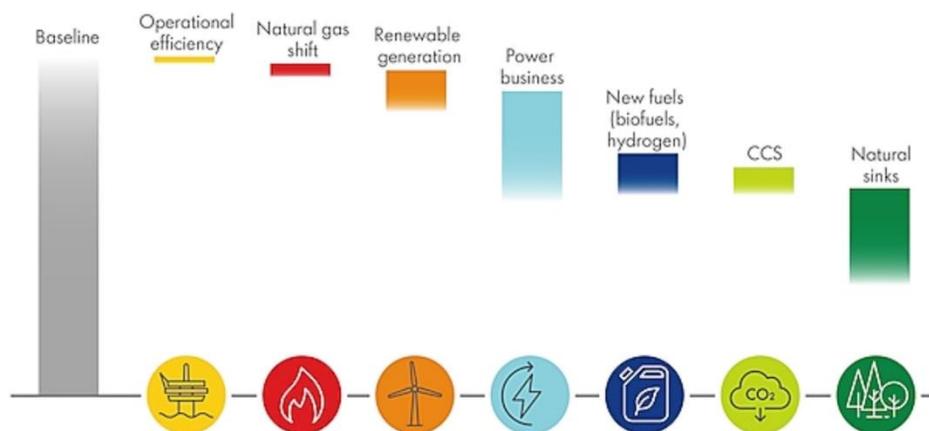
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<sup>29</sup> CNBC. [Total gives itself 15 years to make its products 15 percent less carbon intensive](#). 20 October 2018.

<sup>30</sup> CSIS. [A Conversation with Patrick Pouyanné, Chairman and CEO of Total S.A.](#) 17 May 2018.

Figure 9: Shell's Path To Decarbonisation

### MEETING THE AMBITION: HOW SHELL COULD CHANGE



An infographic showing how Shell could change in the future

Source: [Shell website](#).

IEEFA supports the idea that a carbon price is essential to achievement of large-scale carbon emission reduction. However, the fact that both companies' CEOs refer to this almost as a precondition to their climate goals invites scepticism about their commitment to unilateral action on reducing their carbon emissions.

Total and Shell currently spend an immaterial percentage of annual capital expenditure on CCS<sup>31</sup>, so it is arguable that CCS is emphasised more as a matter of marketing than as a concrete strategic priority.

<sup>31</sup> None of their investments are quantified in annual reports.

## What is Carbon, Capture and Storage?

Carbon capture, use and storage (CCS or CCUS) encompasses an integrated suite of technologies that can prevent large quantities of CO<sub>2</sub> from being released in the atmosphere as a consequence of using fossil fuels. This technology has been applied in a wide range of industries since 1972 when several natural-gas processing plants in the Val Verde area of Texas began employing carbon capture to supply CO<sub>2</sub> for Enhanced Oil Recovery (EOR) operations. Since then, more than 200 million tonnes of CO<sub>2</sub> have been captured and injected deep underground.

CCS involves three major steps:

1. **Capture:** The separation of CO<sub>2</sub> from other gases produced at large industrial process facilities such as coal and natural-gas-fired power plants, steel mills, cement plants and refineries.
2. **Transport:** Once separated, the CO<sub>2</sub> is compressed and transported via pipelines, trucks, ships or other methods to a suitable site for geological storage.
3. **Storage:** CO<sub>2</sub> is injected into deep underground rock formations, usually at depths of one kilometre or more, depleted oil or gas fields, deep saline aquifer formations or other forms of underground cavern, though it could apply to any form of storage.

The 'usage' component includes applications of the carbon in industrial processes such as the manufacture of synthetic diesel, biofuels, solvents and polymers.

### *A Good Idea, But...*

CCS is an excellent idea: if greenhouse gasses can be prevented from entering the atmosphere, we can continue traditional fossil fuel activities without worrying about climate change.

The Global CCS Institute report quotes Lord Nicholas Stern, Bill Gates and other experts in the fields of climate change, engineering and finance emphasising the crucial role CCS has to play in the addressing climate.

### *There Are Some Problems:*

1. It can, and does, leak;
2. The energy cost involved in the process materially reduces its net effect; and
3. It doesn't make any economic sense.

