

Please note, all questions submitted by users are unaltered and in their original form

Message	User	Response	Responder
Hello Jeremy, thanks for offering this opportunity to ask questions.	Denny		
I agree that the Blueprints Scenario is preferable to the Scramble scenario in terms of human and environmental impacts. But, because of its failure to deal adequately with climate change, the Blueprints scenario is nevertheless a recipe for disaster. It is likely to generate no less than a 2 metre sea rise over this century and the ability to produce food is likely to be very severely impacted. In the long term the goals of this scenario would eliminate the whole of the Antarctic ice leading to a 70 metre sea rise - if James Hansen's recent work turns out to be correct. And with 'only' the current 0.8 °C temp rise and 'only' the current 387 ppm CO2 in the air we will see the end of all the Arctic summer sea-ice within 5 years. How do you justify the massive additional and continuing CO2 emissions under the Blueprints scenario? What makes you think that society's around the world will act according to the Blueprints scenario in the light of the seriousness of the climate issue? Philip Sutton Director, Strategy Greenleap Strategic Institute Australia http://www.green-innovations.asn.au/	Philip Sutton	We certainly see the Blueprints outcomes and the more urgent approach as preferable to Scramble. The acceleration of regulatory and technological development in the energy system is necessary. The real challenge is how quickly individual and collective political developments take place. You see places where there have been real changes in attitude and approach, and we see the forces that might extend and harmonise change. That's the Blueprints outlook. But the choices do need to be made soon.	Jeremy
What are in your opinion the main consequences of the two scenarios in the transportation sector?. Will transport demand shift from cars to other transport modes?	Giovanni	In both scenarios there will be consideration of all options for mobility. Within Scramble scenario there will be a focus on maintaining liquid based fuelling options for transport as people access alternatives such as biofuels. In Blueprints there will ultimately be a consideration of electric mobility options such as plug-in hybrids and hydrogen.	Peter
What does Shell think about the Peak of oil discussion?	Denny	We feel that the peak oil concept is not helpful in considering global oil production. The peak oil concept is based on Hubbert's peak, named after a Shell employee who posited the idea. It refers to a peak, which is observable, in the production of an individual hydrocarbon reservoir, this certainly happens. However, it isn't helpful in considering global production which is composed of many thousands of wells. The truth is there is plenty of oil in the	Robert

		<p>world, what was hard to extract in past is now easy and what is hard today will become feasible in the future as our research and development enhances our technology capabilities. The important question is the rate of development of new fields and the rate of production of existing fields. This is determined by economics of investment and public policy decision which also shape those discussions. The important moment is actually not a possible peak of oil production, it is the point at which underlying demand for energy exceeds the pace of supply investments, as our Hard Truths describe, this may come well before a peak in oil production. Thanks for your question.</p>	
How do you see car makers' decision to go on electric car starting 2010?	Cyril Haioun	<p>Electric mobility, which includes hybrids, plug-in hybrids, battery vehicles and hydrogen fuel cells can make contribution to the transport sector. We are already seeing hybrids in the market, and plans for the other options already announced. In Scramble scenario we see an emphasis on continuation of liquid fuelled vehicles and hence slower uptake of Electric mobility, while in Blueprints sees a move towards the electric platform, particularly post 2020.</p>	Peter
What kind of efforts is Shell making in reducing the GHG intensity of the fossil fuels it is producing? Is Shell considering adding electrolytic hydrogen produced from renewable energy to maximize the utilization of the available carbon in its synthetic fuel production?	pandres	<p>The CO₂ emissions are a core part of any Shell assessment for new investments. We are working to reduce carbon dioxide emissions along these six pathways:</p> <ul style="list-style-type: none"> • Increasing the <u>efficiency</u> of our operations • Establishing a substantial capability in <u>CCS</u> • Continuing to research and develop <u>technologies</u> that increase efficiency and reduce hydrocarbon emissions • <u>Aggressively developing low-CO₂ sources of energy</u>, including low-CO₂ fuel options • Helping manage <u>energy demand</u> by growing the market for products and services to help customers use less energy • <u>Working with governments and advocating</u> the need for more effective CO₂ regulation Shell has interests in pilot projects in hydrogen, but has not yet got into the renewables-electrolysis route. 	Robert
How is Shell planning to use these new scenarios?	JulieK	<p>We develop scenarios to improve Shell business decisions and to prepare our leaders for future developments of different degrees of uncertainty. We also share our thinking with others</p>	Jeremy

		as part of our contribution to important public dialogue - sharing our insights and expertise to help others make important decisions that shape our global energy system.	
Was Mr Alistair Darling's statement yesterday (echoed by Gordon Brown today) that the UK must work to prioritise the production of more oil an example of your "scramble" or an example of what is probably a better description of what will happen - "panic".	robert kyriakides	Thank you for your question. The world is certainly going to need more oil for many years as well as more renewables and indeed other energy sources over the long term. This is true in both Blueprints and Scramble. This is because the demand for energy is going up very fast, mainly because of our globally increasing population and increasing prosperity as developing nations lift their populations out of poverty. The demand growth is happening so fast that it will be very difficult for energy supply to keep up, for this reason we're going to need all the energy we can get. There is no single source of energy that is a silver bullet. Renewables for instance will go very fast but it will take decades for them to scale up sufficiently, given the huge size of the global energy system and demand, to make a real contribution. Nuclear will also have constraints. At the same time we're going to have to use that energy more efficiently and we're going to have to get smarter about how we manage the environmental impacts of its use, for instance using CCS to limit carbon emissions.	Robert
If the United States opened up the Outer Continental Shelf, and other areas now off limits, what impact do you believe that would have on prices of natural gas and oil?	Jeff Schrade	Jeff, thanks for your question. Opening up additional sources of energy supply is going to be important in helping to meet the world's rapidly growing energy needs. I'm afraid it's almost impossible to link the opening of one area to market prices for natural gas and oil. The price of these commodities is determined not only by the balance of supply and demand but is also sensitive to geo-political uncertainties as well as speculative investments.	Shawn
Since you developed the scenarios, oil prices climbed even further. Does this recent development influence the scenarios?	Denny	Recently rising energy costs don't directly affect our scenarios; this is because of the very long time frame of our scenarios of 50 years.	Shawn
Why does Shell Scenarios not take into consideration the energy used to build alternative energy resources? For example, building a nuclear powerstation involves massive amounts of concrete, which releases massive amounts of CO2 during it's production process?	Concerned Citizen	You are right that building out new energy infrastructure itself will take large amounts of energy. We do consider that in our modelling, as part of the energy losses from primary energy production to final energy consumption. However, the other uses across the economy for mainly industry, households and transport, will dominate. And in a nuclear power station in	Martin

		particular, the electricity it generates over its lifetime represents CO ₂ savings compared to a fossil power station far exceeding the emissions in the power station's construction.	
In slide 13 I think the growth of wind energy is greatly underestimated even in a Scramble scenario	pandres	We have considered all potential supply options within our scenario work. We have done detailed modeling for each and all have challenges to growth. The numbers we show reflect our perception of how quickly each supply option could respond.	Peter
I have a question about numbers in the appendix on page 46. What energy source labeled "Other Renewables" is going to dwarf Wind? It is not Solar or Biomass, those are listed separately. All projections for geothermal and hydro are quite small, as seen on page 33	windie	This includes Geothermal, Hydro, Wave and Tidal	Peter
In slide 16 you are showing under the blue print scenario again a very low growth curve for wind energy and solar and other renewables to exceed the growth of wind energy. Based on current growth trends of wind energy and its ability to be installed very quickly, the growth of wind energy in the blue print scenario is underestimated!	pandres	Same answer as for Scramble - We have considered all potential supply options within our scenario work. We have done detailed modeling for each and all have challenges to growth. The numbers we show reflect our perception of how quickly each supply option could respond.	Peter
We certainly see the Blueprints outcomes and the more urgent approach as preferable to Scramble. The acceleration of regulatory and technological development in the energy system is necessary. The real challenge is how quickly individual and collective political developments take place. You see places where there have been real changes in attitude and approach, and we see the forces that might extend and harmonise change. That's the Blueprints outlook. But the choices do need to be made soon. Jeremy.	Moderator		
How likely would it be that other than on a cost basis alone that some forms of rationing of energy use or CO ₂ production will evolve?	jw8765	I guess that would become more plausible in worlds with far more constrained supply than we envisage in our analysis. Our CO ₂ measures in Blueprints, however, included regulation (e.g. car fuel economies, domestic appliances energy ratings etc) as well as price-based CO ₂ measures.	Martin
what is Shell's vision of the future? How will Shell participate in this future?	Mr U Secgin	Mr U Secgin, thank you for your question. Shell is working for a responsible energy future. To see how we think the world may develop please see our two Energy Scenarios at: http://www.shell.com/home/content/aboutshell/our_strategy/shell	Robert

