IPIECA

Oil and gas: meeting challenges today … for tomorrow

This fact sheet explores some of the assumptions involved in the concepts of 'unburnable carbon', 'stranded assets' and a 'carbon bubble'.

Exploring the concept of 'unburnable carbon'

Over the past year, the concepts of 'unburnable carbon', 'stranded assets' and a 'carbon bubble' have been promoted by a number of groups, gaining the attention of investors, academics and the media. This fact sheet explores some of the assumptions involved in these concepts and puts them into the wider perspective of the energy system, recognizing the importance that oil and gas bring to modern living standards, economic growth and societal advancement. It also demonstrates how oil and gas companies acknowledge the risks posed by climate change and how they actively manage these risks.

Key facts

1. **The industry agrees with the need to address the challenges of climate change.** The Intergovernmental Panel on Climate Change (IPCC) recently confirmed that the risks of climate change increase with increasing temperature. Although uncertainties remain, rising greenhouse gas (GHG) emissions and global temperature pose risks to society and ecosystems that are serious enough to warrant cost-effective policy responses that balance mitigation and adaptation, as well as other societal priorities.

2. **Oil and gas are needed to meet increasing energy demand.** The International Energy Agency's (IEA's) reference scenario[1] estimates that, in 2035, global energy demand will be 33% higher than today. The IEA expects that 75% of this demand will be met by fossil fuels. In the IEA's 2°C scenario, the consumption of oil in 2035 will be 13% lower than today, while the demand for gas will be around 20% higher. There is a need for new oil and gas production capacity to accommodate the projected increase in demand and compensate for the decline in production at existing fields.

3. **There is no clear evidence of a speculative 'carbon bubble'.** Markets are pricing oil and gas companies rationally. This is based on their expectations of future earnings, taking into account the size and type of mineral reserves, the risks arising from future climate policies and many other factors.

4. **Managing risks is at the core of the oil and gas industry.** Oil and gas companies manage climate change risks alongside other business risks. A number of strategic tools are currently used to manage these risks, including CO_2 costs in project economics.

[1] IEA *New Policies* scenario serves as its baseline or reference case. The IEA states that its *450 Scenario* is roughly in line with a 2°C temperature rise.

"Although future climate changes and impacts remain uncertain, rising GHG emissions and global temperature pose risks to society and ecosystems that are serious enough to warrant cost-effective policy responses."

1. The industry agrees with the need to address the challenges of climate change

The IPCC has stated that the risks of climate change increase with increasing temperature. Although future climate changes and impacts remain uncertain, rising GHG emissions and global temperature pose risks to society and ecosystems that are serious enough to warrant cost-effective policy responses that balance mitigation and adaptation, as well as other societal priorities.

What is meant by unburnable carbon?

The unburnable carbon concept asserts that the cumulative CO_2 emissions required to limit global temperature rise to a certain level, usually 2°C above pre-industrial levels, is much less than the CO_2 that would be emitted from producing existing proven reserves of fossil fuels (see box below on reserves vs. resources). In other words, the potential emissions from proven reserves exceed the carbon budget for the specified temperature rise and would thus remain unburnt.

Reserves differ from resources

According to the IEA, two-thirds of proven fossil fuel reserves would need to remain in the ground to stay within a 2°C temperature increase. But the term 'reserves' can have different interpretations (e.g. Society of Petroleum Engineer's Petroleum Resources Management System, United States Geologic Service classification system, United Nations Framework Classification, etc.).

The IEA defines a reserve as a discovered and positively appraised resource. However, publicly-listed companies use a narrower definition of reserves for U.S. Securities and Exchange Commission reporting: a quantity of oil and gas that is close to investment decision for development and production (i.e. it represents a well-defined quantity and a commercially viable project). Company reserves represent a subset of the reserves listed by the IEA. Resources describe the longer-term potential of unexplored, inaccessible or presently non-commercial hydrocarbons.

Oil and gas company valuations emphasize proven and commercial reserves that will be produced over the next 10 to 15 years. Reserves that could be produced after that period have limited impact on company valuations. This is due to the discounting effect of future cash flows. The IEA's 2°C scenario does not envision the stranding of any oil and gas reserves already under development. In addition, the IEA states that most of the undeveloped resources that could be impacted are either unlicensed or held by national oil companies. In short, even if a company's resources may become subject to impacts 15–20 years from now, it would make little difference in today's calculation of that company's value.

