

# Briefing

## Tackling climate change: keeping coal, oil and gas in the ground

### Introduction

Climate change is already one of the greatest crises the world faces. We have seen global warming of around 1 degree Celsius above pre-industrial levels, and subsequent climate change is already leading to increasingly severe impacts – in 2016, summer temperatures in the Arctic were 20°C above average, there were 50 degree heatwaves in India and Pakistan, flooding that made 500,000 people homeless in Bangladesh, and drought in Africa, the Middle East and the USA.

These impacts will get far worse unless urgent action is taken globally to cut the emissions of greenhouse gases which are causing climate change. The Paris Agreement aims to keep warming to 1.5 degrees, but nations' pledges so far would only limit warming to 3 degrees<sup>1</sup>. According to the World Bank, a 3 degree warming world would see 113 “heat-wave days” a year in Baghdad, compared with 47 such days a year in a 1.5 degree world<sup>2</sup>.

The majority of greenhouse gases come from the burning of fossil fuels – coal, oil and gas.

This briefing sets out nations' commitments worldwide to tackling climate change, the implications for new fossil fuel production, and what this means for the UK's fossil fuel production, in particular North Sea oil and gas, opencast coal mining, and fracking for shale gas. It also sets out the implications for UK pension funds currently investing in fossil fuel corporations.

### In summary

- The coal, oil and gas in reserves already in production and development globally is more than we can afford to burn. **There is no room for any new coal, oil or gas exploration and production.**
- This means that the UK needs a change in fossil fuel production strategy. Tackling climate change means **not drilling for new North Sea oil and gas, not fracking for shale gas in Lancashire, Yorkshire, the East Midlands or elsewhere, not allowing onshore shale oil development in the Weald, and not permitting coal bed methane, underground coal gasification, or new opencast coal mines. The**

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For more than 40 years we've seen that the wellbeing of people and planet go hand in hand – and it's been the inspiration for our campaigns. Together with thousands of people like you we've secured safer food and water, defended wildlife and natural habitats, championed the move to clean energy and acted to keep our climate stable. Be a Friend of the Earth – see things differently.

**UK's focus needs to switch away from increasing supply of fossil fuels to reducing their use, in line with the Paris climate goals. This should be allied to a "just transition" strategy to help workers and communities currently dependent on high-carbon industry.**

- Fossil fuel corporations continue to focus on new fossil fuel exploration and development. This is increasing the amount of "assets" the world economy cannot afford to use – assets which will become "stranded". Investments in these companies present a growing financial risk to investors such as pension funds. **There are now financial as well as ethical arguments for pension funds to "divest" their fossil fuel holdings.**

### **Climate change: the global response**

The world's countries have agreed to collective action to keep climate change in check. The Paris Climate Agreement, now ratified by 153 countries<sup>3</sup> including the UK, commits countries to keeping global warming to "well below" 2 degrees, and to "pursue efforts" to keep warming to 1.5 degrees. We have had just over 1 degree of warming so far. Current pledges will lead to around 3 degrees of warming, so increased ambition is needed by all nations to meet the Paris Climate Agreement's goals.

### **What this means for fossil fuel production**

A global carbon budget is the amount of carbon dioxide we can emit from burning coal, oil and gas to stay below a given global temperature goal. The global carbon budget for a "likely" chance of staying under 2 degrees is around 800 billion tonnes of carbon dioxide (GtCO<sub>2</sub>). For a 50:50 chance of keeping to 1.5 degrees, the carbon budget is around 400 GtCO<sub>2</sub>. But the world's fossil fuel reserves<sup>4</sup> if burned would emit around 2,600 GtCO<sub>2</sub><sup>5</sup>.

It is simple arithmetic then, which Shell<sup>6</sup>, the Governor of the Bank of England<sup>7</sup> and the UK government<sup>8</sup> all agree upon, that only a small fraction of the world's coal, oil and gas reserves can be burned before we would exceed the Paris Agreement's 1.5 and 2 degree goals.