		<p>_global_scenarios/dir_global_scenarios_07112006.html. These are the best way you can understand our thinking about how the future may develop. We prefer the Blueprints scenario since we believe these types of outcomes are better for humanity and will also be a good place for us to do business. We will participate in the future as a leading energy company. In order to work to manage CO2 emissions we are pursuing six reduction pathways:</p> <ul style="list-style-type: none"> • Increasing the <u>efficiency</u> of our operations • Establishing a substantial capability in <u>CCS</u> • Continuing to research and develop <u>technologies</u> that increase efficiency and reduce hydrocarbon emissions • <u>Aggressively developing low-CO₂ sources of energy</u>, including low-CO₂ fuel options • Helping manage <u>energy demand</u> by growing the market for products and services to help customers use less energy • <u>Working with governments and advocating</u> the need for more effective CO₂ regulation 	
<p>Thaks for the oportunity to make same question. I would like to know if shell will return to Biomass and forestry activities, where in the past did an excelente job being a worldwide benchmark for the most of the companies in the sector, Specially knowing the big advantage to produce ethanol from the lignocellulosic. Thanks Maximo</p>	Maximo claveria	<p>Maximo, thanks for your question. Shell is actively participating through partnerships in the development of second generation biofuels. In our partnerships we aim to develop several promising technologies. Examples of the technologies are around cellulosic ethanol using enzymes from wheat straw (with IOGEN), high quality synthetic biofuel (BTL) from wood residue (with Choren), and a JV with HR Biopetroleum (Cellana) on marine algae.</p>	Peter
<p>In the scenarios, I see very little about potable water as a major force shaping policies and adding to energy demand. I fear this can be an important factor impeding Blueprints, turning coalition efforts away from long-run CO2 containment to a short-run focus on water solutions. Do you agree?</p>	Roy	<p>We wanted to stick to energy outlooks for these scenarios. But if water supply did become a serious problem, then yes one can see ways in which it would affect energy. Part of the Blueprints story, however, is that environmental and energy decisions are taken together, with sufficient foresight.</p>	Martin
<p>What are the main challenges for the automotive industry in the two scenarios?</p>	Giovanni	<p>Both scenarios require significant improvements in efficiency across all sectors, in particular transport. In our scenarios we see this from the vehicle side as possibly via improved internal combustion engines, a shift to hybridization, and the uptake of alternatives such as plug-in hybrids, battery electric vehicles and hydrogen fuel cells. All of these present potentially significant</p>	Peter

		change.	
How will CO2 pricing impact Shell's strategy?	Mr U Secgin	In our investment decision framework we do monitor the effects of CO2 costs on our project economics. This is Shell practice for many years. When CO2 pricing would become a global practice, Shell is fully prepared.	Gertjan
I agree with Philip Sutton, the blueprint scenario is not nearly sufficient to address climate change. We need to stabilize emissions in the next 8 years in order to avoid a disaster, so we need much more aggressive action from opinion leaders such as Shell	pandres		
Do you highly encourage local political involvement by constituents with regard to energy use and production of carbon dioxide / monoxide by the general public and do you also think that these same constituent groups should have a say in those two issues with regard to industrial and commercial enterprises through legislation proposals.	jw8765	Thank you for your question. We believe that local actions to address the energy challenge (more energy, less carbon) can be a great contributor to achieving better solutions. It is the right of every society to mandate through legislation how it wants industry and commerce to behave through regulations. Different countries decide on legislation in different ways, in Shell our role is to work to comply with all laws and regulations.	Shawn
How do you see the two scenarios impacting the potential of a large scale biomass infrastructure for power and transportation fuels?	holmesrb	Our view is that biomass is more likely to be turned into biofuels than go into electricity generation on a large scale. This is because the stresses are higher in transport. Electricity generation has many other options.	Martin
what is shell actively doing to facilitate the transition to a "blueprint" scenario?	fmarasco	Shell is working for Blueprints type outcomes in a number of ways. Firstly we are advocating and asking that governments set regulatory frameworks that encourage steps in this direction, particularly a clear CO2 pricing mechanism such as cap and trade. We are engaging many governments on this subject, hoping to help with the expertise we have in the energy field. We are working to supply our customers with the energy they will need in a Blueprints world and we are following these six pathways to CO2 management: <ul style="list-style-type: none"> • Increasing the <u>efficiency</u> of our operations • Establishing a substantial capability in <u>CCS</u> • Continuing to research and develop <u>technologies</u> that increase efficiency and reduce hydrocarbon emissions • Aggressively <u>developing low-CO2 sources of energy</u>, including low-CO2 fuel options 	Shawn

		<ul style="list-style-type: none"> • Helping manage energy demand by growing the market for products and services to help customers use less energy • <u>Working with governments and advocating</u> the need for more effective CO₂ regulation 	
based on the summary what then is the solution for a sustainable future, the intermittents of some of the renewable energy and changing our ways of life is the best for a better future	actionco2	By 2100, the world's energy system will be radically different from today's. Renewable energy like solar, wind, hydroelectricity, and biofuels will make up a large share of the energy mix, and nuclear energy, too, will have a place. Humans will have found ways of dealing with air pollution and greenhouse gas emissions. New technologies will have reduced the amount of energy needed to power buildings and vehicles. Indeed, the distant future looks bright, but much depends on how we get there. We believe the Blueprints outcomes provide the best balance between economy, energy, and environment. But the Blueprints scenario will be realized only if policymakers agree on a global approach to emissions trading and actively promote energy efficiency and new technology in four sectors: heat and power generation, industry, transport, and buildings.	Peter
What extra steps do you think would be required to get towards the 30% reductions in CO ₂ on 2000 levels by 2050 that the IPCC suggests would be required to stabilise atmospheric greenhouse gases at below 550ppm?	tamc	Blueprints is heading for stabilisation of 550 ppm CO ₂ . To achieve 550 ppm of all GHGs, you would need to take more aggressive assumptions in several areas – such as CCS uptake, renewables deployment, technology transfer from the developed to developing world, and of course greater energy efficiency.	Martin
Do you see a "sequencing" of those technologies that were mentioned? It would seem that the hard "transitions" will require enhanced use of certain approaches while others are developed. What might that sequence be?	RegionWorks	We have considered all potential supply options within our scenario work. We have done detailed modeling for each and all have challenges to growth. The numbers we show reflect our perception of the sequencing of each supply option given the conditions of each scenario.	Peter
May I know your methodology on doing the projections for the late reactions and early actions?	cdwijaya	We put together outlooks for around 40 scenario based inputs for factors like population, income, technology development and equipment lifetimes, into our World Energy Model. The early actions part focuses on policies like CO ₂ prices and subsidies to renewables.	Martin

