October 27, 2021

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

February 24, 2021

[redacted]

Message

From: Walton, Gantt H [/O=EXXONMOBIL/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=[redacted]
Sent: 2/28/2019 8:17:38 PM
To: Easley, Daniel C [redacted]; Cooney, Philip [redacted]
Subject: RE: CERAWeek meeting with Perry

Looks good to me

From: Easley, Daniel C
Sent: Wednesday, February 27, 2019 11:14 AM
To: Walton, Gantt H <[redacted]; Cooney, Ph[redacted]om>
Subject: CERAWeek meeting with Perry

Ariel has asked whether we could share briefing sheets for a Perry/Vijay engagem[redacted] Houston. I'm going to send the latest Perry sheet, but also wanted to flag for her some potenti[redacted] that we shou[redacted]ief updates on and include in his materials. Am I missing anything here?

- National Petroleum Council (NPC) study on Ca[redacted]n Capture and Storag[redacted]uy Powell and Susan Blevins
- National Labs Collaboration – Abby Rodgers a[redacted]Pat McCarthy
- 45Q Tax changes affecting CCUS – Ed Colema[redacted]
- Alberta Curtailment – Nathan Bishop and Jam[redacted]sie
- Golden Pass LNG – Todd Spitler and Lauren Kerr[redacted]
- DOE Grid Resiliency NOPR – Sara Ba[redacted]

Regards,

Dan Easley
Senior Director, Federal Relations

Exxon Mobil Corporation
[redacted] Tel
[redacted] Cell

Message

From: Walton, Gantt H [/O=EXXONMOBIL/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/[redacted]
Sent: 5/22/2019 9:25:31 PM
To: Cooney, Philip [redacted]; Easley, Daniel C [redacted]
CC: Sokul, Stanley S [redacted]
Subject: RE: Federal CCS funding, primarily at DOE

Please keep Guy informed

From: Cooney, Philip
Sent: Wednesday, May 22, 2019 2:29 PM
To: Easley, Daniel C [redacted] Walton, Gantt [redacted]
Cc: Sokul, Stanley S [redacted]
Subject: RE: Federal CCS funding, primarily at DOE

That could be helpful..

The funding programs per se are helpful to unders[redacted]d. But the more c[redacted]nging question for EM will be to understand the quality of their various research st[redacted]ms and how they ma[redacted]e up with our view of the most promising areas where we could bring expertise a[redacted] leverage.

Thanks Dan, Phil

From: Easley, Daniel C
Sent: Wednesday, May 22, 2019 2:19 PM
To: Cooney, Philip [redacted] Walton, Gantt H [redacted]
Cc: Sokul, Stanley S [redacted]
Subject: RE: Federal CCS funding, prim[redacted]at DOE

I'm having coffee with DOE FE staff next w[redacted]nd Susan, Ed and [redacted]e going in to meet Winberg and others on the 6th. Why don't we just ask D[redacted]if they have a[redacted]wer year h[redacted]ut of CCS funding?

Regards,

Dan Easley
Senior Director, Federal Relations

Exxon Mobil Corp[redacted]
[redacted]

From: Cooney, Philip
Sent: Wednesday, May 22, 2019 2:02 PM
To: Walton, Gantt H [redacted]
Cc: Sokul, Stanley S [redacted]; Easley, Daniel C [redacted]
Subject: Federal CCS funding, primarily at DOE

Gantt,

In response to your q following a senior-level review in Dallas, Stan has provided links to recent reports from the Congressional Research Service concerning federal funding for CCS research. The second report is 31 pages and is more descriptive of specific research areas.

As I recall, a suggestion had been made that we evaluate federal research projects in this area for the potential to collaborate and potentially leverage our own investments in this important area.

If you would like, we can send these reports to Guy and Pete (and maybe Susan Blevins) – Stan and Dan could then set up a meeting with them to review.

How would you like to proceed? Thanks Phil

From: Sokul, Stanley S
Sent: Wednesday, May 22, 2019 11:55 AM
To: Cooney, Philip [redacted]
Subject: RE: status of determining federal CCS funding? thx

Phil I had found two good CRS reports detailing CCS funding, the first one is sho[redacted]d more to the point. It comes through the DOE office of fossil energy and is very coal focused right now.
https://fas.org/sgp/crs/misc/IF10589.pdf
https://fas.org/sgp/crs/misc/R44902.pdf

From: Cooney, Philip
Sent: Wednesday, May 22, 2019 9:13 AM
To: Sokul, Stanley S[redacted]
Subject: status of determining federal CCS funding? thx

Philip A. Cooney
Global Issues Manager
Public and Government Affairs
Exxon Mobil Corporation

Office: [redacted]
Mobile[redacted]

Visit ExxonMobil's Energy Fac[redacted], an [redacted] resource covering the cutting-edge technology and innovations tha[redacted]helpin[redacted] meet tomor[redacted]w's energy needs.

Clean Energy Ministerial CCUS Initiative
Oil and Gas Climate Initiative
VERSION 4: 14 August 2019

Joint declaration on kick-starting CCUS hubs
OR Joint declaration on accelerating the CCUS industry

1. Carbon capture, utilization and storage (CCUS) is an essential part of a broad set of solutions needed to create more sustainable low carbon energy and industrial systems in support of the Paris Agreement climate goals. It can reduce emissions on a significant scale in both the industrial and power sectors, and support the emergence of key technologies, such as clean hydrogen, direct air capture and biomass with CCUS, crucial to meet net zero ambitions.

2. Investment in CCUS must be scaled-up urgently to achieve global climate and energy goals. Accelerating CCUS will require governments and industry as well as other stakeholders to work collaboratively to develop investable business models.

3. The Clean Energy Ministerial Carbon Capture, Utilization and Storage Initiative (CEM CCUS Initiative) countries and the Oil and Gas Climate Initiative (OGCI) member companies support the global development of an economically viable, environmentally responsible and safe CCUS industry, and recognise the need for strong public-private co-operation in this respect. At the Tenth Clean Energy Ministerial (CEM 10) in Vancouver on 29 May 2019, CEM CCUS Initiative countries and OGCI agreed to explore ways to collaborate to accelerate CCUS[1]. Today, we crystallise our intent to work together to drive strategic CCUS projects and hubs[2] forward as an initial step in development of an economically, safe and environmentally viable CCUS industry.

4. The collaboration between the CEM CCUS Initiative and OGCI aims to facilitate and help develop CCUS hubs and major projects worldwide at commercial scale in order to catalyse the continued environmentally responsible and safe development and deployment of CCUS in CEM CCUS Initiative countries and others identified by OGCI.

5. CEM CCUS Initiative countries and OGCI member companies intend to explore opportunities to support the development of CCUS commercial hubs and projects through the various stages of development. This will notably include sustained dialogue on policy and regulatory frameworks, aiming for commerciality of identified hubs and projects. This could also consider, as appropriate, risk-sharing mechanisms, knowledge sharing, management of storage liabilities, corporate and project finance and engagement with civil society.

6. This framework defines a unique opportunity to bring governments and industries together to create viable market conditions to advance CCUS and to progress potential CCUS hubs and projects in CEM CCUS Initiative countries and others identified by OGCI members, as well as exploring opportunities in developing countries as appropriate. In so doing, CEM CCUS Initiative countries and industry members within OGCI intend to bring their respective expertise and support to advance potential CCUS hubs and projects across the globe.

7. This framework is designed to be flexible, and is non-binding and voluntary. CEM CCUS Initiative countries and OGCI member companies recognise that collaboration will take different forms in different jurisdictions. Various public-private collaboration models exist and CEM CCUS Initiative and OGCI will discuss their merits in different circumstances and work together to create processes that suit each jurisdiction and potential project opportunity.

---

[1] [HYPERLINK "https://www.cleanenergyministerial.org/news-clean-energy-ministerial/clean-energy-ministerial-ccus-initiative-and-oil-gas-climate"]

[2] *A hub captures carbon dioxide from several industrial companies and bring economies of scale by sharing transport and storage infrastructure*

Actions going forward

While this framework is non-binding and voluntary, the CEM CCUS countries and OGCI members wish to express their intention to work together as follows:

8. CEM CCUS countries and OGCI companies will identify the potential commercial CCUS hub(s) and project(s) for advancement within this collaboration. This includes identifying key actors to be involved, their potential responsibilities and roles, as well as the steps in hub/project development. The general roles of both CEM CCUS governments and OGCI members are described as follows:

    a. CEM CCUS Initiative countries' intention is to facilitate CCUS by providing:
        i. General policy and strategic support for CCUS in their national strategies
        ii. Stable and predictable regulatory frameworks
        iii. Policy mechanisms needed to underpin commerciality of CCUS hubs and projects
        iv. Support for, and enablement of, the identified potential CCUS hubs and projects at national and local levels
    b. OGCI members intend to provide:
        i. Technical and business expertise in CCUS development and operation
        ii. An understanding of what is needed from an industry perspective to make CCUS commercially viable
        iii. Facilitation of potential corporate financing and investment, as appropriate
        iv. Dialogue channels with stakeholders.

9. CEM CCUS countries and OGCI member companies will look for opportunities to engage other interested stakeholders, such as emitting industries which may form part of a CCUS hub, banks, investors, governments and technology providers. They will invite them to join the efforts through this collaboration as relevant. CEM CCUS countries and OGCI members will regularly review the progress, budget and planning of the collaboration, with the intent to continuously improve it.

CEM CCUS countries and OGCI member companies will work together to accelerate the development of key CCUS hubs. The OGCI "Kickstarter" programme will consider, identify and select suitable hubs. We will start with a preliminary short-list of potential hubs and will continue to screen other opportunities as we progress[3].

[3] *The list of potential hubs can be found at www.[website].com*

List of potential hubs and projects

- **Teesside, the UK**: *The Clean Gas Project (CGP) could be an anchor project that generates low carbon power from gas and/or enables industrial decarbonisation, in one of the UK's largest emitter industrial regions. CEM CCUS and OGCI member companies will continue project development collaboration via the UK government, and progressively identify lessons learned of this mature project and disseminate to other hubs.*

- **Northern Lights, Norway**: *An open source network for industrial CO_2 sources on the European continent. Ship transport will enable a range of point sources to store their CO_2 on the Norwegian Continental Shelf. CEM CCUS and OGCI member companies will work to reinforce collaboration with Norwegian government to promote the project across the North Sea and enable its development.*

- **Rotterdam, the Netherlands**: *A project in which CO_2 generated by industry in Rotterdam's port area is captured and stored in empty gas fields deep in the North Sea seabed. CEM CCUS and OGCI member companies intend to work together to help accelerate and duplicate the Rotterdam project in other areas of the Netherlands, including the development of appropriate national policies.*

- **Gulf Coast, the US**: *Working to identify large clusters of sources in industrial areas, and sinks in the Permian basin, together with potential coalition of stakeholders and a favourable regulatory environment. CEM CCUS and OGCI member companies aspire to identify and characterize promising hubs in the regions and develop the technical and commercial needs to enable their development.*

- **Xinjiang, China**: *The Junggar Basin presents key characteristics for CO_2 storage, and is located nearby to important emissions sources. CEM CCUS and OGCI member companies endeavour to collaborate with authorities to set the appropriate regulatory environment and with stakeholders on hubs and project identification and feasibility assessment.*

As we progress, we will aim to expand our geographical coverage of hubs.

Message

From: White, John [redacted]@chevron.com]
Sent: 4/5/2019 2:32:00 AM
To: Trelenberg, Pete W [redacted]@exxonmobil.com]
Subject: OGCI & Catch Up
Attachments: SSRN-id3339853.pdf

Hi Pete

Enjoyed catching up at the recent OGCI Excom and trust you had a safe trip back home.

As discussed we would appreciate the opportunity to have a high level engagement on CLC. From Chevron's I would like to include Julie Mulkerin (Climate Strategy Manager) and myself. We would be happy to travel to your offices in Dallas, meet in Houston, or set up a conference call if more convenient. As for timing we can be available anytime the week commencing April 22nd of convenient for you and your team. We envision a high level conversation subject to legal guidance from our teams that avoids anti-competition or other concerns.

On a separate note please find attached the report Imperial College report I mentioned over dinner. It accesses the preparedness of major oil and gas companies for a low-carbon energy transition.

Many thanks,
John

John R White
General Manager, Climate and Energy Transitions

Chevron Corporation
1500 Louisiana St, #39105, Houston, TX, 77002
Office +[redacted] / Mobile +[redacted]

Assessing the preparedness of major oil and gas companies for a low-carbon energy transition

Authors

Francis Shaw, Centre for Climate Finance & Investment, Imperial College Business School

Charles Donovan, Centre for Climate Finance & Investment, Imperial College Business School

Abstract

Given the volume of capital already embedded in the energy sector, the transition of the oil and gas majors towards low-carbon energy will be crucial in meeting global climate objectives. Various commercial indices currently attempt to track climate change risks embedded in these firms. The methodologies employed are largely based on the carbon footprint of a company's assets, operations and supply chains. These approaches rely on objective information about a company's greenhouse gas emissions, thereby avoiding inherently subjective evaluations of corporate governance, strategic planning, and risk management policies. The indices generally do not consider the steps being taken by companies to engage in new lines of business and re-shape business models in response to changes in the global energy system. In short, they act as a poor proxy for the investment risks facing oil and gas sector investors.

In this paper, we introduce a methodology for identifying strategic differentiation amongst major international oil and gas companies with regards to a low-carbon energy transition. Our technique scores companies based on the degree of portfolio exposure, R&D, diversification, and observable business development in low-carbon activities. We track stated targets, board-level commitment, and monitoring by senior management. Our multi-dimensional analysis produces a within-sector, relative scoring of the degree of preparedness for the energy transition by the largest publicly-traded oil and gas companies.

Our approach offers a path towards meaningful interpretation of qualitative information that is becoming available as a result of recommendations by the Financial Stability Board's Taskforce on Climate-Related Financial Disclosures (TCFD) and national regulatory initiatives. The framework has potential application in other sectors by simplifying the assessment of potential strategic responses in energy-intensive industries. We conclude that existing information disclosures made by the oil and gas majors facilitate a robust evaluation of strategic positioning ahead of a potential shift to a low-carbon economy.

I. *Introduction*

The global energy system is undergoing transition towards lower carbon energy in response to the need to reduce greenhouse gas (GHG) emissions. The forces driving the energy transition are complex and varied, including technological innovation, economic development and political responses to climate change (International Energy Agency, 2017). Following the UNFCCC Paris Agreement, the aspired objective of this transition is to limit global warming to *'well below 2°C'* from pre-industrial levels (United Nations, 2015). Action is being taken at many levels to try to de-carbonise elements of the energy system and pressure for further change continues to mount (Benson and Majumdar, 2016). Yet there is still considerable uncertainty over how the energy transition will play out: the pace and extent of change; the pathways followed; and associated technological trajectories.

The low-carbon energy transition has considerable implications for the oil & gas industry. According to the BP Statistical Review of World Energy 2017, fossil fuels currently provide approximately 85% of the global primary energy supply. Approximately two-thirds comes from oil and gas, with the remainder from coal (BP, 2017). The share of coal, oil and natural gas in the energy supply mix will have to reduce significantly over the next few decades if the aspired reductions in GHG emissions are to be achieved (Brown, 2014; Budinis *et al.*, 2016; Capros *et al.*, 2012; IPCC, 2014).

A rapid low-carbon transition would impact upon the major oil & gas companies in terms of strategy, the continued viability of their current business models and their long-term value to investors. Most specifically, there is a risk that climate policies will jeopardise elements of future production value (Kolk and Levy, 2001; Scholtens and Wagenaar, 2011; Castelo Branco *et al.*, 2012; Budinis *et al.*, 2016). Possible limitations on future oil & gas use has given rise to the concept of *'un-burnable carbon'* (Heede and Oreskes, 2016). McGlade and Ekins (2014) estimated that up to the year 2050, one-third of oil reserves and one-half of gas reserves must remain in the ground in order to meet a carbon budget based on the Paris Agreement. Many analyses have come to similar conclusions, resulting in growing pressure on institutional investors to divest out of fossil fuels. The combination of eroding market share, the rising power of NOCs (Finley, 2012), and the prospect of increasing pressure from activists and investor groups to leave oil & gas reserves unproduced, results in significant challenges to existing business models in energy industry (Caldecott *et al.*, 2018).

As of today, there is no clear framework for investors to understand the degrees to which different oil & gas companies are exposed to energy transition risks, nor how well placed

those companies are to grasp new market opportunities. Established theories of socio-technical transitions, such as the Multi-Level Perspective (MLP), generally hold that system incumbents are largely constrained to passive, reactive roles (Geels, 2002). Yet, the major oil & gas companies have a range of capabilities including financial, technical and human resource capital to spur innovation and technology diffusion and hence to adjust to and benefit from the changing energy landscape. They could also leverage existing leadership positions and network of partnerships and influence in support of a transition towards a low-carbon energy system (Sachs, Maennling and Toledano, 2017). Strategic positioning is an important driver of sustainable competitive advantage and can therefore differentiate long-term value for investors (Porter, 1996).

Currently approaches guiding investors tend to focus on commodity price risks for the sector at large. Various tools are emerging that claim to allow rankings, allocations or weightings within the sector, based on climate-related risks. These low-carbon and green financial indices tend to present investors with a binary choice on whether individual equities are investible or not. Rankings are often based on the carbon footprint of a company's assets and operations, with carbon dioxide (CO_2) emissions used as a proxy for a climate risk metric. There is typically little or no consideration given to governance, strategic planning or risk management, which are key dimensions identified as important areas by the Financial Stability Board's Task-force for Climate-related Financial Disclosure (TFCD, 2017) and the EU guidelines for climate-related aspects of the Non-Financial Reporting Directive (Technical Expert Group on Sustainable Finance, 2019).