**So, if only around a small fraction of reserves can be burned, the big question is "which reserves?"**

### **The answer is – the reserves already developed**

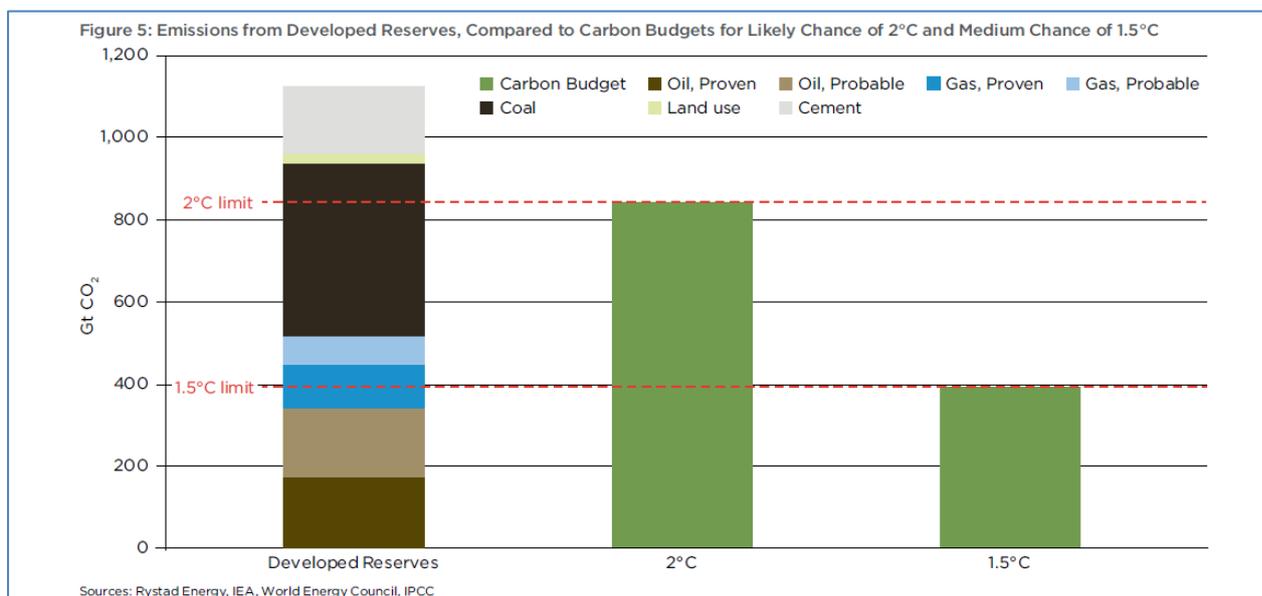
The world's fossil fuel reserves can be split into two categories – coal, oil and gas in mines and reservoirs which are already in production or construction ("developed"), and those which are not.

The emissions from these "developed" reserves alone would produce over 900 billion tonnes of carbon dioxide – this alone exceeds the carbon budget that would have a likely chance of keeping below 2 degrees warming, and far exceeds the limit for the 1.5 degree Paris goal.

Developed fossil fuel projects:	Emissions (GtCO <sub>2</sub> )
Oil	344
Gas	173
Coal	425
Total	<b>942</b>
Carbon budgets:	
Budget for “likely” under 2 °C	843
Budget for 50:50 under 1.5 °C	393

Source: *The Sky's Limit*, table 3 and table 1

**Figure 1: Comparing emissions from existing coal, oil and gas projects with the Paris Agreement’s climate goals**



Source: *The Sky's Limit*

**In other words, the coal, oil and gas in reserves already in development are more than we can afford to burn. There is no room for any new coal, oil or gas exploration and production.**

The full data for this analysis is set out in the landmark 2016 publication *The Sky's Limit* by Oil Change International<sup>9</sup>, which builds on Carbon Tracker’s two unburnable carbon reports in 2011 and 2013<sup>10</sup>.

### **Economic consequences of unburnable carbon**

This does not of course mean an end to fossil fuel use overnight. The world needs to make a rapid switch to clean energy, but coal, oil and gas will continue to be used globally and nationally for many years, albeit on a rapidly declining trajectory. But it does mean that development of new oilfields, gasfields, coal mines and infrastructure should cease, and only existing fossil fuel production be used to meet declining fossil fuel needs.