The IEA's *World Energy Outlook 2013* discusses the difference between reserves and resources in pages 436–437.

"As countries expand their energy infrastructure, they naturally turn to oil and gas for part of the mix, since these are affordable, reliable and plentiful."

2. Oil and gas are needed to meet increasing energy demand

According to the IEA's reference scenario, in 2035, the global energy demand will be 33% higher than today, with 75% of this demand being met from fossil fuels (down from 80% today). In the IEA's 2°C scenario, oil consumption will be 13% lower than today, while the demand for gas will be around 20% higher. Hence, there is a need for significant new exploration and production capacity to accommodate the increase in demand and compensate for the decline in production at existing oil and gas fields.

There is no easy solution to meeting the world's energy demand and reducing CO_2 emissions. The desire to reduce CO_2 emissions drives arguments for a rapid decline in fossil fuel use. Yet, modern civilization relies on a mix of fossil fuels, nuclear, hydro and other renewables to meet energy demand. While energy demand in the developed world is relatively flat, demand in emerging countries is rising rapidly. As countries expand their energy infrastructure, they naturally turn to oil and gas for part of the mix, since these are affordable, reliable and plentiful. Oil and gas companies will continue to deliver this energy safely and responsibly.

Not all fossil fuels are the same

Oil, coal and gas are different in key aspects relevant to the unburnable carbon and stranded assets concepts. For example, coal, oil and natural gas have different carbon intensities. With twice the CO_2 footprint of gas, coal is the most carbon-intensive fossil fuel. Natural gas may benefit from coal-to-gas switching as countries try to reduce CO_2 and other air emissions in the power sector.

Other aspects that differentiate fossil fuels are how they are primarily used today and whether these uses can be quickly transitioned. Coal and gas are mainly used in power generation and in industrial processes. We have seen a transition in North America as natural gas developments have displaced coal in power generation to yield material CO_2 reductions. Oil, on the other hand, is mainly used in transport. There is limited indication of a material transition to alternative energy fuels and transport infrastructure.

"There is a need to develop new oil and gas resources if we are to meet energy demand by 2035."

(Source: IEA)

Energy demand scenarios to 2035[2], using the data of international agencies[i], indicate that:

- Energy demand is expected to grow in all scenarios;
- Energy efficiency and renewable energy supply grow at significant rates; and
- Fossil fuel use grows at a slower rate and still comprises more than 60% of the total primary energy mix (this occurs in all scenarios, even in the low-carbon ones).

New oil and gas developments needed to meet demand

All of the IEA's scenarios conclude that there is a need to develop new oil and gas resources if we are to meet energy demand by 2035. A significant share of current oil and gas producing reserves will need to be replaced. For example, the oil reserves currently producing will only cover about 50% of the demand in the IEA's reference scenario. The IEA states that part of this new production will come from proven reserves, but also from reserves growth (increases in reserves in known fields), as well as from as-yet-undiscovered resources.

3. There is no clear evidence of a speculative 'carbon bubble'

There is no evidence that a speculative 'carbon bubble' is occurring. Markets are pricing oil and gas companies rationally. This is based on their expectations of future earnings, taking into account the size and type of their mineral reserves, the risks arising from future climate policies and many other factors.

The stranded assets concept offers limited analysis for key uncertainties

Stranded assets are investments that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities. They can be caused by a range of risks, including the risk of policy changes that could lead to changes in oil and gas prices. CO_2-related policies, while important, are one of many risks that oil and gas companies continue to manage.

[2] We have used 2035 as a reference year because most credible global forecasts/outlooks/scenarios have projected out to this date.

The concept of stranded assets, in the context of unburnable carbon[ii], relies on assumptions with considerable uncertainties. It assumes that governments unite to take action sufficient with achieving a 2°C target.

It then assumes that these policies would create an unexpected and swift oil price decrease, leading to stranded assets. It also assumes that firms do not modify their investment strategy to avoid stranding capital.

The response of oil-producing countries to climate policies is a key uncertainty that has not been discussed. Analyses dealing with the impact of climate policies on the price of oil should consider the ability of oil producing countries to increase or decrease production to adjust the price of oil as required. More than 70% of the world's oil and gas reserves are under the control of governments and national oil companies. Of these reserves, 90% are held by the Organization of Petroleum Exporting Countries (OPEC).

