

**Proposed questions by the students attending tomorrow's dinner
April 28, 2016**

Carbon Pricing

BP signed a letter of support for carbon pricing with other European oil companies prior to the Paris Conference.

How did the heads of BP and other oil companies come together to support a price on carbon?

- We shared a common purpose which is to promote carbon pricing as the most effective policy to tackle climate change.
- Carbon pricing, is establishing a cost on emissions and incentivises the industry and consumers to reduce emissions.
- Putting a price on carbon will reduce emissions at a larger scale, and at lower cost than alternative policy measures.
- It would make energy efficiency more attractive and lower-carbon energy sources more cost competitive
- Carbon pricing is gaining momentum: over 40 national and 20 sub national jurisdictions have either implemented or are scheduled to implement an emission trading scheme or a carbon tax.
- We, along with the other signatories of that letter, have now joined the Carbon Pricing Leadership Coalition (CPLC) a major multi-stakeholder initiative led by the World Bank to promote carbon pricing across the world.

Why did US oil companies not sign the letter? Are they resistant to carbon pricing? If so, why?

- It is not for us to comment on other companies' reasons for what they do and don't do. However, there are certainly some US companies in favour of carbon pricing – for example Exxon have publicly shown support for a carbon tax. *[for DC team to check/amend accordingly]*

Commented [WL1]: Agree with this. Don't want to go down the route of differences in European vs. U.S. oil companies or get dragged into climate denier litigation.

Natural Gas Leakage

Substitution of natural gas for coal in electricity generation reduces carbon emissions, but leakage of methane from natural gas systems reduces the benefit. Recent studies have found leakage from natural gas systems to be higher than previously estimated. The EPA has proposed new regulations to reduce leakage in the US.

Is reduction of methane leakage an area of focus for BP?

- Yes. We have signed up to the Clean Air and Climate Coalition (CCAC) Oil and Gas Methane Partnership to reduce methane emissions. Methane is also a work focus area of the Oil and Gas Climate Initiative – a partnership of ten oil and gas companies representing around 20% of global oil and gas production.
- Methane emissions from our Lower 48 operations were about 0.6% of gas production in 2014 – at this level, gas outperforms coal in terms of GHG emissions. This performance has been achieved through years of good practice, including green completions (a process that recovers natural gas for sale and minimizes the amount of natural gas either flared or vented during the completion and commissioning of wells) and leadership on voluntary emission controls.
- The Oman Khazzan project has been designed as an inherently low emission concept, eliminating many potential methane emissions sources (well-site production equipment, pneumatic instruments, valve controls, pumps).

Does BP think further government regulations and incentives are required to reduce methane leakage, or are companies already doing all they can to reduce leakage?

- We recognize the importance of methane emissions management in the production of oil and gas. We believe our interests are aligned with the government in that respect. We have no interest in losing valuable product or causing emissions of a potent greenhouse gas.
- It is also important to maximize the lifecycle advantages of natural gas (relative to coal) by reducing methane leakage.
- We have been working closely with EPA and DOI Bureau of Land Management (BLM) on making the recently proposed methane regulations more cost effective; including advocating an easy on-ramp for emerging leak detection repair technologies.
- ***Pivot to David for details on work with EDF and DOE's ARPA-E on leak detection and repair technologies.***

Paris Agreement and Long-Term Strategy

Has the Paris Agreement resulted in any immediate change to BP's strategy?

- BP welcomes the direction provided by the Paris Agreement, for countries to determine their contributions to holding temperature rise well below 2C.
- We will continue to work in our own right and collaboratively with other companies in the Oil & Gas Climate Initiative (OGCI) to evolve our businesses towards and help deliver the aims of the Agreement.
- Key for BP businesses will be whether and how countries implement their NDCs, through carbon pricing, regulation or other mechanisms.
- We are pleased the Agreement creates the possibility for carbon pricing to help deliver global goals and national contributions.
- Putting a price on carbon will reduce emissions at a larger scale, and at lower cost than alternative policy measures.

