



# OIL, GAS AND THE CLIMATE:

An Analysis of Oil and Gas Industry Plans  
for Expansion and Compatibility with  
Global Emission Limits

*“It is the urgent responsibility and moral obligation of wealthy fossil fuel producers to lead in putting an end to fossil fuel development and to manage the phase-out of existing production.”*

**Quote from The Lofoten Declaration (lofotendeclaration.org), calling for leadership towards a phase out of fossil fuel production, signed by over 700 organisations in 80 countries.**



## **EXECUTIVE SUMMARY**

Key Findings	2
Oil and Gas, and the Carbon Budget	3

## **THE OIL AND GAS INDUSTRY PLANS TO INCREASE CARBON EMISSIONS** **4**

Publicly Listed Companies are Largely Responsible	5
Companies with the Largest Expansion Plans	5
The Five-Year Threat: Oil and Gas Expansion Around the World	6
Country Profiles	8

## **A BETTER FUTURE IS POSSIBLE: PHASING OUT EXISTING AND PLANNED OIL AND GAS EXTRACTION IS FEASIBLE AND JUSTIFIED** **11**

First Movers: Governments are Starting to Lead	12
--	----

## **CONCLUSION: THE TIME FOR TRUE CLIMATE LEADERSHIP IS NOW** **13**

A Role for Civil Society	13
Governments Need to Address the Threat of Oil and Gas Production	13
Investors Must Stop Financing Projects That Undermine Climate Goals	13

# EXECUTIVE SUMMARY

This data briefing analyzes the expansion plans of the oil and gas industry and assesses the compatibility with Paris climate goals. We primarily focus on the global expansion threat over the next five years (2020 to 2024). This short-term focus illustrates the urgent need for government, investor, business, and civil society action to chart a different course – to stop licensing and permitting new production and infrastructure and instead manage a swift and just phase-out of oil and gas extraction.

In terms of the global threat, three different metrics are summarized:

1. The investment the oil and gas industry intends to sink into developing new oil and gas fields and shale wells between 2020 and 2024, which creates a carbon lock-in effect out to 2050;
2. The new production that would result from these expansion projects; and
3. The total cumulative carbon dioxide emissions that new financial investment decisions made over the next five years could unlock in coming decades.

## Key findings

- **Carbon emissions from oil and gas in *operating* fields and mines globally would push the world beyond 1.5°C of warming and make it impossible to meet our global obligations under the Paris Agreement.** This is true even if global coal use were phased out overnight, and cement emissions were drastically reduced.
- **Over the next five years, from 2020 to 2024, oil and gas companies are set to invest a further USD 1.4 trillion in new oil and gas extraction projects.**<sup>1,2</sup> The majority of this investment will be in shale and offshore oil and gas.
- **New financial investment decisions over this five-year period have the potential to unlock more than 148 GtCO<sub>2</sub> from currently undeveloped reserves<sup>3</sup> before 2050, equivalent to building over 1200 new average U.S. coal-fired power plants.**<sup>4</sup>
- **In the near-term – looking just at production from expansion projects over the next five years – North America accounts for 85% of new supply.**<sup>5</sup> U.S. oil and gas expansion by *itself* will make it impossible for the rest of the world to manage the safe, equitable and necessary decline of oil and gas production by 2050.
- **Every major International Oil Company (IOC) has sanctioned new oil and/or gas projects that are not Paris Agreement compliant.** Twenty-five companies are responsible for nearly 50 percent of the production to 2050 resulting from new expansion of oil and gas in the next five years.
- **A well-planned phase-out of oil and gas production that considers the needs of workers and communities impacted by fossil fuel developments must start now to avoid climate breakdown and a deferred economic collapse.** This does not mean turning off the taps overnight. Rather, it means taking climate limits seriously and intentionally planning to wind-down fossil fuel extraction at the pace required to meet them. An intentional and thoughtful phase-out approach makes it possible to create transition plans that are socially just and economically sound.

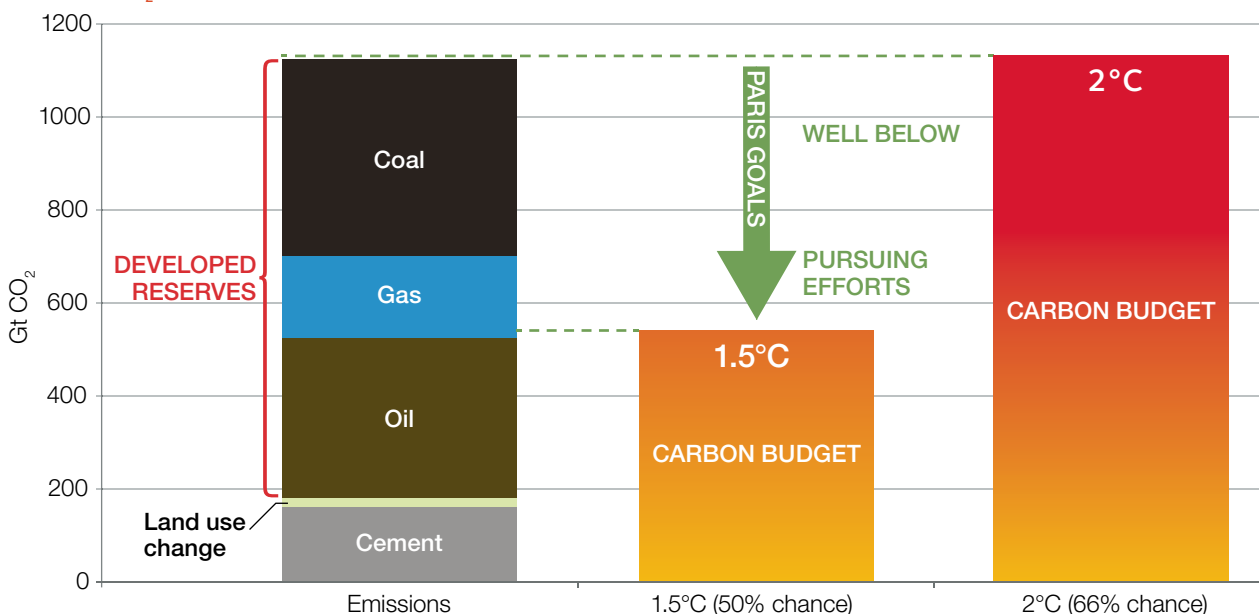
- **First Mover governments and institutions must continue to establish a new standard for climate leadership and ambition by:**
  - Implementing bans on licenses, contracts, and permits for new oil and gas exploration and development, as is the case in Costa Rica, France, New Zealand and Belize.
  - Rapidly phasing out finance and subsidies for fossil fuel production. For instance, Swedfund excluded all oil, gas, and coal finance in 2017, Agence Francaise de Development excluded nearly all upstream and midstream oil and gas in 2019, the World Bank will exclude upstream oil and gas after 2019, and the European Investment Bank will exclude oil, gas, and coal projects after 2021.
  - Creating plans to phase out existing fossil fuel production at a pace aligned with the Paris goals, with high-income countries leading the way.
  - Developing and implementing just transition strategies for fossil-fuel-dependent regions, communities and workers in consultation with trade unions and local leaders as investment shifts to new economic sectors.

