CIEL
CENTER for INTERNATIONAL ENVIRONMENTAL LAW

A Crack in the Shell

New Documents Expose a Hidden Climate History

Key Findings

- A major new trove of Shell documents unearthed by Jelmer Mommers of De Correspondent and released by Climate Files sheds new light on the contrast between Shell's internal discussions and its public actions during a critical window for cllimate action.
- As Shell faces climate litigation and investigation in a growing number of countries, including the Netherlands, these documents, paired with new historical materials, prove Shell had early, repeated, and often urgent notice of climate risks linked to its products.
- A Shell executive authored a 1958 report noting industry research into fossil carbon in the atmosphere.
- In 1962, Shell's Chief Geologist acknowledged possible human and environmental risks of global warming and highlighted calls by other scientists to increase reliance on solar energy.
- A confidential report from 1988 stated that Shell accounted for 4% of global carbon emissions in 1984. Shell now faces mounting litigation based on market share theories of liability.
- In 1989, Shell took the first steps to protect its own offshore oil platforms from the risks of rising seas, even as it joined oil industry efforts to sow public doubt about climate change.
- In a 1991 film, Shell acknowledged both the scale and scope of potential climate harms to human society, ecosystems, and the environment, and warned of potential impacts to food security and the rise of "global warming refugees."
- Despite these warnings, and contrary to its public image, Shell maintained active membership in an array of industry trade groups and front groups that carried out a decades-long campaign of climate denial and climate obstruction.
- More than six decades after it was put on notice of climate risks from its products, Shell continues aggressively pushing to open new oil and gas horizons—including the rapidly melting Arctic.
- Shell's new Sky Scenario is the epitome of this dichotomy: Shell's model sets out a vision to meet Paris goals, even as the company acknowledges that it has no intent to pursue that vision.
- The new revelations pose risks not only for Shell itself, but for other oil majors whose role in the climate crisis have received relatively less attention.
- These findings demonstrate that while these investigations may have begun with ExxonMobil, they are unlikely to end there.

Introduction

Royal Dutch Shell, the major integrated oil and gas company headquartered in the Netherlands and incorporated in the United Kingdom, is among the largest historic producers of fossil fuels and, through that production, one of the largest contributors to atmospheric greenhouse gas emissions. In a landmark analysis of the world's largest carbon producers by the Climate Accountability Institute, emissions attributable to Shell's products and operations rank fifth among the 50 investor-owned companies on the list, accounting for 2% of industrial greenhouse gas emissions since the beginning of the industrial revolution.[1]

Notwithstanding the global importance of its operations, its significant contribution to cumulative CO2 emissions and its active engagement on climate science, and climate policy for decades, Shell's knowledge of and role in the climate crisis has received comparatively less attention than other leading Carbon Majors, such as ExxonMobil.

A major new tranche of internal Shell documents unearthed by Jelmer Mommers from journalism platform De Correspondent and first released on Climate Files demonstrates that Shell's history of flying below the climate investigation radar may be at an end. The documents, spanning the 1980s and 1990s, cover a critical period in the history of climate science, climate policy, and public debates about the risks and realities of both. By bringing to light Shell's internal discussions of climate risks at a time when the company's external actions have already been documented, these documents expose the dichotomies between the two for the first time.

With Shell facing litigation and investigation in a growing number of jurisdictions, from US courts to human rights bodies in the Philippines, this information comes at a critical juncture.

Absence of Evidence is not Evidence of Absence

From *#ExxonKnew* to government investigations to exposés by researchers and media outlets, ExxonMobil has garnered far greater attention than other major oil companies, particularly those based primarily outside the United States. Significant, compelling, and growing documentary and testimony evidence demonstrates that investigations into Exxon are both justified and urgently needed – a perspective upheld by a growing array of courts and human rights bodies.

At the same time, a compelling and growing body of evidence also makes clear that while investigations into climate accountability may begin with ExxonMobil, they cannot and should not end there.

To some extent, the relative lack of attention paid to Shell to date may reflect differences, real or perceived, in the public posture of the companies with respect to climate change. Shell, unlike Exxon, has at times been more proactive about acknowledging the reality of climate change and has been vocal about its corporate commitment to combating climate change, despite the insufficiencies of those commitments.

As previous work by CIEL and numerous other researchers demonstrates, however, Exxon was by no means the only company actively engaged in climate science, the misrepresentation of that science, or – more fundamentally – the continued production of fossil fuels in the face of mounting evidence and mounting impacts. Shell was an early and recurring participant in climate denial and obstruction schemes in the United States and Europe but then made public exits from the groups coordinating them, often after much of the core work had been done. As discussed more fully herein, that exit was not only belated, but also incomplete.

Ironically, the release of the new Shell documents, including confidential internal communications, highlights a second and equally important factor at play in Shell's lower profile relative to ExxonMobil: quite simply, we've seen few documents of this kind. By contrast, a substantial number of once internal communications from Exxon, American Petroleum Institute, and other industry actors have become public over the years, whether through investigation, litigation, or leaks.

While this distinction may seem tautological, it is not: information breeds new information. Whether in investigation or litigation, one document leads to another, yielding names, dates, and connections that create an ever-expanding (and ever more accurate) roadmap to where additional documents might be found. For this reason, this latest set of documents is significant, filling in missing pieces of a story that spans decades, continents, and an array of disciplines. Just as the disclosure of Exxon documents has informed and fueled new investigations into that

company's conduct, the availability for the first time of a significant number of Shell documents heralds a potential step change in the speed and scale of future revelations.