What is senior management's vision for the company in 10 & 25 years? Will the business remain focussed on its core of O&G extraction, or does the company see itself branching into other areas (including carbon reduction focused businesses, e.g. CCS, or renewables, e.g. Total announced new renewables division last week)?

- A diverse mix of fuels will still be needed in a low carbon future. In the IEA 2°C scenario, the total demand for oil and gas is broadly the same in 2040 as today – although with more gas and less oil. *(Note that oil and gas demand goes significantly down in this scenario post-2050)*
- We are moving towards a 'gassier' portfolio – we are already about 50% gas. Gas is the lowest carbon fossil fuel and emits about 50% of the CO₂ of coal per unit of power. Gas is also the most flexible fossil fuel and can act as a support to intermittent renewables.
- We expect to increasingly complement our oil and gas portfolio with renewable and/or other low-carbon energy solutions over time – given a more developed climate policy environment.

In the former case (BP remains focused on O&G extraction), what does BP see as its core role in carbon emissions reduction and environmental stewardship?

- Climate change is an important long-term issue that requires efforts by governments, companies and consumers. Governments must lead by providing a clear, stable and effective climate policy framework.
- BP wants to play its part:
 - We are growing the share of natural gas in our portfolio.
 - We continue to make energy efficiency improvements in our operations and products.

- We also do provide renewable energy: we have an expanding biofuels business in Brazil and we are one of the major wind energy producers in the US.
- We invest in research and new technologies that will allow us to exploit needed energy resources while reducing greenhouse gases.
- We advocate for a global carbon price. We ourselves factor a carbon cost into our investment appraisals and the engineering design of our new projects, for example \$40 per tonne of CO₂e in industrialized countries.

Is BP's generous support of research in climate-change related areas seen as primarily as good community and environmental stewardship, or does BP see potential future business opportunities arising from the research?

- Both. We believe it is the best interest of our shareholders to support the communities where we live and operate. We also believe this research helps us develop better business strategies.

Carbon Capture and Storage

Major oil companies such as BP are well placed with their technical ability and operational experience to implement large-scale CCS projects (or at least the storage component). How (if at all) does CCS fit into BP's long-term strategy?

- CCS is the only known technology that could enable continued large-scale use of fossil fuels in a tightly carbon-limited world.
- But, CCS faces barriers including very high costs, commercial complexity, technical challenges and an uncertain business and policy environment, and BP has therefore scaled back its activities in this area.
- We continue to identify potential opportunities, and actively share our experience in CCS through various industry initiatives.
- BP maintains a relevant capability in case GHG regulation requires it for some businesses, and to support CO₂ enhanced oil recovery opportunities
- CCS is also a focus area for the Oil and Gas Climate Initiative

Research/ Research Funding

How does BP go about selecting external research to fund?

- We work with partners who are some of the best in their fields, with a history of providing sound, practical advice that can help shape business strategy.
- For example, we work with Princeton CMI on climate science research and with Harvard/Tufts on climate policy. These programs together help shape our approach to climate change more broadly.

Has BP used knowledge it has gained from university partnership research to inform its business strategies in the past?

- Yes, as one example, we have learned from our involvement with CMI and others (EDF and ARPA-E) have helped shape our engagement strategies with respect to the EPA and BLM methane rules.

In addition to staying informed of research from university partnerships, is it the job of any of the staff at BP to keep track of relevant carbon mitigation related research via the primary scientific literature?

- A function within BP, called Group Technology based in London with offices globally, monitors emerging science and technologies, tracks global trends, and works closely with universities and thought leaders around the globe.
- For example, Ellen Williams, Director of DOE's ARPA-E program is BP's former Chief Scientist within Group Technology. ***Gardiner Hill, who is currently with us here at Princeton, works in our Group Technology function as Director of Carbon Solutions and helps lead these efforts.***

Impact of Lower Oil Prices

What has been BP's main measures in response to the large decrease in oil price?

- We expect oil prices to be lower for longer, but not lower forever.
- Since 2010, we have been working to create a stronger, simpler and more focused business. This has positioned us well to respond to lower oil prices.
- We are optimizing capital expenditure and driving down cash costs through a reduction in third-party costs, and through efficiency and simplification across the organization.