### *What Can Go Wrong... and Does*

The underground storage into which carbon is injected is not always secure. Wells have weaknesses and gaps, fracking, in particular, causes long-term subterranean

instability and seismic activity could dislodge even the most carefully stored carbon. Leaks in the Aliso Canyon natural gas storage facility in 2015 “released 97,100 metric tons of methane to the atmosphere,” doubling the methane emission rate of the entire Los Angeles basin.

According to geologists, this should not be a practical concern for CO<sub>2</sub> storage if the CCS process is carefully implemented but research concludes the consequences of a minor leakage could reduce the benefit of CCS by up to 35%.

The carbon must be separated, transformed and, in most cases, transported to the sequestration site. The energy used in this process and the leakages that can occur during transportation and handling can materially reduce the net impact of the CCS process.

### *Economics*

Whilst the technical issues can probably be addressed with engineering solutions over time, the more significant problem is financial.

CCS is an expensive process that generates very little revenue. Aside from limited pricing signals from emissions trading systems, there is no financial reason to invest in CCS. Consequently, there are no commercially viable examples of CCS in the world. The traditional financial justification is for enhanced oil recovery (EOR) but with oil prices well below breakeven for oils sands extraction, this does not begin to cover the costs of CCS.

With costs in the order of US\$4,200 per KW for power CCS, even if it works, CCS is a poor investment. It is no surprise the few operating CCS plants are government subsidised.

## *CCS: Playing With Someone Else's Money*

Royal Dutch Shell promotes CCS as a key factor in its bold emission reductions ambitions. As a new CEO, Ben van Beurden told the audience in a keynote speech at Columbia University that CCS could remove up to 90% of emissions from power generation. In 2015, Shell promised investment in CCS, coinciding with the opening of the Quest CCS facility in Canada; at every AGM since, van Beurden has returned to CCS as a key part of the solution.

To date, Shell has two CCS projects: Quest in Alberta, Canada, funded by the Albertan and Canadian governments and operated by Shell; Gorgon in Western Australia, a project in which the project principals (Shell and Chevron) are financially motivated not to operate the CCS plant and, in fact, it has failed to meet its targets every year, notwithstanding a A\$60m subsidy from the Western Australian government.

Shell's actual outlay in CCS remains to be seen. Its overall investment is well behind its stated targets.<sup>32</sup> Any progress Shell demonstrates in removing carbon from the atmosphere using CCS (1Mtpa at Quest and up to 4Mtpa at Gorgon) should be seen in light of Shell's total emissions of 656Mtpa (80Mt scope 1 and 2; 576Mt scope 3).<sup>33</sup>

Meanwhile, Total has also promised massive investment in CCS, to remove up to 5Mtpa of CO<sub>2</sub> (8% of Total's scope 1 and 2 GHG emissions and 1% of scope 1/2/3 emissions).<sup>34</sup>

Equinor, the Norwegian state oil and gas producer, has been investing in CCS since 1996. Its Sleipner CO<sub>2</sub> storage and Snøhvit CO<sub>2</sub> storage facilities have cumulatively captured and stored around 22Mt of CO<sub>2</sub>. Compared to the rest of the fossil fuel industry, this could be viewed as a considerable achievement, yet Equinor is responsible for producing over 330m tonnes of CO<sub>2</sub>-e emissions every year (scope 1, 2 and 3). As such, there is no economic return on its CCS operations, and it is immaterial in the scheme of Equinor's contribution to global warming. By way of comparison, Equinor's scope 3 emissions increased by 26Mtpa from 2014 to 2018.<sup>35</sup>

Total is an investor in Sleipner as well as, with Shell and Equinor, the larger Nordic project under development, Northern Lights.<sup>36</sup>

It seems unlikely that CCS will play any more significant role in Shell's and Total's strategy other than marketing to cover up gaps in their decarbonisation plans, unless there is a significant price put on carbon and it is applied globally in a consistent way. Total currently puts \$30/tonne as an internal carbon price when considering investment priorities and plans to increase that to at least \$50/tonne for 2030 and beyond.