Overall, there can be economic gains from such a transition. There will be huge growth sectors – renewables, electric vehicles, smart grids, battery storage, and energy saving. We are seeing this already – global renewable energy investment in 2016 was over US\$200 billion<sup>11</sup>, double that for fossil fuels. In March 2017 the London Taxi Company announced a £300m factory in Coventry building electric taxis, with the creation of 1000 jobs<sup>12</sup>. The USA has five times more jobs in solar than in coal<sup>13</sup>. Volvo has announced that it will stop developing diesel engines, focussing from now on electric and hybrid vehicles instead<sup>14</sup>.

But there must be help for areas and industries caught in this transition. It is imperative that the UK and Scottish governments lead a “just transition” strategy to help cities like Aberdeen make a smooth transition out of jobs and growth in North Sea oil and gas, and into highly skilled, decent jobs in North Sea renewables.

It is as important though to stress the negative economic implications of continuing to allow new fossil fuel production. There are three possible scenarios, the first two of which are set out in *The Sky's Limit*:

1. New fossil fuel production occurs, and contributes to governments failing to meet the Paris climate goals. There will be huge net negative economic implications from a world ravaged by high levels of climate change. The economic costs of not acting on climate change massively outweigh the costs of action<sup>15</sup>.
2. New production occurs alongside concerted government action which does limit warming to below 2 degrees. In this situation every tonne of new production would have to be matched by the early retirement of at least its equivalent of existing production: if new reserves are opened up, then we will have to extract less of existing production. The world's fossil fuels industries are planning on ploughing US\$14 trillion into new production over the next 20 years<sup>16</sup> – all of which would be stranded in this scenario unless an equivalent amount of existing production was stranded instead. Developing new fields and mines in a world where concerted climate action takes place means massively increased quantities of stranded assets.
3. Action on climate is delayed, and only occurs when climate impacts are so severe that major action is politically unavoidable. In this situation, we would get the colossal negative social and economic impacts of climate change, but also the economic dislocation of a rapid transition: emergency action to limit emissions would lead to extremely rapid asset stranding. This is the nightmare lose-lose scenario, which gets more and more likely with every passing year governments fail to address the issue of fossil fuel production.

### **Implications of unburnable carbon for the UK's fossil fuel strategy**

The UK is one of the countries whose current actions are making this nightmare lose-lose scenario more likely. Despite repeated recommitment to meeting the Paris climate goals, we have an explicit strategy to “maximise economic recovery” of North Sea oil and gas, a planning policy which insists that “need” for fossil fuel extraction is a top priority, and

government policy which has its intention to grow an entirely new fossil fuel industry – fracking for shale gas and shale oil.

The UK government accepts the global analysis that most fossil fuel reserves must stay in the ground<sup>17</sup>. But it has not said what this global analysis means for individual countries such as the UK.

The government response, when asked what the UK response should be to its own agreement that fossil fuel reserves need to stay in the ground globally, was to say:

*“The Department for Business, Energy and Industrial Strategy has not made its own estimates of the proportion of UK fossil fuel reserves that need to be left in the ground to ensure that global warming is kept to within 2°C. However, even if the UK were to leave all of its fossil fuel reserves unused this would not necessarily limit temperatures to below 2°C, as this is a global issue that we need to collectively address.*