The greater attention paid to Exxon and other US oil producers also arises, in part, precisely because they are widely considered US companies – notwithstanding their own global operations. This US presence and identity makes Exxon and other US oil majors of particular interest to journalists, climate advocates, and others interested in better understanding the oil industry's decades-long campaign of climate denial and obstruction in the largest emitting country on the planet.

By contrast, major carbon producers headquartered outside the United States have received less scrutiny. Modest but compelling evidence already exists that European oil majors were or should have been aware of climate risks at the same time as their US counterparts; that these firms were members of US industry groups known to fund climate denial; and that active denial operations were also conducted within and across Europe.[2] But this European evidence remains limited in comparison to that available about US companies. Here, again, the new Shell documents represent a potential turning point.

Royal Dutch Shell: A European and US Carbon Major

To an arguably greater extent than any other oil major, Royal Dutch Shell is and always has been a truly global company. Despite its dual origins in the Netherlands and the United Kingdom, and its historic leadership from within those countries, Shell has operated actively and extensively throughout the world for well over a century, including the United States. Shell has operated in the United States since the early years of the 20th century, organized its first US company in 1928,[3] was listed on the New York Stock Exchange in 1954, and chaired the American Petroleum Institute (API) for the first time just a few years later, under British-born HMS Burns.[4]

As the API chairmanship suggests, Shell has been an active and fully embedded member of the US oil industry for nearly a century. As the discussion herein demonstrates, that engagement extends to every aspect of the oil industry's engagement on air pollution generally and climate change specifically. Significantly, that US history now provides a critical backdrop against which this new cache of documents can be evaluated and their significance for Shell and for the world more fully assessed.

Shell had at its disposal both profound scientific expertise in relevant disciplines and the resources to deploy that expertise to profoundly shape long-term trajectories for both the company itself and the world as a whole.

Significantly, the present analysis shows how Shell's internal and external documents from the 1980s and 1990s built on – and in important cases ignored – a history of climate science and climate engagement stretching back to the 1950s. It proves unequivocally that Shell, like ExxonMobil, was on early and explicit notice of potential climate risks associated with the company's core products – fossil fuels. It documents that Shell, like ExxonMobil, had at its disposal both profound scientific expertise in relevant disciplines and the resources to deploy that expertise to profoundly shape long-term trajectories for both the company itself and the world as a whole.

And this analysis sheds new light on the often stark dichotomy between Shell's internal understanding of climate risk and its public characterization of and operational responses to that risk.

1946-1979: Shell on Notice of Climate Risks

Smoke and Fumes: The Legal and Evidentiary Basis for Holding Oil Companies Accountable for Climate Change details how actual or imputed awareness of a risk (Notice) establishes a critical link in the causal chain across jurisdictions and under in an array of legal domains, ranging from tort to non-contractual liability to human rights law.[5]

Documentary evidence demonstrates that Shell had early, repeated, and often urgent notice of potential climate risks linked to its products and operations.

As previously noted, Shell has actively engaged with API and other industry groups for much of the last century. Leaders from Royal Dutch Shell were prominent in API events from no later than the 1920s,[6] and API member lists indicate that Shell was an active API member by no

later than 1949, both directly and through several subsidiaries.[7]

Documentary evidence also shows that Shell's engagement with API was not limited to US subsidiaries, and it demonstrates direct engagements between Shell's European headquarters and key US entities on relevant pollution issues. For example, a roster of API's Medical Advisory Committee from 1956 shows at least two Shell executives were members of the committee.[8] API records document extensive and ongoing coordination between this committee and the Smoke and Fumes Committee, discussed more fully below. Notably, minutes from a 1958 meeting include executives from Dutch Shell, in addition to those from its American subsidiaries.[9]

More saliently, Shell was involved directly with API's research into pollutants of the air and atmosphere, and was itself on early notice of climate change.

In 1946, faced with growing media attention to and public concern for California's smog crisis, industry executives from the Western Oil and Gas Association (now the Western States Petroleum Association) founded the Smoke and Fumes Committee to coordinate the industry's scientific research into air pollution issues and its public communications about air pollution science.[10] In the face of mounting public demands for action on air pollution, in California and beyond, the Smoke and Fumes Committee was designed explicitly to both fund research into air pollution and to leverage that industry-funded research to shape the views of government agencies and the broader public with respect to the science and potential regulation of air pollution.[11] Recognizing the potential nationwide significance of air pollution issues, the Smoke and Fumes Committee was subsumed within the American Petroleum Institute by 1952.[12]

Shell was an early and active participant in the Smoke and Fumes Committee. In 1958, Charles Jones wrote a history of the Smoke and Fumes Committee.[13] Jones identified himself as both the Executive Secretary of the Smoke and Fumes Committee as well as an executive with Shell.[14] In the document, Jones reported that the Committee was funding a study at Truesdail Laboratories to "determine the amount of carbon of fossil origin" in the atmosphere.[15] This document is the earliest evidence yet unearthed that demonstrates a coordinated industry-wide research program into the accumulation of fossil carbon in the atmosphere and clear evidence that major oil producers, including Shell, were on notice of potential climate risks.

In a presentation on behalf of the Smoke and Fumes Committee to the government-convened National Conference on Air Pollution later that same year, Jones assured participants that the oil industry had a "sincere interest" in solving pollution problems arising from automobile exhaust. Jones declared the industry's intent to address emissions not only from the production of oil and gas, but from their use:

The petroleum industry supplies the fuel used by the automobile, and thus has a sincere interest in the solution to the problem of pollution from automobile exhaust. The stated objective of the Smoke and Fumes Committee of the American Petroleum Institute is to "determine the causes and methods of control of objectionable atmo-

EXHIBIT 1

Excerpt from presentation by Shell scientist Charles Jones to National Conference on Air Pollution, 1958

The petroleum industry supplies the fuel used by the automobile, and thus has a sincere interest in the solution to the problem of pollution from automobile exhaust. The stated objective of the Smoke and Fumes Committee of the American Petroleum Institute is "to determine the causes and methods of control of objectionable atmospheric pollution resulting from the production, manufacture, transportation, sale, and use of petroleum and its products."