<p>Blueprint seems to potentially imply a great deal of policy fragmentation regarding energy investment and use. How comes that Shell considers it as more favourable scenario for energy investments?</p>	<p>Alex Carneiro</p>	<p>Alex, thanks for your question. In Blueprints at first there is policy fragmentation but this is only a step in bringing about a stable international CO2 pricing mechanism. Such a mechanism would provide a great stimulus to the kind of technological innovation at which Shell excels. At the same time, while Blueprints represents much more accelerated and deeper change than Scramble it occurs in an anticipatory manner – people are able to see changes coming and plan for them. So businesses like ours would be better able to plan for the future, invest in markets, which have predictable conditions and fully engage in the economic opportunities these changes would bring.</p>	<p>Shawn</p>
<p>How does Shell sees its own role in the Blueprint dialogues?</p>	<p>Irene van Hooff</p>	<p>Irene, thanks for your question. In this dialogue we see ourselves as a partner for governments and a responsible member of the societies in which we operate working.</p>	<p>Shawn</p>
<p>the other factor is shell been the the father of all the oil company should try and deveolp technology that can see to the end of global demand and over comption</p>	<p>actionco2</p>		
<p>What about a scenario where climate change results in significant catastrophc impacts in various localized regions of the globe? does this not accelerate change?</p>	<p>michael.od onnell</p>	<p>I agree, this could indeed cause a tipping point in action on energy. Our best scientific advice was that the more serious consequences of climate change would happen in the 2nd half of the century and beyond. The point then is that energy decisions we take over the next 10-20 years will be setting up climate consequences for a long time in the future.</p>	<p>Martin</p>
<p>Have you disscussed with other large international oil companies? According to you, it seemed that Shell needs to keep cooperations with others.</p>	<p>Shigeya Sasaki</p>	<p>Our scenarios are developed by Shell to be prepared for the dramatic developments in the global energy system that will emerge in the coming years. With these scenario's Shell is already engaging with governments to make clear the energy realities the world is facing and encourage them to develop appropriate energy policy frameworks. It is up to governments to define the framework for the oil industry.</p>	<p>Peter</p>
<p>Thanks for the clear presentation. We seem to be already moving rapidly along the Scramble path. At the same time, the science is increasingly indicating that the target to minimise dangerous climate change is below 350ppm CO2e rather than the 450-550ppm range you mention. We are already at around 430ppm CO2e.</p>	<p>Ian Dunlop</p>	<p>Yes, the scientific advice has shown a trend to tighter and tighter limits over recent years, as a result of evidence of greater climate sensitivity of GHG emissions. If societies do agree that lower limits, such as 350 ppm are going to be necessary, then the race will be on to develop capability to remove CO₂ from the atmosphere. Trees probably represent our best bet for that at</p>	<p>Martin</p>

		the moment, but I'm sure it's something we shall all be hearing more about.	
I would like to know how the expansion of new trains and added train track could be used in the Blueprint Scenario.	Steve	Trains will be important for two reasons in the scenarios. Firstly in Blueprints to offer efficient intercity transport for passengers, as part of a better integrated public transport system, which will ensure efficient mobility solutions, and in Scramble for moving commodities like coal around. This will mean growth in train track is likely for both scenarios.	Peter
Apologies if these questions were asked already--but what do you see as some of the political choices that must happen in the next 2-3 years? Also, how much do you see the currently high prices for oil as being a factor in whether a Blueprints or a Scenario plays out?	joannahart	<p>Joanna, thank you for your excellent question. We believe political action will be needed on the following points:</p> <ul style="list-style-type: none"> • Governments will need to develop internationally aligned policies to meet the energy challenge and address climate change, without distorting competition among companies. No one single instrument – whether a carbon tax or emissions trading -- will be effective for all sectors. Power generation, transport, heavy industry, buildings all require tailored policy approaches. • They should include: <ul style="list-style-type: none"> ▪ “cap and trade” systems for large stationary emission sources like power stations and most industrial facilities, and thereby creating a global carbon dioxide market. ▪ <i>clear incentives for Carbon dioxide Capture and Storage (CCS)</i> ▪ a simple, credible target for the share for renewable sources in our energy supply. ▪ separate measures in the transport sector such as vehicle efficiency targets, vehicle/road-use programmes for drivers and low-carbon fuel standards based on well-to-wheel methodologies ▪ and a series of robust energy standards for buildings and appliances with incentives to retrofit existing infrastructure. • Financial incentives will be crucial to encourage the 	Shawn

		<p>research, discovery and development of new technologies. Governments will need to partner with industry to finance significant demonstration projects for the most promising ones. And focused, market-based policy instruments – such as tradable renewable energy certificates, and the EU's Emissions Trading Scheme (EU ETS) -- will be necessary to make sure that successful technologies can become commercially viable and widely deployed.</p> <ul style="list-style-type: none"> • Technology to capture and store CO₂ (CCS) is a good example and will be a critical part of society's response to climate change. Governments need to partner with industry to ensure this technology is demonstrated and deployed. • Emissions savings from CCS should earn carbon credits under carbon abatement mechanisms - such as the EU ETS and the Kyoto Protocol's Clean Development Mechanism (CDM). This is justified on the grounds that a tonne of CO₂ stored is equivalent to a tonne avoided. <p>We actually don't see currently high energy prices are a very decisive factor in pushing the world towards one or other scenario, they are more or less neutral since they could push societies towards either a scramble for more resources or anticipatory actions and energy efficiency, a lot depends on political choices.</p>	
<p>You mentioned forces other than national governments combining to accelerate change. Where do you see the most effective leverage points in guiding those actors toward the blueprint scenario?</p>	<p>afrazier</p>	<p>Afrazier, thank you for your question. Many leverage points exist. Among the most likely candidates to accelerate change are large cities, industrial enterprises concerned about energy supplies and environmental impacts on their business as well as opportunities in providing solutions to the Energy Challenge. Also concerned populations will be critical.</p>	<p>Shawn</p>
<p>Is shell working to build an energy industry consensus about the preferred path forward, or is yours a solo initiative?</p>	<p>Peter</p>	<p>Peter, thanks for your question. We are mainly working with governments and our major business partners. Part of the reason for this is that for competition law reasons, which we fully respect and support, it would be very difficult and not necessarily acceptable to bring about any kind of industry consensus.</p>	<p>Shawn</p>

<p>Is it possible to obtain spreadsheets of the emissions profiles and energy profile for each of the scenarios portrayed in the graphs?</p>	<p>Bruce Duguid</p>	<p>We have published the table of energy demand for the two scenarios at the back of the booklet available on the website.</p>	<p>Martin</p>
<p>I'm interested in how you use the scenarios. It sounds like you are trying to be more of a Shaper by vocally favouring one scenario over another but would I am very interested in whether you use the "No regrets", Big bets types strategies and in particular how you develop and manage/exercise your Option strategies. Could you give a couple of examples of Options you have played? Do you have any "Simple Rules" type criteria for options you will and will not make?</p>	<p>mark h</p>	<p>Mark – thanks for the questions. The point of scenarios is not to try and choose which is the more likely. Rather, scenarios play a vital part in providing the context for our judgments and decisions, which typically involve complex projects developed and operated over several decades. We will be using the scenarios to help us be as sure as we can that our “More upstream, profitable downstream” strategy is robust against either future – or indeed, against other possible futures also. Our main focus to be prepared for the future is leveraging technology. Our large investment in a new world scale GTL plant in Qatar as well as new technologies we are developing in oil sands and with partners on second generation biofuels are good examples of that focus.</p>	<p>Peter</p>
<p>Can and does Shell see a future for itself outside of petroleum? How is it doing so and over what time frame?</p>	<p>3P</p>	<p>Thanks for your question 3P. Shell’s strategy is more upstream oil and gas and a profitable downstream, and we are committed to building one commercial scale renewable energy business by around the middle of the next decade. We believe, and our scenarios and those of others such as the IEA show this, that oil and gas will continue to be central to meeting the world’s need for energy for decades to come. Renewables will certainly form an increasing part of the energy mix, because demand is going up so much the amount of hydrocarbon energy used will also expand. Our role is to extract and supply this energy in a responsible way.</p>	<p>Shawn</p>
<p>Is it not too late to implement the policies to affect the next five years, as suggested under the Blueprint scenario?</p>	<p>John Hall Associates</p>	<p>Thanks for your question. In calling for action to tackle the energy challenge, more energy and less carbon (which we express as a Blueprints world) we make the point that decisions in the next five years will be critical for how the energy system develops over the next fifty years. This is because of the long time lags between decisions and new energy sources and technologies coming on stream, largely because of the vast scale of investment and physical scope of energy infrastructure projects. So decisions made soon will affect the next generation of energy investments, those in turn will continue to operate until around the middle of the century. For example a good quality car bought today will probably still be on the road somewhere in</p>	<p>Shawn</p>