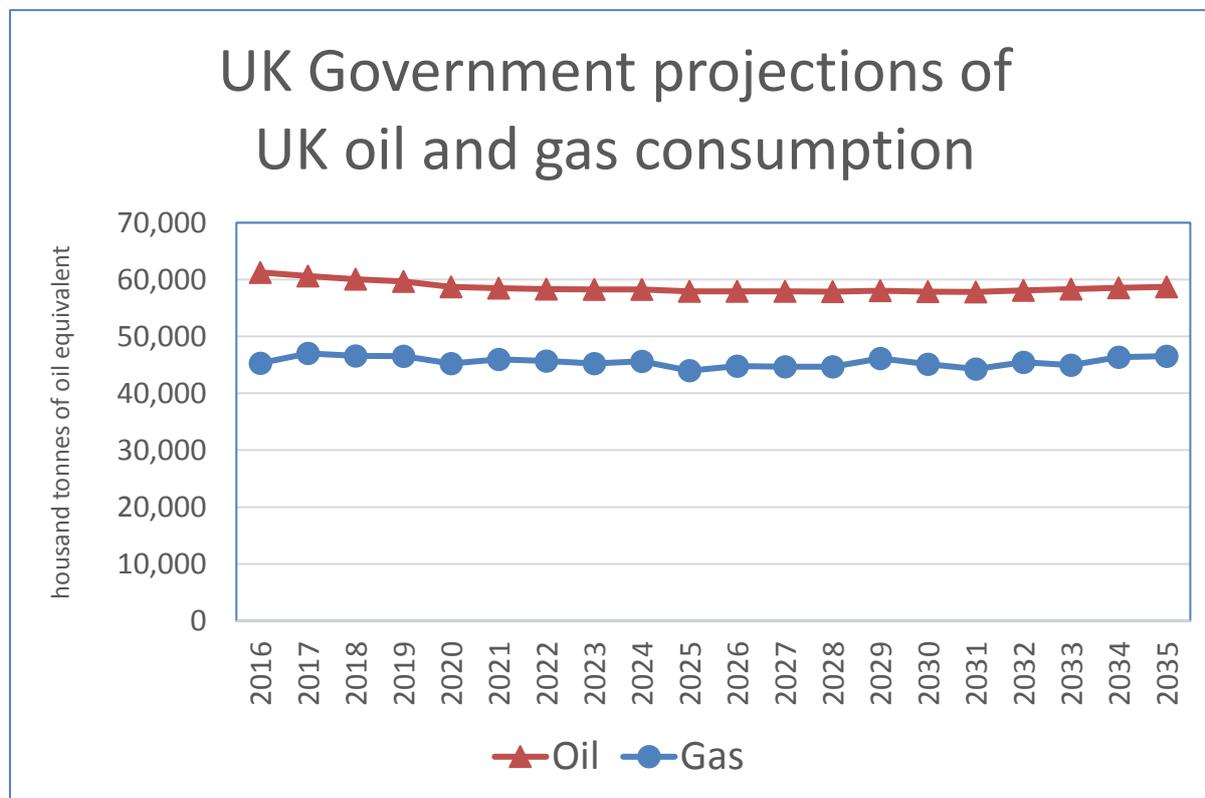
*As we move towards a low-carbon future following the path set by the Climate Change Act and the carbon budgets, it remains in all our interests that we utilise our home-grown oil and gas reserves as they are expected to be an important part of the energy mix for years to come”<sup>18</sup>*

Friends of the Earth believes this response is inadequate on two grounds.

First, it is correct to say that this a global issue, but not that this therefore means the UK should not set out the implications and a strategy for itself. The UK acknowledges that other issues around climate change are collective global issues, and sets out a UK response – for example the UK Climate Change Act, which sets out what the UK believes is a reasonable UK contribution to global carbon emissions. This reflects the principles of the United Nations Framework Convention on Climate Change (UNFCCC), which says that countries must act on the basis of “differentiated responsibility”. The UK should set out a response and strategy for its own fossil fuel production. It is an abrogation of responsibility to defer this issue, given the urgency of the unburnable fossil fuel problem, and the delay before these issues could be considered at UNFCCC level. The government says it will “*continue to take a lead in global action on climate change*”<sup>19</sup>. It needs to show a lead on fossil fuel production.

Second, the UK only needs so much fossil fuel in future because there is inadequate policy to cut its use. The government’s plans to meet carbon budgets in the 2020s have been off course for many years<sup>20</sup> and these budgets are also incompatible with the Paris goals. They are too unambitious, based on at best a 50:50 chance of preventing 2 degrees warming, and the UK doing far less than a reasonable share of global action needed<sup>21</sup>. The main reason the UK government says oil and gas “*are expected to be an important part of the energy mix for years to come*” is because it is not doing enough to change this situation. It projects that there will be almost no progress in cutting UK oil and gas use as far out as 2035 (see Figure 2). But by this time our economy needs to be close to fossil free: for the UK, an equal distribution of the remaining global carbon budget “*implies reaching net zero CO2 emissions by 2033-55 for 2°C and 2026-8 for 1.5°C*” according to the Committee on Climate Change<sup>22</sup>. This will simply not be possible with current oil and gas use projections.