This research project explores the range of strategic response options available to the oil & gas majors as the energy system changes in response to climate change concerns. Three **research questions** were established at the outset:

RQ1. What are the strategic options available to oil and gas companies to respond to a low-carbon energy transition?

RQ2. What do stated intentions and actions tell investors about the degree to which companies are taking up these options?

RQ3. Can information disclosed by companies be used to rank a firm's relative degree of preparedness for a low-carbon energy transition?

At the heart of our paper is a framework that employs fifteen parameters that can be used by investors to differentiate the strategic responses of oil and gas majors. We test our framework by evaluating a sample of the world's largest publicly listed oil and gas companies.

II. Methods

We collected qualitative and quantitative data from a range of publicly-available information including annual reports, strategy statements, speeches and interviews by top executives, and company press releases. Secondary data collection was supplemented by in-person interviews with company executives. In-person interviews were fully transcribed and subsequently coded. The coding structure was also applied, recursively as the analysis progressed, to the secondary data. This process followed elements of thematic analysis as described by (Thornhill, Saunders and Lewis, 2016) to establish patterns across diverse datasets.

The resulting range of strategic responses was then incorporated into the second phase of the research, whereby we developed a framework for assessing the relative preparedness of the oil & gas majors to a low-carbon energy transition. The elements of our framework for relative, within-sector ranking were drawn from three sources:

- our own list of industry-specific strategic response options;
- the Recommendations of the Task Force on Climate-related Financial Disclosures (2017); and
- a study commissioned by Access Corporate Finance from Harvard Kennedy School students (HKS, 2018).

Data were downloaded from company websites. In all cases, this included relevant sections of the most recent Annual Report and Sustainability Report. In addition, we made our own summary of the existing low-carbon activities within the company, based on published company data. Strategy updates were captured from company strategy reports or presentation transcripts wherever possible, otherwise from the text on webpages dedicated to strategy, with the text subsequently loaded into a dedicated worksheet in an excel spreadsheet for subsequent coding and analysis. In this way the actual words prepared by the relevant company about its own strategy were used as the source data, rather than third party interpretations of that strategy. Having compiled all the data into a master file, data analysis was undertaken as an iterative process involving adaptation and augmentation of the coding structure. The final coding structure reflects the patterns that emerged from statements by the sample companies about their preparations for a low-carbon energy transition.

The sample of oil & gas companies to be included as majors for the purposes of this research is:

- ExxonMobil;
- Royal Dutch Shell;
- Chevron;
- Total;
- BP;
- Equinor (formerly known as Statoil); and,
- Eni.

These companies were selected as the largest International Oil & Gas companies (by market capitalisation), publicly listed on stock exchanges and subject to shared influences and pressures from ownership structure and global multi-national enterprise culture. National Oil Companies (NOCs) were excluded from this research because they are not as exposed to the same influences and pressures, often serving a strategic agenda set by their state ownership. In addition, these oil & gas majors share a common range of capabilities covering:

- technical know-how;
- financial strength;
- project management experience;
- human resource and social capital; and
- risk management expertise.

Our framework contains 15 parameters in total. Scoring against each parameter was conducted by the lead author. In order to help ensure consistent application of expert judgement across all sampled companies, a set of guidelines of 'low', 'medium' and 'high' outcomes was prepared based upon the range of actual responses observed in the analysis. Thus, the analysis represents a *relative* assessment of the sampled companies against each other and against the 'best-in-class' response identified in advance. The analysis is not, therefore, an *absolute* indication across all possible current or future performance outcomes. To convert the description of the assessed status for each parameter into a numerical score, a five-point ordinal scale was used.

Highlighting of key observations and comments as they arose, recording reflections on issues arising from one analysis step to help ensure consistent application in subsequent analysis steps, and using a formal coding structure were all approaches used to help improve the internal reliability (self-consistency) of the research. Given the intentionally subjective nature of the work, there is a low degree of external validity. We cannot assure that repeating our process for data collection and analysis would produce the same

findings, at another time or if replicated by other researchers. Steps were taken to limit bias as much as possible in the research. However, the analysis does ultimately rely upon expert judgement. The inclusion of a full description of the research design and method (as more fully described in the Appendices) is intended to allow industry analysts and other researchers to replicate our approach, if so desired.

Measurement validity was addressed by using a coding structure for the data analysis developed around the strategic responses being assessed by the research, which is therefore a direct and appropriate measure of the subject. Furthermore, the data were collected from the companies directly, rather than being a third party's interpretation of their intentions. Whilst this research deals with a sample of seven of the largest publicly listed international oil & gas companies, the same approach could be utilised to assess major companies in other sectors, providing that a similar analysis is undertaken to identify the key strategic response options relevant to that sector.

III. Results & Analysis

Identification of Strategic Options (RQ1) & Take-Up of Strategic Options (RQ2)

Table 1 below shows a high-level overview of the status of diversification into lower carbon portfolios across the set of oil & gas majors. A green tick indicates positive diversification action into that area, a question mark indicates that the company has stated its intention to consider moving into a low-carbon area but there is not yet evidence of any completed actions. A blank cell indicates no stated intent or actions.

Portfolio Action	ExxonMobil	Chevron	Eni	BP	Equinor	Shell	Total
Portfolio adjustments - Gas Growth	?		✓	✓	✓	✓	✓
- Divesting higher-carbon assets					✓	✓	
Wind Power - Onshore		✓	?	✓		✓	✓
Wind Power - Offshore					✓	✓	
Solar - PV		✓	✓	✓	?	✓	✓
Solar - Thermal				✓		✓	
Other Renewables - e.g. tidal, geothermal		✓					
New Transport fuels - LNG, CNG & GtL						✓	✓
New Transport fuels - BEV charging				✓	✓	✓	✓
New Transport fuels - Hydrogen						✓	
New Transport fuels - Biofuels	✓	✓	✓	✓		✓	✓
CCS	✓	✓			✓	✓	✓
Commercial Models - Elect. Trading/Retail						✓	✓
Energy Efficiency Management		✓			✓		✓
Others			Biomass power, car sharing, autonomous vehicles		Storage, smart grids	digital, mini grids, distributed energy systems	Storage, digital, smart grids

Table 1: High-Level Overview of Low-Carbon Portfolio Actions

Shell and Total have been among the most active of the majors in recent low-carbon diversification actions. Further in-depth case-study analysis of these two companies was carried out by collating the press releases from both companies' websites together with other relevant press reports. The data were loaded into a worksheet in a spreadsheet file and arranged chronologically in order to explore linkages and the development of a narrative.

Total entered into about two dozen relevant transactions covering areas as diverse as gas growth with LNG assets, developing gas as a transport fuel, renewable power generation from wind and solar PV, together with electricity and gas retail, distributed generation, smart grids innovation, batteries, storage and energy efficiency. In addition, Total has made significant investment in its bio-refinery at La Mede to develop bio-fuels for transport. Total has invested at least US$7.5 billion in low-carbon diversification through these transactions over the past two years or so, potentially more given that not all transaction financial considerations are disclosed.

Shell's recently established New Energy division is focused initially on new fuels for transport, including bio-fuels, gas, hydrogen and battery electric vehicles, as well as electricity generation, trading and supply, and optimisation of supply and demand, from wind, solar and natural gas. Further acquisitions and investments have also been made in storage, mini-grids, distributed energy and off-grid solutions, as Shell seeks to explore and integrate opportunities across the value chain.

There is a common theme, across Shell, Total and some of the other more active majors, of using partnerships, through venturing in new start-ups, acquisitions and new business models in a complementary manner to the existing legacy businesses and customer networks to both catalyse and leverage new low-carbon opportunities.

Thematic analysis of these recent low-carbon diversification actions and the stated strategic responses of the sample set of oil & gas majors resulted in identification of the following key parameters for implementation of strategic options, for subsequent inclusion in the framework for assessing preparedness:

- **Portfolio Adjustment:**
  - How the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.

- **R&D:**
  - The company's R&D programme and its commitment to material R&D spending in low-carbon technologies, demonstration projects and early-stage commercial deployment.
- **Diversification:**
  - How the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).
- **Extension of the Value Chain:**
  - How the company is pursuing business opportunities extending along the renewables & low-carbon value chain and deploying new business models.
- **Partnership & Venturing:**
  - How the company is investing in partnerships and new ventures with technology innovators.

Assessment of Relative Energy Transition Preparedness (RQ3)

Analysis of Strategic Options for creating new and enhancing low-carbon revenue streams in the first component of this work revealed the following main levers for implementation:

- R&D and technology deployment
- Carbon Capture & Storage (CCS)
- alternative transport fuels
  - bio-fuels
  - EV charging
  - Hydrogen, gas for transport, Gas-to-Liquids
- renewable power
  - generation
  - expansion along the value chain
    - trading, retail, storage, grid services, off-grid, access to energy
  - integration and synergies with new and existing businesses
    - customer base, legacy infrastructure, energy efficiency
- new commercial models, revised business models
- partnerships and venturing with low-carbon innovation start-ups.

These implementation parameters form the core of assessing differentiation in strategic positioning of the oil & gas majors in readiness for a low-carbon energy transition. In addition, TCFD has developed guidance to support the development of climate-related financial disclosures by providing context and suggestions for implementation and

descriptions of the types of information that should be disclosed or considered. The TCFD recommendations cover four dimensions (TFCD, 2017):

- **Governance** – *information supports evaluation of whether climate-related issues receive appropriate board and management attention*
- **Strategy** – *informs expectations about the future performance of the organisation*
- **Risk Management** – *supports overall evaluation of the risk profile and risk management activities of the organisation*
- **Metrics and Targets** – *supports assessment of potential risk-adjusted returns, ability to meet financial obligations, general exposure to climate-related issues, and progress in managing or adapting to those issues, as well as providing a basis for comparison.*

These components have been brought together into a single assessment framework covering the four dimensions of TCFD recommended disclosures plus a fifth dimension covering those parameters identified as important in implementation, as shown in Table 2.

Table 2: Parameters for Assessment Framework	
A.	***Governance***
	1. Board Oversight: Process for board-level oversight of climate-related issues, including monitoring of progress against targets; consistency with other governance aspects and corporate review processes.
	2. Management Responsibilities: Arrangements for management-level responsibilities for climate-related issues: assigned management roles, reporting relationships, management information and monitoring processes. Plus, how the company links executive pay to GHG emissions performance.
B.	***Strategy***
	3. Incorporation of Climate Risks into Strategy: Identification of climate-related issues which can have a material impact over different timescales in relation to the lifetime of the company's assets and infrastructure. Incorporation into strategy formulation, planning assumptions and objectives.
	4. Consideration of Deep De-carbonisation Scenarios: Use of scenarios to inform strategy and financial planning, including a 2°C or lower scenario. Demonstration of resilience of strategy to climate-related scenarios, how strategies might change as a result, and the scenarios and time horizons considered.
C.	***Risk Management***
	5. Identification, Assessment & Management of Climate Risks: Processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework; assessment relative to other risks; prioritisation.
	6. Investment Decision Making: Use of internal carbon price in supporting investment decision- making. Consideration of low-carbon business investments relative to differing risk profile and expectation of returns.
D.	***Implementation***
	7. Portfolio Adjustment: Portfolio adjustment; moving away from higher carbon intensity assets and increasing its weighting to low-carbon assets.
	8. R&D: R&D programme; commitment to material spending in low-carbon technology, including CCS.
	9. Diversification: How the company is pursuing new low-carbon lines of business.
	10. Extension of the Value Chain: Pursuing business opportunities extending along the renewables & low-carbon value chain; deploying new commercial & business models to leverage synergies with legacy businesses.
	11. Partnership & Venturing: Investing in partnerships and new ventures with low-carbon technology innovators.
E.	***Metrics & Targets***
	12. GHG Emissions: The company's disclosure level for scope 1, scope 2 and scope 3 GHG emissions.
	13. GHG Emissions Reductions: Targets for GHG emissions reductions and progress towards achievement of targets.
	14. Low-carbon Capital Expenditure: Investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment, and targets for future investment levels.
	15. Flaring, Venting and Methane Leakage: Approach to flaring & venting reduction and to tackling methane loss in the supply chain, together with any targets.

The assessment framework developed through this work comprises 15 separate parameters, for each of which a score of 1 to 5 has been assigned where 5 represents the most engaged and prepared for that component of climate risk exposure. The overall risk ranking is established by summing the scores over all 15 parameters and presenting as a percentage of the maximum possible score, with equal weighting applied to each parameter. Table 3 shows the overall outcome for the sample set of oil & gas majors, reflecting their relative preparedness for responding effectively to climate transition risks.

Rank	Company	Overall Score
1	Total	95%
2	Shell	93%
3	Equinor	89%
4	BP	75%
5	Eni	67%
6	Chevron	47%
7	ExxonMobil	40%

Table 3: Overall Assessment of O&G Major Climate Risk Ranking

The European companies are better engaged with the transition and are more effectively taking the necessary steps to limit their exposure to climate risks than the North American based majors. ExxonMobil and Chevron (40-47) are clearly clustered at the bottom of the ranking. A further distinction can be drawn amongst the Europeans, with Total, Shell and Equinor (95-93-89) forming a cluster of highest level of preparedness for climate risk and BP and Eni (75-67) forming a mid-level cluster between the most well-prepared Europeans and the Americans.

This relative ranking is broken down in Table 4 across the five dimensions of governance, strategy, risk management, implementation, and metrics & targets, with the best-in-class in each dimension shaded in green and the worst-in-class shaded red.

	Exxon Mobil	Chevron	Eni	BP	Equinor	Shell	Total
A. Governance	2	2	3.5	2	4	5	4.5
B. Strategy	2.5	4	3.5	4	4.5	5	5
C. Risk Management	3	2.5	4	4.5	5	5	5
D. Implementation	1.6	1.8	2.8	4.4	4.6	4.6	4.8
E. Metrics & Targets	1.75	2.25	3.5	3.25	4.25	4.25	4.5
OVERALL SCORE	**40%**	**47%**	**67%**	**75%**	**89%**	**93%**	**95%**

Table 4: Overall Assessment of O&G Major Climate Risk Preparedness

Figure 1 shows the overall relative assessment expressed graphically against the 5 dimensions.

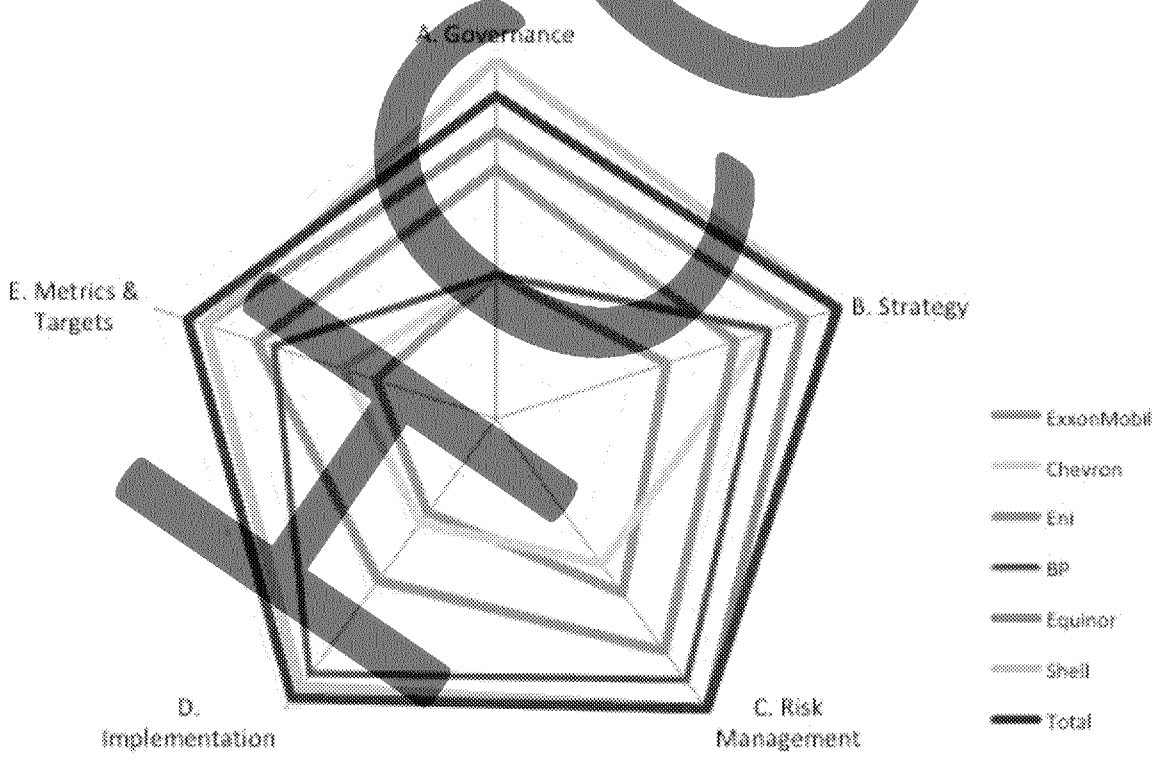


Figure 1: Overall Assessment of O&G Major Climate Risk Preparedness

IV. Discussion

Overall, we conclude that existing information disclosures made by the oil and gas majors facilitate a robust evaluation of their strategic positioning ahead of a potential shift to a lower-carbon energy economy. Our assessment reveals three clusters:

- *ExxonMobil* and *Chevron* at the bottom of the ranking;
- *Total, Shell* and *Equinor* at the highest level of preparedness for climate risk; and
- *BP* and *Eni* forming a mid-level cluster.