		20 years while a coal fired power plant built today without the capability to add carbon capture and storage technology will probably still be operating in 40 years. So we need to take decisions very soon which will set us on a pathway both to the more energy the world will need for increased prosperity, especially in the developing world, and critically for a lower carbon intensity energy system.	
Are you looking at what impact vehicle to grid (V2G) technology will have for PHEVs and the increased potential for integrating substantially more intermittent renewable energy sources such as wind and solar into the grid?	pandres	Thank you for your question. Electric Mobility options have potential for significant impact on the transport sector, which is described in the Blueprints scenario. If this does happen then options such as intermittent renewables supplies and V2G will become important. We continue to study all such alternatives to understand their potential future impact.	Peter
What could be the role for other technologies, like fuel cells and hydrogen?	tdv	Both scenarios require significant improvements in efficiency across all sectors, in particular transport. In our scenarios we see this from the vehicle side as possibly via improved internal combustion engines, a shift to hybridization, and the uptake of alternatives such as plug-in hybrids, battery electric vehicles and hydrogen fuel cells. All of these present potentially significant change.	Shawn
Do you know what level of CO2 emission are likely to be hit as a stable equilibrium by Blueprints? It would appear to be higher than the outside limit of success of 550ppm as commonly agreed e.g. in Stern report). Why is Blueprints seen to be limited in this way - does it indicate further success is seen as unlikely by Shell?	Bruce Duguid	CO ₂ emissions are on a stabilisation pathway to 550 ppm in Blueprints, according to our research. This was developed by our modelling of the different drivers affecting energy; we didn't set out to meet a particular target. This seemed to be a credible set of actions together for a plausible scenario. Whilst it is not the most extreme scenario we could have envisaged, we believe it represents a stretch, and a sustained effort of early actions to achieve it.	Martin
Do you agree that nuclear energy, possibly cold fusion in the 2030's, is the most certain future energy source?	futurestudies	We have considered all potential supply options within our scenario work. We have done detailed modeling for each and all have challenges to growth. Fusion is not envisaged to be commercial before 2040. Also it is challenging to expand nuclear fission quickly on a global scale due to long lead-times for churn of new capacity, building of new capacity being constrained by materials and skilled labour availability and the need for significant government support.	Shawn

<p>Hi all This is Fernando. When will governments and international institutions begin to consider the necessary issue of a limitation of human population..??? Will it be when the natural resources of the earth come to an irreversible end..??</p>	<p>fernando</p>	<p>Fernando, thanks for your question. We have formed our scenarios without making any assumptions along these lines, which we believe would be well outside of the legitimate scope of business.</p>	<p>Shawn</p>
<p>This urgency to constrain CO2e to 350 ppm is not reflected in either scenario. Do you accept the latest science and if so how would that impact on the evolution of either scenario ?</p>	<p>Ian Dunlop</p>	<p>Ian – please see my answer to you above.</p>	<p>Martin</p>
<p>As both scenarios consider a substantial increase in the use of Coal, would Shell consider going back to that sector?</p>	<p>Alex Carneiro</p>	<p>Alex thanks for the question. Heightened interest around the world in clean coal technology has led to a significant number of potential gasification licensing opportunities being offered to Shell, which we are currently assessing. During 2007 we have licensed our technology to four new projects (UK, US, China and Vietnam). Shell's gasification technology can also be used in the conversion of coal to liquids. We are involved in two early-stage joint studies (one in China and one in Australia).</p>	<p>Peter</p>
<p>What will be the role of biofuels - mainly ethanol - in this scenarios?</p>	<p>Menezio</p>	<p>Biofuels is a significant part of both energy mixes. The supply source will move from competing with food to so called second generation biofuels that use waste or cellulosic material, and offer lower 'well to wheel' CO2 production. Shell is committed to providing sustainable energy, including developing lower carbon fuels, and was one of the first energy companies to invest in second generation bio-fuels. Shell's technical partnerships with the world's leading biotechnology companies are at the forefront of these developments: Iogen in Canada, CHOREN in Germany, and Codexis, HR Biopetroleum and Virent in the US.</p>	<p>Peter</p>
<p>How do you see the London Array project fitting into these scenarios?</p>	<p>drhermandc</p>	<p>Drhermandc, thanks for your question. The world faces critical choices over how it wants the global energy system to develop over the next 50 years and manage climate change. As such, our scenarios look at changes in the energy system over many years across the globe. Our scenarios don't look at individual projects we may or may not be involved in.</p> <p>We envisage that wind energy is likely to play an important role in meeting the world's energy, along with other renewables and fossil fuels. In our Blueprints scenario there is a significant stimulus to renewable energy investments in the form of effective CO2 pricing, which would allow a more level playing</p>	<p>Shawn</p>

		<p>field and help make these sources more competitive with other energy sources.</p> <p>You may be aware that Shell has recently taken the strategic decision to consider disposing of its shareholding in London Array. We are committed to wind projects that make economic sense and pursue active portfolio management to add value to our shareholders. Shell WindEnergy is increasing its focus on North America where already today the majority of our wind projects are located. Out of the total capacity of the wind projects we are involved in (1,100 megawatts with 845 megawatts in operation and more than 260 megawatts under construction) almost 900 megawatts are located in the United States. Both our partners in London Array have substantial investments and are experienced in UK offshore wind, and potential delays in the project schedule would be unrelated to Shell's decision to consider disposing of its shareholding in London Array.</p>	
Does Shell plan investment in renewables?	rob.shepler	We already invest in renewables. In fact, we spent \$1 billion over the years 2003-2007 in the areas of solar, hydrogen, wind and biofuels. We are currently focused on increasing our spending on second-generation biofuels going forward.	Shawn
The Stern Review talks about opportunities for businesses in the future. What are these opportunities?	Mr U Secgin	There are a large number of entrepreneurs, venture capitalists as well as established energy companies interested. Even if governments mandate change, then it will be businesses who do the work building out the new infrastructure. But within the working of the market, there are likely to be big opportunities – from the small scale such as having more efficient standby systems on TVs, to contractors installing solar panels, for farmers in biofuels, and to wide-scale roll out of large infrastructure such as carbon capture and storage.	Martin
Now that the strategic choice has been made in favor of the Blueprint scenario, what actions are Shell undertaking to make this happen?	Jeannette	Jeannette, thanks for your question. Shell is working for Blueprints type outcomes in a number of ways. Firstly we are advocating and asking that governments set regulatory frameworks that encourage steps in this direction, particularly a clear CO2 pricing mechanism such as cap and trade. We are engaging many governments on this subject, hoping to help with the expertise we have in the energy field. We are working to supply our customers with the energy they will need in a	Shawn

		<p>Blueprints world and we are following these six pathways to CO2 management:</p> <ul style="list-style-type: none"> • Increasing the <u>efficiency</u> of our operations • Establishing a substantial capability in <u>CCS</u> • Continuing to research and develop <u>technologies</u> that increase efficiency and reduce hydrocarbon emissions • Aggressively <u>developing low-CO₂ sources of energy</u>, including low-CO₂ fuel options • Helping manage <u>energy demand</u> by growing the market for products and services to help customers use less energy • <u>Working with governments and advocating</u> the need for more effective CO₂ regulation 	
<p>Can you please revisit why total energy demand is lower in the blueprint scenario than it is in the scramble one and what Shell is doing to contribute to this reduction in demand as well as how it reconciles this with its interest in selling commodities that contribute to the production of energy?</p>	<p>Michael</p>	<p>Total energy is lower as a result of earlier deployment of more efficient technologies, leading to a legacy of lower consuming devices and other uses. The energy system will be undergoing massive change over the next 50 years. Shell is investing in a range of alternative technologies, and has set a particular target to have a material-sized business in an alternative energy as from the second half of the next decade.</p>	<p>Martin</p>
<p>Was Mr Alistair Darling's statement yesterday (echoed by Gordon Brown today) that the UK must work to prioritise the production of more oil an example of your "scramble" or an example of what is probably a better description of what will happen</p>	<p>panic</p>	<p>Thank you for your question. The world, including the UK, is certainly going to need more oil as well as more renewables and indeed many energy sources. This is true in both Blueprints and Scramble. This is because the demand for energy is going up very fast, mainly because of our globally increasing population and increasing prosperity as developing nations lift their populations out of poverty. The demand growth is happening so fast that it will be very difficult for energy supply to keep up, for this reason we're going to need all the energy we can get. There is no single source of energy that is a silver bullet. Renewables for instance will go very fast but it will take decades for them to scale up sufficiently, given the huge size of the global energy system and demand, to make a real contribution. Nuclear will also have constraints. At the same time we're going to have to use that energy more efficiently and we're going to have to get smarter about how we manage the environmental impacts of its use, for instance using CCS to limit carbon emissions.</p>	<p>Robert</p>