Figure 2: Future UK oil and gas use



Source: UK government Updated Energy and Emissions Projections<sup>23</sup>

The UK government deserves praise and credit for its policies so far to drive coal out of the UK energy mix. Coal power generation has plummeted in the last two years, and the government forecasts it will have fallen by 99% on 2015 levels by 2022<sup>24</sup>. It is this level of action and policy which is now required across all sectors of the economy, in particular to cut oil and gas use. **Cutting demand for dirty energy should be the policy priority, not increasing its supply.**

- **On oil**, there should a major overhaul of the Department for Transport's strategy to deliver the twin goals of clean air and reduced oil use, by a combination of making public transport, walking and cycling safe and affordable, land use planning to reduce the need to travel, and a rapid switch to electric vehicles (EVs). There should be no new conventional car sales by 2025 – they should all be EVs by this date.
- **On gas**, the government should prioritise energy saving, particularly insulation in the millions of the most energy-inefficient homes, reversing the cuts to energy efficiency policy and funding in recent years, and delivering a strong low-carbon heat strategy<sup>25</sup>. The other main use for gas is in electricity generation – the 2020s should see gas power generation decline more rapidly, by reversing recent attacks on the growing renewables sector, and by investing in smart grids and energy storage. We can have a largely decarbonised electricity grid by 2030, without recourse to new nuclear power<sup>26</sup>.

- There should be a **just transition strategy** for the fossil fuel sector as a central element of the government's industrial strategy, aimed at helping workers, industries and communities make a smooth transition into highly skilled, decent jobs and industries in clean technologies.

### Implications of unburnable carbon for pension funds

The reality of unburnable fossil fuels also has consequences for pension funds.

The issue of financial risks to pension funds from climate change has become mainstream in recent years, driven by interventions from the Bank of England, Aviva and others<sup>27</sup>. Pension funds hold considerable investments in fossil fuel companies, whose value would drop in a world which took concerted action on climate change.

The majority of pension funds' responses so far to the risks from these holdings is to advocate "engagement" – to try to persuade fossil fuel companies to better align their business models with the political imperatives of the Paris Agreement and changing economic realities such as the falling costs of renewables and electric vehicles. This is their preferred approach, rather than reducing their holdings in these companies.

There are two arguments that such an approach is too risky, and should be reassessed as quickly as possible. There are also growing calls that failure to assess and manage these financial risks puts pension funds in breach of their fiduciary duties<sup>28</sup>.

First, there is almost no evidence that engagement works when the core business of the company is at stake. Under intense pressure over many years, Exxon, BP and Shell have passed resolutions on climate change at Annual General Meetings (AGMs), but these still only relate to reporting, not to actually aligning their business model with a below 2 degree world. After climate change-related AGM shareholder resolutions in 2016, BP responded by announcing a series of huge new exploration projects – all of which will either be stranded, or cause other assets to be stranded, in a 2 degree world. After the 2017 AGM season, BP announced "*we expect to start-up seven major projects in 2017*"<sup>29</sup>. Other oil companies such as Statoil and Total are perceived to be better on climate issues than Shell, BP and Exxon. However, in February 2017 Total said of renewable energy "*It's only 5% of the strategy. We are an oil and gas company*"<sup>30</sup> and in March 2017 Statoil published a climate strategy in which it said that even by 2030, more than 80% of its new investments would still be in new oil and gas projects<sup>31</sup>. It is delusional to expect more than a very low probability of success with an engagement strategy, and pension funds which engage rather than divest are more likely to face larger losses when oil company devaluations start in earnest, as they have done for coal companies in recent years.

Second, there is plenty of evidence that oil companies, deliberately or not, are massively underestimating the speed of change which is occurring in the energy sector globally. This is misleading investors into thinking that oil companies' long-term prospects are good. BP's annual energy outlooks have repeatedly underplayed the growth of renewables, and continue to do so<sup>32</sup>:

- BP predicts that the annual global growth in renewables will be lower over the next two decades than in the previous two, at 8% a year compared with 12% previously.
- BP predicts that there will be just 100 million EVs on the road in 2035, a level which would not affect global oil demand significantly. By contrast, Imperial College recently estimated the 2035 figure to be 560 million EVs<sup>33</sup>.
- BP only expects global car fuel efficiency to be 50 mpg by 2035 – but the EU, Japan and USA all have fuel efficiency regulations which bring this standard in between 2020 and 2025.

