Irresponsible Energy

Shell: The World's Most Carbon Intensive Oil Company

This brief summarizes our analysis of the carbon intensity of the top international oil companies. It reveals that Shell has become the most carbon intensive oil company in the world based on its total resources.

When Shell's total resources are taken into account, the amount of greenhouse gases (GHGs) emitted per barrel of oil equivalent produced will outstrip those of its nearest competitors. The data shows that in the age of carbon reduction, Shell is fast heading in the opposite direction, massively increasing the carbon intensity of its production of oil and gas. This presents real risks for Shell, for investors, and for the climate.

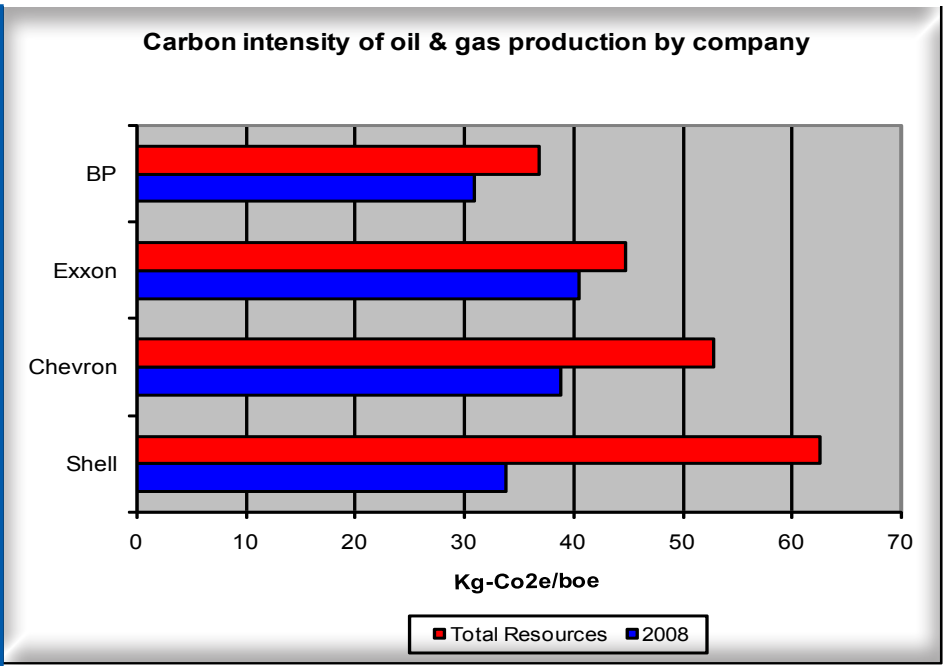
Key Conclusions

1) Shell holds more carbon in its resources, per barrel of future oil equivalent, than any other major international oil company. It is therefore the world's most carbon intensive oil company;

2) The average carbon intensity of each barrel of oil and gas Shell produces is set to rise dramatically, increasing 85 per cent on today's figure;

3) This sharp increase is caused by Shell's move into tar sands, its reliance on liquefied natural gas (LNG), and its continued gas flaring in Nigeria;

4) Shell is therefore more vulnerable to carbon pricing and subject to greater carbon risk than its peers.



Units in Figure 1 above and Table 1 below are average intensity of kilograms of carbon dioxide equivalent emitted per barrel of oil equivalent produced.

Company	2008 Production	Total Resources	Percentage Increase
Shell	33.8	62.6	85
Chevron	38.8	52.8	36
ExxonMobil	40.6	44.7	10
BP	31.0	36.9	19

Shell's green image still benefits the company, and the company wins praise for its words expressing awareness of and concern for climate change. But the reality is that Shell has chosen the most carbon intensive and climate changing path forward. Climate science reminds us that global greenhouse emissions need to peak by 2015 and come down to at least 80 per cent of 1990 levels by 2050 in order to prevent the worst impacts of climate change. Given this, using ever greater quantities of energy to produce billions of barrels of otherwise inaccessible oil appears to be a strategy for disaster. It appears however, to be Shell's strategy.

The carbon intensity of major oil companies

Not every barrel of oil has the same carbon footprint. When a barrel of oil is produced, the amount of carbon emitted during its production varies significantly. This depends on factors, such as the depth and pressure of the reservoir, as well as the attributes of the oil, such as its viscosity and gravity. In addition, oil is often extracted with gas, known as 'associated gas'. If this gas is flared, as is common in Nigeria, the amount of greenhouse gases emitted radically increases.