**The use of natural carbon sinks is an even less credible part of the supermajors' decarbonisation strategies.**

The use of natural carbon sinks is an even less credible part of the supermajors' decarbonisation strategies. Total claims to be investing \$100m per annum in reforestation from 2020, with a plan to capture 5Mt CO<sub>2</sub>-e by 2030.<sup>37</sup> Similar to its CCS strategy, this represent a small percentage of Total's GHG emissions and Total has no expertise in reforestation, nor is there any material transparency of disclosure.

<sup>32</sup> NS Energy. [Royal Dutch Shell could be set to miss out on its green energy targets](#). 3 January 2020.

<sup>33</sup> [Shell Sustainability Report 2019](#).

<sup>34</sup> Total. [Integrating Climate into our Strategy](#). 2019.

<sup>35</sup> [Equinor's website](#).

<sup>36</sup> [Northern Lights website](#).

<sup>37</sup> Total. [Integrating Climate into our Strategy](#). 2019.

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## Cause for Optimism

There is good reason to believe that Shell and Total can make a successful pivot away from fossil fuels and towards renewable energy.

The European regional oil and gas companies, in particular ENI, Repsol and Equinor are genuinely pivoting and have proven more agile and determined than the supermajors. But the supermajors have some key advantages that could underpin their transformation.

The supermajors have traditionally had several sources of competitive advantage:

- **Scale** – their sheer size provides access to capital, political power and the ability to undertake world scale projects;
- **Expertise** – they have nurtured engineering and project management expertise in ways many other industries envy;
- **Distribution** – their massive physical retail footprints around their work give them a close relationship with consumers and the ability to distribute their products in the market.

Shell was a low risk company in the early 2010s: it had a gearing of around 15%, double digit return on capital employed (ROCE), and it generated reliable free cashflow. Its share price growth was lethargic, but dividends were extremely reliable.

From 2011 onwards, Shell improved total shareholder returns with significant share buybacks. When it acquired BG in FY16, Shell doubled its gearing and has never scaled it back. It conducted massive buybacks in FY18 and 19 to counter a share price reversal but it now looks like relatively volatile stock with little protection from oil and LNG price movements.

This year's response to the sector's double crisis (COVID-19 caused demand contractions in oil and gas, industry dysfunction triggering and further oil and gas price collapse) was to cut its dividend more than any time since the end of World War II, to shelve any buyback plans, and to cut capex by \$5bn and operating expenditure by \$3-4bn respectively.

Total has been less volatile but its response to COVID-19 and the oil price crash has been similarly substantial: a \$4bn reduction in capex and \$1bn in annual operating expenses.

Their traditional attractions to investors—reliable dividends and free cashflow, growth to come from deep water in the case of Shell and Africa for Total—are failing. What's more, with the gas price also in freefall, the growth engine for both companies over the last few years is also significantly at risk.

This is a powerful motivation for change. Unlike their U.S. counterparts, especially ExxonMobil, the European supermajors have acknowledged the problem:

notwithstanding the existence of copious oil and gas reserves, the long-term growth profile for oil and gas producers who do not diversify into non-fossil fuel energy is bleak. The current demand contraction and the price volatility of the last 5 years is likely to be repeated, possibly with increasing frequency, permanently expanding stranded asset risks.

It is not just that consumers and businesses are taking carbon emissions seriously; non-fossil fuel alternatives are becoming a more attractive financial proposition from a total cost of ownership perspective. Electricity generated by wind and solar, firmed by batteries, gas-peakers and/or pumped hydro, will soon be permanently cheaper than any other form of electricity generation in most markets globally.

**The long-term growth profile for oil and gas producers who do not diversify into non-fossil fuel energy is bleak.**

They have solid progress in getting started but neither Shell nor Total is on track to meet its climate goals. The new elevated commitments of 2020 by Shell and Total have the right approach but they need to do four things:

1. **Bring on expertise all the way to the top:** the board and the management team need renewables, technology and transformation skills and experience.
2. **Be transparent:** the renewables businesses must be carved out of fossil gas into separate business segments for management and reporting.
3. **Focus on competitive advantage:**
  - a. *Scale:* undertake the largest projects in the world (potentially farming in as they do in oil and gas, then leveraging low cost patient pension capital by capital recycling once projects are fully commissioned), and make larger acquisitions;
  - b. *Geography:* Most OECD countries have decoupled energy use from economic growth, so the majority of new energy demand is in emerging markets, and the supermajors have a competitive advantage in political, country and operating risk management here;
  - c. *Complexity:* use the world class project management and engineering capability to do difficult projects that NextEra or Iberdrola would not and could not do; and
  - d. *Distribution:* use the massive retail networks and distribution capability to accelerate growth in renewable energy for transportation, including electricity, hydrogen and biofuels.
4. **Speed up:** the allocation of capital to renewable energy and related technologies must be increased.