Unless they change course, it looks increasingly likely that it will be the pension funds which get burned, not the fossil fuels.

### **Conclusion**

We cannot even burn all of the coal, oil and gas already in production, let alone start new projects.

Friends of the Earth urges the UK government to put in place a new climate strategy which addresses the neglected issue of fossil fuel production. It should include:

- An end to new fossil fuel extraction through revising the planning system to set out a presumption against these developments; and a just transition for existing industry.
- Not subsidising fossil fuel projects abroad.
- Focusing policy on cutting energy use, not increasing supply.
- A more rapid switch to using clean energy – renewables, not gas and coal power, electric, not diesel or petrol vehicles.

Friends of the Earth urges pension funds to shift their investments out of fossil fuel exploration companies, and into clean energy projects and infrastructure.

**Simon Bullock**  
**July 2017**

## Appendix

### 1. Is there any wiggle room on unburnable fossil fuels?

There are two ways in which the “unburnable fossil fuel” argument might be weakened:

- First, perhaps when the fossil fuels are burned, can the carbon be captured and stored?
- Second, can the carbon budget be extended, for example by using “Negative Emissions Technologies” to capture carbon already in the atmosphere?

Neither of these arguments make a material difference:

Carbon Tracker has looked at the impact of an extremely rapid, large-scale ramp-up of Carbon Capture and Storage (CCS) globally, and even this idealised scenario would add just 12-14% to the global carbon budget for burnable fossil fuels<sup>34</sup>. This does not materially affect the numbers, but even this amount is extremely unlikely to happen: CCS has not fulfilled its potential, and for example the UK Government’s latest projections do not see any power CCS until 2035<sup>35</sup>. But it is the next 20 years when CCS could make the biggest difference. CCS suffers too from poor economics – it is already cheaper to produce electricity from renewables than fossil fuels with CCS, and renewables’ costs continue to fall.

Negative Emissions Technologies (NETs) are a highly speculative possibility, with extreme uncertainty around cost, and knock-on impacts. In addition, to work at sufficient scale to make a difference would require colossal new global industries, and vast areas of land. The amount of land needed at scale for one of the leading technologies, bioenergy with carbon capture and storage, equals an area larger than the size of India – land for which there are increasing and competing global needs, for example feeding 9 billion people<sup>36</sup>.

Overall, NETs and CCS should be investigated, but policy makers should not assume that their deployment will alter the fundamental fact that as much of the world’s fossil fuels as possible need to stay unburned.

### 2. What UK fracking proponents say

Even ignoring all the local environmental impacts of fossil fuel extraction and use, on climate grounds alone new fossil fuel exploration cannot be justified. But UK fracking proponents say that shale gas can be good for the climate, as in the short term it would be displace more polluting coal, ie it would be a temporary “bridge” fuel. This argument does not stack up:

- It is not clear that shale gas would be less polluting than coal. This depends on the level of methane leakage from fracking wells, and this issue is contested<sup>37</sup>.
- In the UK, shale gas would not be displacing coal. Coal is rapidly being phased out. The government projects that coal power generation will be down 99% on 2015 levels by 2022, and zero by 2024<sup>38</sup>, long before shale gas would be produced in any meaningful quantity. Shale gas would be displacing other forms of energy, not coal. It is likely to displace lower-carbon energy, such as renewables. Even in the last 10 years, gas has not matched coal’s drop in generation: coal has fallen by 112 TWh,

but gas has risen by just 3 TWh. The gap has been met predominantly by renewables (up 61 TWh) and energy saving (saved 44 TWh)<sup>39</sup>.