<p>"Asia and Coal" seems to sum up the divergence between the scenarios, for me. And in turn, the progressive disparity in relative energy (joules, mMBtu) cost between petroleum (oil and gas) and coal will be very hard for Asia to ignore. Too simple?</p>	<p>Richard</p>	<p>Significant energy demand growth is likely in Asian economies for both scenarios, with coal continuing to be a significant part of the energy mix. I think the main divergence is actually the level of alignment, cooperation and coordination we might see within each scenario.</p>	<p>Peter</p>
<p>I would like to know what part of the energy sources in the world are currently consumed by public and private transport? Cars will become electric as you predict. Aeroplanes will still run on petrol. Could some ships use both petrol and solar energy in the future? What about the use of sea and ocean wave energy?</p>	<p>Borisov</p>	<p>Borisov, Just over a quarter of final energy demand, worldwide, is consumed for transport. Some have proposed that large ships could run on nuclear. But in our outlooks, we kept our ships on liquid fuels. Biofuels then becomes the best bet to replace a fossil source. Solar is unrealistic, unless converted to something like hydrogen, because of the large area needed to collect enough solar energy to run ships. Plus you'd have to store a lot of energy to run them at night.</p>	<p>Martin</p>
<p>Do you see a role for Shell in lobbying for the kinds of clear political initiatives you see as necessary under Blueprints?</p>	<p>Scott Milne</p>	<p>Scott, thanks for your question. Yes, we feel that Shell, with its expertise in energy, has a responsibility to work with governments to help move towards Blueprints type outcomes. We have been involved in these types of discussions with many governments over the last few months.</p>	<p>Shawn</p>
<p>How do you see the role of renewable fuels in both scenarios? Will they play an important role in all the regions?</p>	<p>Paulo Santos</p>	<p>They will, but I expect them to be somewhat different regionally. Japan, for instance, has limited options but does have a sizeable geothermal resource base. Britain, Chile and Portugal could try new technologies like wave-generated electricity. Whilst countries like Brazil and USA will have a wide range to choose from. Solar and wind represent the biggest prospects for renewable electricity on a world scale, however.</p>	<p>Martin</p>
<p>What is Shell's role in Latin America, and more specifically in Brazil. Kindly refer to the ethanol expansion use in fleet vehicle versus gasolina (from oil) mainly due to Brazil's endowment (soil, sun, water) is significant if produced in a sustainable way.</p>	<p>Mirna</p>	<p>Since the mid 70s Brazil has achieved global leadership on the use and development of biofuels. Brazil's ethanol industry is currently the second largest in the world and is expected to grow around 50% through 2015. In 2007, ethanol production in Brazil was just under five billion gallons. The flex-fuel automotive car fleet in Brazil is also growing at a very rapid rate. Today, more than 85% of the new vehicles sold in Brazil are flex-fuel, capable of handling either gasoline C - a 25% blend of ethanol in gasoline - and hydrous ethanol - 93% ethanol and 7% water. It is no longer possible to buy pure gasoline at the pump in Brazil. By 2015, two-thirds of Brazilian light car fleet is expected to be flex-fuel. For Shell, we are the second largest private fuels distribution company and procure and distribute ethanol as a</p>	<p>Shawn</p>

		fuel and blend it with gasoline, in line with legal standards, for our network of over 2600 Shell-branded retail locations. We have actively marketed biofuels since the launch of the Brazilian government's <i>Proalcool</i> programme three decades ago.	
What if electric cars were widely available in only tow years how would this affect the overall fluid energy business of not only Shell but the industry as a whole?	jw8765	If significant numbers of electric cars were made available in the short term, it would still take many years to achieve significant impact on the vehicle mix as the existing 800 million vehicles would still on average have more than a decade on the road before being removed.	Peter
Robert, CCS? Not all of us know all the acronyms :)	jessica lipnack	Carbon Capture and Storage	Moderator
What kind of efforts is Shell making in reducing the GHG intensity of the fossil fuels it is producing?Is Shell considering adding electrolytic hydrogen produced from renewable energy to maximize the utilization of the available carbon in its synthetic fuel production? -.		Thank you for your question . In late 90s , acknowledging the threat of climate change, we set voluntary targets for reducing our own CO2 emissions through to 2010. Improvements in our downstream facilities for example have already delivered 1 million tons per annum of reductions. Hydrogen is potentially an important future energy carrier, and we continue to work to understand better how this will play a role in our future business	Shawn
Are the renewable energy targets likely to be achieved? Many believe this will not be the case!	futurestudies	Thank you for your question. This will depend on the level of political and social will that is applied to the challenge.	Shawn
Carbon Capture and Storage	Moderator		
To what extent is Shell using this work to contribute to the current discussions happening under the UN Framework Convention for Climate Change process?	Dale	Dale, thanks. We have presented this work to quite a number of governments that are participating in the UNFCCC and we are delighted to make this contribution. We also maintain a dialogue with the Secretariat of the UNFCC, seeking to assist where we can in their important work.	Shawn
How is Shell engaging in the coalition aspect of blueprints?	Jeff	Thanks Jeff, we are working with a number of government and business partner to work towards Blueprints. We are exploring possibilities for further coalitions with interested parties who are significant players in the energy system.	Shawn
Does Shell plan investment in renewables?	rob.shepler	We already invest in renewables. In fact, we spent \$1 billion over the years 2003-2007 in the areas of solar, hydrogen, wind and biofuels. We are currently focused on increasing our spending on second-generation biofuels going forward.	Shawn

<p>China and USA are leading in CO2 emission what is shell operation in this area doing to see that this is reduced with fast alternative, america today are consuming more than what there can produce..</p>	<p>actionco2</p>	<p>Shell is working on carbon capture and storage, and is supporting countries who wish to have this incorporated into their energy policies.</p>	<p>Martin</p>
<p>I think another solution is for society to re-evaluate their priorities. Does everyone need a personal vehicle going into this future as described or will their possibly be other modes of transportation which are effective and efficient for most reasons for travel.</p>	<p>jw8765</p>	<p>You raise a good point. The biggest potential efficiency gains in transportation may require a change in the current paradigm regarding personal vehicles. The approach to a better system may lay in a total re-examination of some of the current tenets of the way people view their vehicles. Perhaps the most published recent attempt to change the way people view personal transportation was the development of the Segway, a two-wheeled electric device. Although the Segway failed to reach mass adoption, some view it as a potential step in the right direction. The idea of automated travel continues to inspire a great deal of thinking, as does the idea of virtual travel requiring no physical travel at all. Regardless, coming up with less energy-intensive modes of transportation for the future will require a lot of bright ideas and creative solutions to resolve.</p>	<p>Shawn</p>
<p>I would like to know what part of the energy sources in the world are currently consumed by public and private transport? Cars will become electric as You prdict. Aeroplanes will still run on petrol. Could some ships use both petrol and solar energy in the future? What about the use of sea and ocean wave energy ?</p>	<p>Borisov</p>	<p>Borisov, Just over a quarter of final energy demand, worldwide, is consumed for transport. Some have proposed that large ships could run on nuclear. But in our outlooks, we kept our ships on liquid fuels. Biofuels then becomes the best bet to replace a fossil source. Solar is unrealistic, unless converted to something like hydrogen, because of the large area needed to collect enough solar energy to run ships at night.</p>	<p>Martin</p>
<p>what is shell plan towards research since technology and skill are still lacking..</p>	<p>actionco2</p>	<p>Shell is investing large sums in R&D (\$1.2 billion in 2007). Our strategy with a strong focus on technology, was well supported with over 4,500 new professional hires in 2007. We have hired over 10,000 new professionals (many of which with a technological background) in 2006 and 2007, which was over double the hiring rate in 2004-05. We were early to see the trend of strong demand for staff in the technical areas, and we have been very successful with recruitment for that.</p>	<p>Peter</p>