The assessment within these three clusters can be shown graphically as follows:

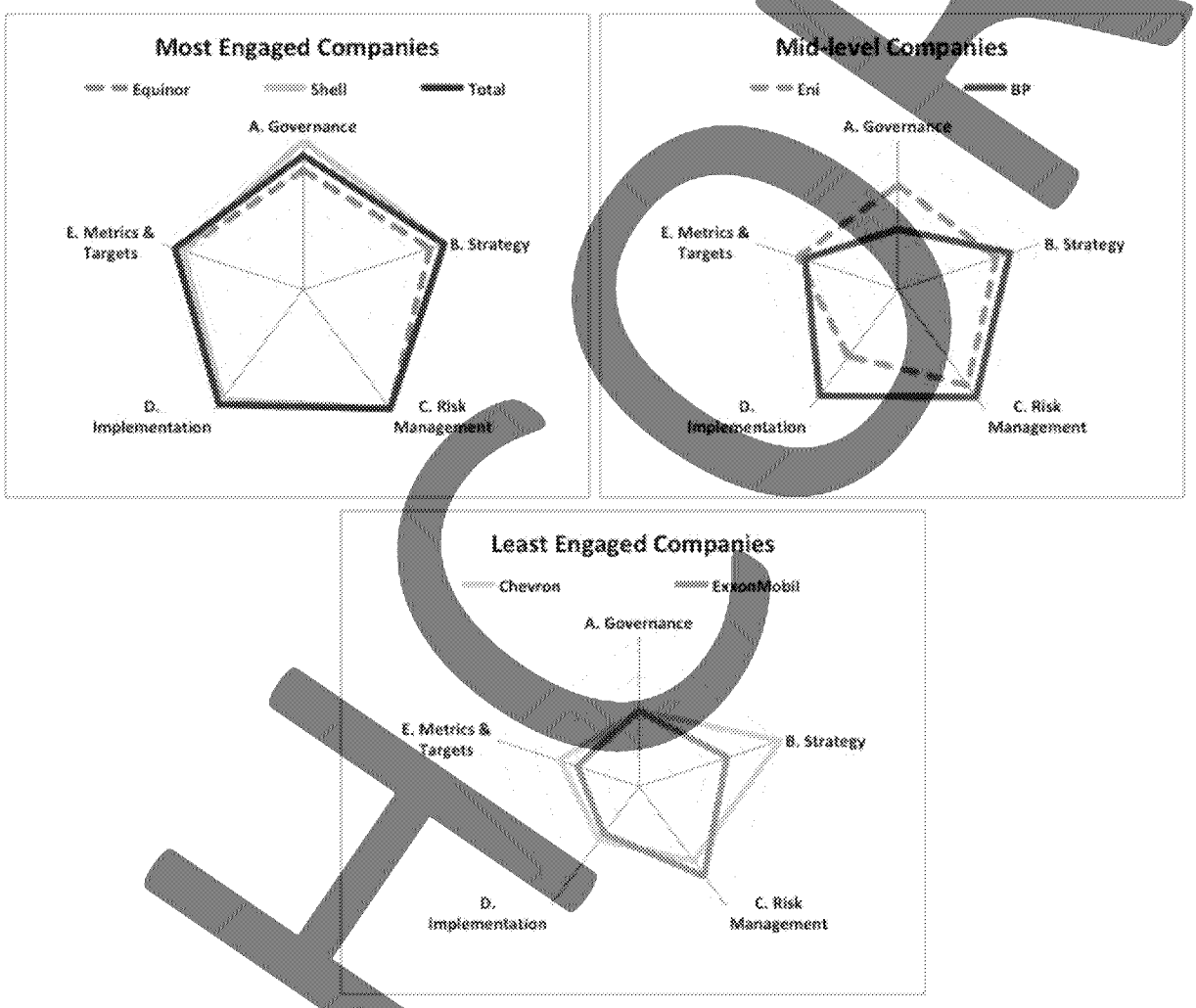


Figure 2: Variation by Firm – three clusters

There is a significant difference across all fifteen assessment parameters between the most prepared and engaged of the oil & gas companies and the least, as shown in Figure 3. There is greater differentiation evident between companies in the *Implementation* and *Metrics & Targets* parameters, which offers insight to investors through objective measures of concrete actions to help sift potential '*greenwashing*' aspects. For example the actual spend on R&D and capital investment directed to low-carbon activities shows significant variation by company. Low-carbon investment still remains low, however, versus legacy

oil & gas investments – less than 5% for all oil majors during the period 2010 to 3Q2018 according to analysis by the Financial Times (Anjli Raval (FT), 2018). Whilst these financial parameters do not yet 'move the needle' for investors, our assessment framework will allow greater insight by tracking progress of whether the majors realise their stated low-carbon investment targets – Shell up to 7.5% over the next three years, Equinor up to 15%-20% by 2030 and Total up to 20% within twenty years.

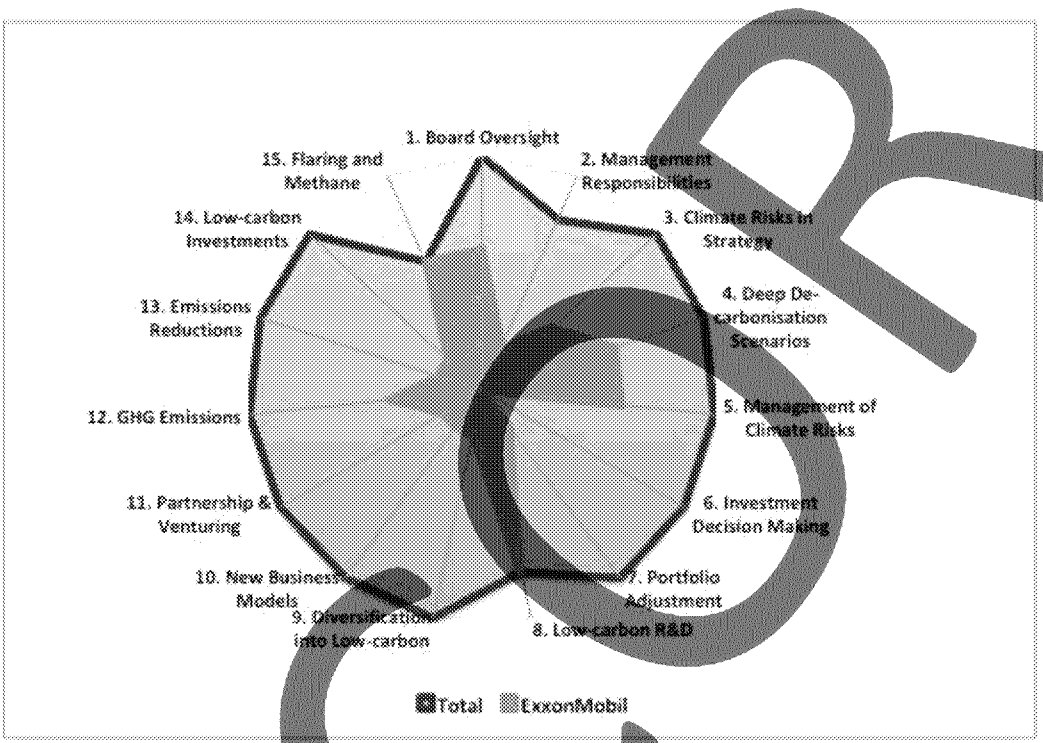


Figure 3: Variation by Firm – overall range of preparedness

The relative differences between the companies and their clusters is depicted in Figure 4, below.

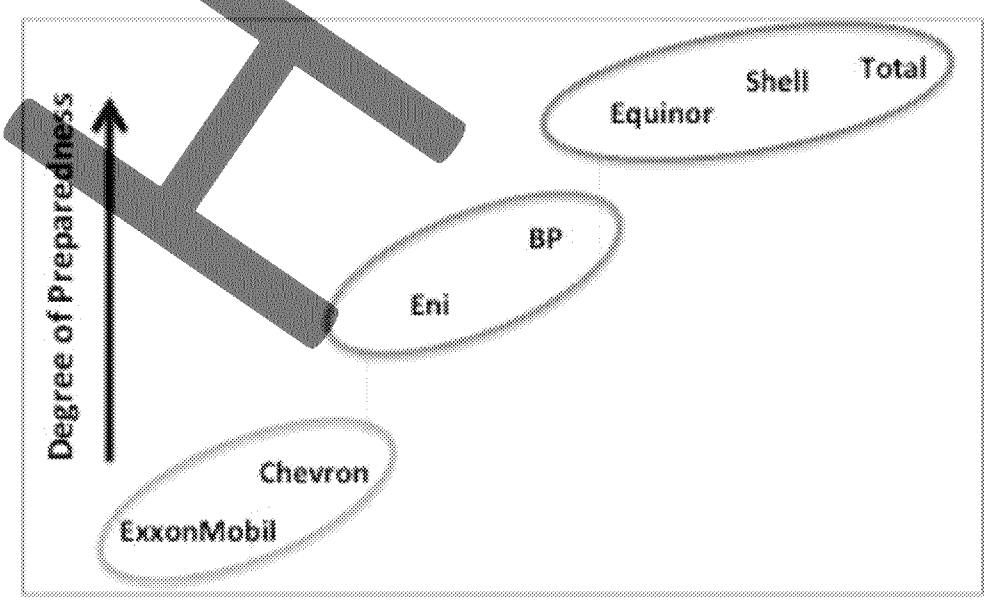


Figure 4: Relative Preparedness by Firm

There is considerable previous work reported in the literature leading to the expectation that firms within a specific sector will over time tend to exhibit isomorphism, that is tend to adopt similar corporate organisational responses to common pressures, displaying reduced heterogeneity over time (DiMaggio and Powell, 1983; Levy and Rothenberg, 2002; Milstein, Hart and York, 2002). This is commonly referred to in the management literature as the *'iron-cage'* constraint on individual firm behaviour and differentiation. DiMaggio and Powell (1983) argue that such isomorphism is brought about by both competitive and institutional forces, comprising coercive, mimetic and normative processes. The heterogeneity seen in the current responses of the sample oil & gas majors can best be explained as a timing effect. As European firms start responding earlier to certain coercive and normative external forces, they begin the process of innovation in strategic response which is later adopted by the North-American firms, through mimetic and normative isomorphic processes.

Our analysis generates insights from company disclosures concerning governance, strategic processes, and risk management policies. The framework described in this paper can be used to generate an additional layer of qualitative analysis on top of the quantitative analysis generated by commercial ratings agencies. In Table 5, we provide a comparison of our scoring against those made by CDP (formerly known as the Carbon Disclosure Project) in their 2017 assessment (CDP, 2017):

Company	CDP 2017 Rating	Our Ranking
Total	A-	95%
Shell	B	93%
Equinor	A-	89%
BP	A-	75%
Eni	A-	67%
Chevron	B	47%
ExxonMobil	C	40%

Table 5: Comparison of Preparedness Ranking with CDP Rating

There are some clear similarities. ExxonMobil and Chevron are in both at the bottom. There are again similarities at the top of the list, although the position of Shell is notably different. Observed differences may be attributable to the fact that our framework ranks based on the *quality* of the information increasingly being disclosed. Many commercial

indices are concerned primarily with the *quantity* of relevant information made available. The aim of our framework is to provide a robust yet simple system for interpreting the content of what companies disclose, not just how much they disclose.

As a simple check on our analysis, we carried out an automated keyword-count analysis on the main data sources used in this research. The results of the keyword count are provided in in Appendix 4.

V. *Conclusions*

In response to the first research question of how the oil & gas majors can respond to a low-carbon energy system transition, this work has demonstrated that there are a range of active strategic response options available for the major international oil & gas companies. The work has furthermore demonstrated that stated strategic intentions and recent actions disclosed by companies can offer meaningful insight to investors about the differing degree of pursuit of strategic options.

We took as given that oil & gas majors seeking to thrive in an energy transition would have to reduce existing high-carbon revenue streams and replace them over time with low-carbon or lower-carbon revenue streams. Existing revenue streams can be characterised as:

- high-carbon oil (tar sands, heavy oil)
- conventional oil (onshore, offshore, deep water)
- tight oil and gas (shale)
- natural gas (pipeline and LNG)
- refinery throughput
- oil, gas & products trading & supply
- retail oil products and associated customer services
- petrochemicals.

These existing revenue streams can be enhanced by reducing costs & improving margins and lowering existing carbon intensity (e.g. through flaring reductions, lowering methane emissions along the gas supply chain, and portfolio adjustments). Movement towards greater operational excellence have been prominent in all majors' strategies over recent years. This can be measured through quantitative metrics such as GHG intensity or carbon intensity, $/bbl opex, development costs and margins. While these metrics are an important consideration in providing a quantitative element to the assessment framework, they are not, in and of themselves, enough in indicating a state of preparedness for long-term business transformation.

In answering the final research question, '*Can information disclosed by companies be used to rank a firm's relative degree of preparedness for a low-carbon energy transition'*, we see implementation as a key dimension for assessing the relative degree of preparedness for a low-carbon energy transition. Our measure of implementation is a crucial addition to the topics of *governance, strategy, risk management, metrics & targets* that comprise the TCFD guidance.

Transition preparedness varies significantly across the sample companies. We confirm a clear differentiation between the European based companies and their North American counterparts, with ExxonMobil and Chevron close together at the least prepared end of the spectrum, Equinor, Shell and Total clustered together as most prepared, and with Eni and BP sitting between the two clusters.

The heterogeneity observed in the strategic responses and level of preparedness, which might appear to contradict the theory of isomorphism within organisation fields, might be explained as a phasing effect, with European based firms adopting earlier innovative strategic change in response to coercive and normative pressures.

The assessment framework approach has the potential to be applied to other sectors, in addition to oil & gas, to provide similar insight into the relative preparedness for a low-carbon energy transition, with the important parameters relative to implementation updated in accordance with the strategic drivers relevant to each sector.

VI. References

Anjli Raval (FT) (2018) 'Oil majors keep tight grip on spending for greener future', *Financial Times*, 27 December.

Benson, S. and Majumdar, A. (2016) *Deep decarbonization: A role for the oil and gas industry | Energy*. Available at: https://energy.stanford.edu/from-directors/deep-decarbonization-role-oil-and-gas-industry (Accessed: 21 January 2018).

BP (2017) 'BP Statistical Review of World Energy 2017', *British Petroleum*, (66), pp. 1–52. doi: http://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf.

Brown, D. (2014) 'IEA's World Energy Outlook 2013: Renewables and Natural Gas to Surge Through 2035.', *Power*, 158(1), pp. 8–9. Available at: http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=93654064&site=ehost-live.

Budinis, S. *et al.* (2016) 'CAN TECHNOLOGY UNLOCK UNBURNABLE CARBON'? WHITE PAPER'.

Caldecott, B. *et al.* (2018) 'Crude awakening: making oil major business models climate-compatible', (March). Available at: http://www.smithschool.ox.ac.uk/research/sustainable-finance/publications/E3G-Oil-Majors-Report-Digital-March-2018.pdf.

Capros, P. *et al.* (2012) 'Transformations of the energy system in the context of the decarbonisation of the EU economy in the time horizon to 2050', *Energy Strategy Reviews*, 1(2), pp. 85–96. doi: 10.1016/j.esr.2012.06.001.

Castelo Branco, D. A. *et al.* (2012) 'A multicriteria approach for measuring the carbon-risk of oil companies', *Energy Strategy Reviews*. Elsevier, 1(2), pp. 122–129. doi: 10.1016/J.ESR.2012.06.002.

CDP (2017) *CDP 2017 Program Scores*. Available at: https://www.cdp.net/en/scores-2017 (Accessed: 20 December 2018).

DiMaggio, P. and Powell, W. (1983) 'The Iron Cage Revisited', *American Sociological Review*. doi: 10.2307/3094810.

Finley, M. (2012) 'The Oil Market to 2030--Implications for Investment and Policy', *Economics of Energy & Environmental Policy*, 1(1), pp. 25–36. doi: 10.5547/2160-5890.1.1.4.

Geels, F. W. (2002) 'Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study', *Research Policy*. doi: 10.1016/S0048-7333(02)00062-8.

Heede, R. and Oreskes, N. (2016) 'Potential emissions of CO2 and methane from proved reserves of fossil fuels: An alternative analysis', *Global Environmental Change*, 36, pp. 12–20. doi: 10.1016/j.gloenvcha.2015.10.005.

HKS (2018) *A Framework for Assessing How Oil and Gas Companies Adapt to Climate Change*. Harvard Kennedy School.

Hook, L. (2018) 'Lightbulb group shows way on climate change', *Financial Times*, 23 December. Available at: https://www.ft.com/content/945b8c44-0450-11e9-99df-6183d3002ee1.

International Energy Agency (2017) *'Introduction and scope', in World Energy Outlook 2017*. Paris. doi: 10.1787/weo-2017-en.

IPCC (2014) *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Core Writing Team, R.K. Pachauri and L.A. Meyer*. doi: 10.1017/CBO9781107415324.004.

Kolk, A. and Levy, D. (2001) 'Winds of Change:: Corporate Strategy, Climate change and Oil Multinationals', *European Management Journal*. Pergamon, 19(5), pp. 501–509. doi: 10.1016/S0263-2373(01)00064-0.

Levy, D. and Rothenberg, S. (2002) 'Heterogenity and Change in Environmental Strategy: Technological and Political Responses to Climate Change in the Global Automobile Industry', in *Organizations, Policy, and the Natural Environment*. doi: 10.1016/S0040-4020(01)01027-4.

McGlade, C. and Ekins, P. (2014) 'Un-burnable oil: An examination of oil resource utilisation in a decarbonised energy system', *Energy Policy*, 64, pp. 102–112. doi: 10.1016/j.enpol.2013.09.042.

Milstein, M. B., Hart, S. L. and York, A. S. (2002) 'Coercion breeds variation: the differential impact of isomorphic pressures on environmental strategies', in *Organizations, Policy, and the Natural Environment: Institutional and Strategic*. doi: 10.5465/AMR.2004.11851775.