Charles A. Jones, *A Review of the Air Pollution Research Program of the Smoke and Fumes Committee of the American Petroleum Institute*, 8 J. of the Air Pollution Control Ass'n 268, 270 (1958), available at http:// www.tandfonline.com/doi/pdf/10.1080/00966 665.1958.10467854.

spheric pollution resulting from the production, manufacture, transportation, sale, and use of petroleum and its products.[16]

This express recognition that the use of its products constitutes a major part of the oil industry's impact (and responsibility) is significant given the industry's decades-long (and ongoing) campaigns to shift that responsibility away from oil companies and onto individual consumers. Despite the Smoke and Fumes Committee's then active research into the accumulation of atmospheric CO2 from fossil fuels, Jones makes no reference to that research in his presentation. The only reference to CO2 emissions characterizes them as "harmless."[17]

At a high level symposium on *Energy and Man* convened by API the following year, renowned physicist Edward Teller directly challenged that characterization. Calling attendees attention to the link between fossil fuels and rising atmospheric levels of CO2, as well as the resulting "greenhouse effect" from rising CO2, Teller warned that "a temperature rise corresponding to a 10 percent increase in carbon dioxide will be sufficient to melt the ice-cap and submerge New York. All the coastal cities would be covered… this chemical contamination is more serious than most people tend to believe."[18] At the time, API was chaired by Shell Oil President HMS Burns.

By the end of the 1950s, therefore, Shell was demonstrably on notice that atmospheric contamination by CO2 from fossil fuels was an environmental issue of potentially significant concern to the industry and to the planet. In the decade that followed, warnings to Shell from both within and outside the company would become increasingly explicit, detailed, and urgent.

In 1962, Marion King Hubbert, Chief Geology Consultant at Shell and former director of its research labs, produced a book- length report on the earth's *Energy Resources* for a committee of the National Academy of Sciences.[19] The report, which draws heavily upon a 1956 analysis Hubbert prepared for the American Petroleum Institute,[20] demonstrates Shells' profound understanding of the earth's energy balance, including the differences in the reflection of long- and short-wave solar radiation back into space, the role of global atmospheric temperatures in driving global weather, and the intrinsic and delicate natural balance between the heat energy absorbed by plants through photosynthesis with the equivalent energy released by plant matter through natural decay.[21]

Hubbert produced detailed discussions of both past and predicted future growth in the production and use of the earth's energy resources, with a heavy focus on the production and use of coal, oil, and natural gas, both through conventional development and through future extreme energy sources such as oil shale and tar sands.[22] Hubbert then briefly reviewed progress and viability of other energy sources, including solar, wind, geothermal, and hydropower. [23] In so doing, he explicitly acknowledged the potential risk that humanity's growing use of fossil fuels could result in dramatic changes to the earth's climate:

There is evidence that the greatly increasing use of the fossil fuels, whose material contents after combustion are principally H2O and CO2, is seriously contaminating the earth's atmosphere with CO2. Analyses indicate that the CO2 content of the atmosphere since

EXHIBIT 2
Excerpt from Hubbert's 1962 report *Energy Resources*

There is evidence that the greatly increasing use of the fossil fuels, whose material contents after combustion are principally H_2O and CO_2, is seriously contaminating the earth's atmosphere with CO_2. Analyses indicate that the CO_2 content of the atmosphere since 1900 has increased 10 per cent. Since CO_2 absorbs long-wavelength radiation, it is possible that this is already producing a secular climatic change in the direction of higher average temperatures. This could have profound effects both on the weather and on the ecological balances.

In view of the dangers of atmospheric contamination by both the waste gases of the fossil fuels and the radioactive contaminates from nuclear power plants, Professor Hutchinson urges serious consideration of the maximum utilization of solar energy.

M. King Hubbert, Energy Resources: A Report to the Committee on Natural Resources of the National Academy of Sciences-National Research Council 96 (1962).

SD-Pictures/Pixabay

1900 has increased 10 per cent. Since CO2 absorbs long-wavelength radiation, it is possible that this is already producing a secular climatic change in the direction of higher average temperatures. This could have profound effects both on the weather and on the ecological balances.[24]

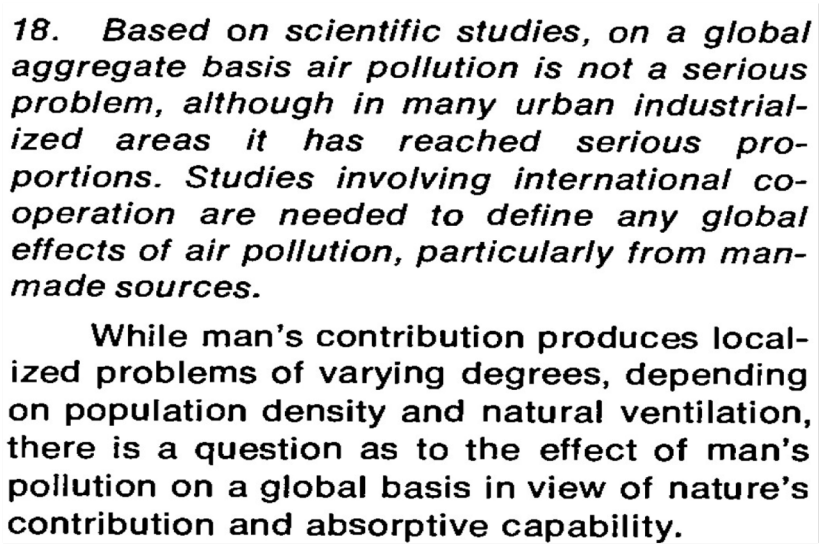
Hubbert concluded by recognizing that:

In view of the dangers of atmospheric contamination by both the waste gases of the fossil fuels and the radioactive contaminates from nuclear power plants, Professor Hutchinson urges serious consideration of the maximum utilization of solar energy.[25]

In 1968, the warning by Shell's own Chief Geologist was echoed and dramatically amplified in a report commissioned by API's Smoke and Fumes Committee, by then renamed the Committee for Air and Water Conservation. As previously detailed by CIEL, the authors of the 1968 report *Sources, Abundance, and Fate of Gaseous Atmospheric Pollutants* warned the industry that accumulating carbon dioxide in the atmosphere, caused primarily by burning fossil fuels, would likely result in increasing atmospheric temperatures.[26] They also warned that "[s]ignificant temperature changes are almost certain to occur by the year 2000 and these could bring about climatic changes."[27] Significantly, the 1968 report acknowledged that, while uncertainties remained, the combustion of fossil fuels was the best fit to the scientific data for rising CO2 and, accordingly, emphasized that future research should focus on technologies and other changes to reduce CO2 emissions. In a supplemental report delivered to API the following year, the authors addressed the issue of atmospheric carbon dioxide in greater detail. Although the supplement dealt at greater length with the uncertainties in climate science, its central conclusion – that accumulating carbon dioxide in the atmosphere could lead to planetary warming and potentially catastrophic climatic changes – remained the same.[28]

Given its longstanding and active role within API generally and in the Smoke and Fumes Committee and successor committees specifically, it is reasonable to assume Shell received these reports. Two pieces of documentary evidence further buttress this assumption. First, a 1972 API report on the status of ongoing research reports identifies Shell not only as a member of API's Air and Water Conservation Committee, but also of the smaller Engineering and Technical Resources Executive Committee responsible for steering API's research into atmospheric pollutants.[29] (Another European oil major, British Petroleum, is also among the committee members.) Moreover, also in 1972, a submission from the National Petroleum Council (NPC), an industry-staffed advisory committee to the United States federal government, made significant references to the 1968 report. The report, *Environmental Conservation: The Oil and Gas Industries*, praised the work of the SRI scientists and their conclusions about atmospheric scavenging mechanisms for traditional pollutants, but disregarding their findings with respect to atmospheric carbon dioxide, relying instead on an earlier and more skeptical report from another source. Tellingly, and in stark contrast to the contents of the SRI reports themselves, the Executive Summary to the 1972 NPC report all but dismissed any suggestion of global impacts from pollution:

EXHIBIT 3
Excerpt from Executive Summary to the 1972 NPC report



18. Based on scientific studies, on a global aggregate basis air pollution is not a serious problem, although in many urban industrialized areas it has reached serious proportions. Studies involving international cooperation are needed to define any global effects of air pollution, particularly from man-made sources.

While man's contribution produces localized problems of varying degrees, depending on population density and natural ventilation, there is a question as to the effect of man's pollution on a global basis in view of nature's contribution and absorptive capability.

Environmental Conservation: The Oil and Gas Industries / Volume 2, National Petroleum Council xxii (1972), *available at* http://www.npc.org/reports/1972- Environmental_Conservation-Oil_and_Gas_ Industries-Vol_II.pdf.

Based on scientific studies, on a global aggregate basis, air pollution is not a serious problem . . . . Studies involving international cooperation are needed to define any global effects of air pollution, particularly from man-made sources.

While main's contribution produces localized problems of varying degrees, depending on population density and natural ventilation, there is a question as to the effect of man's pollution on a global basis in view of nature's contribution and absorptive capacity.[30]

Three senior Shell Oil executives, including company President Harold Bridges, were identified as contributors to the report, suggesting familiarity with and endorsement of its contents. L.P. Haxby, Shell's Manager for Environmental Conservation (and Public Relations) was a member of the six-person Air Conservation Task Group to which the report's discussion of air pollutants is attributed. At minimum, this demonstrates Shell was aware of the SRI reports.

Shell continued its active engagement in climate research and climate discussions throughout the 1970s. At the same time, Shell made early forays into solar energy. In 1973, Shell acquired industry pioneer Solar Energy Systems and actively published research and filed for patents throughout the 1970s.[31] In 1977, Shell participated in the Conference on Energy Resources, which included a discussion of global warming as caused by fossil fuel combustion and carbon dioxide accumulation.[32] Two years later, the World Meteorological Organization hosted the World Climate Conference and made explicit and specific reference to the "additional issue of special importance that pervades all the above-mentioned components: The problem of possible human influences on climate."[33] Shell was again a participant.[34]

1980-1998: New Documents Expose a Growing Dichotomy between Shell's Knowledge, Rhetoric and Conduct during a Critical Period for Climate Science and Climate Action

As the preceding discussion demonstrates, Shell entered the 1980s with nearly three decades of steadily accumulating research and warnings about the potential climate risks linked to its products and operations. By 1980, Shell was unequivocally on notice of those risks, of the increasingly robust body of scientific evidence linking fossil fuels to atmospheric carbon dioxide, and to climate change and climate impacts.

The trove of documents unearthed by Jelmer Mommers and De Correspondent exposes not only Shell's deep awareness of these risks but the growing divergence between that internal awareness, its public assessment of climate science, and, critically, its corporate conduct in the face of mounting climate risks.