## Oil and Gas, and the Carbon Budget

The latest science from the Intergovernmental Panel on Climate Change (IPCC) indicates that we have to fundamentally shift our energy systems away from fossil fuels to stay within the limits set by the 2015 Paris Agreement. By 2030, global carbon emissions must be cut in half, compared to current levels, to be in range of limiting global warming to 1.5 degrees Celsius (°C).<sup>6</sup>

Even if global coal use were phased out overnight, and cement emissions were drastically reduced, carbon emissions from the oil and gas in *operating* fields globally would push the world beyond 1.5°C of warming and make it impossible to meet our global obligations under the Paris Agreement (Figure 1). Developed oil and gas fields contain approximately 510 GtCO<sub>2</sub> out of a remaining carbon budget (as of 2019) of 540 GtCO<sub>2</sub>.<sup>7</sup> Developed coal reserves, by comparison, are on track to emit 425 GtCO<sub>2</sub>, as shown in Figure 1. In short, the use of all hydrocarbons—oil, gas, and coal—must be phased out well before 2050, and we need to start on that pathway now.

**Figure 1: CO<sub>2</sub> Emissions from Developed Global Fossil Fuel Reserves, Compared to Paris Goals Carbon Budgets**



Sources: Rystad UCube, International Energy Agency (IEA), World Energy Council, IPCC, OCI analysis<sup>8</sup>

# THE OIL AND GAS INDUSTRY PLANS TO INCREASE CARBON EMISSIONS

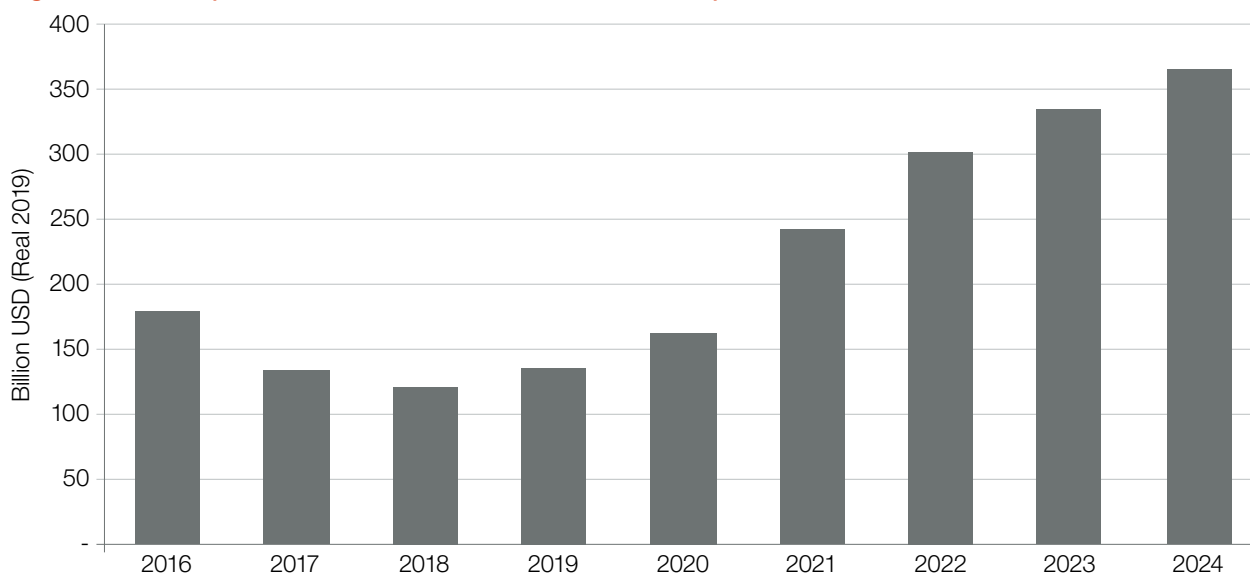
Despite global recognition that we need to transition to a zero-carbon economy, oil companies continue to plan for and invest in new oil and gas projects. Data from Rystad Energy, an industry consultancy, indicates that the oil and gas industry is ignoring the significant risks of climate change, acting contrary to what is required, and instead planning to dramatically expand oil and gas production over the next decade and beyond.

While capital expenditure (CapEx) on new oil and gas projects shrank after the low-price years of 2015 and 2016, it is now on a steady trend upward.<sup>9</sup> We are already seeing the effects of overinvestment in the existing fossil energy system. In 2018, oil and gas production grew by more than 3 percent. Not surprisingly, global carbon dioxide emissions grew by a similar amount, the sharpest rise since 2011.

Figure 2 shows the rise in capital expenditure into developing new oil and gas production since 2018. CapEx is projected to reach USD 365 billion (real) in 2024. Between 2020 and 2024, projected CapEx spent on new oil and gas extraction projects totals USD 1.4 trillion (real). This figure is for upstream only and does not include many billions more expected to be spent on pipelines, export terminals and other oil and gas related infrastructure.

As a result of this investment, global annual oil and gas production is on a trajectory to rise 7% between 2019 and 2024.<sup>10</sup> By projecting production to 2050 from assets sanctioned for development over the next five years, total oil and gas unlocked reaches 197 billion barrels of oil and more than 1.1 quadrillion cubic feet of gas.<sup>11</sup> This production locks in more than 148 GtCO<sub>2</sub> from currently undeveloped reserves,<sup>12</sup> equivalent to building 1200 new average U.S. coal-fired power plants.<sup>13</sup>

**Figure 2: Global Upstream CaPex into New Oil and Gas Development**



Source: Rystad Energy UCube

## Publicly Listed Companies Are Largely Responsible

### Companies with the largest expansion plans

According to Carbon Tracker Initiative, every major International Oil Company (IOC) has sanctioned new oil and/or gas projects that are not Paris Agreement compliant, including large European companies that are doing the most to try to persuade investors and the public that they are responsive to climate concerns (BP, Shell, Total, Equinor).<sup>14</sup>

In our analysis, 25 companies are responsible for nearly 50 percent of the production to 2050 from investment sanctioned in the next five years. Only four of these companies are fully state-owned, with the rest a mix of fully and partially public companies. One of the state-owned companies, Saudi Aramco, is preparing to list in what might be the largest IPO in history.

All of the major IOCs are on the list. All but two of them, Total and Eni, have over 50 percent of their new development in shale plays. Shell is second only to Gazprom in the size of projected production from new development. Seven of the top 25 are 100 percent invested in shale production.

Figure 3 shows the companies ranked by the amount of production that they would unlock through to 2050 by their new development between 2020 and 2024. Fully state owned means companies are not listed on any stock exchange.