Porter, M. E. (1996) 'Porter, M. E. (1996). What is Strategy? Harvard Business Review, 74(6), 61–78.', *Harvard Business Review*.

Sachs, L., Maennling, N. and Toledano, P. (2017) *How Oil & Gas Companies Can Help Meet the Global Goals on Energy and Climate Change*. Available at: http://unsdsn.org/wp-content/uploads/2017/01/170123-Energy-and-Climate-Draft-for-Consultation.pdf (Accessed: 21 January 2018).

Scholtens, B. and Wagenaar, R. (2011) 'Revisions of international firms' energy reserves and the reaction of the stock market', *Energy*. Pergamon, 36(5), pp. 3541–3546. doi: 10.1016/J.ENERGY.2011.03.060.

Task Force on Climate-related Financial Disclosures (2017) *Recommendations of the Task Force on Climate-related Financial Disclosures*.

Technical Expert Group on Sustainable Finance (2019) *Report on Climate-related Disclosures*.

TFCD (2017) 'Final Report: Implementing the Recommendations of the Task Force on Climate Related Financial Disclosures', (June).

Thornhill, M., Saunders, P. and Lewis, A. (2016) *Research Methods for Business Students*. Seventh Ed. Harlow: Pearson.

United Nations (2015) 'Paris Agreement', *21st Conference of the Parties*, 21932(December), p. 3. doi: FCCC/CP/2015/L.9.

Appendix 1 – Assessment Framework Template

Framework of Parameters for Inclusion in Climate Risk Ranking Metric

Company Name *Date*

A. *Governance*

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments	Weighting
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.						
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.						

B. *Strategy*

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments	Weighting
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.						
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.						

C. ***Risk Management***

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments	Weighting
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.						
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low-carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.						

D. ***Implementation*** - *Include relevant quantitative measures where available.*

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments	Weighting
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.						
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.						
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).						
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.						
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.						

E. *Metrics & Targets*

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments	Weighting
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosures of scope 3 GHG emissions.						
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.						
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.						
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.						

Appendix 2 – Completed Assessments for each Company

ExxonMobil December 2018

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	Climate change issues have been covered under sustainability topics 'routinely reviewed at board meetings'. Additional climate change disclosures were agreed following activist shareholder AGM resolution in 2017, resulting in the publication of the Energy & Carbon Summary in Feb 2018	Sustainability Report	Medium	3	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	No clear information disclosed, except in general terms: 'The Chairman/CEO and other members of the Mgt Committee have responsibility for management of climate risk, including in business plans, performance, and public policy.' Limited, indirect link from GHG emissions to executive pay via share awards, which represent about 60% of pay, where award '..is based on key performance metrics including safety and operations integrity, in which sustainability risks are incorporated'	Low-carbon Portfolio Report	Low	1	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined those timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Climate change risk management strategy consists of four pillars: mitigating emissions in operations, developing scalable technology solutions, providing customer solutions that reduce their greenhouse gas emissions and engaging on climate change policy. The process of assessing climate impact on strategy is not clear, nor the relevant timescales.	Sustainability Report	Medium-Low	2	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	In general strategy is built upon ExxonMobil's Energy Outlook, which most closely resembles an RCP4.5 pathway, therefore well above 2C. From 2018 2°C or lower scenarios have been used for sensitivity stress testing to identify areas which might be impacted. Resilience is claimed, largely on the basis of the long timescales of transition.	Low-carbon Portfolio Report	Medium	3	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.	Risk oversight is the responsibility of the entire board. The board routinely reviews and considers these risks, including briefings on public policy, scientific and technical research, as well as company and external positions and actions in this area.	Sustainability Report	Medium	3	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	Not known		None	Zero	

D. Implementation – Include relevant quantitative measures where available

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	General statements on gas demand over coal for power generation. ExxonMobil continues with significant oil sands operations (Kearl).	Annual Report	Low	1	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment in material R&D spending in low carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	Low-carbon R&D effort is focused on algal bio-fuels, CCS development, including carbonate fuel cells linked to CCS, and energy efficiency improvements. No R&D spend data available. ExxonMobil has significant deployed commercial CCS facilities.	Annual Report Low-carbon Portfolio Report Sustainability Report	High-Medium	4	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	Limited activity in renewables and low-carbon transport fuels, other than algal bio-fuels R&D, plus some on-site co-generation. Also some testing/evaluation of renewable options.	Low-carbon Portfolio Report Annual Report	Low	2	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	Limited evidence of value-chain extension. Focus is on CCS, algal bio-fuels, re-finishing the downstream product slate, energy efficiency, and general technology development to provide future lower-carbon products.	Low-carbon Portfolio Report Annual Report	Low	2	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Some related activity in the R&D space, but not a material component of the ExxonMobil approach.	Low-carbon Portfolio Report Annual Report	Low	1	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosure of scope 3 GHG emissions.	Scope 1 & 2 emissions only reported on a net equity basis - 122 Mte CO2e in 2017. Largely flat over the past 10 years. Scope 3 emissions are not disclosed.	Sustainability Report	Medium-Low	2	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	No targets set for emissions reductions. Instead ExxonMobil focuses on spend on $9bn investment since 2000 'to develop lower emissions energy solutions'.	Sustainability Report	Low	1	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	Claims $9bn investment since 2000 'to develop lower emissions energy solutions' but without giving details. There is no low-carbon energy division and no data on R&D spend on bio-fuels and CCS. No targets or guidance on future low-carbon spend level.	Low-carbon Portfolio Report Sustainability Report	Low	2	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	Flaring 3.8 Mte/yr. (ca. 3.8 mmscfd?) Adopted industry-wide Guiding Principles on methane loss management. Target to reduce greenhouse gas emissions from flaring and methane emissions through quantified reductions of 25% and 15% respectively by 2020.	Sustainability Report	Medium	3	

Chevron — *December 2018*

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	Chevron's management integrates climate change considerations into its risk management, governance and business planning processes. The Board regularly assesses climate change risks and opportunities throughout the year. Climate change is also a frequent topic when management and members of the Board meet with stockholders. As a result of stockholder feedback, the Board recently endorsed a second, more detailed voluntary report on climate change related to Chevron.	Annual Report	Medium	3	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	High-level structure described of executive level committees responsible for climate issues. No information on links to executive pay.	Climate Change Report	Low	1	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Chevron incorporates climate issues into strategy formulation, including: • Energy demand and supply projections • Energy mix projections • Commodity price outlooks • Leading indicators such as policy and technology changes. Consumer preferences are also addressed, such as demand for low-C alternatives. Climate issues incorporated into strategy and planning assumptions, but does not cover all dimensions and timescales.	Climate Change Report	Medium	3	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	Chevron uses the IEA's scenarios: NPS to represent most-likely outcomes and SDS to test its strategy against a deep decarbonisation scenario. It considers the impact of reduced demand in the SDS on pricing, plus increased C-pricing, with limited impact in the s/t (<10 years) and some potential impact in l/t (>10 yrs) though with freedom to act identified as pace and direction of the transition becomes apparent.	Climate Change Report	High	4	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritization and materiality determination.	Climate change is integrated into Chevron's overall Enterprise Risk Management framework. No details are given of assessed timescales, risk magnitudes, or management, with disclosure limited to a statement of concluded resilience.	Climate Change Report	Medium	2	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low-carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	Chevron uses carbon pricing for business planning, investment considerations, reserves and impairment assessment. Pricing is not disclosed, with a clear statement of commercial sensitivity and potential competitive harm if disclosures are made. Reference is made to existing low C-prices in many jurisdictions. No information on differential rates/returns.	Climate Change Report	Medium-Low	2	

D. **Implementation** - include relevant quantitative measures where available

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	Limited or no action. Approx. 20% of liquids portfolio is heavy oil, with no intent to re-balance other than general emissions reductions across the portfolio.	Annual Report	Low	1	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	$75mln invested in last decade in CCS R&D, where Chevron is a significant global player. Other R&D Effort aimed at renewables development & testing - solar, biofuels and wind. No data on low-C proportional R&D spend.	Low-carbon Portfolio Report Climate Change Report	Medium	2	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	Solar, wind and geothermal all in service, though at relatively low scale (<150MW in total). Biofuels Development has so far been non-commercial without subsidy. No significant moves into other low-C areas.	Low-carbon Portfolio Report Annual Report	Medium	3	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	No significant moves along the value chain, other than limited attempts to utilise downstream infrastructure for biofuel blending. No evidence of new business model development.	Low-carbon Portfolio Report Annual Report	Low	1	
11. Partnership & Ventures: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Chevron reports it is an "open innovator" seeking to support the development of innovative technologies. Other than it's own R&D, most of the effort is targeted at educational support and outreach, with limited venture capital spend - certainly not a material element of strategy.	Low-carbon Portfolio Report Annual Report	Low	1	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosures of scope 3 GHG emissions.	Chevron reports scope1/2 and scope 3 emissions on equity basis and scope 1/2 on operated basis. 68 Mte CO_2 in 2017. Upstream direct emissions intensity 33 $kgCO_2$/boe, cf 9 kgCO2/boe for Equinor and 18 industry average.	Sustainability Report	High	4	
13. GHG Emission Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Chevron has no public emissions reductions targets. Anticipated future emissions reductions is for CCS projects only. Reported scope 1/2 emissions fell from 75 to 68 Mte/yr in last 5 yrs. Upstream emissions intensity fell from 36 to 31kgCO2/boe. Refining emissions intensity was flat.	Sustainability Report	Low	1	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	Limited investment in solar, wind and geothermal. No investment levels disclosed except $1.1bn for CCS projects plus $75mln R&D in CCS over 10 years and ca. $250mln in flaring reduction. Chevron has no targets for low-carbon investments: "...we continue to evaluate emerging and future sources of energy and the role they should play in Chevron's portfolio".	Sustainability Report Climate Change Report	Low	1	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	22% reduction in flaring since 2012, but rising since 2014. 634mmcf/d total flaring in 2016. 9% of Chevron's GHG emissions are from methane, about 25% of which are fugitive emissions. Member of industry task force to reduce methane leakage but no targets set. 2017 CH4 emissions 4 Mte CO_2e, down from 7 over 5 years.	Sustainability Report	Medium-Low	2	

Eni *December 2018*

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	The Sustainability and Scenarios Committee reports to each meeting of the Board. In July 2017 the board established an Advisory Board, charged with analysing major geopolitical, technological and economic trends, including issues associated with decarbonisation. It is not clear how the board links climate considerations to other major reviews and decisions.	Annual Report	Medium	3	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	Eni describes a 4-pronged approach to climate management: 1. a centralised function dedicated to climate change; 2. a cross-functional working group aiming to reduce GHG emissions in line with a 2C target 3. energy transition R&D; and 4. an energy solutions business team to develop renewables. There is a variable pay element for the CEO linked to performance, with 12.5% weighting for CO2 emissions. Senior mgt variable pay depends on GHG emissions, reduction targets and energy efficiency.	Annual Report	High-Medium	4	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Climate related issues are incorporated in the overall integrated risk management framework as for other risk types, also covering medium-long term business sustainability aspects. This has led to a commitment to the definition of a long-term decarbonisation roadmap and a 'path to decarbonisation' being established as one of the three pillars of the business model and elements of overall strategy. Not clear if all dimensions are included.	Annual Report	High-Medium	4	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	The IEA 'low carbon' scenario (SDS?) is used to test the resilience of the portfolio.	Annual Report	Medium	3	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.	Climate related issues are incorporated in the overall integrated risk management framework, with climate risks treated in the same manner relative to other risks. Structured and clear treatment disclosed for climate risk, taking into account inherent risk levels and residual risk following mitigation actions. Climate change is treated as a top strategic risk for the corporation.	Annual Report	High	5	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low-carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	Carbon pricing is used as a sensitivity in main investment decisions, but the price level is not disclosed. Although there is a commitment to developing renewables and bio-refining, and a recent track record to match, there is no indication of acceptance of differing risk-return profile.	Annual Report	Medium	3	

D. ***Implementation*** – Include relevant quantitative measures where possible.

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	50% current portfolio is gas, with general expectations of growth. However, also intention to boost conventional liquids portfolio going forward.	Low-carbon portfolio report Annual Report	Medium	3	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	R&D on energy transition is one of 4 pillars of strategy to address climate change. A new R&D programme is dedicated to the energy transition, supporting actions in renewables and bio-refining. R&D spending of €72mln out of 185mln in de-carbonisation. No material effort in CCS.	Low-carbon portfolio report Annual Report	High-Medium	4	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	Renewables being actively pursued, particularly in conjunction with oil & gas assets to reduce net GHG footprint rather than an active revenue stream. Plus moves to more power retail linked to renewables. Focus on growing bio-refinery business. Currently limited to solar and bio-refining.	Low-carbon portfolio report Annual Report	Medium	3	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	There is some mention of extending the customer base but no material progress or developments in this area so far. Also some R&D focused on smart grids and renewables integration.	Low-carbon portfolio report Annual Report	Medium-Low	2	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Eni is a founder member of OGCI and subscriber to $100mln fund for innovation, but no material venturing in its own right.	Low-carbon portfolio report Annual Report	Medium-Low	2	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosure of scope 3 GHG emissions.	Scope 1 emissions presented on operated basis (42.5 Mte) and also on consolidated equity basis (23.5 Mte). Scope 2 and scope 3 emissions not disclosed, but GHG footprint per boe is tracked - 0.162 te CO2eq/boe	Annual Report	Medium	3	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Emissions target expressed as 43% reduction per boe by 2025. Current status: 'GHG emissions increased by 2.5% vs. 2016 due to the production growth. GHG emission index per barrel produced was down by approximately 3% vs. 2016 and by 19% vs. 2014 in accordance with the long-term target of a 43% reduction by 2025.'	Annual Report Low-carbon portfolio report	High-Medium	4	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	Relatively small investment in low-carbon so far, mainly R&D and solar projects at existing oil & gas locations. €1.8 bln spend target 2017-21 on renewables; ≈€32 bln total capex. 'We expect to speed up the development of renewable sources business, planning 2018-2021 capex for more than €1.2 billion, including the R&D expenditure, to reach an installed capacity of 1 GW at the end of the plan period.'	Annual Report Low-carbon portfolio report	Medium	3	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	*Eni has joined the world bank zero flaring initiative, making significant progress in recent years.* '... we have designed initiatives to achieve the ambitious 2025 targets of zero flaring gas, corresponding to a reduction of 43% from 2014 baseline of the emissions per barrel produced and 80% of the fugitive emissions of methane.'	Annual Report	High-Medium	4	

BP December 2018

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	The board provides input to strategy, including via a 2-day workshop. This includes the impact of the low carbon transition on the business model. Energy transition to low-carbon is discussed 'frequently'. No specific board committees or structure for dealing with climate issues.	Annual Report Sustainability Report	Medium	3	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	BP's strategy involves embracing the energy transition by reducing operational emissions, improving products to enable customers to lower emissions, and creating low-carbon businesses. The first two are the line responsibility of existing businesses, with a new Alternative Energy business for the latter. GHG emissions are not included in the calculation of bonus or share pay elements, other than as an 'underpin' consideration of 20% of long-term performance shares from 2018.	Annual Report Sustainability Report	Low	1	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	BP's strategy has been updated and focused on a lower carbon future, with a core commitment to help drive the energy transition. The strategy has been devised to remain flexible to a range of climate scenarios, so as to be resilient to the evolving energy landscape in the medium to longer term. An Alternative Energy business is established to develop lower-carbon across five core areas: advanced mobility; bio and low carbon products; carbon management; power and storage; as well as digital. Market guidance is to invest around half a billion dollars annually in these areas.	Annual Report Sustainability Report	High-Medium	4	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	BP has long developed and published scenarios which it uses to support its strategy development. These include deep decarbonisation scenarios ('faster transition' and 'even faster transition'). Whilst these are used as part of a suite to assess strategy resilience, details are not disclosed.	Annual Report Sustainability Report	High-Medium	4	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control these risks, as well as processes for prioritization and materiality determination.	Climate change and transition risks to a low-carbon economy are incorporated into BP's corporate risk management system as per other strategic risks. There is a framework of identification, monitoring, review and governance - up to and including board level.	Annual Report	High	5	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low carbon business activities in a manner which recognizes the differing risk profile and therefore expectation of returns.	BP uses a carbon price internally for (large) investment decision making (as well as publicly calling for external carbon pricing). $40/te CO2 for industrialised countries (others not specified), with up to $80/te for stress testing. Track record of recent investments in low-carbon activities, but without explicitly stating expected risk-reward profiles.	Annual Report	High-Medium	4	