In 1986, a Shell working group completed a study of greenhouse gases in the atmosphere, which they then presented in a report called *The Greenhouse Effect* in 1988.[35] This report examined the science of the greenhouse effect, climate scenarios and modeling, and potential impacts from climate change caused by greenhouse gas accumulation.

The Greenhouse Effect acknowledged unequivocally that atmospheric CO2 levels were increasing, that

fossil fuel combustion was the primary cause, and that there was "reasonable scientific agreement that increased levels of greenhouse gases would cause a global warming."[36] The report discussed the potential consequences – including rising sea levels, ocean acidification, changes to agricultural patterns, and climatic change – as well as the potential economic, social, and political severity of those consequences.[37] Notably, this included a discussion of the implications for the energy industry as a whole and for Shell companies in particular.[38]

Even more significantly in light of ongoing and active litigation against the company and Shell's earlier recognition in the CA Jones memo that oil producers must address the pollution impacts of their products, *The Greenhouse Effect* not only acknowledged the scale of Shell's own CO2 emissions, but calculated them:

Fossil fuels which are marketed and used by the Group account for the production of 4% of the CO2 emitted worldwide from combustion. Of these emissions, 80% comes from Group oil, 12% from Group gas and 8% from Group coal.[39]

This explicit recognition that Shell's sold products accounted for 4% of global carbon emissions in 1984 may have long-term ramifications for the company as it faces mounting litigation based on market share theories of liability. It is particularly significant in this regard that Shell's self-tabulated emissions figure for 1984 of 0.25 Gigatons of carbon is only marginally lower than the 0.348 Gigaton of carbon emissions attributed to Shell in 1984 using the "Carbon Majors" accounting methodology developed by the Climate Accountability Institute.[40]

This explicit recognition that Shell's sold products accounted for 4% of global carbon emissions in 1984 may have long-term ramifications for the company as it faces mounting litigation based on market share theories of liability.

Shell also recognized climate change could have "direct operational consequences…from a rising sea level, impacting offshore installations, coastal facilities and operations (e.g. platforms, harbours, refineries, depots) with an uncertain magnitude."[41] Although the report suggested that no immediate facility relocations were needed given the slow pace of sea level rise, Shell nonetheless announced in 1989 that it was redesigning a $3 billion natural gas platform, raising it a meter or two to account for future sea level rise.[42] Meanwhile, Shell's apparent failure to consider the impacts of climate change in siting hazardous facilities in low-lying coastal areas is the subject of active and ongoing litigation.[43]

The conclusions and recommendations in *The Greenhouse Effect* shed light not only on Shell's then-current understanding of climate risks, but on the company's subsequent conduct in light of that understanding. Although the report acknowledged uncertainties, it counseled that research should "be directed more to the analysis of policy and energy options than to studies of what we will be facing exactly."[44] It also noted that "by the time the global warming becomes detectable it could be too late to take effective countermeasures to reduce the effects or even to stabilise the situation."[45] As will be discussed below, subsequent documents (many of which, unlike *The Greenhouse Effect*, were not marked "confidential") highlight uncertainties in forecasts of specific impacts, and cite them as reasons for continued inaction.

These explicit acknowledgements should be remembered when considering efforts by Shell to undermine public confidence in the certainty of

EXHIBIT 4
Excerpt from *The Greenhouse Effect* report, 1988

Fossil fuels which are marketed and used by the Group account for the production of 4% of the CO2 emitted worldwide from combustion. Of these emissions, 80% comes from Group oil, 12% from Group gas and 8% from Group coal (see Tables 7 and 8).

Shell Internationale Petroleum Maatschappij, The Greenhouse Effect 29, 57 (1988), *available at* http://www.climatefiles.com/shell/1988-shell-report-greenhouse/.

EXHIBIT 5
Excerpt from *The Greenhouse Effect* report, 1988

> Direct operational consequences can be expected from a rising sea level, impacting offshore installations, coastal facilities and operations (e.g. platforms, harbours, refineries, depots) with an uncertain magnitude. Costs of defending against a sea level rise will depend on the local situation (levels of security demanded for contingencies like extreme ocean storms, flooding, etc.) and national policies to compensate industry for the extra costs incurred.

Shell Internationale Petroleum Maatschappij, The Greenhouse Effect 29, 57 (1988), *available at* http://www.climatefiles.com/shell/1988-shell-report-greenhouse/.

climate science and to thwart regulation at the sub-national, national, and international levels.

In 1991, Shell released a 28-minute film entitled *Climate of Concern*. The film acknowledged the consensus surrounding climate change, the role of fossil fuels in driving the warming, and the scale and scope of the potential devastation.[46] It also noted that the rate of temperature change is greater than anything seen since the end of the last ice age, and that the climate might "change too fast, perhaps, for life to adapt without severe dislocation."[47] The film discussed the scale and scope of risks, including changes to weather patterns and "the increasing frequency of abnormal weather;"[48] saltwater intrusion; sea level rise; increasingly destructive storm surges, noting "warmer seas could make such destructive surges more frequent and even more ferocious;" pollution of groundwater; impacts on agriculture; and the displacement of people living on low-lying islands. It warned of "greenhouse refugees" displaced by shifting climates,[49] noting "if the weather machine were to be wound up to such new levels of energy, no country would remain unaffected."[50]

Climate of Concern demonstrates that Shell was aware not only of the risks of climate change, but also of the robustness and growing specificity of the scientific case for climate change. It noted that evidence for warming had already been observed, acknowledging observed warming in the Arctic as far back as the 1930s, and stating that "[r]egion by region analysis of world temperature records shows a small but significant warming trend over the century, with a marked increase in the 1980s."[51]

It concluded that, while not all is certain, many think waiting for ironclad proof would be irresponsible and action now (in 1991) is the only safe insurance.[52] "What is now considered abnormal weather could become a new norm. We have seen the consequences in our own time."[53]

Importantly, this film did not simply address the risks posed by climate change, but also examined solutions. Notably, the film acknowledged that, while technology, including renewable energies and energy efficiency technologies, was a part of the solution, combating global warming would require more than technological fixes. That is to say, in 1991 Shell explicitly acknowledged that coordinated, regulatory action would need to be taken to solve the climate crisis.