**Figure 3: Top 25 Companies by Production Unlocked from New Development between 2020-2024**

Company	Production (Billion BOE)	Fully State Owned	Shale Percentage
GazProm	21.7	N	0%
Shell	17.7	N	60%
ExxonMobil	14.3	N	57%
Chevron	11.9	N	77%
Qatar Petroleum	11.1	Y	0%
Occidental	10.2	N	97%
PetroChina	10.0	N	54%
BP	7.4	N	53%
EOG Resources	5.7	N	100%
Saudi Aramco	5.2	Y	0%
Rosneft	5.1	N	0%
Total	4.8	N	6%
Equinor	4.3	N	27%
Abu Dhabi NOC	4.3	Y	0%
Government of Brazil	4.2	Y	0%
Encana	4.2	N	100%
Concho Resources	4.1	N	100%
Chesapeake	4.0	N	100%
Eni	4.0	N	0%
Petronas	4.0	N	20%
ConocoPhillips	3.8	N	66%
Cimarex Energy	3.6	N	100%
Antero Resources	3.6	N	100%
Pioneer Natural Resources	3.6	N	100%
CNOOC	3.5	N	11%
Total (Billion BOE)	176.4		

Billion Barrel Oil Equivalent includes oil and gas.

## Carbon Capture and Storage (CCS)

Representatives of the oil and gas industry might challenge this analysis, arguing that increasing gas production is consistent with climate goals<sup>15</sup> on the grounds that emissions can be captured by carbon capture and storage (CCS) or bioenergy with CCS (BECCS).<sup>16</sup> This view is disputed by a growing number of scientists, economists and risk analysts. As the recent IPCC report warns, “carbon dioxide removal deployed at scale is unproven, and reliance on such technology is a major risk in the ability to limit warming to 1.5°C.”<sup>17</sup> The economics of CCS are also unfavourable, and pilot projects to date have proven more costly and less effective than hoped.<sup>18</sup>

Given renewable technologies have become cheaper than oil and gas, the additional cost of CCS would put fossil fuels at a further competitive disadvantage.

BECCS is similarly unappealing. Offsetting a third of today’s fossil fuel emissions would require land equivalent almost to half of the world’s total crop-growing area,<sup>19</sup> risking large-scale food shortages, unsustainable freshwater use and massive habitat conversion.

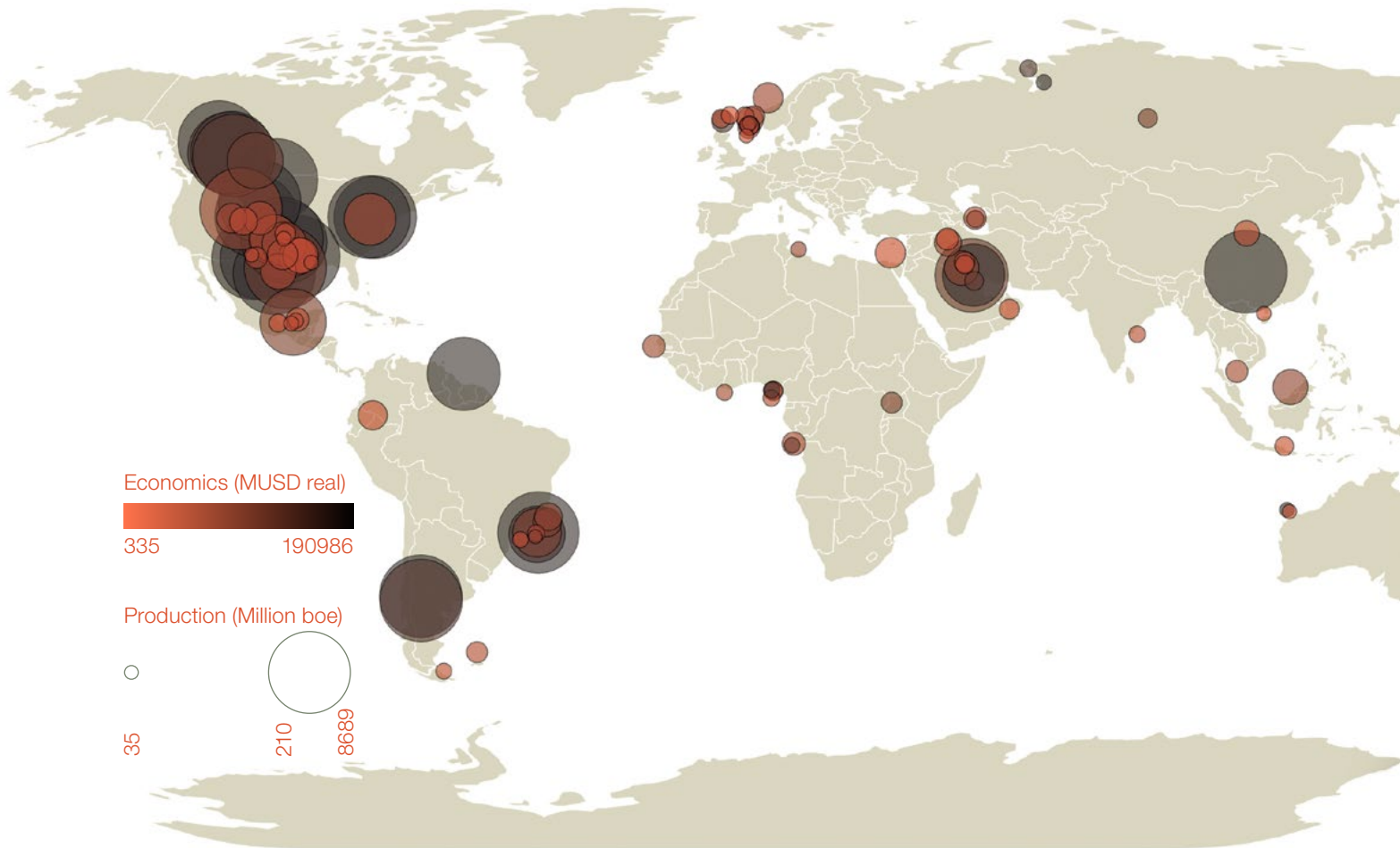
Rob Bailey, formerly of Chatham House and now director of climate resilience at Marsh and McLennan, a global professional services firm, sums up the risk of relying on unproven technological fixes.

*“Speculative negative emissions technologies may be worse than chimeras if they result in the false comfort that continued fossil fuel emissions can simply be offset, thereby diverting financial and policy resources from conventional mitigation.*

*This would be reckless.*<sup>20</sup>

## The Five-Year Threat: Oil and Gas Expansion Around the World

Map 1: Top 100 New Oil and Gas Projects (Shale and Conventional), by Projected Production, 2019-2025