D. Implementation - Include relevant quantitative measures where available

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	Strategy focuses on growth in 'gas and advantaged oil' - i.e. low cost or high margin. Alternative Energy business seeks to grow new low-carbon solutions, with 3rd strategy pillar in reducing carbon footprint of products.	Annual Report Sustainability Report	High-Medium	4	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	Active R&D programme with elements supporting the low-carbon businesses of biofuels and renewables. $391mm total R&D; low-carbon R&D spend not itemised. Not currently active in CCS.	Annual Report Sustainability Report Low-carbon portfolio report	Medium	3	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	BP is active in biofuels, bio-power, solar and wind renewable power generation. Recent expansion into EV charging. Alternative Energy low-carbon business line is core component of strategy.	Annual Report Sustainability Report Low-carbon portfolio report	High	5	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	Low-carbon focus areas include advanced mobility, power generation and storage. Hence extending along transport and power value chains, e.g. EV charging via existing retail infra-structure and grid services and power generation & trading. Synergies being developed with existing core businesses.	Annual Report Low-carbon portfolio report	High	5	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	$400mm invested so far in venturing in line with strategy. $500mm/yr set aside for low-carbon: $200mm for venturing and $300mm for organic growth.	Annual Report Low-carbon portfolio report	High	5	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosure of scope 3 GHG emissions.	BP reports Scope 1 and 2 emissions on an operational control and on an equity basis. Scope 3 emissions are not reported in the Annual Report but are included in the Sustainability Report as 'Customers' Emissions'.	Annual Report	High-Medium	4	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Strategy is "Reduce-Improve-Create" but no targets set for GHG emissions reductions. Emissions trend data available from 2014, showing ca. 7% reduction on operated basis, but flat in equity terms. High GHG intensity (equity basis) of ca. 30 kg CO_2/boe.	Sustainability Report	Medium-Low	2	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	Many investments in past 2 years in line with strategy. $500mm 'budget' for alternative energy investments in low-carbon - $200mm in venturing and $300mm for internal growth. This is linked to strategy of reducing emissions, improving products and creating new low-carbon solutions. Total capital investment $15-$16bn in 2018, $15-$17bn 2019-21.	Annual Report Low-carbon portfolio report	High-Medium	4	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	BP is a member of world bank flaring initiative for zero routine flaring by 2030. Flaring has been flat over past 4 years at around 2,000 kt/yr. Methane emissions disclosed; some measures being taken, no firm targets.	Annual Report Sustainability Report	Medium	3	

Equinor November 2018

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	Equinor has an agreed process for board oversight of climate issues. CEO stated during SRI in May 2018: "Climate considerations are integrated in our vision, strategy and performance management. Both our Corporate Executive Committee and our Board of Directors frequently discuss the business risks and opportunities associated with climate change, including regulatory, market, technological and physical risk factors." In 2016 4 out of 9 board meetings addressed climate issues. It is not clear how the board links climate considerations to other major reviews and decisions.	Sustainability Report Annual Report	High-Medium	4	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	"Executing the company's climate ambition is a line responsibility. However, the Corporate Sustainability Unit is responsible for monitoring progress on the Climate roadmap and reporting on sustainability and climate risk issues and performance at group level, to the corporate executive committee and the board of directors." Equinor's CEO pay is linked to 6 KPIs, one of which is the carbon intensity of production ($kgCO_2/boe$, based on scope 1/2 emissions).	Annual Report Sustainability Report	High-Medium	4	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Strategy incorporates adaptation to climate risk at its very core: 'high value, low carbon', robust to future fluctuations in energy prices and carbon costs. But these 4 all others dimensions are also included.	Annual Report Sustainability Report	High-Medium	4	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe the how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	Equinor states: "We stress test our portfolio against IEA's World Energy Outlook scenarios on an annual basis." This includes a low carbon future, and a 2-degree scenario. Testing is largely by replacing own planning assumptions by those within the different scenarios on oil & gas prices and carbon taxes. Equinor claims that this demonstrates strategy robustness, eg 60% of capex in 2025 is fit in as yet unsanctioned projects and thus flexibility for "continued investments in high value, low carbon oil and gas projects and Renewable Energy."	Sustainability Report Annual Report	High	5	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.	Climate risks are integrated in the overall Enterprise risk management process in the same manner as other risks.	Annual Report	High	5	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	Equinor "...use a carbon tax of $58 for all investment decisions, whether they're subject to CO2 taxes or not." Equinor's offshore wind portfolio has a stated "attractive risk reward profile" and real returns of 9% to 11% cf. "30% IRR at $70/bbl" for next generation oil & gas portfolio of projects.	Annual Report Sustainability Report	High	5	

D. Implementation - Include relevant quantitative measures where available

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	Equinor's strategy is "...high value, low carbon" and consequently the company has divested from Canadian oil sands and will not pursue heavy oil. It has a stated intent to prefer gas with a 50% gas weighting in its portfolio.	Sustainability Report Low-carbon portfolio report	High	5	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	Approx. $32mln R&D spend in 2016 on low carbon - 1/3 to CCS and renewables, 2/3 to energy efficiency [emissions reductions?]. This represents 17% of all R&D. Target 25% by 2020. CCS: Active commercial CCS in Sleipner field (offshore Norway) for many years, with 40 Mte CO_2 stored. Active R&D programme. Also participant in new Norwegian project to capture CO_2 from industry and store in offshore geological formations.	Annual Report Sustainability Report	High	5	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	Equinor has made equity investments in ChargePoint, a tertiary EV charging start-up, but is not engaged in biofuels or other low-C transport. Equinor has an extensive portfolio of offshore wind generation, including leading technology development in floating offshore wind.	Low-carbon portfolio report	High-Medium	4	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	Potential themes for venture investments include smart grids. Existing developments includes battery storage linked to offshore wind, and electricity trading (Danske acquisition).	Low-carbon portfolio report	High-Medium	4	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Equinor has set up an Energy Venture Fund of US$200 million that intends to help start-ups with equity injections in the order of 1 to 20 million over a 4 to 7-year period, to help shape the future of energy.	Low-carbon portfolio report	High	5	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosure of scope 3 GHG emissions.	Equinor discloses scope 1 and 2 GHG emissions. Current emissions intensity is 9 kg CO_2/boe (on 100% operated basis, or 12 on an equity basis). Industry average is quoted as 18. Scope 1 GHG emissions in 2017 were flat at 15.3 MtCO_2e. Equinor does not includes scope 3 emissions as a matter of routine in its disclosures.	Annual Report	Medium	3	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Target of 3 Mte CO_2/yr emissions reduction by 2030 (vs. 2016). 2017 emissions reductions of 0.36 Mte/yr, or 12% of its target to 2030. Historical trends are reported each year. Stated expectation is 'on track'.	Annual Report	High-Medium	4	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	Several offshore wind projects, including the first floating system (UK) and one of the first zero-subsidy auctions (NL). Current investment level not known, (5%-10% according to HSBC). Equinor has stated its target is to invest 15% to 20% of capital expenditures into renewables by 2030.	Annual Report Sustainability Report	High	5	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	Target zero routine flaring by 2030. 2017 performance: "flaring was at 0.002 tonnes per unit produced -- around the fifth of the industry average." SRI: "for the upstream and midstream part of the value chain of piped gas to Europe, which we control, the methane leakage rate is very low, only 0.03%. Significantly lower than the industry average." And also: "For operations in the U.S., the leakage rate is 0.09%."	Annual Report Sustainability Report	High	5	Best in class

Shell December 2018

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	Formal processes and structures for Board and Board Committees oversight of climate issues. 2017 governance activities covered strategy, portfolio, GHG emissions targets, linking CEO performance contract, methane abatement, and others.	Annual Report	High	5	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	Defined management structure for climate from CEO down through all lines of business and subsidiaries, with defined functional support and control for businesses, projects and assets. CEO performance contract now includes climate aspects and all staff performance pay is linked to Executive Directors scorecard which includes GHG emissions.	Annual Report	High	5	Best-in-class

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Climate related risks are incorporated into overall risk management framework at all levels in a structured manner considering societal, commercial, regulatory and physical risks over 3 years (S/T), up to about 10 years (M/T) and more than 10 years (L/T) horizons. Climate related risks are clearly identified with a range of options for mitigation and management incorporated into strategy formulation.	Annual Report	High	5	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	A range of scenarios are used for testing strategy and financial plans including low emissions scenario. Shell has its own published scenarios and IEA scenarios are also stated to be considered. Strategy resilience is tested accordingly. Portfolio exposure is also reviewed annually against changing GHG regulatory regimes and physical conditions.	Annual Report	High	5	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.	Climate risk is identified, assessed and controlled in the same manner as other risks through the enterprise-wide Control Framework and associated mandatory standards and guidance documents. Structured processes require review of key risks and their management at board and board level.	Annual Report	High	5	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low-carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	A standard C price of $40/te applied uniformly to all new project investments. Some high intensity projects screened more thoroughly with fixed estimates of future C price, up to $100/te from 2030. Stated expectations of lower 'downstream-like' returns on new transport fuels ('high teens %') and possibly 8-12% for renewable power.	Annual Report New Energies Interview	High	5	

D. Implementation - Include relevant quantitative measures where available.

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	Gas is currently 50% of portfolio with intent to grow towards 75%. Recent divestment from oil sands. New Energies division created in 2016 to develop low-carbon opportunities.	Annual Report Low-carbon portfolio report	High	5	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	No detailed R&D programme breakdown. Some highlights of major low-carbon areas: - Demonstration plant for waste to biofuels in India; - Qatar Carbonates and Carbon Storage Research Centre in UK. Overall R&D spend $0.9[illegible]bn; low-C component not disclosed. Some CCS commercial scale plant projects in Norway & Australia.	Annual Report	Medium	3	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	Shell set up a New Energies division in 2016 to develop low-carbon lines of business, focusing initially on new transport fuels - bio-fuels, EV charging, hydrogen and gas - plus electrical power, including renewables. Investment of $1bn-$2bn/yr vs $25-$30bn total.	Annual Report Low-carbon portfolio report	High	5	
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	Active programme of extending along power value chain with renewables generation, trading, retail, grid services, off-grid - with synergies exploited and new business models being developed. Also leveraging infrastructure and customer base in transport and power.	Annual Report Low-carbon portfolio report	High	5	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Several recent investments (more than 10) in low-carbon start-ups. Founder member of OGCI with $100mm fund each. Material part of New Energies division investment is in early stage ventures. Dedicated technology venture arm (STV) plus incubator programme.	Annual Report Low-carbon portfolio report New Energies interview	High	5	Best-in-class

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosures of scope 3 GHG emissions.	Scope 1 GHG emissions increased in 2017 to 73 Mte CO_2e (from 70 in 2016). Scope 2 and scope 3 emissions are also reported in detail with breakdown across lines of business.	Annual Report Sustainability Report	High	5	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Most ambitious set of emissions targets. Net carbon footprint reduction targets of 20% by 2035 and 50% by 2050, to be reviewed to ensure alignment with society progress on Paris targets. Plus 3-5 year targets to be introduced from 2020. Includes full scope 3 GHG emissions of products for combustion for energy with external verification of net carbon footprint data.	Annual Report Press Release Dec 2018	High	5	Best-in-class
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	More than a dozen transactions (acquisitions or investments) in low-carbon activities, covering range of areas in line with stated strategy ambitions. Most investment levels not disclosed, but estimated in line with stated $1-$2bn budget per year, compared to circa $25bn/yr total.	Annual Report Low-carbon portfolio report New Energies interview	High-Medium	4	
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	Committed to world bank initiative of zero routine flaring by 2030. Flaring increased by 10% in 2017 (over 2016). Signed guiding principles for reducing methane emissions across the natural gas value chain in Nov 2017, with specific targets to be released by end 2018.	Annual Report	Medium	3	

Total *December 2018*

A. Governance

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
1. Board Oversight: Describe the company's process for board-level oversight of climate-related issues, including monitoring of progress against targets, and how consistent this is with other governance aspects and corporate review processes.	The Board Strategy committee is accountable for examining the Group strategy proposed by the CEO, including specifically examining climate-related issues in strategy. The strategy committee reports to the main board, which also considers climate-related issues in conjunction with major actions (acquisitions, business plans, etc) and at least annually in the strategic outlook for each business segment.	Annual Report	High	5	
2. Management Responsibilities: Describe the company's arrangements for management-level responsibilities for climate-related issues, including assigned management roles, reporting relationships, management information and monitoring processes. Describe how the company links executive pay to GHG emissions performance.	Snr VP Strategy & Climate, reporting to Snr VP Strategy & Innovation (to CEO), has day-to-day Climate responsibility: developing & implementing climate roadmap, setting & monitoring targets, chairs cross-business steering committee. CEO variable pay component has 10% weighting for CSR performance, which does not include GHG measures but was assessed for 2017 on several climate-related strategic improvements.	Annual Report	High-Medium	4	

B. Strategy

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
3. Incorporation of Climate Risks into Strategy: Describe how the company has identified climate-related issues which can have a material impact over the short-, medium- and long-terms, and describe how the company has defined these timescales in relation to the lifetime of the company's assets and infrastructure. Describe how the company incorporates climate-related issues into strategy formulation, planning assumptions and objectives.	Total has built in climate issues into strategy, with s/t (2020), m/t (2030) and l/t considerations. Group restructured from Jan 2017 to reflect revised strategy: growth in gas, power and renewables. This includes capital allocation for low-carbon. Energy efficiency improvements across the group to reduce carbon footprint. Exiting coal. Progressing CCS. Supporting carbon pricing.	Annual Report	High	5	
4. Consideration of Deep De-carbonisation Scenarios: Describe how has the company has used scenarios to inform its strategy and financial planning, including a 2°C or lower scenario. Describe how has the company has demonstrated the resilience of its strategy to climate-related scenarios, including a 2°C or lower scenario, documenting where strategies may be affected, how strategies might change as a result, and the scenarios and time horizons considered.	Reference scenario for strategic planning is the IEA SDS, consistent with <2C. Resilience testing includes SDS l/t commodity prices, l/t carbon pricing and reserves stranding beyond 20 years. Impact <5% of NPV. Does not explicitly state the potential strategy changes or upside opportunities in the event of a faster transition.	Annual Report	High	5	

C. Risk Management

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
5. Identification, Assessment & Management of Climate Risks: Describe the company's processes for identifying, assessing and managing climate-related risks and how that fits into the overall risk management framework. How are climate risks assessed relative to other risks, using defined risk terminology and coherent risk classification frameworks. Describe the company's processes for managing climate-related risks, including decision making to mitigate, transfer, accept, or control those risks, as well as processes for prioritisation and materiality determination.	Climate risks are fully integrated into the group risk management processes and reviewed by the risk mgt committee. This is a coherent framework for identifying, assessing and managing risks.	Annual Report	High	5	
6. Investment Decision Making: Describe how the company uses an internal carbon price in supporting investment decision-making. Describe the company's approach for considering investments in new low-carbon business activities in a manner which recognises the differing risk profile and therefore expectation of returns.	Internal carbon price of $30-40/t used, or actual local price if higher. Higher carbon pricing used as a sensitivity for overall portfolio robustness. No information on treatment of risk-return profiles for low-carbon opportunities.	Annual Report	High	4	

D. Implementation - *Include relevant quantitative measures where available*

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
7. Portfolio Adjustment: Describe how the company is adjusting its portfolio in response to the energy transition, moving away from higher carbon intensity assets such as oil sands and increasing its weighting to low-carbon assets.	Growth in gas is core strategic component. Currently 48% of production, with several recent major acquisitions to grow gas. Portfolio choice biased to gas and lower-cost oil. Divested all coal assets, including coal-to-olefins project, but still has interests in Canadian oil sands. Major growth strategy for gas, power and renewables.	Annual Report	High	5	
8. Low-carbon R&D: Describe the company's R&D programme and its commitment to material R&D spending in low-carbon technologies, including CCS R&D, demonstration projects and CCS technology development for commercial deployment at scale.	Significant low-carbon R&D to support bio-fuels, energy efficiency improvements and CCS progress. Spend not disclosed. $912mln overall R&D spend.	Annual Report	High-Medium	4	
9. Diversification into Low-carbon Energy: Describe how the company is pursuing new low-carbon lines of business, including transport fuels (bio-fuels, hydrogen, EV charging or other) and renewable power (solar, wind, hydro, geothermal).	About 2 dozen transactions in last 2 years in low-carbon activities: gas, bio-fuels, gas for transport, solar, battery storage, grid services and others. Not all costs disclosed but at least $7.5 bln invested. Actions consistent with strategy to grow in gas, bio-fuels, power and renewables.	Annual Report Low-carbon portfolio report	High	5	Best-in-class
10. Value Chain Extension & New Business Models: Describe how the company is pursuing business opportunities extending along the renewables & low-carbon value chain, and developing and deploying new commercial and business models to leverage synergies between new low-carbon activities and legacy businesses.	Active synergies and integration with existing businesses - retail with power generation & trading, bio-fuels with oil products retail, battery storage with solar and grid services, etc.	Annual Report Low-carbon portfolio report	High	5	
11. Partnership & Venturing: Describe how the company is investing in partnerships and new ventures with low-carbon technology innovators.	Total Energy Ventures has invested €150 million in more than 25 start-ups over 10 years. Particularly focusing on opportunities to create additional value in synergies of renewables storage and grid management. Part of the OGCI initiative.	Low-carbon portfolio report	High	5	

E. Metrics & Targets

Climate Risk Readiness Parameters	Description of Assessed Status	Data Source	Performance Assessment	Score	Comments
12. GHG Emissions: Describe the company's disclosure level for scope 1 and scope 2 GHG emissions. Also describe the company's disclosure of scope 3 GHG emissions.	Total reports Scope 1 and 2 GHG emissions on operated & equity basis and also scope 3 emissions from customer use of products.	Annual Report	High	5	
13. GHG Emissions Reductions: Describe the company's targets set for GHG emissions reductions and how the company is progressing towards the achievement of its emissions reduction targets.	Operated scope 1 reduced by 38% since 2010 to 36 Mte/yr in 2017. Targets for reducing GHG emissions are 80% flaring reduction by 2020 (with zero routine flaring by 2030) and 1% per year improvement in energy efficiency. Both these targets were achieved ahead of schedule in 2017.	Annual Report	High	5	
14. Low-carbon Energy Investments: Describe the company's investment levels in low-carbon activities and businesses over the past two years, also as a proportion of its overall capital investment. Describe the company's targets for future investment levels in low-carbon business, covering both financial scale and strategic focus, as well as the coherency with its stated long-term strategy for responding to climate risk.	More than 20 major investments in last 2 years in low-carbon activities. Estimated $7.5 bln versus $17 bln total capex in 2017. On track to meet target of 20% low-carbon business in 20 years (by 2035).	Low-carbon portfolio report Annual Report	High	5	Best-in-class
15. Flaring, Venting and Methane Leakage: Describe the company's approach to flaring & venting reduction or elimination, including current flaring & venting rates and any targets. Describe the company's approach to tackling methane loss in the supply chain and any targets.	Part of world bank approach to zero routine flaring by 2030. (Note: zero-routine flaring comprises <90% of actual flare volumes) 2017 flaring: 5.4Mm3/d (1.8 Mm3/d is routine) - ca.190mmcf/d. Aims to reduce methane loss; works with OGCI on methane initiatives; but no firm reduction targets. Currently <0.5% leakage.	Annual Report	Medium	3	