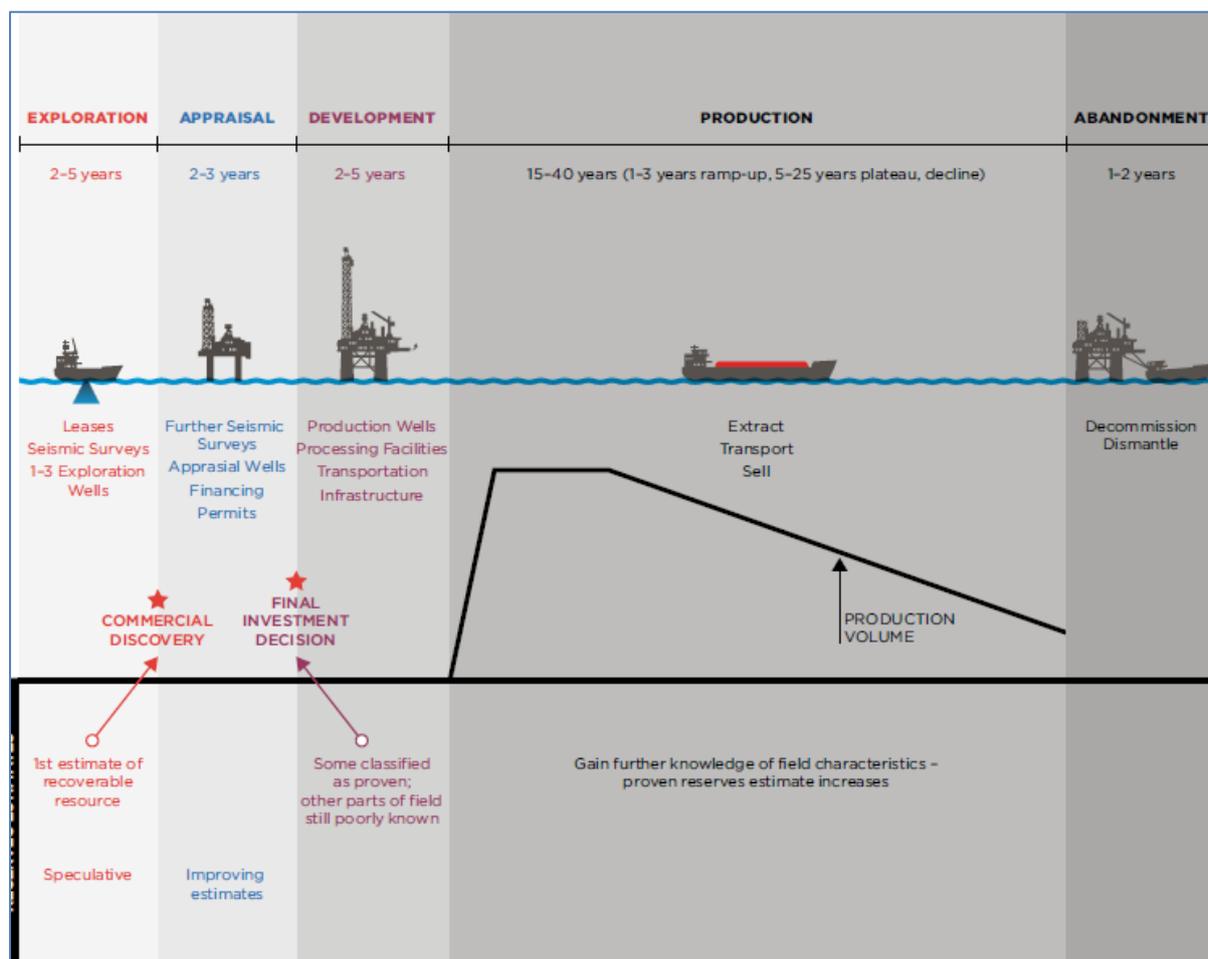
### 3. Definitions

Definitional issues are covered in detail in *The Sky's Limit* report. In short:

- **Resources** are the largest category: fossil fuels which might one day be extracted, some of which are geologically expected, but yet to be found.
- **Reserves** are the next largest: fossil fuels which are known and extractable using today's technologies and under today's economic conditions.
- **Developed reserves** are the smallest category: fossil fuels which can be currently extracted from existing and in-construction fields and mines.

The cut-off point for developed reserves is when construction starts after a Final Investment Decision – see the reproduction of *The Sky's Limit* Figure 4 below. Developed reserves do not include projects at test drilling, seismic surveying or flow-testing stages.

Figure 3: Lifecycle of an oil and gas field



Source: *The Sky's Limit*, Figure 4.