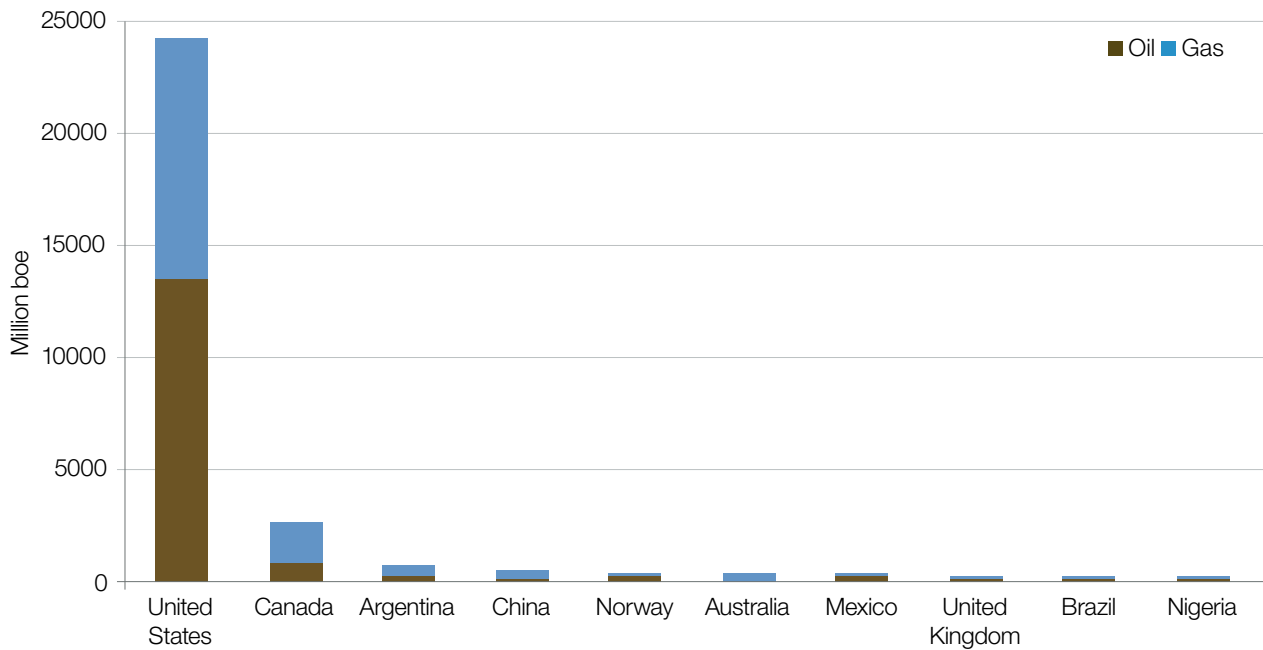
Source: Rystad Energy UCube (April 2019)



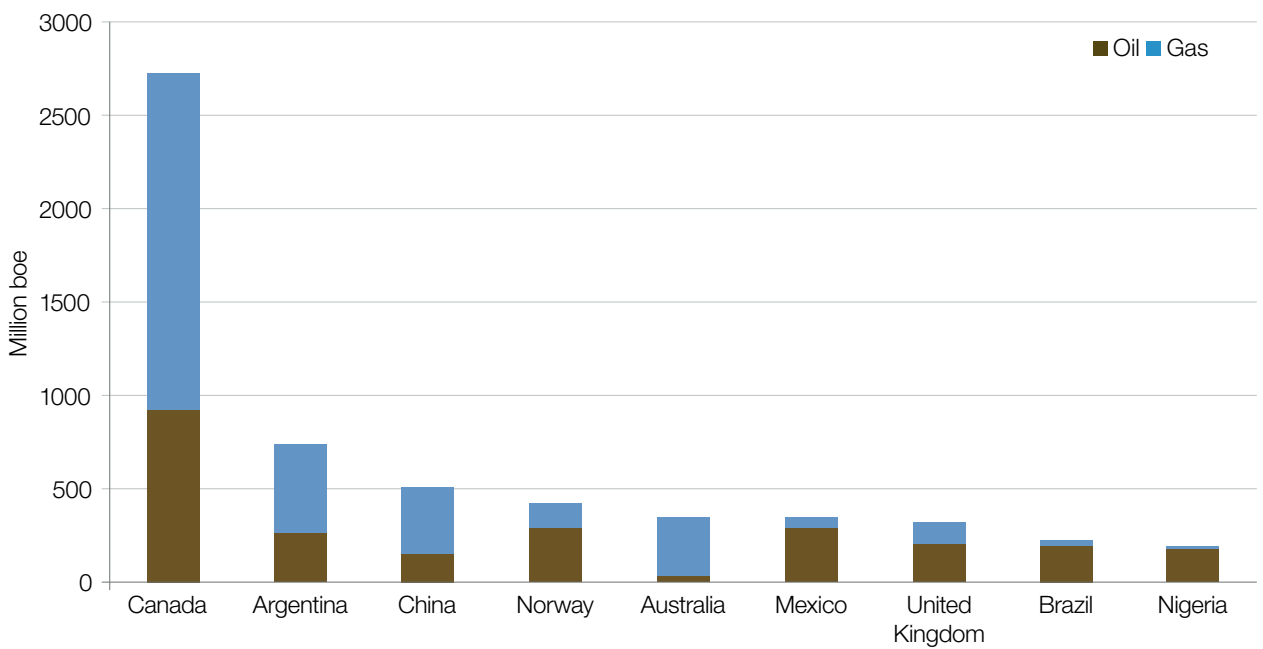
**Figure 4: Top Countries by Projected Production from New Oil and Gas Development, 2020-2024**

Focusing on just the next five years, we see a number of key countries emerge with substantial expansion plans. The graphs demonstrate the importance of the U.S., with Canada and Argentina posing the next most risk.

**a) U.S. expansion**



**b) Next top expanders**



Source: Rystad Energy UCube

## Country Profiles

Below are snapshots of countries with significant planned new expansion. This snapshot is not a comprehensive list of carbon risks, as there is critical fossil fuel infrastructure and expansion on every continent that is incompatible with the Paris climate goals. It serves to illustrate some of the key challenges globally.<sup>21</sup> In the country profiles, we provide a longer view of the potential climate impact of oil and gas expansion in each location, quantifying the total carbon pollution at risk of being unlocked between 2020 and 2050.

### United States of America

---

- North America is set to see the largest projected volumes of new oil and gas development, accounting for 85% of global production from new development through 2024.<sup>22</sup> U.S. oil and gas expansion by itself will make it virtually impossible for the rest of the world to manage the safe, equitable and necessary phase-out of oil and gas production by 2050.
- Through 2050, new drilling could unleash 120 billion tons of cumulative carbon pollution on top of 70 GtCO<sub>2</sub> locked in from already developed projects.<sup>23</sup> The 120 GtCO<sub>2</sub> from new projects is the equivalent of the lifetime carbon pollution of approximately 1000 U.S. coal fired power plants.<sup>24</sup>
- Through 2024, over 90% of U.S. oil and gas expansion would be shale production dependent on fracking.
- The Permian Basin, centered in west Texas and southeastern New Mexico, would account for 39% of new U.S. oil and gas production by 2050. It holds the greatest risk for new oil and gas development in the United States *and in the world*.<sup>25</sup>
- The Appalachian Basin, with extraction centered in Pennsylvania, Ohio, and West Virginia, would account for 19% of new US production, while the Western Gulf Basin, including the Eagle Ford Shale play in Texas, would add 9%.<sup>26</sup>