Despite its recognition of these realities, Shell's messaging on climate change – both internally and publicly – shows a marked shift in the ensuing years, just as the public and policy debates over climate action were accelerating.

In 1994, Shell commissioned an update to *The Greenhouse Effect*, called *The Enhanced Greenhouse Effect*. This report restated the consensus of climate scientists and included updates. In a significant departure from previous analyses, however, nearly half of the report was dedicated to "Areas of Controversy and Alternative Scientific Views."[54] Even as it acknowledged compelling new climate science, the 1994 report placed a heavy emphasis on discrediting and downplaying that science. Three years after Shell declared in *Climate of Concern* "waiting for ironclad proof would be irresponsible and that action now is the only safe insurance," Shell seemed more interested in demanding proof than in taking action.

What changed?

The timing of *The Enhanced Greenhouse Effect*, at a critical juncture in the climate change debate, suggests one possible answer. When *Climate of Concern* was released in 1991, the UN Framework Convention on Climate Change (UNFCCC) was still being negotiated, with the two most powerful nations on the planet actively working to slow or weaken the deal. By 1994, however, the UN Climate Convention was a reality, and demand was already rising for a new, stronger deal to turn the treaty commitments from words into action. *The Enhanced Greenhouse Effect* appears a year before the first Conference of Parties to the United Nations Framework Convention on Climate Change, where nations would gather to begin negotiating how to collectively confront the challenge of climate change.

Perhaps this why the 1994 report marks an inflection point in Shell's treatment of the subject, with the company thereafter increasingly focusing public attention on scientific uncertainty.

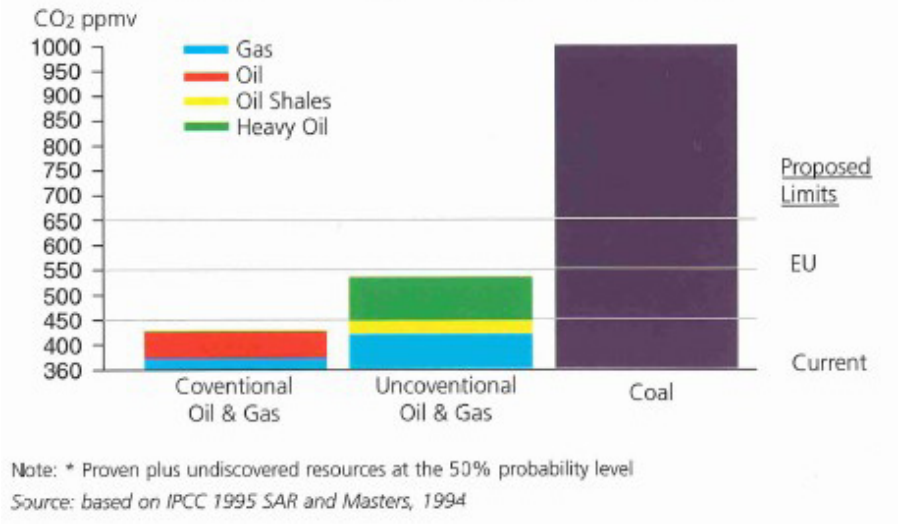
The Greenhouse Effect from 1988 acknowledged uncertainties, but made clear that the key research questions lay in *how* to address growing emissions and climate impacts, not what the precise impacts would be. *The Enhanced Greenhouse Effect*, in comparison, contained a long discussion of those uncertainties. In its section on "Areas of Controversy and Alternative Scientific Views," the report addressed alternative carbon sinks,[55] the reliability of temperature records,[56] defects in global climate models,[57] the possibility that actual climatic changes might not be as bad as expected,[58] and the uncertain impacts on agriculture.[59] It concluded that "[i]t is thus not possible to dismiss the global warming hypothesis as scientifically unsound; on the other hand any policy measure should take into account explicitly the weaknesses in the scientific case."[60] While the 1988 report was marked "confidential," there is no indication that *The Enhanced Greenhouse Effect* was as well.

A Shell Management Brief from February, 1995 restated many of the points in the 1994 report – acknowledging the potential consequences of climate change, but emphasizing the uncertainties in climate science. Shell again acknowledged that "an increase in atmospheric greenhouse gas concentrations… must have some effect on the radiation balance which ultimately determines global climate. However, it is not possible to quantify the consequences for global climate."[61] This brief was not marked as classified.[62]

Another report in 1995, entitled *Is Climate Change Occurring Already?* and not marked as classified, addressed whether the human signal could be found in the climate system.[63] It bears recognition that this 1995 report diverged from Shell's own earlier analyses and disregarded the explicit testimony by Dr. James Hansen of NASA to the US Congress in June 1988 that the signal of anthropogenic climate change had, by that summer, clearly emerged from the background noise of natural variation. In other words, climate change was no longer an abstract hypothesis; it was an emergent reality.