Appendix 3 – Overall Assessment for all 15 parameters

Assessment of preparedness for the energy transition resulted in significant differences between the seven sample firms across all fifteen parameters as shown in Figure 5 below:

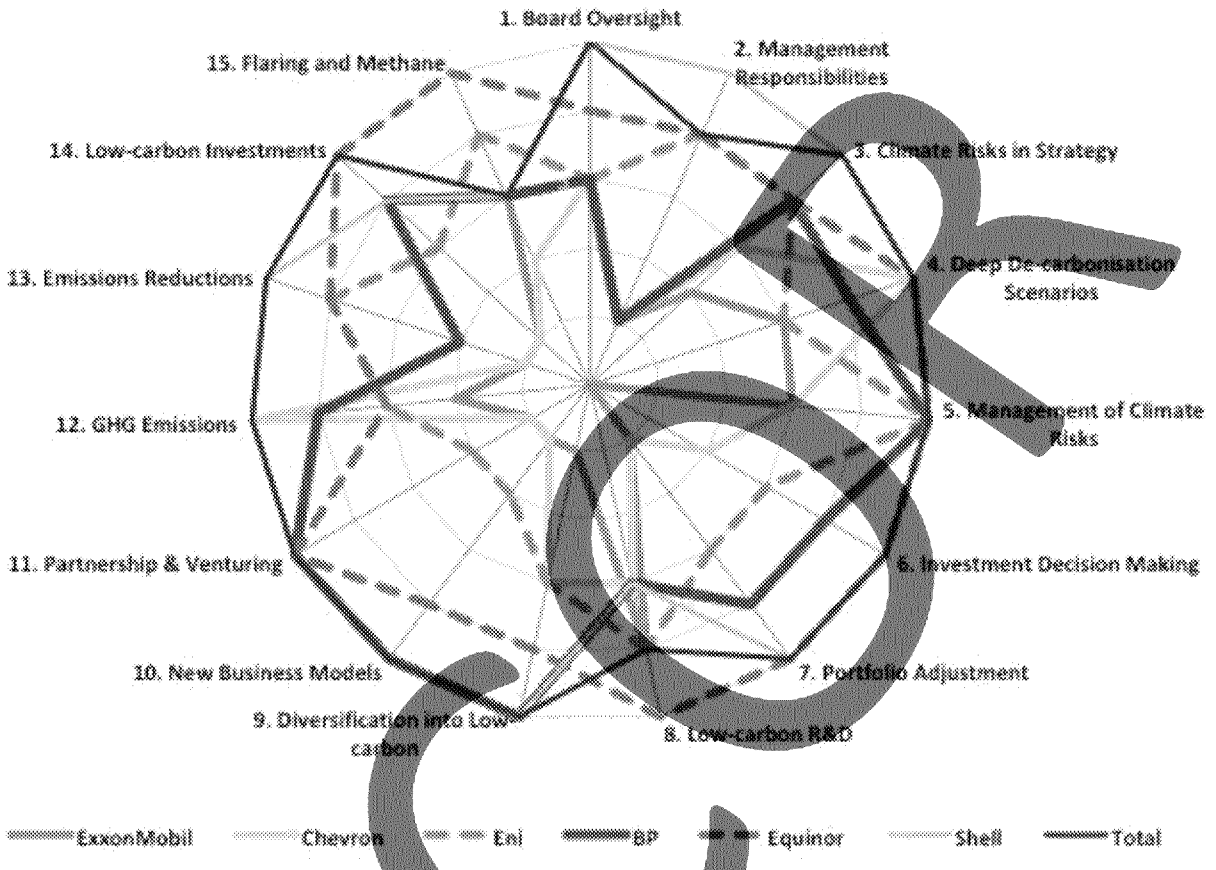


Figure 5: Relative Preparedness by Firm across all Parameters

Total and Shell scored highly in most of the fifteen parameters with Equinor falling slightly behind in only a few areas. BP and Eni are assessed largely in the mid- to higher score range, although BP outscores Eni in several of the implementation parameters. ExxonMobil and Chevron score more erratically, with several lower scoring elements combined with high scores in deep de-carbonisation scenarios and GHG emissions for Chevron and a relatively high score for low-carbon R&D by ExxonMobil.

Appendix 4 – Simple Keyword Ranking Analysis

One method to gauge increased interest in, and emphasis on, climate change risk and the energy transition is to record the incidence of relevant keywords in public documents, such as company Annual Reports and Strategy Updates. There has been a surge in interest in such approaches recently. A recent analysis for the Financial Times concluded that mentions of climate change-related keywords in corporate earnings calls increased by more than 70% in the three years following the Paris agreement (Hook, 2018).

A simple keyword analysis has been carried out to cross-check against the overall pattern of relative preparedness for energy transition risk. Relevant keywords were selected and automatically screened in the Annual Reports, Strategy Update reports or presentation transcripts, Sustainability Reports and the Low-Carbon portfolio updates or descriptions for each of the seven oil & gas firms studied. This automated analysis confirmed that an overall ranking by total occurrence of keywords is *not* misaligned with the relative preparedness ranking of the companies identified from the expert judgement interpretation of this study.

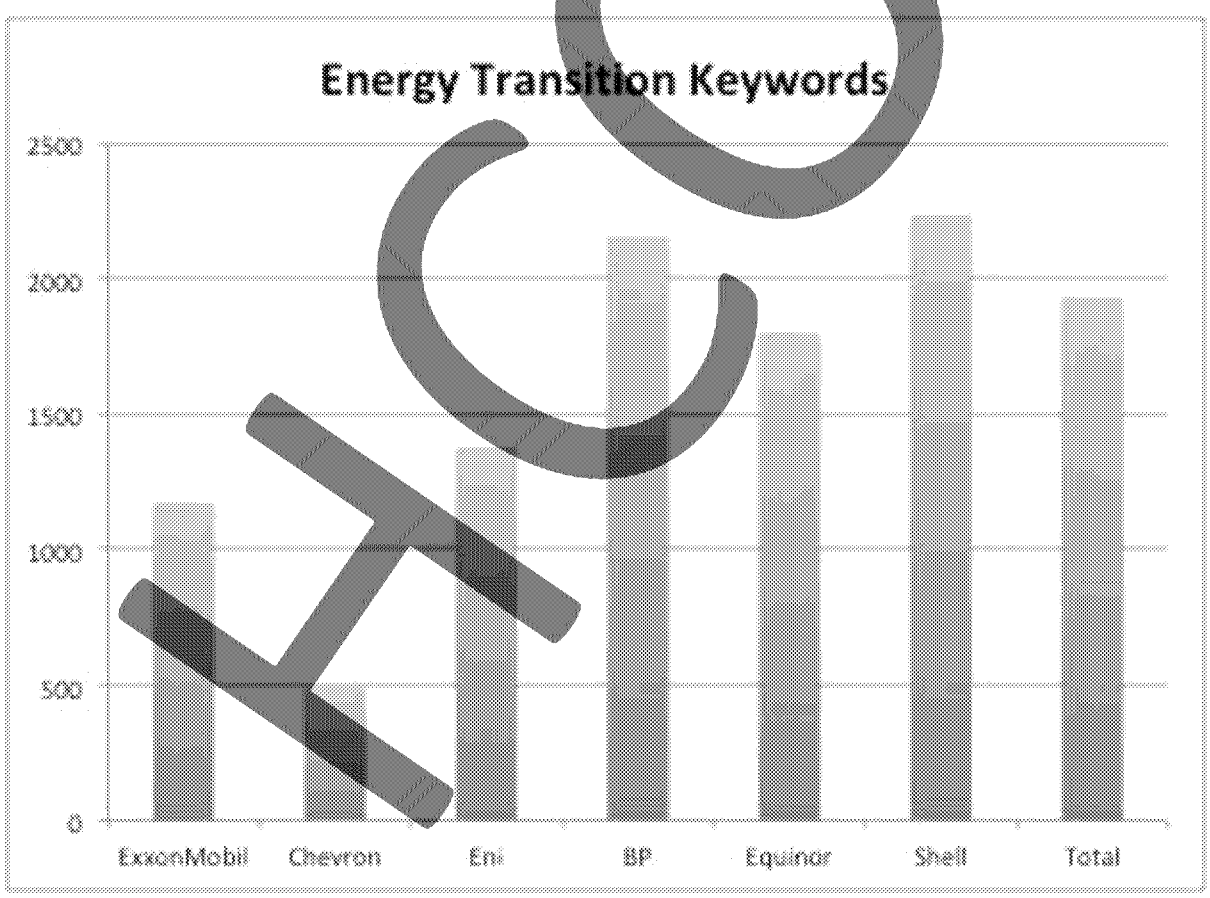
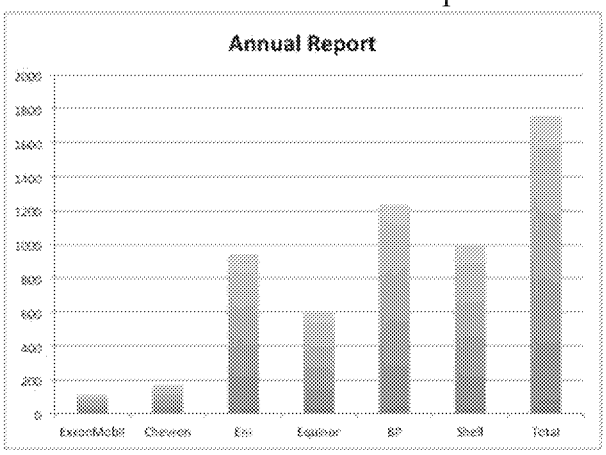


Figure 6: Relative Preparedness by Firm vs Occurrence of Keywords

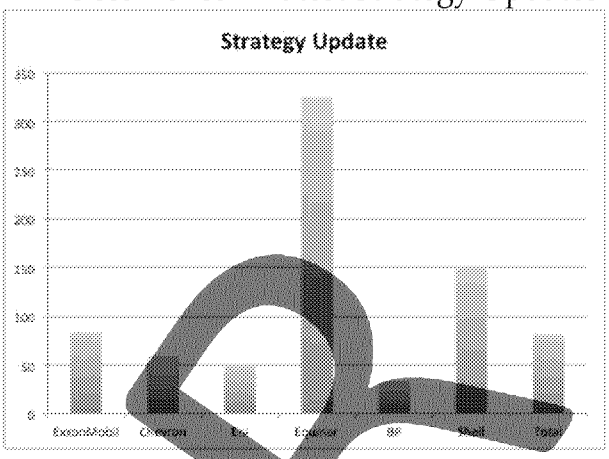
There is a broad similarity between the keyword occurrence ranking and the output of the more detailed and broader assessment framework. The North-American based majors

again cluster at the "least engaged" end of the spectrum. Further differences can be seen in the different source documents, as shown below:

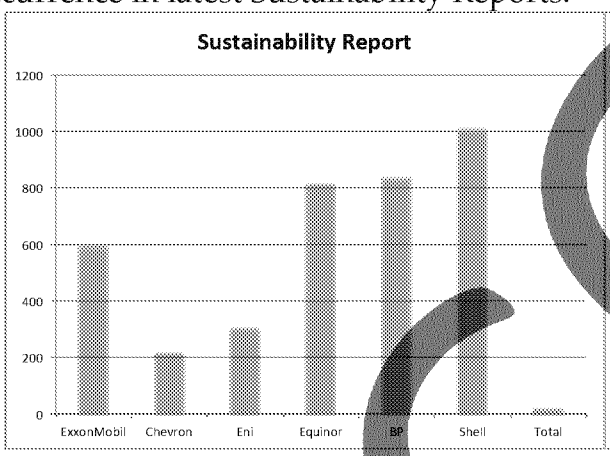
Occurrence in latest Annual Reports:



Occurrence in latest Strategy Updates:



Occurrence in latest Sustainability Reports:



Occurrence in Low-C Portfolio description:

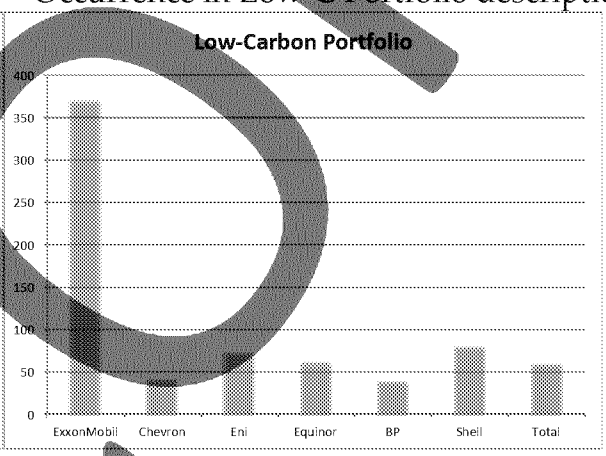


Figure 7: Occurrence of Keywords in different source documentation

Against the assessment framework outcome, ExxonMobil appears high on a keyword-count basis in its low-carbon portfolio documentation, and Total looks low on the sustainability report keywords. The apparent discrepancy between these outputs from the word count and the conclusions of our qualitative analysis provides a promising area for future research. In short, should investors be guided by what companies do, what they say, or some combination of both?

BEGDOC = EM-HCOR3-00943385
ENDDOC = EM-HCOR3-00943390
TEXT : P:\Fossil Fuel Companies\EXXON\Exxon Disinfo Investigation\2022.06.22 Exxon Production\20220621 EM-HCOR3 Vol026\TEXT\TEXT106\EM-HCOR3-00943385.txt
BEGATTACH : EM-HCOR3-00943384
ENDATTACH : EM-HCOR3-00943413
PAGECOUNT : 6
CUSTODIAN : Suzanne Mccarron
RECORDTYPE : E-MAIL ATTACHMENT
DATE = 12/02/2015
TIME : 01:36:58 AM
SENTDATE = 12/02/2015
SENTTIME : 01:26:01 AM
FROM : "Keil, Richard D" [redacted]>
TO : "Jeffers, Alan T" [redacted]
SUBJECT : FW: Thought you might be interested in this
FILENAME : FW: Thought you might be interested in this
FILESIZE : 6.16
INTMSGID : <C3043AEBB2A13441A6F2D45AB9B65D462AB5D0884A@HOEEXM02.NA.XOM.COM>
INTFILPATH : REQ000032431030_1-McCarron, Suzanne M-11.14.2021-1836PM-6.pst\Top of Personal Folders\Primary Mailbox\Recoverable Items\Purges\Emails\
OCR1 : Subject: FW: Thought you might be interested in this
From: "Keil, Richard D" [redacted]
Date: Wed, 02 Dec 2015 01:26:01 +0000
To: "Jeffers, Alan T" [redacted]

More from Croasdale…

From: croasdal@[redacted]
Sent: Thursday, October 15, 2015 11:01 AM
To: Keil, Richard D
Subject: Fwd: Thought you might be interested in this

Here is the string of e-mails from Peter Noble who was also interviewed by Sara J.

His recollections are the same as mine in that she generally gave the impression that she was doing academic research aimed at compiling a history of Arctic activities by the oil industry and in particular in Canada. Yes, she mentioned she was a student of journalism. Maybe she said that articles might come out of this research - but if she did - that was secondary and not prominently stated. She did not say her main focus was "climate change" - although she eventually was certainly interested in that during discussions with me. She did not mention the ExxonMobil public statements connection. So to me, the issue of listening to the tape is not that critical - it is the weight of the impressions of those who she spoke to that she was doing academic research not seeking a story along the lines that was published - which is important !

I am afraid that listening to the tape will just murky the water and there may be parts that I wished I hadn't said - especially now knowing the context - and I don't want to spend the time on it.

My suggestion is that we continue to make the points in the main paragraph above - and that therefore those of us who were interviewed by her (especially me) feel that this was an unethical approach - which I have already said to her. If there is something in the tape that clearly reinforces their position then I am sure they will extract it - then we would want to ensure that we hear more to get the full balance.

I have others who I can ask about their impressions of her stated goals, I will get these also .

Ken C.

From: "Peter Noble" [redacted]
To: croasda[redacted]
Sent: Wednesday, October 14, 2015 9:09:49 AM
Subject: Re: Thought you might be interested in this

I recall that she said she was at Columbia as a student, but no mention of LA times or anything like that

Best regards

Peter N

On Wed, Oct 14, 2015 at 9:34 AM, croasdal@[redacted] wrote:

Peter,

Thanks - but I take it she did not mention she was part of the Columbia group as indicated in the LA Times or that she was going to be involved in an article for the LA Times ?

I agree she seemed a very nice person - maybe she was blindsided by her colleagues !

Ken

From: "Peter Noble" [redacted]
To: croasda[redacted]
Sent: Wednesday, October 14, 2015 8:26:35 AM

Subject: Re: Thought you might be interested in this

Ken,

Yes she did meet with me at ATC in Copenhagen (it was the Trondheim reference that steered me wrong. Seemed like a nice young lady, a student of journalism at Columbia, I think she said but that just shows that I am a poor predictor of character?

Best regards

Peter N

On Wed, Oct 14, 2015 at 9:06 AM, croasdal@[redacted] wrote:

Peter,

Thanks for the response. Strangely she indicated that she did meet with you - see below - but it was Copenhagen not Trondheim - sorry - wrong conference !