<p>Do you agree that nuclear energy, possibly cold fusion in the 2030's, is the most certain future energy source?</p>	<p>futurestudies</p>	<p>Thank you for your question. Nuclear energy has an important role in the energy system currently, and will have in the future. We see that growing the industry rapidly will face practical challenges (as well as political challenges in some places). This is because old reactors will be decommissioned in the coming years, and new developments will require significant expansion of construction capacity etc.. Developments like (hot) fusion are a number of years away from practical demonstration in industrial sized plants, and so will not be able to be deployed to contribute at global scale in the coming decades.</p>	<p>Jeremy</p>
<p>What is Shell's roll in Latin America, and more specifically in Brazil. Kindly refer to the ethanol expansion use in fleet vehicle versus gasolina (from oil) mainly due Brazil's endowment (soil, sun, water) is significant if produced in a sustainable way. -</p>	<p>mirna :</p>	<p>Mirna, thank you for your question. Shell has a significant presence in Latin America, we are proud to do business in the region. Brazil is certainly a world leader in the production and use of ethanol as a transport fuel. Shell is also active in the use of biofuels, we've just significantly stepped up our investment in second generation biofuels. 2nd generation biofuels are produced from non food use sources so they don't take food out of the world's food supply. If you need a more specific answer than this I can refer you offline to one of my colleagues in Brazil. Many thanks.</p>	<p>Robert</p>
<p>Are the renewable energy targets likely to be achieved?</p>	<p>futurestudies :</p>	<p>Many believe this will not be the case - Renewables will be important part of any future energy mix. It must be recognised that all energy supplies have challenges to growth, which includes renewables. However, we believe that renewables will still grow significantly to make up approximately 30% of primary energy by 2050.</p>	<p>Peter</p>
<p>Do you expect collaboration between oil companies and utilities on CCS? of what type? Just R&D, joint business?</p>	<p>Roberta</p>	<p>Roberta, Carbon capture and storage (CCS) at scale will need some new technologies. I would definitely expect to see new alliances between different companies, such as those involved who develop the best and most efficient methods of capture, alongside those with some of the skills that are more established such as pipelines and drilling to store the CO2 underground.</p>	<p>Martin</p>
<p>When do you believe that ethanol made by cellulose (second generation) will be available in big scale ?</p>	<p>paulo &acute;pasos</p>	<p>Good question Paulo. As you probably know we have several technology partnerships on second generation biofuels. As with other technologies, also these will take time to matue. New energy technologies will have to go through extensive R&D and demonstration before they are ready for development on a</p>	<p>Peter</p>

		commercial scale. It will take for sure many years for second generation biofuels to mature. We are looking for an opportunity to set up a commercial plant with our partner IOGEN.	
I thought your two scenarios were good, however should there perhaps be parallel couple of scenarios relative to the uncertainties. For example, if "new oil" includes oil shale and tar sands at a large scale, how will that affect water use and environemtn as well as net energy production? Will the nuclear issue of long term storage become significant with an increase in nuclear? How will a change in incentives from traditional to new energy sources impact on the energy producing and energy using industires? I am not looking for answers just raising the issue of how difficult it will be to deal with immense uncertainties.	rogerc	Roger, thank you for raising these interesting points. We chose to use our two scenarios to help strategic decision-making, we believe they provide the right mechanism to stimulate and challenge thinking. We did consider the questions you raise above in our scenarios and both Scramble and Blueprints reflect, among many other considerations, the questions you raise.	Shawn
does Shell have targets as to what percentage of its capital investments will go towards renewables? If yes, then what are they?	pandres	Thanks for the question. We do not have a specific target for investments on renewables. However we have spend considerable amounts on our various renewable business opportunities in the past (over \$ 1 bln over the last 5 years), and are looking for further opportunities especially in the area of second generation Biofuels and Wind. Shell is aiming to have a material-sized business in an alternative energy as from the second half of the next decade.	Martin
In order to reduce the need to build more highways in the USA (and expanding the number of lanes on existing highways) wouldn't it be more energy efficient and safer	Steve		
Both scenarios emphasise the centrality of conventional economic growth, but in a world moving to 9 billion people by 2050, all intent on escalating consumption, this seems totally unrealistic. Did you consider scenarios where new paradigms emerge, for example steady-state economies ?	Ian Dunlop	We did have extensive debates about how to consider economic growth given the importance of income in driving demand for energy services. We concluded that rather than differentiate our scenarios on economic growth, we would like to explore how energy might be met, under different sets of people's choices, with the economic growth maintained.	Peter

<p>The scenarios appear to be assuming that Oil and Gas resources (not specifically "production") will decline on a "long plateau" (Blueprints, p.41). In the light of recent events (e.g. the oil price having approached \$127, Saudi refusal to increase supply, Russian admissions that their production may have peaked, etc.), what if the rate of oil and gas production decline turns out to be significantly steeper than anticipated? - Ji</p>	<p>jim King</p>	<p>m King - thanks for your question. In developing the scenarios we have considered various different possible economic and political approaches in different nations. So we believe we have reflected the interaction of economic and political rationale in the scenarios, resulting in the different production profiles you see in the figures (i.e. moving towards different levels of long plateau). Tightness in the system, of course, stimulates a variety of different developments, such as the growth of unconventional oil production and enhancements in the efficient use of energy.</p>	<p>Jeremy</p>
<p>Shell is making major investments in oil shales and tar sands. The Energy Return on Energy Invested in either case is low and the environmental impact is major. CCS is essential if this activity is to be viable, yet your scenario booklet seems somewhat dismissive of the probability of CCS ever being of widespread application, certainly not for some time to come. How do you see this dilemma being resolved ? -</p>	<p>Ian Dunlop</p>	<p>Ian, thanks for your question. Our scenarios are certainly not dismissive of widespread use of CCS (carbon capture and sequestration), indeed it is one of the key mechanism in we see which the world can use to tackle climate change. Our Blueprints scenario envisages that by 2050 90% of fossil fueled power plants in the developed world and 50% in the developing world would have CCS applied. This is a massive change from today and will require a vast amount of investment and work, as a world we need to start doing this as early as possible and Shell is actively advocating CCS to many governments. Regarding oil sands, the three hard truths we describe as the preliminary to our scenarios, which are observables realities today, really dictate that the world will need all the energy it can get, including oil sands. Many thanks,</p>	<p>Robert</p>
<p>shell has been in operation in Nigeria for long and i have seen their contribution to community development, what is the best future for to see that Nigeria energy demand is improved? many country have gone far in going green, what then can u do to see to the end of crises in niger delte</p>	<p>actionco2</p>	<p>Actionco2, thanks for your question. Shell remains deeply committed to supporting the government's efforts to bring peace and prosperity to the Niger Delta. This starts with generating oil and gas revenues – we paid \$1.6 billion to the government in taxes and royalties in 2007. Onshore in the Delta, the government received 95% of the profits from each barrel of oil and gas equivalent produced by the SPDC joint venture based on average oil prices last year. We are also helping the government build the capacity of the country's public institutions to use these oil and gas revenues effectively for development, for example through strong support for the Extractive Industry Transparency Initiative in Nigeria and by using our relationships with international development experts. Also, we make concerted efforts to use local contractors and suppliers in ways</p>	<p>Shawn</p>