Seven years after Hansen's testimony and four years after Shell released *Climate of Concern,* the company's 1995 report proved remarkably – unjustifiably – equivocal about climate science. Although Shell did not deny that climate change was happening or that it was the caused primarily by fossil fuel combustion, it argued that only "a slow accumulation of evidence, rather than a 'smoking gun', will indicate man-made emis-

EXHIBIT 6
Atmosphere Concentration for Total Resource Use



Presentation from Royal Dutch Shell Group, Climate Change: What Does Shell Think and Do About It? 6 (Mar. 1998), *available at* http://www.climatefiles.com/shell/1998-shell-report-think-and-do-about-climate-change/.

sions as the cause of some part of observed climate change."[64] This is a stark contrast to the warnings of Shell's own scientists in 1988 that "by the time the global warming becomes detectable it could be too late to take effective countermeasures to reduce the effects or even to stabilise the situation."[65]

Shell released another public-facing document in 1995 entitled *Shell and the Environment*.[66] In it, the company acknowledged that "[t]he possibility of climate change caused by an enhanced greenhouse effect is probably the most prominent global environmental issue of today."[67] It also noted that, despite uncertainties, "Shell companies accept that there is enough indication of potential risk to the environment for governments to address the issue."[68]

The following year, in 1996, a Shell Management Brief outlined the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report (SAR).[69] This briefing analyzed the major conclusions in the SAR, but placed heavy emphasis on uncertainties in the science and limitations in the models. Still, the brief acknowledged that "Climate change is potentially the most serious and intractable environmental issue faced by mankind. If man is changing the climate, the environmental consequences could be severe."

In 1998, Shell calculated the scale of the potential climate impact in *Climate Change: What Does Shell Think and Do About It?* In a remarkable chart, Shell acknowledged that the complete combustion of any single category of fossil fuel reserves would send atmospheric greenhouse concentrations soaring.

Shell's solution was simple: abandon coal; focus on oil and gas; and accept a doubling of atmospheric CO2.[70]

The "Roadmap Memo" outlined a strategy to convince the public that climate science was still unsettled. It described victory as having the "[a]verage citizens 'understand' (recognize) uncertainties in climate science."

Undergirding all of this history is the fact that the Shell Group possessed (and continues to possess) enormous scientific and technical expertise. Not only did Shell have vast resources at its disposal, it was a multinational corporation involved in dozens of other organizations and working groups. As such, Shell must be assumed to have known at least as much as was known in scientific and public discourse – and likely knew more than we are aware of even now. Shell's history should be evaluated in the light of that expertise, and Shell should be held to the highest standard of conduct and responsibility for its decisions, communications, and behavior.

Shell's Public Image and Private Behavior Diverge

Shell was on clear and early notice of climate change, yet still took actions inconsistent with a safe, climate-stable future. Moreover, despite its public acknowledgements, Shell joined industry efforts to obstruct critically needed measures to address the climate crisis.

Despite the company's confidence in the science, which drove it to incorporate climate change impacts into operational planning by no later than 1989, Shell joined the Global Climate Coalition (GCC), a group of companies and industry groups which fought climate regulation, the same year.[71]

The GCC actively sowed misinformation about climate change and fought the adoption of the Kyoto Protocol. After joining the GCC in 1989, Shell participated actively throughout the Kyoto negotiations, including through the Protocol's adoption at the UNFCCC.

Although Shell formally withdrew from the GCC in 1998, it remained an active member of the American Petroleum Institute, whose climate misinformation campaign either began or accelerated that same year. A 1998 document from the American Petroleum Institute, referred to as the "Roadmap Memo," outlined a strategy to convince the public that climate science was still unsettled. It described victory as having the "[a]verage citizens 'understand' (recognize) uncertainties in climate science."[72] As part of its strategy, API funded Smithsonian scientist Wei-Hock Soon, who produced work contradicting the scientific consensus about climate change from 2001 to 2012. Soon failed to disclose any conflicts of interest in the funding of his work and promoted his research as independent.

API's active opposition to the Kyoto Protocol played a key role in the Bush Administration's decision to reject the Kyoto Protocol in 2001. The following year, the administration withdrew from Kyoto, and the GCC disbanded.[73]

N. Scott Trimble/Greenpeace

In addition to Shell's participation in the GCC, it was also involved in the formation of other climate denial groups. Frits Böttcher, who spent 30 years as a part-time advisor to Shell, co-founded the European Science and Environment Forum (ESEF) in 1994, together with Roger Bate of the Institute for Economic Affairs. "The issue of climate change was the initiation (sic) for the meeting" from which ESEF was organized.[74] Böttcher, a known climate denier in the Netherlands, also ran the Global Institute for the Study of Natural Resources, partly funded by Shell, where he remained an active climate denier.[75]

Shell also belongs to the Western States Petroleum Association (WSPA), an industry group which coordinated a series of "Astroturf" civil society groups to oppose California legislation in 2014.[76] In 2014, WSPA organized sixteen fake grassroots organizations, at least two of which, "California Driver's Alliance" and "Fed Up at the Pump," fought against emissions regulations for vehicle exhaust with radio ads and billboards.[77] As of 2014, WSPA was working through similar groups, such as "Washington Consumers for Sound Fuel Policy" and "Oregon Climate Change Campaign," in Washington and Oregon, respectively.[78]

Shell was also a member of the American Legislative Exchange Council (ALEC), a right-wing group that, among other things, actively promoted outright climate denial. Shell publicly left ALEC in 2015, citing their climate denial as the reason.[79] This membership in and subsequent withdrawal from ALEC mirrors Shell's participation with the Global Climate Coalition.

Buying the Arctic, Selling the Sky

It is important to underscore again the internal expertise and sophistication that Shell employed throughout its history. Among the newly revealed documents are scenario analyses prepared by Shell which, among other things, address the major forces and changes which will impact global business and geopolitics. Some of the predictions in these scenarios, including the acceleration of globalization, automation, industry consolidation, and even the expansion of income inequality in developed nations and the rise of violent non-state actors, turned out to be remarkably prescient.