International oil companies, like Shell, face a growing problem of finding sources of conventional oil. Much of the "easy oil" has already been produced or is controlled and exploited by countries such as Saudi Arabia. The decline of oil fields in the Middle East, North Sea, North America and elsewhere, as well as the resource sovereignty exercised by governments all over the world, means that access to oil reserves for Shell has declined sharply. In the 1970s international oil companies controlled around 70 per cent of reserves. Today that figure is close to 10 per cent. [1]

The oil industry has to look beyond conventional resources of oil to maintain supplies. In its Sustainability Report, Shell concedes that,"conventional sources of oil alone will struggle to meet growing demand". [2]

In order to maintain the production of oil and gas, companies have developed technology to access reserves that were previously inaccessible. Deepwater, tight gas, shale gas, liquefied natural gas, enhanced oil recovery and tar sands production are all examples of how the industry has developed technology to access more oil and gas from the decreasing pool of hydrocarbon reservoirs they have access to.

There is a fundamental problem for the industry though: all of these forms of production are to different degrees more energy intensive than traditional methods. For example, injecting steam into a tar sands reservoir in order to get the tar to flow to a production well can emit up to 135 kg of co2 per barrel of oil produced.[3] Extracting conventional oil in Saudi Arabia on average emits only 13.6 kg of co2 per barrel.[4] So as the industry moves further towards unconventional oil, the emissions associated with each barrel will dramatically increase.

In fact, gas flaring in the production of oil in Nigeria and the energy-intensive extraction of tar sands are two of the most carbon intensive forms of oil production (see Figure 2). The liquefaction and re-gasification processes involved in producing liquefied natural gas (LNG) which enables it to be transported by tanker are also typically highly energy intensive and therefore constitute a markedly carbon intensive way to produce and deliver natural gas.[5] Shell is a leading producer of both tar sands and LNG, and is the largest oil operator in Nigeria.

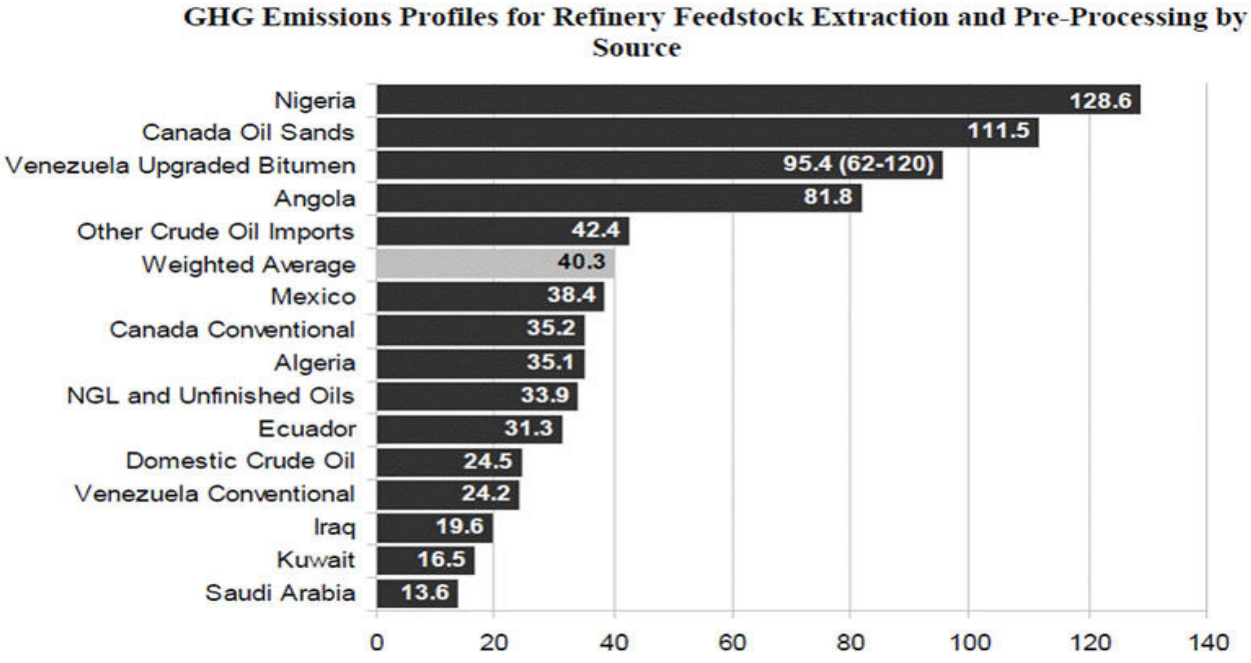


Figure 2 - Oil's contribution to global warming varies, depending on where, and how, it was extracted.