### Canada

---

- New oil and gas development in Canada between now and 2050 could unlock an additional 25 GtCO<sub>2</sub>, more than doubling cumulative emissions from the sector, and equal to the lifetime emissions of more than 200 average Canadian coal plants.<sup>27</sup>
- Although opposition and poor economics have stymied significant expansion plans, two new projects in the Alberta tar sands have been approved in the last two years. Exxon's Aspen Oil Sands project was endorsed in November 2018, the first sanctioned greenfield oil sands project in five years. And in July 2019, Teck's new Frontier Mine was recommended by the National Energy Board but awaits Trudeau Cabinet approval. It could emit up to 4 MtCO<sub>2</sub> each year.<sup>28</sup>
- Shale gas extraction, particularly the Montney Shale Basin<sup>29</sup> in British Columbia, is a major focus of the industry. They are projected to invest CapEx totaling USD 26 billion (real 2019) over the next five years for new development in the Montney Basin. From 2020 to 2050, new gas projects could be responsible for as much CO<sub>2</sub> as new oil projects.
- A report from the Canadian gas industry predicts the country's gas production could be as high as 21 bcf/d in 2040.<sup>30</sup> The Canadian Association of Petroleum Producers projects that Canadian crude oil production will increase by 1.27 million barrels per day to 5.86 million b/d by 2035.<sup>31</sup>

## Argentina

---

- The United States Energy Information Agency ranks Argentina's shale gas and oil resources in second and fourth place, respectively, in the world.<sup>32</sup>
- Almost all of Argentina's expansion plans involve shale oil and gas development in the Neuquén Basin in Northern Patagonia, where the Vaca Muerta formation is located.
- If the Vaca Muerta fracking project receives the infrastructure investment and government support for continued expansion, the associated cumulative emissions will quadruple by 2050, exceeding eight GtCO<sub>2</sub> in total.<sup>33</sup>
- The drilling of new wells would unleash four times more carbon compared to existing development over the next three decades.<sup>34</sup>
- Exploited to their maximum potential, Argentina's shale gas reserves could eat up 11.4% of the world's remaining carbon budget required to keep global temperature rise to below 1.5°.<sup>35</sup>

## Brazil

---

- Oil and gas production has grown 13% since 2015, and Brazil is planning to expand production by more than 60% by 2030, drastically increasing greenhouse gas emissions.
- New licensing and development decisions could triple the cumulative carbon impact of Brazilian production to 2050.<sup>36</sup>
- Of a potential 26 Gt of cumulative carbon pollution from Brazilian oil and gas from 2020 to 2050, more than two-thirds is not yet committed.<sup>37</sup>

## Ecuador

---

- Ecuador has the third-largest oil reserves in South America, largely in the Oriente Basin in the eastern part of the country.<sup>38</sup>
- Despite long-term production declines, Ecuador is pulling out of OPEC to free itself from restrictions and increase output.<sup>39</sup>
- New development could increase cumulative carbon emissions from Ecuadorian oil and gas by just over 40% by 2050.

## Guyana

---

- Offshore Guyana represents ExxonMobil's largest global oil play outside the Permian Basin.
- Guyana is estimated to have reserves totaling 13.6 billion barrels of oil and 32 trillion cubic feet of gas.<sup>40</sup>
- Production is projected to reach 450,000 barrels per day by 2025, creating nearly 69 million MtCO<sub>2</sub> per year.
- One project, the offshore Stabroek block led by Exxon, Hess, and the China National Offshore Oil Corporation, is expected to deliver six billion barrels of oil equivalent. The first three projects under development by this partnership alone will produce 197 million barrels of oil per year and 85 million MtCO<sub>2</sub> in associated emissions between 2024 and 2030.<sup>41</sup>

## Denmark

---

- Denmark is poised to significantly expand its North Sea oil and gas extraction from now through the early 2030s, but 60 percent of the related emissions are not yet committed.<sup>42</sup>
- If new licenses and permitting move forward, carbon emissions from Danish-produced oil and gas would overtake Denmark's total expected domestic CO<sub>2</sub> emissions from energy by mid-2025.
- Of the projected emissions, 193 MtCO<sub>2</sub> is associated with 'undeveloped' fields that have been awarded licenses already, and another 208 MtCO<sub>2</sub> with 'undiscovered' fields that will require new licenses. These new projects would increase the cumulative emissions associated with Danish oil and gas from 2020 to 2050 by 150%.<sup>43</sup>

## Norway

---

- Norway has the fifth most aggressive near-term expansion plans in the world.
- Current projections suggest Norwegian oil production would still exceed 1.2 million barrels of oil equivalent by 2050, and gas would be about 6,000 million cubic feet per day by 2050.<sup>44</sup>
- Despite its reputation internationally as a climate leader, the Norwegian government is pushing ahead with oil and gas extraction inconsistent with the Paris Agreement, offering a record number of 93 blocks for oil and gas exploration in the Barents Sea alone in 2019.
- Norway's proposed and prospective new oil and gas fields would lead to 77% more cumulative emissions to 2050, compared to what is in currently operating fields.
- Norway is the world's seventh largest exporter of carbon emissions. Through its oil and gas exports, Norway is exporting 10 times more emissions than the country produces at home.<sup>45</sup>

## United Kingdom

---

- The UK is the second largest producer of oil and gas in Europe.
- Already operating oil and gas reserves amount to 5.7 billion barrels, while undeveloped and undiscovered fields contain a further 14.3 billion million cubic feet per day—2.5 times the amount of oil being currently produced.<sup>46</sup>
- The government's stated policy objective which is a legal obligation enshrined in legislation, is to maximise the economic recovery of all UK reserves or in other words to try to extract every last drop. The government has begun to expand production.
- Opening new fields would nearly quadruple the emissions from UK oil and gas.
- Additional emissions from expanding North Sea extraction far exceed carbon savings from the UK's coal phase-out. Recent subsidies for oil and gas extraction will add twice as much carbon to the atmosphere as the phase-out of coal power saves.<sup>47</sup>

## Australia

---

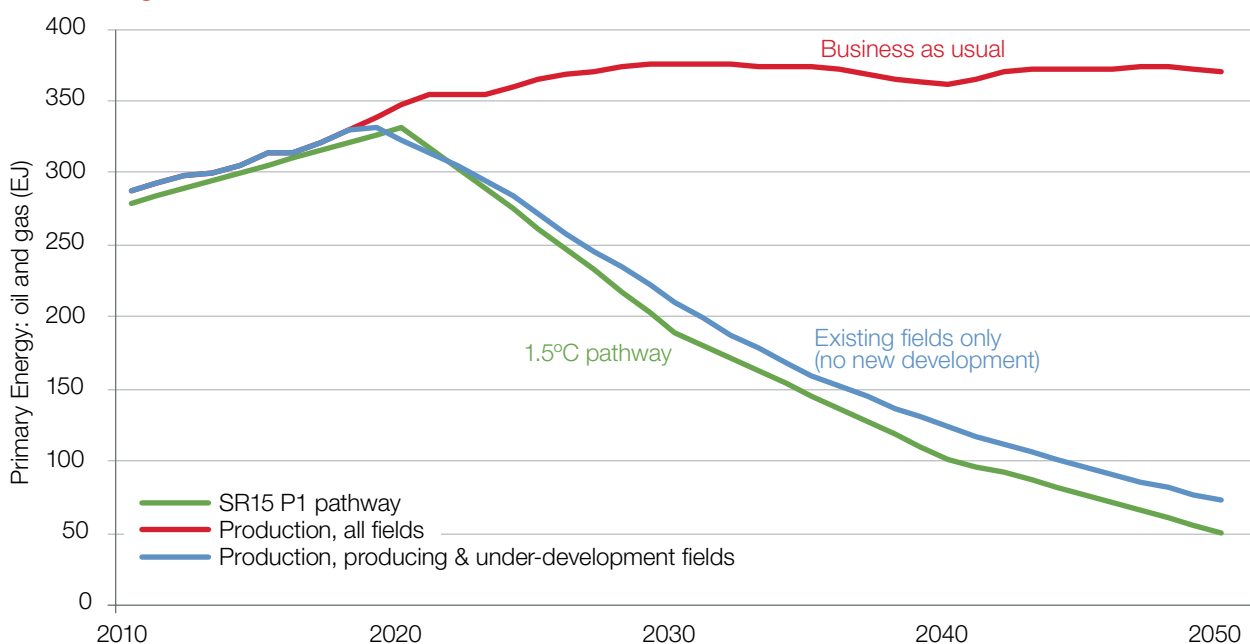
- Australia is already the second-largest liquefied natural gas (LNG) exporter in the world (behind Qatar).
- New oil and gas development in Australia threatens to double the carbon pollution enabled by the country's oil and gas production through 2050.
- The carbon pollution unlocked by new oil and gas extraction projects could total nearly 13 GtCO<sub>2</sub>. For context, that would be the carbon equivalent of opening nearly three new coal mines on the scale of the controversial Adani Carmichael project as it was originally proposed (its proposed size was reduced at the end of 2018).<sup>48</sup>