		that spread economic wealth without increasing conflict, for example last year Shell run companies awarded contracts worth nearly \$1 billion to Nigerian companies.	
I have been working with a housing association which is getting to grips with microgeneration (CHP, heat, pumps, etc) which is often required now as part of planning applications for larger developments. Is microgeneration too small to have any significant part to play in these scenarios, and is it more likely to flourish under Blueprint?	David de Paeztron	The hard truths we're facing are really challenging. So we are going to need a vast number of technologies. So, microgeneration from CHP, heat pumps, and some solar technologies are definitely a part of the mix. Some distributed energy, like CHP, does require co-ordination across many parties and as such fits better into Blueprints.	Martin
Blueprints scenario will be realized only if energy efficiency and demand management is achieved in four sectors: heat & power generation, industry, transport, and buildings. Buildings account for about half of all energy demand. Sustainability-oriented neighborhoods, villages, and cities have the potential to reduce building energy use; and also increase efficiency of power generation via distributed generation and combined heat and power. They therefore offer a leverage point to support the blueprints scenario. Has Shell considered making seed investments in support of such leverage points?	BillF	Blueprints requires lots of solutions. There is not just one. It will also require a lot of different players taking this on. Shell wants to build one large-scale renewables business within the next decade. We are also making a number of seed investments, such as marine algae as a biofuel. In addition, we are participating in the ZeroGen project in Australia which is integrating clean coal technologies of coal gasification with carbon capture and storage to produce low emission baseload power.	Shawn
I have noticed that Chevron around Malaysia had tapped into thermal energy coming from the earth in areas that apparently have only a thin layer of cover. They drill down and use the thermal energy to produce steam and the steam generates electricity. Is Shell doing any type of exploration for this type of energy sources?	jw8765	All forms of renewables will be important part of future energy mix, including geothermal. We continue to explore potential of all options.	Peter
I have worked in the oil and gas industry for over 40 years and find that the solutions such as CCS are only a small part in ameliorating GHG. What we need is also to reduce the energy consumption and polluters pay a fee for putting GHG in the atmosphere.	engineer	The biggest savings, I agree, do come from using energy much more efficiently, so as to meet people's needs to for travel, to heat homes etc whilst reducing overall energy consumption. Paying for GHG emissions will be a key part of this. CCS does have a sizeable contribution to make – though far more in electricity generation than in the oil and gas industry. If you're right that its overall contribution will be small, then we shall require even more from the other technologies (including energy saving ones) than we have in Blueprints.	Martin

<p>ok. I'll appreciate. As you certainly know, Robert, we have the raw material, the bagasse from sugar cane, to be used in 2nd generation (hydrolisis) right inside the plant, which reduces costs. Would like to talk to one of your colleagues. Thank you.</p>	<p>mirna</p>		
<p>Would it be possible to split the O2 from the Carbon and use the Carbon with the biofuels and the O2 with Industrial processes? Would a process to do such a thing cost more than shipping the CO2 all over the place?</p>	<p>jw8765</p>	<p>At the moment, most technologists at energy conferences that I've been to believe that capturing and storing CO2 will be the cheapest technology. However, there are a number of scientists working on various mineralisation technologies to capture CO2 in various ways and store it. Your suggestion was the first I'd heard of taking the carbon out directly. You would have to put in a lot of energy first to split the C from the O2 though.</p>	<p>Martin</p>
<p>How will the new French hydrogen cars affect the requirement of oil? -</p>	<p>sqklein</p>	<p>Hydrogen is a potentially important future energy carrier, and could be important part of future transport. Oil will continue to be a significant part of the transport mix as shown in our two scenarios, even with significant penetration of alternative such as biofuels, electricity and hydrogen.</p>	<p>Peter</p>
<p>Blueprints scenario will be realized only if energy efficiency and demand management is achieved in four sectors: heat & power generation, industry, transport, and buildings. Buildings account for about half of all energy demand. Sustainability-oriented neighborhoods, villages, and cities have the potential to reduce building energy use; and also increase efficiency of power generation via distributed generation and combined heat and power. They therefore offer a leverage point to support the blueprints scenario. Has Shell considered making seed investments in support of such leverage points?</p>	<p>BillF</p>	<p>Bill, thanks for your question. You're absolutely right about the important role of energy efficiency gains in these sectors and these play a key part in our Blueprints scenario. I'm afraid it's not Shell's role to make these kind of seed investments. Government and NGOs play that role in societies. The Shell Foundation does make seed investments, I'm not quite sure if it does so in this particular area, you could contact the Shell Foundation to ask for more information. Many thanks,</p>	<p>Robert</p>

<p>The complete loss of the Arctic summer sea-ice by 2013 will raise temperatures in the region by about 5C. This will accelerate the loss of methane and CO2 from the permafrost in vast quantities. It is very likely that when the penny drops about the significance of this (after a few years of scientific, social and political digestion) that a growing number of countries will realise that we have seriously too much CO2 in the air now. This means that the target for all countries should be zero CO2 (greenhouse gas) emissions AND to restore the Arctic sea-ice we will need to extract 200 Gigatonnes of excess carbon from the air. Could Shell handle a scenario where after say five years from now, many countries realise this and they go onto a mobilisation footing like in WW2, and make the transition to a zero carbon economy in about 10 years? Have you got any internal scenarios like this? If not you might like to look at the report " Climate Code Red" that you can download from http://climatecoded.net Regards, Philip Sutton –</p>	<p>Philip Sutton</p>	<p>Philip, you raise serious concerns. We work closely with a number of leading scientific communities (e.g. MIT) who have the expertise to combine energy emissions outlooks and the impact of land-use changes, and translate this into climate risk profiles. As you say, the regulatory and political playing field around this is critical. Timescales are very significant. A decision about a power station today, probably means a plant that will still be operating in 40 years time. Thanks for your reading suggestion!</p>	<p>Jeremy</p>
<p>In a tougher and tougher operating environment oil multinationals are being criticized for not doing enough to develop and promote alternative renewable energy sources...\$1 billion over five years might be viewed as nominal. How would you respond?</p>	<p>3P</p>	<p>Shell currently has various "alternatives pots" on the fire at different stages of R&D development. This enables us to be at the forefront of technology and market development of new alternative energy technologies. Shell wants to build one large-scale renewables business within the next decade. As with other technologies, these "pots on the fire" will take time to mature. The principles is always the same: new energy technologies have to go through extensive R&D and demonstration before they are ready for development on a commercial scale.</p>	<p>Shawn</p>
<p>Both scenarios give a relatively pessimistic outlook for reduction of ghg emissions. Even in the EU there is no reduction to 2020. What are the views of the energy team on the prospects for a post-2012 agreement and the nature of such an agreement? Are the team discounting extreme climate events or merely the willingness of countries to impose meaningful constraints?</p>	<p>Ian Emsley</p>	<p>Ian, The focus to 2020 has to be to develop the alternative technologies. So many of them are not ready, competitive, or even have the capacity to roll out at the sorts of scale we need. There is a lot of legacy and momentum in the energy system. The work to 2020 may not look significant on the charts, but it is vital so that technologies can be rolled out at scale after 2020. I would say that the development of a climate deal, after 2012 is a major uncertainty we're facing. One of the most important differentiators between our scenarios is humans' decisions around CO2. The climate scientists advised us in our scenario workshops that the significant climate events were more of a problem for the second half of the century.</p>	<p>Martin</p>

I see that the hour is about gone. I have enjoyed the exchange of thoughts on the future of energy scenarios from the perspective of Shell and look forward to the next one. I would like to thank everyone and particularly those at Shell for providing answers to all of the questions.	jw8765		
Robert, how do I contact Shell Foundation? -	Billf	Billf, you can find more info at www.shellfoundation.org	Robert
what do you think needs to be done to move towards a workable standard for pricing CO2 emissions?	Ben Backwell	Ben, thanks for your question. In the end this is clearly going to take significant international cooperation between governments. What we also see is that actions at a sub-national level can pave the way for this and help national governments past the political hurdles to international agreement. Examples of this kind of non-national government action include the AB32 bill in California establishing a cap on carbon emission and the efforts of the C40 group of major cities to tackle climate change.	Robert
From my own point of view using of biofuel is the most feasible because its resources is available through out the universe either wastes or plants But solar and electricity will be expensive and some developing countries will not be able to afford it. Especially countries that are lacking behind in Technology	oluwatosin	Biofuels will be an important part of any future energy mix, as demonstrated in our two scenarios, as will solar. Both options offer significant potential but both also require significant investment and technology development.	Peter
More emphasis should be directed towards Clean energy. Why not direct Shell resources more towards Fuel Cell development instead of sticking with the traditional, un-renewable, petroleum search?	Mike	Mike - I used to look after the Shell Hydrogen business, which is the probably the major fuel for fuel cells. This business was established to contribute to establishing the playing field for such developments, both regulatory and technical. As Shell, our expertise is in energy and fuels, so we worked in close partnership with the fuel cell and automotive industry players to move forward this route to complementary energy. And we continue to do so.	Jeremy
What about the Chinese mini nuclear pellet (plants?) which will provide energy for 4000-5000 families. Technology which was developed around the 1940s I believe in the US	sqklein	The Chinese and South Africans are leading the way in developing so called pebble bed nuclear plants that could be developed on a much smaller scale than today's nuclear plants. However, we shall need breakthroughs in standardisation and scale in order to have a major impact on our energy outlooks.	Martin