The fall was reportedly partly due to an OPEC strategy to force out higher-cost US shale oil producers. Has that strategy been successful? What proportion of BP's

unconventional resources in the US are liquids focused? Has BP changed its exploration/production mix toward lower cost reservoirs or away from oil?

- BP's unconventional development activity is largely in the US where we are the eighth largest gas producer and 80% of our onshore gas globally is from unconventional resources.
- As oil prices have come down, production volumes have fallen, and the number of new wells being drilled has also fallen.
- Our Lower 48 business is constantly looking to optimize its mix of assets.

Has cost reduction and technical innovation in shale production kept pace with the fall in oil price?

- In 2015, BP's U.S. Lower 48 onshore business began operating as a separate business designed to promote nimble decision making and innovation so that BP can be more competitive in the U.S. onshore market, while maintaining BP's commitment to safe, reliable and compliant operations.
- Despite setting up this operation as a separate business, due to the oil and gas price collapse we've had to undergo painful staff reductions, as have our other upstream businesses.

Renewable Energy

What has dictated BP's variations in extent of renewable energy investment over the past decade?

- BP has invested over \$8 billion in alternative energies in the past decade, but our investment experience has been mixed.
- BP now focuses investments in renewables where we can build commercially viable businesses at scale.
- BP currently has the largest operated renewables business among our oil and gas peers.
- Biofuels: We increased our production of ethanol equivalent by 47% in 2015, compared with 2014.
- Wind: BP is among the top wind energy producers in the US, with our share of wind energy capacity enough to power all the homes in a city the size of Dallas.
- Air BP is the world's first supplier of commercial jet biofuel, supplying SAS, Lufthansa and KLM, using the existing fuelling infrastructure at Oslo's airport.

- BP also invests in start-up companies to better understand evolving alternative and advanced technologies such as electric vehicles, batteries and bio-lubricants.

In recent years, BP has chosen to focus on its core business in liquid and gas fuels, and backed away from pre-recession investments in renewable power (wind and solar). What advises those strategic decisions within BP's management? Under what conditions does BP choose to "hedge its bets" on climate change by diversifying, versus waiting for a clear policy-driven market signal.

- We have not backed away from wind – we are among the top ten wind energy producers in the US, with interests in 16 wind farms across the country.
- Overall BP strives for a balanced portfolio in terms of its resources, geography and businesses.
 - Diversity of resources helps us provide energy to support economic development and contribute to a lower-carbon future. Half of our Upstream portfolio is natural gas.
 - Geographical diversity of operations gives us access to a variety of resources and markets, and provides robustness to geopolitical events.
- With our proved reserves replaced every 13 years on average, we have time to adapt our investment strategy to changes in policy, market or technology conditions.
 - Greenhouse gas policy – we use an internal carbon cost of \$40/tonne of CO2e for large new projects in industrialized countries. We also stress test at a higher carbon price.
 - Supply and demand – our Energy Outlook looks past the near-term volatility and identifies the structural trends such as advancements enabling faster growth (e.g. shale). In our 'faster transition' scenario, oil and gas account for over half of demand in 2035.
 - Fluctuating oil prices – we test our investments against a range of oil and gas prices to check their profitability over the long term. We take into account current price levels and our long-term outlook.
 - Cost of supplying oil and gas – we consider factors such as the nature of the asset class or resource, technology advancements and government incentives.
 - Evolving technology – we monitor emerging technologies such as batteries and solar conversion, with our Technology Outlook and other activities. We invest in start-up companies to understand and participate in these potentially disruptive technologies.

- We take relevant steps to make our operations resilient to potential physical impacts of climate change – such as sea-level rise, higher temperatures, extreme weather events.
 - We have guidance for existing operations and projects on how to assess potential climate change risks and impacts – to enable mitigation steps to be incorporated into project planning, design and operations.
 - Example: we decided to place some of the new South Caucasus pipeline deeper underground to avoid potential washouts due to flooding.