# A BETTER FUTURE IS POSSIBLE: PHASING OUT EXISTING AND PLANNED OIL AND GAS EXTRACTION IS FEASIBLE AND JUSTIFIED

Despite the scale of the challenge, it is possible to stop the expansion of oil and gas production and avoid the associated carbon impacts. Expansion plans will depend on new licenses and permits from governments and a significant buildout of new infrastructure, as well as trillions of dollars of public and private investment, much of which civil society is or will be contesting.

Ceasing the approval of new projects would put production on a necessary, albeit insufficient, trajectory downward to 2030 (Figure 5 - blue line). Stopping industry expansion would allow production of oil and gas to fall by 13% in five years and by just over 30% by 2030. If no new fields are developed, global extraction will flatten out for a few years, followed by a decline of between 4% and 7% per year.<sup>49</sup> These steps, combined with the early closure of some existing extraction projects would put us on a path to keep warming to 1.5°C (green line) without relying on unproven carbon-dioxide removal technologies.

**Figure 5: Global Oil and Gas Extraction with and without New Development, Compared to Demand Aligned with 1.5°C**



Source: IPCC/IAMC 1.5°C Scenario Explorer and Data hosted by IIASA,<sup>50</sup> Rystad Energy UCube

Importantly, an alternative supply of energy and materials is feasible. The declining cost of renewable energy is quickly eliminating the financial and economic case for fossil fuels. Already, over three-quarters of the onshore wind and four-fifths of the utility-scale solar PV project capacity due to be commissioned in 2020 should provide lower-priced electricity than the cheapest new coal-fired, oil or gas options.<sup>51</sup> This means renewables are now on track to replace fossil fuel supply with a more cost-effective alternative. As the International Energy Agency (IEA) acknowledged, offshore wind is set to be competitive with fossil fuels in the next decade, with the potential to meet Europe's entire electricity demand more than 10 times over. Perhaps even more importantly, the IEA sees offshore wind as matching the capacity factors of efficient gas-fired power plants and coal-fired power plants, thereby addressing concerns over intermittency.<sup>52</sup>

The demand for fossil fuels appears set to drop faster than predicted, too. A 2019 report by BNP Paribas concluded that *“the economics of oil for gasoline and diesel vehicles versus wind- and solar-powered EVs are now in relentless and irreversible decline, with far-reaching implications for both policymakers and the oil majors.”*<sup>53</sup> As a result of citizen pressure, significant users of hydrocarbons such as consumer goods retailers are escalating their efforts to, for example, use recycled materials in their products and shift to 100% renewable energy.<sup>54</sup>

### First Movers: Governments are starting to lead

Many governments, especially at the local level, are stepping in to drive the transition and lead the required phase out. The list of countries and financial actors putting precedent-setting limits on oil and gas extraction – as part of comprehensive climate action – is growing:

- *Full licensing bans or moratoria:* **Costa Rica** (2011), **France** (2017)
- *Partial licensing bans:* **New Zealand** – offshore (2018), **Belize** – offshore (2018), **Denmark** - onshore and inland waters (2018)
- *Pending licensing bans:* **Sweden** (2019)
- *Removing Financing for Upstream Oil and Gas Projects:* **World Bank** (2017; begins in 2020), **Swedfund** (2017), **Agence Française de Développement** (2019), **European Investment Bank** (2019, starts 2021)

*“Ensuring a liveable planet for future generations means getting serious about phasing out coal, oil and gas. Countries such as Costa Rica, Spain and New Zealand are already showing the way forward, with policies to constrain exploration and extraction and ensure a just transition away from fossil fuels. Others must now follow their lead. There is no time to waste.”*

### Christiana Figueres

Convenor, Mission 2020, and former Executive Secretary of the UN Framework Convention on Climate Change

*Other momentum:* The **UK's** Conservative party announced it would introduce a moratorium on fracking in England and Wales, if it remains in Government after December's general election, to follow the **Scottish** government's existing ban. Other parties have announced they would ban fracking in England and Wales. The **Spanish** government and **Irish** and **Icelandic** parliaments are considering bans on new oil and gas licenses. Active debates are happening in sub-national jurisdictions: the U.S. state of **California** is weighing steps towards a managed decline of oil, and a growing number of jurisdictions have banned specific types of fossil fuel development and/or infrastructure. Major insurers, banks, and pension funds, including AXA, BNP Paribas, ING, HSBC, Sweden's AP7, and Norway's Government Pension Fund Global, have begun withdrawing finance from certain types of oil extraction and pipeline projects.

It is only a matter of time that others intervene more to remove the enabling conditions, such as subsidies and permits, that allow the oil and gas industry to expand, and instead support the development of zero-carbon economic systems. It is vital that governments step in and do not leave it to the market economics for a number of reasons, in particular because fossil fuel incumbents are fighting back, flooding the market with cheap hydrocarbons that undercut clean alternatives to carbon-intensive energy, plastics and petrochemicals, thereby manufacturing demand for their products.

Progress to date and opportunities ahead are thanks largely to one of the greatest causes for optimism: the continued success of civil society campaigns worldwide. Given the feasibility of renewable energy and the need to dramatically reduce the use of plastic, coordinated efforts to stop new oil and gas projects are a necessary and justified response to the climate crisis.

# CONCLUSION: THE TIME FOR TRUE CLIMATE LEADERSHIP IS NOW

## A Role for Civil Society

2019 has been a landmark year for civil society demanding climate action. Global scale initiatives like FridaysForFuture and Extinction Rebellion join diverse and widespread grassroots movements around the world that are standing up to new fossil fuel projects and infrastructure. Increasingly, these tactics are matched by initiatives engaging board rooms and court rooms. The message is clear: there is no more time to waste, and little time for incremental or half measures. The end of the fossil fuel era is inevitable and necessary, but how it unfolds will be determined in the coming years.