Dear Mr. Croasdale,

I hope your week is going well. Thank you again for the document recommendations. The conference in Copenhagen went very well. I was able to meet with Peter Noble and Dan Masterson, among others. Their insight into the 1970s/1980s/1990s was fascinating. Sound like a

really exciting time to be involved in Arctic research.

I am beginning to plan my trip out to Calgary. I was wondering if you might have any available time to meet the week of May 11th?

Thank you very much for your help.

Best,
Sara

From: "Peter Noble" [redacted]
To: croasdal@[redacted]
Sent: Wednesday, October 14, 2015 7:57:39 AM

Subject: Re: Thought you might be interested in this

Ken,

I don't recall her interviewing me, but I recently declined to be on a panel at Columbia because it sounded a bit like they had an "agenda". Out of the panel on future arctic development I was the only engineer and only one connected to energy sector. The others were lawyers, policy wonks or "scientists".

I am now even more glad I declined, as I think I was being set up to be the roasted pig

As with a lot of press reports what you said sounded fine to me, but it was spun in a bad way. I see nothing inconsistent twitch your quote from 1991 when we didn't knw much about global climate change to Exxon's current position in 2015 when we still don't know much about climate change even if our politicians claim it is "settled science"

This is a cross we have to bear for our oil industry connections I guess?

Best regards

P

PS Houston has lost some of its usual optimism with massive lay-off. Today Statoil announce laying off 1000 in Houston and CoP has closed down pretty much all their frontier work (arctic, Deepwater etc) and laid off lots of folks, BP, Shell, Chevron all are in the process of major downsizing.....

On Wed, Oct 14, 2015 at 8:39 AM, croasdal@[redacted] wrote:

Peter,

Yes I am aware of it and currently in damage control mode with ExxonMobil ! I am annoyed with her because she indicated she was doing research on the history of Arctic operations in Canada - But the footnote to the LA Times article indicates that she is part of a group at Columbia researching what ExxonMobil was saying in public vs what they were doing in-house. Although everything she quoted was in the public record, she did not disclose her true purpose and put a negative spin on it.

I believe Sara J also interviewed you in Trondheim. Did she say to you that she was writing an article for the LA Times - or that she was part of a group at Columbia doing research on the gap between ExxonMobil's public position and its internal planning on the issue of climate change ? Just curious because I can't recall her ever mentioning this to me. If she had I might have refused seeing her or at least attached some conditions.

Cheers,

Ken

K R Croasdale & Associates Ltd.
2120, 720, 13th, Ave SW
Calgary, Alberta, Canada, T2R1M5
Phone [redacted]
Mobile +[redacted]

From: "Peter Noble" [redacted]
To: "ken croasdale" [redacted]
Sent: Wednesday, October 14, 2015 6:17:21 AM
Subject: Fwd: Thought you might be interested in this

Ken,

Thought you might like to see this

Peter N

---------- Forwarded message ----------
From: Lars Ronning [redacted]@statoil.com>
Date: Wed, Oct 14, 2015 at 7:06 AM
Subject: Thought you might be interested in this
To: "[redacted]

Good morning, Peter. Your friend, Ken Croasdale, is in the news: http://graphics.latimes.com/exxon-arctic/

Best regards,

Lars Ronning
Principal Engineer - Platform Technology
OF AS FAC
Statoil Gulf Services LLC

Mobile: [redacted]
Email: [redacted]@statoil.com

Visitor address: Building 4, 8th Floor, 2101 CityWest Blvd, USA
Incorporation number: 3962264
www.statoil.com
Please consider the environment before printing this e-mail.

--

regards

Peter Noble

Noble Associates Inc

Offshore, Arctic and Marine Technology Advisors

--

regards

Peter Noble

Noble Associates Inc

Offshore, Arctic and Marine Technology Advisors

--

regards

Peter Noble

Noble Associates Inc

Offshore, Arctic and Marine Technology Advisors

--

Ken Croasdale
K R Croasdale & Associates Ltd.
2120, 720, 13th, Ave SW
Calgary, Alberta, Canada, T2R1M5
Phone [redacted]
Mobile [redacted]

--

regards

Peter Noble

Noble Associates Inc

Offshore, Arctic and Marine Technology Advisors

********** END OF PAGE **********

Message

From: Keil, Richard D [/O=EXXONMOBIL/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPI[redacted]
Sent: 12/2/2015 1:18:25 AM
To: Jeffers, Alan T [redacted]@exxonmobil.com]
Subject: FW: Research by Sara Jerving and an LA Times article

More from Croasdale. A lot on this chain.

-----Original Message-----
From: croasdal[redacted] [mailto:croasdal[redacted]
Sent: Friday, October 16, 2015 11:19 AM
To: Keil, Richard D
Subject: Re: Research by Sara Jerving and an LA Times article

Dick,

OK - will be back in Calgary by then - in my office.

Ken Croasdale
K R Croasdale & Associates Ltd.
2120, 720, 13th, Ave SW
Calgary, Alberta, Canada, T2R1M5
Phone +[redacted]
Mobile +[redacted]

----- Original Message -----
From: "Richard D Keil" [redacted]@exxonmobil.com>
To: croasdal[redacted]
Sent: Friday, October 16, 2015 8:47:06 AM
Subject: Re: Research by Sara Jerving and an LA Times article

Ken, thanks.

We should probably visit by phone Monday on where this is heading.

Sent from my iPhone

> On Oct 16, 2015, at 10:03 AM, "croasdal@telus.net" <croasdal[redacted] wrote:
>
> Dick,
>
> Two more responses to my requests for experiences of others with respect to Sara J's interviews (below).
>
> Anne Barker heads up an Arctic engineering group at Canada's National Research Council (NRC) in Ottawa. Bob is retired from that group but was in it for about 40 years and still contracts with them. I have collaborated closely with them over the years. The group has done contract work for oil companies as well as doing in-house research for the Canadian government.
>
> It seems she did mention climate change to Anne but Bob was given the impression it was a request for historical data and experience in general. (That is how I interpret their replies). They did not indicate that the LA Times article was mentioned or that there was an emphasis on ExxonMobil, but I may ask them again about those specifics.
>
> I will follow up for requests for any e-mails indicating stated purpose, but like with me she may have done it mostly by phone.
>
> I am also assuming that the feedback we are getting from my colleagues will not be quoted directly by you - as I have not indicated to my sources that I am passing back their replies to you - although I have implied that I am in communication with ExxonMobil to help clarify the stated background to the interviews.
>
> Ken C.
>
>
>
> ----- Forwarded Message -----
> From: "Bob Frederking" [redacted]
> To: "Anne Barker" [redacted], "croasdal@[redacted]
> Sent: Thursday, October 15, 2015 4:35:25 PM

> Subject: Re: Research by Sara Jerving and an LA Times article
>
> Hi Ken and Anne,
>
> I just looked at the LA Times article. I see why you are upset Ken. To
> me she wrote the article to an audience and with an 'agenda' in mind.
> Her 'audience' will see you as a 'tool' of big oil.
>
> I first noticed Sara looking at my papers on Research Gate, and was a
> little surprised. Around that time Anne mentioned she would be
> contacting me through NRC's communications group. When I did speak to
> her (over the phone), she identified herself being at Columbia U and
> interested in the history of research on arctic oil/offshore
> development. I interpreted her interest as historical, and did not
> sense an environmental agenda. When I think back, she may have sked
> something about changing conditions, but I said I have not been in the
> field in the Arctic for 20 years. She asked about other people with
> Arctic experience and I mentioned you, Dan and Brian.
>
> She can say that her sources were in the open, peer-reviewed literature,
> but I think she has betrayed the openness with which you met with her.
>
> Regards,
>
> Bob
>
>> On 15/10/2015 4:10 PM, Barker, Anne wrote:
>> Hello Ken. Both Bob and I sat with Sara last December or thereabouts. I did understand that she was doing research with respect to climate change and oil and gas activities in the Arctic. In my meeting with her, I told her that NRC did not, and does not look at climate change in particular (that would be other government departments), but come at it from a standpoint of ensuring safe operations in the Arctic, should exploration / production proceed (maybe because of changing conditions). From me, she went away with a copy of the report that Garry and Bob wrote summarizing past Arctic activities, which probably pointed her in your direction (apologies). I understood that she was affiliated with Columbia, but I would have to dig through my emails to job my memory of if we went into more detail than that. The interviews were arranged through NRC communications group.
>>
>> I read that LA time article too. I thought it seemed kind of weak if they were trying to generate dissent, as to me, your quotations all pointed to a balanced approach. Maybe that's an insider's perspective, however.
>>
>> Anne
>>
>>
>>
>>
>> -----Original Message-----
>> From: croasdal[redacted] [mailto:croa[redacted]
>> Sent: October-15-15 12:20 PM
>> To: Bob Frederking; Barker, Anne
>> Subject: Research by Sara Jerving and an LA Times article
>>
>>
>> Bob, Anne,
>>
>> Earlier in the year I was approached by a post grad student from Columbia University (Sara Jerving) who stated that she was investigating the history of Arctic activities (see her e-mail to me below). I think she said that she had either talked to someone with NRC in Ottawa or was about to. I am sending this e-mail to see if she did interact with anyone at NRC and what she generally said about her motivation.
>>
>> I met with her when she was in Calgary in late April. She said she was doing research on early Canadian activities in the Arctic - so I gave her a lot of information. Among other things she also showed me a copy of a paper I had written in 1992 relating to potential effects of potential warming on Beaufort Sea operations etc. I did this at Esso/Imperial with their full approval. It was not predicting global warming but really asking what if ?
>>
>> It turns out that she is part of a group at Columbia who state that " they are researching what ExxonMobil was saying in public vs what they were doing in-house" (in relation to climate change). They recently wrote an article in the Los Angeles Times which quotes me and is generally critical of ExxonMobil. I am annoyed, because she did not tell me that this was her motivation. I am 99.9% sure she did not tell me she was in this group at Columbia and that they would be writing an article for the LA Times. She essentially told me she was doing research at Columbia on early Arctic work.
>>
>> If she did contact NRC I am I am curious to know whether she stated she was doing historical research generally into Arctic oil and gas activities in Canada and/or whether she said anything about the specific research at Columbia relating to ExxonMobil and the article for the LA Times.
>>

>> You can see the article if you go onto the LA Times website and search Sara Jerving / Arctic etc. or go to http://graphics.latimes.com/exxon-arctic/
>>
>> Thanks,
>>
>> Ken
>>
>>
>> K R Croasdale & Associates Ltd.
>> 2120, 720, 13th, Ave SW
>> Calgary, Alberta, Canada, T2R1M5
>> Phone +[redacted]
>> Mobile [redacted]
>>
>>
>> Dear Mr. Croasdale,
>>
>> I hope your week is going well. Thank you again for the document recommendations. The conference in Copenhagen went very well. I was able to meet with Peter Noble and Dan Masterson, among others. Their insight into the 1970s/1980s/1990s was fascinating. Sound like a really exciting time to be involved in Arctic research.
>>
>> I am beginning to plan my trip out to Calgary. I was wondering if you might have any available time to meet the week of May 11th?
>>
>> Thank you very much for your help.
>>
>> Best,
>> Sara
>

--

Message

From: Jeffers, Alan T [/O=EXXONMOBIL/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN[redacted]
Sent: 10/23/2015 8:17:42 PM
To: Susanne Rust [redacted]@columbia.edu]
Subject: RE: Following up

Susanne
Here is our statement. Can you tell me if you're planning to post the documents?
Alan

Rather than support the thesis you outlined yesterday, the documents show the company advocated a balanced approach to communicating about the risk of climate change, accurately reflecting the prevailing scientific uncertainty at the time.
It should be made clear to your readers that the documents were prepared up to seven years before the world's top climate scientists made the first link between climate change and human activity in the second assessment report of the UN's Intergovernmental Panel on Climate Change in 1995. [1]
ExxonMobil has continuously and publicly researched and discussed the risks of climate change, carbon life cycle analysis and emissions reductions, resulting in nearly 150 publicly available documents, including more than 50 peer-reviewed publications, and nearly 300 patents for cutting-edge technological advances in emissions reduction and other related applications.
To continue to suggest otherwise is inaccurate and deliberately misleading to your readers.

Footnote
[1] The following appears on page 5 of the IPCC's 1995 Second Assessment Report, which can be found at the link below.

2.5 There are inadequate data to determine whether consistent global changes in climate variability or weather extremeness have occurred over the 20th century. On regional scales there is clear evidence of changes in some extremes and climate variability indicators. Some of these changes have been toward greater variability, some have been toward lower variability. However, to date it has not been possible to firmly establish a clear connection between these regional changes and human activities.

The following appears on page 22 of the Second Assessment Report.
Our ability to quantify the human influence on global climate is currently limited because the expected signal is still emerging from the noise of natural variability, and because there are uncertainties in key factors. These include the

---

[1] The following appears on page 5 of the IPCC's 1995 Second Assessment Report, which can be found at the link below.
2.5 There are inadequate data to determine whether consistent global changes in climate variability or weather extremeness have occurred over the 20th century. On regional scales there is clear evidence of changes in some extremes and climate variability indicators. Some of these changes have been toward greater variability, some have been toward lower variability. However, to date it has not been possible to firmly establish a clear connection between these regional changes and human activities.
The following appears on page 22 of the Second Assessment Report.
Our ability to quantify the human influence on global climate is currently limited because the expected signal is still emerging from the noise of natural variability, and because there are uncertainties in key factors. These include the magnitude and patters of long-term natural variability and the time-evolving pattern of forcing by, and response to, changes in concentrations of greenhouse gases and aerosols, and land surface changes. Nevertheless, the balance of evidence suggests that there is a discernible human influence on global climate.
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCIQFjAAahUKEwiPnuKBg9nIAhURK4gKHZ1GC8g&url=https%3A%2F%2Fwww.ipcc.ch%2Fpdf%2Fclimate-changes-1995%2Fipcc-2nd-assessment%2F2nd-assessment-en.pdf&usg=AFQjCNF5Z_PCzRJtHeZTefmwlVohV0WFaw&sig2=INEzVpA1B9yl8MI3H9SY-Q&bvm=bv.105841590,d.eWE

magnitude and patters of long-term natural variability and the time-evolving pattern of forcing by, and response to, changes in concentrations of greenhouse gases and aerosols, and land surface changes. Nevertheless, the balance of evidence suggests that there is a discernible human influence on global climate.

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCIQFjAAahUKEwiPnuKBg9nIAhURK4gKHZ1GC8g&url=https%3A%2F%2Fwww.ipcc.ch%2Fpdf%2Fclimate-changes-1995%2Fipcc-2nd-assessment%2F2nd-assessment-en.pdf&usg=AFQjCNF5Z_PCzRJtHeZTefmwlVohV0WFaw&sig2=INEzVpA1B9yl8MI3H9SY-Q&bvm=bv.105841590,d.eWE

Alan T. Jeffers
Media Relations Manager
Exxon Mobil Corporation
Phone: [redacted] Fax: [redacted]
[redacted]

Read **ExxonMobil Perspectives** for our company's views on the issues, policies, technologies and trends that are shaping the energy industry.

From: Susanne Rust [redacted]@columbia.edu]
Sent: Friday, October 23, 2015 3:09 PM
To: Jeffers, Alan T
Subject: Re: Following up

confirmed

On Fri, Oct 23, 2015 at 3:55 PM, Susanne Rust <[redacted]@columbia.edu> wrote:

> Hi Alan,
>
> You said you were sending something this morning. When I had heard nothing from you by noon, I filed. Please send comments/ statement along as soon as you can.
> -Susanne

On Fri, Oct 23, 2015 at 3:41 PM, Jeffers, Alan T <[redacted]> wrote:

> Susanne
>
> Just wanted to touch base and let you know we will have a statement for your shortly.
> Also wanted to confirm that we think we have the other two documents you referenced in your general description of them last night.
>
> Can you confirm that one is entitled "Potential Enhanced Greenhouse Effects, Status and Outlook,' a presentation to Exxon's board of directors on Feb. 22, 1989, by Duane G. Levine, and the other is an internal company newsletter entitled Connections from the fall of 1989 with an article by Brian Flannery entitled "Greenhouse Science"?
>
> Also, can you let me know whether you're planning to post these documents on the LA Times site?
>
> Alan

Alan T. Jeffers

Media Relations Manager

Exxon Mobil Corporation

Phone: [redacted] Fax: [redacted]

[redacted]

From: Susanne Rust [redacted]@columbia.edu]
Sent: Thursday, October 22, 2015 6:29 PM
To: Jeffers, Alan T
Subject: Re: Following up

Thanks. That's the one.

On Oct 22, 2015, at 7:22 PM, Jeffers, Alan T <[redacted]> wrote:

> Susanne
>
> I think I know which document you are referring to, labelled the Greenhouse Effect.
>
> But just to be sure, does it have a hand-written cover note in which the author, Joseph M. Carlson, states it is a draft and notes that he hasn't attempted to check any of the facts on two separate occasions?
>
> If that's the one, I'll send you a detailed response in the morning. Let me know if that's too late and I can get you something tonight.
>
> Alan

Alan T. Jeffers

Media Relations Manager

Exxon Mobil Corporation

Phone: [redacted] Fax: [redacted]

[redacted]

From: Susanne [redacted]columbia.edu]
Sent: Thursday, October 22, 2015 5:49 PM
To: Keil, Richard D
Cc: Jeffers, Alan T
Subject: Re: Following up

Hi,

Considering what I've told you about the story, does Exxon have a response?

Right now I have lines from the response you sent a few weeks ago and reference to the 50+ docs you provided citations for.

Documents cited include a board presentation and a draft called the Greenhouse Effect. I also reference an internal newsletter called Community from 1989.