<p>"The climate scientists advised us in our scenario workshops that the significant climate events were more of a problem for the second half of the century. Martin "</p>	<p>Philip Sutton</p>		
<p>But the climate system has 30 -50 year lags so you have to cut now to avoid catastrophe (bigger than Burma) in the second half of the century. Philip Sutton</p>	<p>Philip Sutton</p>		
<p>Carbon emission price: What CO2 emissions price, in today's \$ are you considering when you say in Blueprints: Page 25: CO2 prices strengthen early. Page 37: Reversing the growth in CO2 emissions requires significant CO2 pricing and trading.</p>	<p>Robert Gibson</p>	<p>The CO₂ policies to vary regionally, but for Blueprints we considered for richer OECD countries that the CO₂ price would rise from 40 USD / tonne in the mid 2010s to 90 USD / tonne (real terms) over our scenario timeframe.</p>	<p>Martin</p>
<p>Both of your scenarios include a similar level of oil usage. Is there currently sufficient investment to support the projected levels of oil supply?</p>	<p>John Hall Associates</p>	<p>Good question and one that many people are asking. As you know, adequate investment depends on the plans of many entities, often national government via their national oil companies. In our scenarios we have assumed that where economic and political conditions make sense investment will happen.</p>	<p>Robert</p>
<p>CCS efficiency: You mention in Blueprints page 33 that capturing and storing CO2 is energy intensive. Comparing CCS with vent to atmosphere, what % extra coal does one need to burn to reduce CO2 emissions by, say, 80% the same net kWh delivered to end consumers? In answering this question one needs to consider: 1. What are the energy efficiencies in: a. The power station b. The system required to compress the CO₂, pipe it to a storage location, pump it into the ground and monitor it for as long as is necessary. c. The system for mining coal and transporting it to the power station. d. The energy required to manufacture and decommission the CCS equipment for the power station. 2. What % of the CO₂ emissions will the station capture? If it captures 90% and, in order to cover the energy required for CCS, burns twice as much coal then that gives the 80% of vent to atmosphere emissions. But this is not the whole story. What about the CO₂ emissions in items 1 b to 1 d above?</p>	<p>Robert Gibson</p>	<p>In our consideration, we assumed that an extra 15% energy input would be required to run the CCS and maintain the same electricity output from a coal-fired power station. Technologies today do not achieve this at scale, but several research programmes are underway with a target to do even better than this. We assumed that 85% of emissions are avoided under CCS. The energy losses in mining and transporting coal are considered in our analysis as part of so called 'energy sector losses'. We considered the energy consumption specifically to build out the CCS infrastructure would be small by comparison.</p>	<p>Martin</p>

<p>I notice the reduced share of the nuclear powered energy in the energy supply of both scenarios. Due to its reduced effect on the GHG, what was the logics behind this assumption? Alvaro/IBP</p>	<p>alvaro</p>	<p>We have considered all potential supply options within our scenario work. We have done detailed modeling for each and all have challenges to growth. It is challenging to expand nuclear quickly on a global scale due to long lead-times for churn of new capacity, building of new capacity being constrained by materials and skilled labour availability and the need for significant government support</p>	<p>Peter</p>
<p>Any investment to protect our environment worth going into in which solar and biofuel is will be assesible and available,when there is life there is wealth</p>	<p>oluwatosin</p>	<p>Sorry, we don't understand the question.</p>	<p>Peter</p>
<p>Hello: I'm epsecially interested in knowing your opinion on the impacts of biofuels, especially the debate between food vs fuel and local production vs importation from Brazil where I am. Thanks</p>	<p>jaime</p>	<p>Jaime, Biofuels will be important part of any future energy mix. Shell is committed to providing sustainable energy, including developing lower carbon fuels. Biofuels are not only part of this sustainable solution, but also present Shell with a great business opportunity. Not all biofuels are the same. Shell was one of the first energy companies to invest in the so called second generation biofuels (i.e. using nonfood feedstocks) and continue this with technical partnerships with Iogen in Canada, CHOREN in Germany, and Codexis, HR Biopetroleum and Virent in the US.</p>	<p>Peter</p>
<p>Second question: I notice the reduction of the biofuels share in the Blueprint scenario. Why? Alvaro/IBP</p>	<p>alvaro</p>	<p>Biofuels in absolute terms actually continue to grow in Blueprints scenario.</p>	<p>Peter</p>
<p>Can you please give some figures for your estimated capital expenditure on renewables for the next five years?.</p>	<p>Ben Backwell</p>	<p>Ben, thanks for your question. Shell currently has various alternative energy 'pots on the fire' at differing stages of R&D and execution. This enables us to be at the forefront of technologies in the alternative energy space. These 'pots' will take time to mature, it is therefore difficult to predict our exact investments in this area. Shell is committed to develop one commercial scale renewable energy business in the course of the next decade.</p>	<p>Robert</p>

<p>what do you think needs to be done to move towards a workable standard for pricing CO2 emissions?</p>	<p>Ben Backwell</p>	<p>I don't think there's a single silver bullet answer to this. Both top-down and bottom-up approaches have a role to play, as described in the Blueprints scenario. I think it is significant to move forward along routes like the various Emission Trading Systems, rather than waiting for everyone to wait for years to agree on a single ideal approach. However, the aim should be to move towards progressive harmonisation and to limit the number of different approaches, as too fragmented a patchwork could inhibit investment and trade.</p>	<p>Jeremy</p>
<p>Does Shell prefer that a carbon pricing system drive the Blueprints scenario--or gov't policies that subsidize R and D and subsidize new technology, like oil shale development?</p>	<p>energyprof</p>	<p>ANSWER: Both pricing and technology policy have key roles to play. The first shapes choices among available options, and the second expands the number of options to choose from. We need both.</p>	<p>Jeremy</p>
<p>I believe in shell and hope they will continue to work towards a free and environmental firendly society</p>	<p>ACTIONCO2</p>		
<p>Robert, CCS? Not all of us know all the acronyms :)</p>	<p>jessica lipnack</p>	<p>Carbon Capture and Storage</p>	<p>Robert Burley</p>
<p>What portion of your profits are being invested in renewable energy projects? I read that it was <1% and that Shell had bailed out of a wind farm project in England.</p>	<p>NB_Doug</p>	<p>thanks Doug. Shell is committed to building a full commercial scale renewable energy business by around the middle of the next decade. At the moment we have a number of renewable energy 'pots on the fire' including wind power and we are working on making them cost competitive and learning. Recently</p>	<p>Shawn</p>

		we have quadrupled our rate of investment in transport biofuels, particular in more sustainable 2 nd generation biofuels.	
Why is the oil wealth not being shared with the people of Nigeria? I have seen the poverty and pollution that are happening there and it is no wonder that there are violent uprisings there. How about sharing the profits by investing in schools, housing, hospitals and environmental protection?	NB_Doug	Doug, thanks for your question. Shell remains deeply committed to supporting the government's efforts to bring peace and prosperity to the Niger Delta. This starts with generating oil and gas revenues – we paid \$1.6 billion to the government in taxes and royalties in 2007. Onshore in the Delta, the government received 95% of the profits from each barrel of oil and gas equivalent produced by the SPDC joint venture based on average oil prices last year. We are also helping the government build the capacity of the country's public institutions to use these oil and gas revenues effectively for development, for example through strong support for the Extractive Industry Transparency Initiative in Nigeria and by using our relationships with international development experts. We make concerted efforts to use local contractors and suppliers in ways that spread economic wealth without increasing conflict, for example last year Shell run companies awarded contracts worth nearly \$1 billion to Nigerian companies.	Shawn