Governments and institutions must listen to the science, echoed by people-powered movements, and begin a managed and just transition away from the fossil-fuel economy and towards the safe, clean and renewable energy that must power this century.

## Governments Need to Address the Threat of Oil and Gas Production

Governments, starting with wealthy, developed fossil fuel producing countries, must recognize that leadership on climate change needs to include plans for a just and equitable phase out of fossil fuel production. As this report has shown, the oil and gas industry's plans are incompatible with what governments agreed in Paris in 2015.

Given these inconvenient realities, governments must stop the various ways in which they currently encourage expansion: stop further exploration and licencing of new oil and gas projects; stop using export finance to enable projects overseas; and eliminate tax breaks and other subsidies for oil and gas exploration and production.

Furthermore, governments need to invest in a just transition for workers and communities affected by a gradual phase-out of production, with economic development strategies and support for training/retraining ensuring that Trade Unions are involved in the process. They must also accelerate the implementation of policies that shift demand away from fossil fuels, especially in the transportation, energy, plastics and petrochemicals sectors.

## Investors Must Stop Financing Projects That Undermine Climate Goals

The role of private finance cannot be ignored. Investors must acknowledge their responsibility to align their work with the Paris Agreement, in accordance with article 2.1.C, which states the need to make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

Oil and gas companies are set to invest USD 1.4 trillion into new oil and gas extraction over the next five years. Banks, debt and equity investors will be key enablers of expansion. Banks alone provided USD 1.9 trillion in finance to companies across the fossil fuel lifecycle from 2016 through 2018, with the annual total increasing each year since the Paris Agreement was signed.<sup>55</sup>

Through divestment, shareholder engagement, and legal pressure, investors are ramping up pressure on oil and gas companies, and the banks financing them, to align investments with the Paris goals. The debate is starting to shift. For example, leaders at Legal & General Investment Management, the UK's largest asset manager, issued a call last year for oil companies "to be clear that its future is one of long-term decline."<sup>56</sup>

It is imperative that investors build on such progress. They must not wait until 2050 to align their portfolios with the climate goals. Rather, they must act now to ensure their current and near term investments do not enable the oil and gas industry to build the new projects detailed in this report.



**Acknowledgments**

Lead author: Jeff Gailus

With research and analysis from Oil Change International

The report is a project of the Global Gas and Oil Network, supported by Oil Change International; 350.org; Center for Biological Diversity; Center for International Environmental Law; CAN-Rac Canada; Earthworks; Environmental Defence Canada; Fundacin Ambiente y Recursos Naturales:FARN; Global Witness; Greenpeace; Naturvernforbundet; Overseas Development Institute; Platform; Sierra Club; Stand.Earth.

A project of the Global Gas and Oil Network [www.ggon.org](http://www.ggon.org).

## Endnotes

- 1 All oil and gas production data in this report is from Rystad Energy AS UCube database, unless otherwise stated. All emissions numbers are calculated from the Rystad production data, unless otherwise stated. Rystad's commercial database, called the UCube, includes past, present, and future production and economics data for all of the world's oil and gas fields and projects (more than 65,000 in total). Historical data and projections are derived from independently verified data from company and government reports and Rystad's own modelling, and updated monthly. Rystad provides sophisticated query tools that allow for categorizing future production volumes according to the current stage of development of the resource. This allows us to analyse future production trajectories from existing projects only, i.e., fields that are already producing or under construction (or already-drilled wells, in the case of shale), compared to planned and projected expansion projects, i.e., reserves that are not yet developed and resources projected for exploration.
- 2 These numbers are upstream (extraction) only and do not include billions more in transport (pipelines), processing and export facilities.
- 3 82 Gt oil and 66 Gt of gas.
- 4 Coal plant equivalency based on U.S. Environmental Protection Agency estimate (as of Sept. 2017) that the average U.S. coal plant emits just over 4 million metric tonnes annually, and assuming a 30-year plant lifetime.
- 5 This is in part because we're looking at a short timespan and shale reserves are developed on a faster timeline than conventional projects.
- 6 IPCC, "Summary for Policymakers," In: *Global warming of 1.5°C. An IPCC Special Report*, [V. Masson-Delmotte et al. (eds.)], World Meteorological Organization, 2018, p. 12, [https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15\\_SPM\\_version\\_report\\_LR.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf).
- 7 The term "carbon budget" refers to the cumulative amount of CO<sub>2</sub> emissions permitted over a period of time to keep within a certain temperature threshold. According to the latest estimates as of the start of 2019, the total amount of CO<sub>2</sub> in the atmosphere needs to be less than 540 gigatonnes (Gt) for just a 50 percent chance of keeping the planetary warming below 1.5°C
- 8 Greg Muttitt, *The Sky's Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production*, Oil Change International, September 2016, <http://priceofoil.org/2016/09/22/the-skys-limit-report/> (see Chapter 2 for detailed methodology); Carbon budgets updated: IPCC, *Special Report on Global Warming of 1.5 Degrees (SR15)*, 2018, Table 2.2, p. 108, <http://www.ipcc.ch/pdf/special-reports/sr15/>; Oil and gas developed reserves updated: Rystad UCube, accessed 7 April 2019.
- 9 Global Witness, *Overexposed: How the IPCC's 1.5° Demonstrates the Risks of Overinvestment in Oil and Gas*, April 2019, <https://www.globalwitness.org/en/campaigns/oil-gas-and-mining/overexposed/>
- 10 Rystad Energy UCube, October 2019.
- 11 Rystad Energy UCube, October 2019.
- 12 82 Gt oil and 66 Gt of gas.
- 13 Coal plant equivalency based on U.S. Environmental Protection Agency estimate (as of Sept. 2017) that the average U.S. coal plant emits just over 4 million metric tonnes annually, and assuming a 30-year plant lifetime.
- 14 Mike Coffin and Andrew Grant, Carbon Tracker Initiative, *Breaking the Habit - Why None of the Large Oil Companies are "Paris-Aligned", and What They Need to do to Get There*, September 2019, <https://www.carbontracker.org/reports/breaking-the-habit/>
- 15 For example see: Royal Dutch Shell, "Natural Gas: Providing More and Cleaner Energy," <https://www.shell.com/energy-and-innovation/natural-gas/providing-more-and-cleaner-energy.html>, accessed April 23, 2019
- 16 A theoretical greenhouse gas mitigation technology which produces negative carbon dioxide emissions by combining sequestration of CO<sub>2</sub> by plants, bioenergy use, and storing the CO<sub>2</sub> emitted during the process through geologic carbon capture and storage (CCS).
- 17 Rogelj et al., "Mitigation Pathways," in *Global Warming of 1.5°C*, p. 96.
- 18 For example, the world's first industrial-scale CCS project, the Sleipner project in Norway, started in 1996 and was assumed to be safe until it was discovered to have fractures in its caprock in 2013. The Boundary Dam project in Canada, the first to install CCS at a power station, was exceptionally expensive to build and has struggled to operate as planned, suffered considerable cost overruns, and been forced to pay out for missing contractual obligations.
- 19 Twelve billion metric tons of carbon dioxide extracted per year is estimated to require a land area devoted to bioenergy of 380 to 700 million hectares, equivalent to 25 to 46 percent of total world crop-growing area. Pete Smith et al., "Biophysical and economic limits to negative CO<sub>2</sub> emissions," *Nature Climate Change* 6, 2015, p. 5, <https://doi.org/10.1038/NCLIMATE2870>.
- 20 Carbon Brief, "In-depth: Experts assess the feasibility of negative emissions," December, 2016, <https://www.carbonbrief.org/in-depth-experts-assess-the-feasibility-of-negative-emissions#bailey>
- 21 The country profiles here are drawn from various previously published reports using different time frames for their analysis. Therefore some of the numbers do not precisely tally with the earlier sections of this report.
- 22 This is in part because we're looking at a short timespan and shale reserves are developed on a faster timeline than conventional projects:
- 23 Rystad Energy UCube (October 2018)
- 24 See footnote 12 for methodology.
- 25 Kelly Trout and Lorne Stockman, *Drilling Towards Disaster: Why U.S. Oil and Gas Expansion Is Incompatible with Climate Limits*, Oil Change International, January 2019, Section III, <http://priceofoil.org/2019/01/16/report-drilling-towards-disaster/>.
- 26 *ibid.*
- 27 Based on CoalSwarm data on annual Canadian coal plant emissions and operating units (updated in January 2019), and assuming a 30-year plant lifetime: <https://endcoal.org/global-coal-plant-tracker/summary-statistics/>.
- 28 Sharon J. Riley, "10 things you need to know about the massive new oilsands mine that just got a green light," *The Narwhal*, July 2918, <https://thenarwhal.ca/10-things-you-need-to-know-about-the-massive-new-oilsands-mine-that-just-got-a-green-light/>
- 29 Projected to produce 2816 MBOE by 2025, and 7916 by 2030
- 30 Canadian Society for Unconventional Resources. LNG: CANADA'S GLOBAL. MARKET OPPORTUNITY. *Canada and the Natural Gas Economy. Special Report 1* | August 2019 <https://s3.amazonaws.com/media.dailyoilbulletin.com/pdf/LNG+-+Special+Report+1+-+August+2019.pdf>
- 31 Canadian Association of Petroleum Producers, *2019 Crude Oil Forecast*, <https://www.capp.ca/publications-and-statistics/crude-oil-forecast>
- 32 Diego DiRisio, *Vaca Muerta Mega Project. A Fracking Carbon Bomb in Patagonia*, December 2017, <https://www.boell.de/sites/default/files/megaproject.pdf>
- 33 *Rystad Energy UCube (March 2019)*
- 34 *Rystad Energy UCube (March 2019)*