Capital markets are appropriately pricing climate-related risks

Proponents of the carbon bubble concept suggest that capital markets have mispriced the climate risk borne by fossil fuel companies. They suggest that investors have failed to incorporate climate risks into their analyses. They postulate that once investors understand the potential consequences of climate policies, they will exit investments in fossil fuel producers.

Investors have known about climate change risks since at least 1992, when the United Nations Framework Convention on Climate Change was negotiated. The issue of cumulative emissions has been discussed publicly for more than a decade. Oil and gas companies have disclosed climate change risks in annual reports and in discussions with investors for many years[iii].

4. Managing risks is at the core of our industry

Oil and gas companies manage many business risks, including those presented by climate change. For example, geological/technical risks impact costs and production, and market risks impact price and demand. Oil and gas companies have developed various tools to manage project risks such as sensitivity analysis on project costs and oil and gas prices.

Similarly, a number of instruments are used to manage climate change risks. For example, companies use CO_2 costs in project economics[iv], allocate capital for energy efficiency improvements and conduct research on new energy technologies, including renewables.

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Right: this 30 MW lignite-fired steam generation plant was established as a pilot project for the evaluation of carbon dioxide capture using oxyfuel combustion technology. The resulting carbon dioxide is compressed before being stored in geologic formations instead of being emitted to the atmosphere.

"Carbon capture and storage (CCS) offers another opportunity for emissions reductions. According to the IEA, large-scale deployment of CCS will play a significant role in future CO_2 abatement in both power generation and industry."

Decisions on making new investments in exploration and development of reserves will continue to be based on expected risk-weighted returns. Costs, prices, and many other relevant strategic elements are taken into consideration. The risks posed by climate change, such as possible climate policy regulations, are incorporated into such decisions.

Developing and deploying innovative technology

Energy efficiency offers a means to manage the growth in energy consumption, including fossil fuels, by getting more out of our existing supply and reducing waste. The IEA estimates that their top policy recommendations on efficiency could reduce global CO_2 emissions by 7.6 billion tonnes per year[v].

Carbon capture and storage (CCS) offers another opportunity for emissions reductions. According to the IEA, large-scale deployment of CCS will play a significant role in future CO_2 abatement in both power generation and industry. Oil and gas companies have been developing and demonstrating CCS technologies for more than two decades. The Global CCS Institute states that the 21 large-scale integrated CCS projects currently in the 'operate' or 'execute' phases will help contribute to cost reductions for capturing and storing CO_2.[vi]

Oil and gas companies will continue to play their part in discovering and developing technologies to meet the challenges of supplying energy to billions of people, while reducing CO_2 emissions.

References

i The review considered the following sources:
IEA (2013). *World Energy Outlook 2013* (450, NPS, CPS);
WEC (2013). *World Energy Scenarios 2013* (Jazz, Symphony);
US EIA (2013). *International Energy Outlook 2013*; and
MIT (2013). *Energy and Climate Outlook 2013*.

ii Stranded assets are also used beyond climate. See:
www.smithschool.ox.ac.uk/research/stranded-assets

iii SEC (2010). *Commission Guidance Regarding Disclosure Related to Climate Change*. Securities and Exchange Commission (2 February 2010).

iv CDP (2013). *Use of internal carbon price by companies as incentive and strategic planning tool*. Carbon Disclosure Project, December 2013.

v IEA (2012). *Progress Implementing the IEA 25 Energy Efficiency Policy Recommendations.* IEA's 'Insights Series 2012'.

vi GCCSI (2014). *The Global Status of CCS*. Global CCS Institute, February 2014.

IPIECA

IPIECA is the global oil and gas industry association for environmental and social issues. It develops, shares and promotes good practices and knowledge to help the industry improve its environmental and social performance, and is the industry's principal channel of communication with the United Nations.

Through its member-led working groups and executive leadership, IPIECA brings together the collective expertise of oil and gas companies and associations. Its unique position within the industry enables its members to respond effectively to key environmental and social issues.

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International Association of Oil & Gas Producers (OGP)
Japan Petroleum Energy Center (JPEC)
Petroleum Association of Japan (PAJ)
Regional Association of Oil and Natural Gas Companies in Latin America and the Caribbean (ARPEL)
South African Petroleum Industry Association (SAPIA)
The Oil Companies' European Association for Environment, Health and Safety in Refining and Distribution (CONCAWE)
UK Petroleum Industry Association (UKPIA)
World Petroleum Council (WPC)

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