Source: US Department of Energy, National Energy Technology Laboratory, March 2009

Greater Vulnerability to Carbon Pricing

As concerns over climate change have risen up the political agenda – with many countries now enacting legislation to regulate carbon emissions – the investment community has started to analyse what risks a carbon-constrained world could pose to oil and gas companies.

Shell admits it has a problem in its latest Sustainability report, saying "*Our upstream energy intensity has risen by around 27% since 2000 as fields age and more heavy and harder-to-reach oil is produced.*"[6]

In September 2008 the Global Research Department of HSBC produced a report, '*Oil and Carbon*', in which it analysed the top European oil companies' potential exposure to legislation on carbon and carbon pricing. The report notes Shell's increasing move into carbon intensive tar sands and increasing LNG production. It concludes that Shell's *"above average exposure to carbon intensive projects leaves Shell more vulnerable to carbon pricing than its peers"*.[7]

Total Resources Analysis

According to HSBC: *"the most commonly used measure of reserves, proven and probable, is a probability-weighted assessment of a company's reserves. This … understates the level of a company's potential reserve base. …it does not capture some companies' unconventional reserves as many have only potentially become commercial in the past 12 months as the oil price has risen…An alternative measure, 'resources'… is a much wider assessment and is an estimate of the total potential reserves for a company. This measure will capture a higher proportion of unconventional energy sources including oil sands, heavy oil and tight gas."* [8]

We agree with HSBC that a total resources measure is more indicative of a company's total carbon profile, and therefore we have used that measure in our analysis.

In March 2009 the National Energy Technology Laboratory, (NETL) part of the United States Department of Energy, reported on the huge range in carbon intensities for oil production, depending on location and extraction method.[9] Figure 2 (above) shows that oil from Nigeria (because of the associated gas flaring)and Canada's tar sands top the list for the carbon intensity of crude oils processed in US refineries.

Our Analysis

Company disclosure of total resources from annual reports and strategy presentations were analysed using the NETL carbon intensity figures in figure 2 along with intensity estimates for other forms of oil and gas production drawn from the HSBC report.[10]

We applied these carbon intensity averages to the relevant percentages of the resource base disclosed by each company and derived a weighted average.[11]

The 2008 figure we used for comparison with current production is drawn from a carbon intensity analysis conducted by Trucost in April 2009.[12]

Table 1 (cover page) reveals that based on reported total resources, Shell's production of oil and gas will become the most carbon intense of its peers. It will rise by 85 per cent from today's figure – an increase markedly greater than its competitors. This sharp rise is due to Shell's total resources being dominated by unconventional and heavy oil (34.7 per cent) and LNG (16.9 per cent), as well as Shell's ongoing reliance on Nigerian crude with its associated gas flaring. Other companies, while showing an increase that is also of concern, have not staked such a significant proportion of their future production on these carbon heavy resources.

Shell's future dependence on carbon intensive, unconventional oil is illustrated succinctly in its disclosure of total resources from its 2008 strategy update.[13] Of the 66 billion barrels of oil equivalent represented in Shell's 2008 chart of total resources, 22.9 billion is heavy oil and enhanced oil recovery. We know that 20 billion barrels of that is tar sands[14], which therefore constitutes the biggest single portion of Shell's resources, a full 30 per cent of its future oil and gas production. No other oil company has staked so much of its future on the dirtiest form of oil production.

Shell also has major research and development in oil shale extraction, which does not yet factor into these resource estimates. Shell's oil shale extraction technology emits between 176 and 292 kilograms of carbon dioxide equivalent per barrel of oil equivalent produced. (kg-co2e/boe).[15] Shell is also aggressively seeking oil shale and tar sands production opportunities in Russia and Jordan. [16]

Shell's sustainability report claims that its tar sands operations are more efficient than its competitors. It also claims that as the company produces increasing amounts of natural gas its production base is becoming cleaner. The truth is the dominance of tar sands resources in its resource base will render Shell's oil and gas production more carbon intensive per unit of production than any of its peers.

Shell's green image still benefits the company, and they continue to win praise for their good words expressing awareness of and concern for climate change. But the reality is that Shell has chosen the most carbon intensive and climate changing path forward. Climate science reminds us that global greenhouse emissions need to peak by 2015 and come down to at least 80 per cent of 1990 levels by 2050 in order to prevent the worst impacts of climate change. Using ever greater quantities of energy to produce billions of barrels of otherwise inaccessible oil appears to be a strategy for disaster. It appears to be however, Shell's strategy.

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Endnotes

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