- 35 “No más contaminación en Patagonia”, Greenpeace, <https://www.greenpeace.org/argentina/involucrate/no-mas-contaminacion-en-patagonia/>
- 36 *Rystad Energy UCube (October 2019)*
- 37 *Rystad Energy UCube (October 2019)*
- 38 U.S. Energy Information Administration, *Country Analysis Brief: Ecuador*, October 2017, [https://www.eia.gov/beta/international/analysis\\_includes/countries\\_long/Ecuador/Ecuador.pdf](https://www.eia.gov/beta/international/analysis_includes/countries_long/Ecuador/Ecuador.pdf)
- 39 Alexandra Valencia, “INTERVIEW-Ecuador sees oil output of 590,000 bpd in 2020 after OPEC exit,” CNBC, October 2019, <https://www.cnbc.com/2019/10/03/reuters-america-interview-ecuador-sees-oil-output-of-590000-bpd-in-2020-after-opec-exit.html>
- 40 Irina Slav, “Guyana, The New Star on the Global Oil Map”, *Drillers.com*, September 2019, <https://drillers.com/guyana-the-new-star-on-the-global-oil-map/>
- 41 Mark Chernaik, Carbon Footprint Assessment of Proposed Esso Exploration and Production Guyana Limited (EPPGL) Activities in Guyana (Environmental Law Alliance Worldwide, November 2019).
- 42 Bronwen Tucker, *The Sky’s Limit Denmark: Why Denmark Must Phase Out North Sea Oil and Gas Extraction*, Oil Change International, September 2019, <http://priceofoil.org/2019/09/19/the-skys-limit-denmark-why-denmark-must-phase-out-north-sea-oil-and-gas-extraction/>
- 43 Ibid.
- 44 Hannah McKinnon, Greg Muttitt, and Kelly Trout, *The Sky’s Limit Norway: Why Norway should lead the way in a managed decline of oil and gas extraction*, Oil Change International, August 2017, <http://priceofoil.org/2017/08/09/the-skys-limit-norway-why-norway-should-lead-the-way-in-a-managed-decline-of-oil-and-gas-extraction/>
- 45 Ibid.
- 46 Greg Muttitt, Anna Markova, and Matthew Crighton, *Sea Change: Climate Emergency, Jobs and Managing the Phase-Out of UK Oil and Gas Extraction*, Oil Change International, Platform, and Friends of the Earth Scotland, May 2019, <http://priceofoil.org/2019/05/15/sea-change-report/>
- 47 Ibid.
- 48 An expert report presented in 2014 to the Land Court of Queensland by climate scientists Dr. Chris Taylor and Malte Meinshausen estimated that “Scope 3” CO<sub>2e</sub> emissions from the Adani mine project (including transport and combustion) would total 4.6 gigatonnes. See: <http://envlaw.com.au/wp-content/uploads/carmichael14.pdf>.
- 49 Sea Change, p. 19:
- 50 The data for the P1 pathway comes from the MESSAGEix-GLOBIOM 1.0 model, LowEnergyDemand scenario (Grubler et al.); These pathways are assessed in: Rogelj, Shindell, Jiang, et al., “Mitigation pathways compatible with 1.5°C,” In: *Global warming of 1.5°C*, IPCC.
- 51 IRENA, *Renewable Power Generation Costs in 2018*, International Renewable Energy Agency, 2019 <https://www.irena.org/publications/2019/May/Renewable-power-generation-costs-in-2018>
- 52 IEA, *Offshore Wind Outlook 2019*, International Energy Agency, October 2019, <https://www.iea.org/offshorewind2019/>
- 53 Mark Lewis, *Wells, Wires and Wheels, EROCI and The Tough Road Ahead for Oil*, BNP Paribas AM, August, 2019, <https://docfinder.bnpparibas-am.com/api/files/1094E5B9-2FAA-47A3-805D-EF65EAD09A7F>
- 54 See for example RE100 <http://there100.org/>
- 55 Alison Kirsch et al, *Banking on Climate Change: Fossil Fuel Finance Report Card 2019*, Rainforest Action Network, BankTrack, Sierra Club, Oil Change International, Indigenous Environmental Network, and Honor the Earth, March 2019, <https://www.ran.org/bankingonclimatechange2019/>.
- 56 Anton Eser and Nick Stansbury, “Oil must face its future as a declining industry,” *Financial Times*, 12 June 2018, <https://www.ft.com/content/bc84470a-6e65-11e8-852d-d8b934ff5ffa>.