More important than the specific prognostications, though, is what these projections and forward-looking scenarios show. They illustrate

how Shell planned over periods of decades, and would have been keenly able to incorporate considerations of climate change and the need to phase out fossil fuels. Instead of making choices to avoid climate catastrophe, Shell continued pushing to open new oil and gas horizons.

Despite the awareness of the need to decarbonize the energy mix, Shell continued aggressively pursuing new carbon reserves, even when doing so was financially dubious, as in the company's highly criticized efforts to open the Arctic to decades of oil drilling.[80] For years, Shell pursued plans to drill in Alaska's Chukchi Sea, even as environmental activists and the company's own shareholders fought against it, believing the project to be environmentally devastating and financially unwise.[81] Still, in light of these pressures, and with a keen awareness of global carbon budgets,[82] Shell spent $7 billion on Arctic exploration before abandoning its plans in 2015.[83]

This pattern would become common for Shell; the company would make declarations about the dangers and severity of climate change, yet developed significant additional reserves and helped perpetuate a carbon-based energy mix.

This pattern would become common for Shell; the company would make declarations about the dangers and severity of climate change, including what it planned to do to combat it, yet developed significant additional reserves and helped perpetuate a carbon-based energy mix. It would join groups intent on opposing climate action, including by spreading misinformation, but then leave once the damage had been done.

This practice continues today. In March 2018, Shell released a model scenario it claimed would meet Paris Agreement goals,[84] which the UNFCCC supported and promoted.[85] This model scenario, however, distracts from Shell's actual behavior.

Shell's new model scenario, called the Sky Scenario, is not a blueprint for how Shell plans to decarbonize. As Shell makes clear in the scenario's accompanying legal disclaimer, "we have no immediate plans to move to a net-zero emissions portfolio over our investment horizon of 10-20 years."[86] However, even if it were an outline of Shell's operational and investment plans, it would still contain significant flaws.

First, the Sky Scenario simply does not meet Paris goals. It proposes a scenario in which the world has a two-thirds chance of avoiding two degrees of warming, [87] which is a massive dilution of the Paris target of keeping warming "well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C."[88]

Second, and perhaps unsurprisingly, the Sky Scenario relies extremely heavily on continued fossil fuel use and assumes the development and deployment of unproven and economically unviable carbon capture and negative-emissions technologies on a massive scale. The scenario allows for global levels of oil, gas, and coal use at 88%, 93%, and 62% of current consumption in 2050[89] and accounts for the overshoot with negative emissions technologies.

These projections are both unrealistic and problematic. The Sky Scenario would require the construction of up to 10,000 large carbon capture and storage (CCS) facilities and the use of bioenergy with carbon capture and storage (BECCS) over a land area the size of Australia.[90]

Again, though, even if one were to set aside the issues with the Sky Scenario, Shell does not plan to pursue a course of action to actually meet its targets. As demonstrated by an analysis by Carbon Tracker, 30-40% of Shell's planned upstream capital expenditures through 2035 are unneeded in a two-degree warming scenario (which would still fail to meet Paris targets and cause massive climatic change).[91] Instead, Shell projects dramatic increases in fossil fuel use through at least 2060.[92] This fits Shell's pattern, whereby the company publicly purports to support action on climate change and appears friendlier to regulation than its peers. Meanwhile, Shell still plans for – and contributes to – vast increases in the use of fossil fuels.[93]

Conclusion

Like ExxonMobil, Shell has been at the leading edge of climate science at least since the scientific debate began in earnest. The company actively participated in the research and communications apparatus of the American Petroleum Institute, which was studying the issue no later than 1958. In 1962, Shell's Chief Geologist acknowledged the potentially significant climate risks of fossil fuel combustion and echoed the recommendations of other scientists that society must transition to more sustainable energy sources. By 1968, API had received an explicit warning that, while uncertainties remained,

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climate change was a global risk and the combustion of fossil fuels was its primary driver.

Throughout the 1970s and early 1980s, scientific and public evidence mounted. By 1988, Shell's own scientists were confirming that the fundamental science of climate change was sound, even if uncertainties remained, and they acknowledged that by the time those uncertainties were resolved, it might be too late. The following year, Shell took the first steps to protect its own offshore oil platforms from the risks of rising seas.

That same year, Shell joined the Global Climate Coalition, where it would remain an active partner in climate denial efforts until 1998. In 1998, Shell withdrew from GCC, but not from API, which launched its own new denial efforts that same year. API's active program of promoting climate denial continued through at least 2012, and potentially beyond. In the meantime, Shell maintained its memberships in ALEC and WSPA, even as they launched active and ongoing campaigns to obstruct climate action through at least 2015.

For periods that are not yet fully documented, Shell fostered or funded climate denial operations within Europe as well.

Throughout much of this period, Shell publicly acknowledged that climate change was a severe threat to people and the planet, and that coordinated public action would be needed to combat that threat. Despite this, Shell coordinated with opaque industry and front groups to sow doubt and confusion about the issue and slow progress on climate solutions.

More fundamentally, and throughout the six decades since CA Jones first acknowledged the industry's awareness of climate risks, Shell has continually expanded its global production and sale of fossil fuels. Indeed, as the Arctic melted due to climate change, Shell actively sought to exploit these climate impacts to open a major new oil frontier.

As this report goes to press, and amidst rising climate litigation against the company in countries around the world, Shell has yet again declared a positive, progressive vision for meeting the challenge of climate change. It does so even as it acknowledges that it has no intent to pursue that vision, because it continues banking on a fossil fuel future the world can no longer afford or accept.

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