To reach their own stated targets, IEEFA estimates that Shell and Total each needs to shift at least \$10bn per annum (or 50% of total capital expenditure) from oil and gas exploration and to acceleration of their renewable strategies. This will at least tip the balance of investment in favour of renewables over fossil fuels and will scale them up towards NextEra and Iberdrola. It will also accelerate global decarbonisation, adding scale and learning which in turn will drive down renewable energy deployment costs.

**IEEFA estimates that Shell and Total each needs to shift at least \$10bn per annum from oil and gas exploration.**

Shareholder activists have pushed Shell and the other European oil companies to act. The Netherlands based group, Follow This, gained support from 14% of Shell shareholders in the May AGM for a resolution pushing Shell to do more to meet Paris Agreement goals. This was more than double the 5.5% the year before.

Large investors such as BlackRock have not yet applied the same blowtorch to oil and gas as they have to thermal coal, but it is coming. The increasingly bleak financial prospects for oil and gas production will make it happen. As with coal, debt finance will become harder and more expensive for oil and gas. The domestic U.S. oil and gas companies are falling at a prodigious rate. Extraction Oil & Gas, a Denver-based company filed for bankruptcy at the beginning of June, following a raft of other failures including Chesapeake Energy at the end of June, as shown in Figure 10.

Rystad Energy, a Danish research firm, forecasts that 73 firms will fail this year if the oil price remains at or below \$30/barrel of oil and a further 170 in 2021.<sup>38</sup>

Shell and Total are betting that expanding their exposure to zero emissions growth sectors in the global energy markets will motivate shareholders to move towards them from ExxonMobil and competitors, but investors may avoid the supermajors altogether unless they demonstrate serious progress towards their stated goals.

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<sup>38</sup> Houston Chronicle. [More than 240 US energy bankruptcies forecast](#). 21 May 2020.

**Figure 10: Exploration and Production Companies in Default in 2020 to-date**

**EXPLORATION AND PRODUCTION (E&P) COMPANIES IN DEFAULT**

<b>Company name</b>	<b>Reason for default</b>	<b>Default date</b>
Chesapeake Energy Corp.	Distressed exchange	10-Jan
Bridgemark Corp	Chapter 11	14-Jan
Southland Royalty Co. LLC	Chapter 11	27-Jan
Dalf Energy	Chapter 11	17-Feb
California Resources Corp	Distressed exchange /seeking bankruptcy	24-Feb
Sheridan Holding Co. LLC	Chapter 11	23-Mar
Echo Energy Partners	Chapter 11	24-Mar
Whiting Petroleum Corp.	Chapter 11	01-Apr
Sklar Exploration, LLC	Chapter 11	01-Apr
Sable Permian Resources Holdings	Missed interest	08-Apr
SM Energy	Distressed exchange	30-Apr
Callon Petroleum	Distressed exchange	11-May
Fieldwood Energy	Missed interest	12-May
Gavilan Resources	Chapter 11	15-May
Ultra Petroleum	Chapter 11	15-May
Extraction Oil & Gas	Missed interest	15-May
Centennial Resource Development	Distressed exchange	21-May

Source: S&P Global Ratings

## About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. [www.ieefa.org](http://www.ieefa.org)

## About the Author

### Clark Butler

Clark Butler is an IEEFA guest contributor, and a corporate adviser with a background in the technology and finance sectors. In addition to being a director of and investor in technology and data companies, he is exploring technology and financing solutions to encourage investment in renewable energy solutions. [clark.butler@ironbarkgroup.com](mailto:clark.butler@ironbarkgroup.com)

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