-Susanne

On Oct 22, 2015, at 6:41 PM, Keil, Richard D [redacted]> wrote:

> Susanne – following up on our earlier phone conversation, we're definitely surprised that your story is written and filed before we'd had any advance notice; having said that, we're following up on your agreement to send us a reference point on the document you intend to reference in your story, asking

for it again, as soon as possible, given that the LAT has been doing a quick turnaround on your work.

As we both know, there's a lot of material to go through, and some of the documents at UT are quite lengthy, so we want to have as much time to review the relevant document as possible.

Thanks in advance for sending the citation along. We can work off either UT's archival coding system or date and subject title.

Richard D. Keil

Senior Media Relations Adviser

ExxonMobil Corporation

5959 Las Colinas Blvd.

Irving, TX 75039

[redacted] (o)

[redacted] (m)

--
Susanne Rust
Editor, Energy and Environment Reporting Fellowship
Columbia University Graduate School of Journalism

[redacted] (cell)
[redacted]@columbia.edu

--
Susanne Rust
Editor, Energy and Environment Reporting Fellowship
Columbia University Graduate School of Journalism

[redacted] (cell)
[redacted]@columbia.edu

Message

From: Jeffers, Alan T [/O=EXXONMOBIL/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/[redacted]]
Sent: 10/1/2015 11:30:27 PM
To: Susanne Rust [redacted]@columbia.edu]
CC: Keil, Richard D [redacted]
Subject: RE: Response

Susanne
Imperial is a Canadian corporation whose ownership is divided between public shareholders (30.4. percent of common shares) and Exxon Mobil Corporation (69.6 percent). Imperial shares are traded on the Toronto and New York stock exchanges.
I don't have any further responses to your questions.
Alan

Alan T. Jeffers
Media Relations Manager
Exxon Mobil Corporation
Phone: [redacted] Fax: [redacted]
[redacted]

From: Susanne Rust [redacted]@columbia.edu]
Sent: Thursday, October 01, 2015 2:27 PM
To: Jeffers, Alan T; Keil, Richard D
Subject: Re: Response

Thank you!
Any chance you'll be able to give me responses to the specific questions I had?
1) Please explain the among Imperial, ExxonMobil and Esso.
2) I have been told that between 1986 and 1993, Imperial had between 15 and 20 people working on climate change issues. In particular, they were looking at how a warming climate could affect business operations in Canada - from Beaufort Sea ice regimes to pipeline construction and maintenance. Can you confirm that such a team existed?
3) I understand this team reported to colleagues at Exxon in New Jersey and Houston. Who would these colleagues have been? How much direction was the Imperial team getting from these colleagues? From Exxon HQ?
4) How much did the company spend on this research/ team between 1986 and 1993?

6) What other areas was Exxon using climate models to make forecasts of future operations?
7) How has Exxon applied these scenarios? In what areas? What changes, adaptations, mitigations have been made as a result of these analyses? Were changes made to the pipelines? As a result of sea-level rise on onshore infrastructure? Increased fetch on Arctic waters? Bigger waves in the Gulf? North Atlantic? etc.

Then, also - my questions on the board meeting and Natuna?

There's one form Texas that I've beeb curious about, and that's a presentation that was given by Duane LeVine to the company's board of directors in 1989. It's basically climate change 101 - here's what we know, here's how it works, etc. What was the genesis and purpose of that presentation?

Natuna. Again, from the archives. I understand the CO2 from this reserve was/is extremely high. Considered a contaminant, it had to be removed to make marketable natural gas. Seeing that climate change and therefore CO2 emissions could be a policy problem in the future - and aware that if Natuna's CO2 were vented, it would become the largest source of CO2 emissions on the planet - the company began investigating ways to dispose of the gas in a non-emitting manner. According to the docs - the best solution was sequestration, or reinjection. Such a disposal method minimized ocean acidification and air emission concerns. The company decided against moving forward at the time,

siting the cost of disposing of CO2 as the major hindrance. So, here's my question: Was this the first time that climate change really factored into Exxon's business decisions? Or at least at such a large scale?

On Thu, Oct 1, 2015 at 3:21 PM, Jeffers, Alan T [redacted] > wrote:

Susanne

Here is a response from us that you can attribute to me.
As Dick said below, any guidance you can give us on the focus of the story and timing would be appreciated.

Again, my apologies for the delay in responding.

Alan

ExxonMobil has always advocated for good public policy that is based on sound science. We will continue to do that despite criticism from those who make unsupported and inaccurate claims about the ability of alternative forms of energy to maintain our standard of living or the certainty of future outcomes.

We know that increasing concentrations of greenhouse gases in the atmosphere are having a warming effect and that additional research is required to better understand how that will affect the Earth's complex climate system.

Since 2009 we have supported a revenue-neutral carbon tax as the most effective, transparent and efficient way for governments to send a signal to consumers and the economy to reduce the use of carbon-based fuels. ExxonMobil is taking action to reduce greenhouse gas emissions in our operations and to help consumers reduce their emissions while supporting research into technology breakthroughs.

For more than three decades, ExxonMobil has continuously funded and participated in research to improve understanding of climate science, often in conjunction with government bodies and leading research universities, much of which has been made public.

Our scientists have been involved in climate research and related policy analysis and have contributed to more than 50 papers in peer-reviewed publications. They've participated in the United Nations Intergovernmental Panel on Climate Change since its inception and were involved in the National Academy of Sciences review of the third U.S. National Climate Assessment Report.

With regard to possible Beaufort Sea development, our researchers considered a wide range of potential scenarios, of which potential climate change impacts such as rising sea levels was just one. This approach is standard operating procedure in effective planning for and managing all foreseeable risks in large, capital-intensive oil and gas projects, many of which need to maintain safe and effective operations for decades.

Alan T. Jeffers

Media Relations Manager

Exxon Mobil Corporation

Phone: [redacted] Fax: [redacted]

[redacted]

Read **ExxonMobil Perspectives** for our company's views on the issues, policies, technologies and trends that are shaping the energy industry.

From: Susanne Rust [redacted]@columbia.edu]
Sent: Thursday, October 01, 2015 1:53 PM
To: Jeffers, Alan T
Cc: Keil, Richard D
Subject: Re: Response

Thank you.

Susanne

On Thu, Oct 1, 2015 at 2:47 PM, Jeffers, Alan T <[redacted]> wrote:

Susann

Apologies for the delay. I'm just having our corporate planning group check something and will shoot you a statement shortly.
Thanks for waiting.
Alan

Alan T. Jeffers

Media Relations Manager

Exxon Mobil Corporation

Phone: [redacted] Fax: [redacted]

[redacted]

Read **ExxonMobil Perspectives** for our company's views on the issues, policies, technologies and trends that are shaping the energy industry.

From: Keil, Richard D
Sent: Thursday, October 01, 2015 1:15 PM
To: Susanne Rust
Cc: Jeffers, Alan T
Subject: Re: Response

Hi Susanne - we're just about there. Given my plus 6 hour time zone status, Alan most likely will get to you.

Also please do let us know what the lede and main thrust of your story looks like, so we can consider whether to provide any additional response.

We've seen in recent weeks what low quality work was produced when ICN ignored important explanatory and contextual information, and we are obviously expecting higher standards of professionalism and fairness here from you and the LA Times.

Sent from my iPhone

On Oct 1, 2015, at 6:09 PM, Susanne Rust [redacted]@columbia.edu> wrote:

> Hi,
>
> It's been a week since I sent my questions. I hate to pester, but, I need a response.
>
> I have agreed to every phone call and inquiry you have had - but am realizing you are not extending me that same courtesy. You have pushed back deadlines, and delayed.
>
> I will have to run the story in the next few days - and if I haven't heard back from you, I'll have no choice but to write that you didn't cooperate with us. And of course, any story I write now will be based on all of the literature and interviews (including retired and current Exxon employees) I've analyzed and collected - but without your input.
>
> So, I implore you to please get back to me.
>
> Thanks for understanding,
>
> Susanne
>
> --

Susanne Rust

Editor, Energy and Environment Reporting Fellowship

Columbia University Graduate School of Journalism

[redacted]

[redacted] (cell)

[redacted]@columbia.edu

--

Susanne Rust

Editor, Energy and Environment Reporting Fellowship

Columbia University Graduate School of Journalism

[redacted]

[redacted](cell)

[redacted]@columbia.edu

--

Susanne Rust
Editor, Energy and Environment Reporting Fellowship
Columbia University Graduate School of Journalism

[redacted] (cell)

[redacted]@columbia.edu

BEGDOC = EM-HCOR3-00943410
ENDDOC = EM-HCOR3-00943413
TEXT : P:\Fossil Fuel Companies\EXXON\Exxon Disinfo Investigation\2022.06.22 Exxon Production\20220621 EM-HCOR3 Vol026\TEXT\TEXT106\EM-HCOR3-00943410.txt
BEGATTACH : EM-HCOR3-00943384
ENDATTACH : EM-HCOR3-00943413
PAGECOUNT : 4
CUSTODIAN : Suzanne Mccarron
RECORDTYPE : E-MAIL ATTACHMENT
DATE = 12/02/2015
TIME : 01:36:58 AM
SENTDATE = 12/02/2015
SENTTIME : 01:27:38 AM
FROM : "Keil, Richard D" [redacted]
TO : "Jeffers, Alan T" [redacted]
SUBJECT : FW: Article in LA Times on Arctic and ExxonMobil
FILENAME : FW: Article in LA Times on Arctic and ExxonMobil
FILESIZE : 4.20
INTMSGID : <C3043AEBB2A13441A6F2D45AB9B65D462AB5D0884C@HOEEXM02.NA.XOM.COM>
INTFILPATH : REQ000032431030_1-McCarron, Suzanne M-11.14.2021-1836PM-6.pst\Top of Personal Folders\Primary Mailbox\Recoverable Items\Purges\Emails\
OCR1 : Subject: FW: Article in LA Times on Arctic and ExxonMobil
From: "Keil, Richard D" [redacted]
Date: Wed, 02 Dec 2015 01:27:38 +0000
To: "Jeffers, Alan T" [redacted]

One more…this brings to 8 or 9 the number of people Croasdale reached out to.

From: croasdal@[redacted]
Sent: Thursday, October 15, 2015 9:36 AM
To: Keil, Richard D
Cc: Hamilton, Jed M
Subject: Fwd: Article in LA Times on Arctic and ExxonMobil

Dick,

I am forwarding this correspondence - I knew that Sara Jerving had interviewed other Arctic experts - so I thought I would check to see if she mentioned the LA Times or the Columbia University research about ExxonMobil to them. It appears she did not. Her stated context was historical Arctic drilling activity etc. in general - as it was to me.

I have a similar response from Peter Noble (Ex ConocoPhillips) which I can forward if you like.

I suppose it is possible that this was her objective at the time but others at Columbia took her material selectively afterwards.

Regards,

Ken Croasdale
K R Croasdale & Associates Ltd.
2120, 720, 13th, Ave SW

Calgary, Alberta, Canada, T2R1M5
Phone [redacted]

_____

From: "Dan Masterson" [redacted]
To: croasda [redacted]
Sent: Thursday, October 15, 2015 7:01:36 AM
Subject: Re: Article in LA Times on Arctic and ExxonMobil

Ken:

Yes I did meet with Sara Jerving on March 25 2015. This is my diary entry re the meeting.

. Then met with Sara Jerving, a post-grad student in journalism at Colombia University. We talked for about 1.5 hours re what I did in my career and what took place in the 1970's, 1980's and thru the 90's to now. Jose Gonzalez came along and asked for my autograph re the award yesterday. She had no background so it was from square one. She will write it up and may ask me to do some editing or answer questions. Very pleasant young woman and very bright.

I never heard from her again and thus did not edit anything. We did not discuss the environment and especially climate change. I read the LA Times article, link is below. She is very young and, to someone as ignorant as her re real life in the Arctic, climate change would be an attractive subject and a good way to get attention.

http://graphics.latimes.com/exxon-arctic/

I see she also refers to Derrick Nixon and some work he did on the subject. Considering that the LA Times article was written by journalists, it is not that bad I suppose. She never mentioned the article or the "group". Had she asked me about global warming and its supposed effects on arctic operations, I would have diverted the conversation to reality and if she persisted, I would have terminated the interview. The murky part of global warming and climate change seems to be whether it is anthroprogenic or related to other very long term changes not related to human activity. I think the latter is the case and that the Exxon executives were correct in stating that the science was "murky".

You may find the link below of interest. I am no fan of David Suzuki.

http://www.quebecoislibre.org/001014-11.htm

Hope to see you at SNAME.

Dan

Dan Masterson
112 Silvercreek Cres. N.W.
Calgary AB T3B 4H7
Canada
Home +[redacted]
Mobile [redacted]
e-mail [redacted]

On Wed, Oct 14, 2015 at 9:20 AM, croasdal@[redacted] wrote:

Dan,

I hope you are well. I have a question. I believe when you were in Copenhagen a journalist student from Columbia might have interviewed you about history of Arctic activities (see her e-mail to me below).

I also met with her when she was in Calgary in late April. She said she was doing research on early Canadian activities in the Arctic - so I gave her a lot of information. Among other things she also showed me a copy of a paper I had written in 1992 relating to potential effects of potential warming on Beaufort Sea operations etc. I did this at Esso/Imperial with their full approval. It was not predicting global warming but really asking what if ?

It turns out that she is part of a group at Columbia who state that " they are researching what ExxonMobil was saying in public vs what they were doing in-house" (in relation to climate change). They recently wrote an article in the Los Angeles Times which quotes me and is generally critical of ExxonMobil. I am annoyed, because she did not tell me that this was her motivation. I am 99.9% sure she did not tell me she was in this group at Columbia and that they would be writing an article for the LA Times. She essentially told me she was doing research at Columbia on early Arctic work.

I am curious to know what your impression was and/or whether she said anything about the specific research relating to ExxonMobil and the article for the LA Times.

You can see the article if you go onto the LA Times website and search Sara Jerving / Arctic etc.

Thanks,

Ken

K R Croasdale & Associates Ltd.
2120, 720, 13th, Ave SW
Calgary, Alberta, Canada, T2R1M5

Phone [redacted]
Mobile [redacted]

Dear Mr. Croasdale,

I hope your week is going well. Thank you again for the document recommendations. The conference in Copenhagen went very well. I was able to meet with Peter Noble and Dan Masterson, among others. Their insight into the 1970s/1980s/1990s was fascinating. Sound like a really exciting time to be involved in Arctic research.

I am beginning to plan my trip out to Calgary. I was wondering if you might have any available time to meet the week of May 11th?

Thank you very much for your help.

Best,
Sara

********** END OF PAGE **********

BP Announcement Overview

- BP said its target includes zero net emissions growth from operations from 2015 to 2025. Its announcement includes the following:
  - An emissions reduction goal of 3.5 million tonnes by 2025 (BP is not clear on what all this includes).
  - Its outlook includes investments in renewables (solar, wind, biogas) and product improvements to offset emissions from its operations.
  - If emissions exceed targets, it may buy carbon offsets.
  - A goal of reducing methane emissions intensity to 0.2 percent, not to exceed 0.3 percent.
  - A $500 million annual investment target for low-carbon activities.
  - Third-party (Deloitte) assessment of BP's internal low carbon accreditation program, designed to encourage all business lines to pursue lower carbon opportunities.

BP Strategy: *Reducing, Improving, Creating*	**ExxonMobil Parallels**

Reducing Emissions
• Overall GHG zero emissions growth target 2015 -2025
  – 3.5 million tonnes of sustainable GHG reductions by 2025
• Use offsets as needed (seems to include items below, not just e.g. UN purchases)
• Methane intensity target of 0.2 – 0.3 percent
  – Lists aspects of methane management
• Efficiency Gains (optimizing, retrofitting, cogen)
	• XOM has not set a GHG emissions target
	• XOM does not purchase offsets to meet a target
	• XTO/XOM does not have a methane intensity cap, but our program includes elements BP discusses
	• XOM seeks efficiency gains

Improving Products • Producing more natural gas • Improving fuels and lubricants	• XOM is producing more natural gas • XOM is pursuing product improvements for customers
Creating Low Carbon Businesses • Renewable Investments (Solar, Wind, biofuels, biopower) • Ventures (Lightsource BP) • R&D	• XOM is not investing in renewables • XOM does have some venture activity (e.g., CCUS, FuelCell) • XOM has considerable climate related R&D
Low-Carbon Accreditation Program • Designed to encourage all business lines to pursue lower carbon opportunities.	• No parallel (third-party accreditation) but XOM does track GHG reductions across the business
Advocating for Better Policies (carbon pricing)	• XOM has similar policy approach

Initial Third-Party Reaction

- The announcement and report was supported by the Environmental Defense Fund, which described the methane target as a "stringent, quantitative target."
- Other environmental NGOs, including Carbon Tracker, criticized the announcement as greenwashing and lightweight. They also say the target was only to hold emissions flat and that it did not cover the company's products.

If asked about BP's announcement and what we are doing to reduce emissions:

- There are several commonalities between BP's announcement and how we manage our emissions.
- We have a strong set of processes to improve efficiency and mitigate emissions including setting tailored objectives at the business, site and equipment levels, and then working toward meeting those objectives.
- We continue to make significant steps toward mitigating emissions and helping customers reduce their emissions.
- Our methane reduction program announced last year outlined a three-year plan. It includes enhancing leak detection and repair across our production and midstream sites, a phase out high-bleed equipment, enhanced personnel training and improved facility design in new operations
- We have invested billions of dollars on research in recent years and are focused on potential breakthrough technologies that could have a large-scale impact on emissions, such as carbon capture and storage and algae biofuels.
- We recently released our Energy and Carbon Summary that highlights what we're doing to address the dual challenge of providing the energy the world needs while managing emissions.