## References

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- <sup>2</sup> World Bank Group. 2014. *Turn Down the Heat: Confronting the New Climate Normal*. Washington, DC. <https://openknowledge.worldbank.org/handle/10986/20595>
- <sup>3</sup> [http://unfccc.int/paris\\_agreement/items/9444.php](http://unfccc.int/paris_agreement/items/9444.php), accessed 13 July 2017.
- <sup>4</sup> See Appendix for definitions of “reserves” and “developed”.
- <sup>5</sup> <http://priceofoil.org/2016/09/22/the-skys-limit-report/>, Table 1 and Figure 2.
- <sup>6</sup> <https://blogs.shell.com/2013/05/03/bubble/>
- <sup>7</sup> <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx>
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- <sup>9</sup> <http://priceofoil.org/2016/09/22/the-skys-limit-report/>
- <sup>10</sup> Carbon Tracker, 2011. Unburnable Carbon. <http://www.carbontracker.org/report/carbon-bubble/> and Carbon Tracker, 2013. Unburnable Carbon 2013. <http://www.carbontracker.org/report/unburnable-carbon-wasted-capital-and-stranded-assets/>
- <sup>11</sup> <https://data.bloomberglp.com/bnef/sites/14/2017/04/2017-04-25-Michael-Liebreich-BNEFSummit-Keynote.pdf>
- <sup>12</sup> <http://www.businessgreen.com/bg/news/3006957/green-cab-london-taxi-company-cuts-ribbon-on-gbp300m-electric-taxi-plant>
- <sup>13</sup> <https://www.vox.com/energy-and-environment/2017/4/10/15234330/trump-coal-museum>
- <sup>14</sup> <https://electrek.co/2017/05/17/volvo-tesla-says-stop-diesel-electric-vehicle/>
- <sup>15</sup> Eg see [http://www.lse.ac.uk/GranthamInstitute/news/dietz\\_stern\\_june2014/](http://www.lse.ac.uk/GranthamInstitute/news/dietz_stern_june2014/) or [https://obamawhitehouse.archives.gov/sites/default/files/docs/the\\_cost\\_of\\_delaying\\_action\\_to\\_stem\\_climate\\_change.pdf](https://obamawhitehouse.archives.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf)
- <sup>16</sup> *The Sky's Limit*, Table 6, p33.
- <sup>17</sup> <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2016-12-09/56871>
- <sup>18</sup> <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2017-01-27/62007/>
- <sup>19</sup> <https://www.conservatives.com/manifesto> , page 42. May 2017.
- <sup>20</sup> See <https://www.theccc.org.uk/2017/06/29/new-plans-for-a-new-parliament-are-urgently-needed-to-address-climate-change-risks/> and previous annual progress reports from the CCC
- <sup>21</sup> <https://www.foe.co.uk/sites/default/files/downloads/paris-climate-agreement-what-it-means-uk-95285.pdf>
- <sup>22</sup> <https://www.theccc.org.uk/publication/uk-action-following-paris/> Box 2.3. An equal distribution is still very generous to the UK as it ignores historical responsibility.
- <sup>23</sup> <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016>, Annex F.
- <sup>24</sup> <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016>, Annex J.
- <sup>25</sup> See <https://www.theccc.org.uk/publication/next-steps-for-uk-heat-policy/>
- <sup>26</sup> <https://www.foe.co.uk/sites/default/files/downloads/switching-how-renewables-will-power-uk-103641.pdf>
- <sup>27</sup> Eg <http://www.bankofengland.co.uk/pages/climatechange.aspx> and <https://www.aviva.com/media/thought-leadership/climate-change-value-risk-investment-and-avivas-strategic-response/>
- <sup>28</sup> ClientEarth, 2016. <https://www.clientearth.org/pension-trustees-face-legal-challenge-ignoring-climate-risk-leading-qc-confirms/>
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- <sup>36</sup> <https://www.carbonbrief.org/in-depth-experts-assess-the-feasibility-of-negative-emissions>
- <sup>37</sup> See <https://www.theccc.org.uk/publication/onshore-petroleum-the-compatibility-of-uk-onshore-petroleum-with-meeting-carbon-budgets/>
- <sup>38</sup> <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016>, Annex J.
- <sup>39</sup> <https://www.gov.uk/government/statistics/electricity-section-5-energy-trends>, table ET5.1