

Taking a long-term view

Shell is a global group of energy and petrochemical companies, operating in more than 145 countries and employing nearly 120,000 people. Shell produces circa 3% of the world's oil and circa 3.5% of the world's gas. Most people know the company for its retail outlets and its oil and natural gas exploration and production activity.

Other Shell activities include:

- marketing, transporting and trading oil and gas
- providing oil products for industrial uses, including fuel and lubricant for ships and aircraft
- generating electricity, including wind power and producing solar panels
- producing petrochemicals used for plastics, coatings and detergents
- developing technology for hydrogen vehicles.

Shell considers it a business priority to diversify its business portfolio to include more unconventional fuels in order to meet the world's increasing demand for energy whilst minimising the impact on the environment. Hence the need for the development of 'future fuels'.

At the present time, any company seeking merely to exploit resources for immediate gain and at the expense of the environment or customers' best long-term interests is likely to generate government scrutiny, public hostility, customer resistance and, possibly, prosecution. Like any well-run business, Shell takes a long term view of what constitutes 'best possible use' of the resources available to it.

One key challenge facing Shell is how to use its profits and accumulated reserves to promote sustainable business growth. Like all companies, Shell distributes some of its profits to shareholders in the form of dividends. It needs to invest any retained profit in developing the business in sustainable ways e.g. investing in new oil and gas drilling projects, refinery improvements, and research into, and development of, new products such as 'future fuels'.

A company like Shell makes an operating profit from its manufacturing and trading activities. Some of this operating profit

- goes to government in the form of Corporation Tax payments and other tax revenues
- is distributed to shareholders in the form of dividends
- is retained in the business, and invested in exploration, operational improvement and research and development.



Together with other major companies, Shell participated in the Sustainable Mobility Project run by the World Business Council for Sustainable Development, which has highlighted the complexity and importance of making transport systems more sustainable.

Some of the initiatives being developed by Shell to contribute to sustainable mobility are outlined in section 5, e.g. developing lower sulphur fuels and building a worldscale Gas to Liquids plant in Qatar.

Research and development

In any well-run company, research and development (R&D) have strictly commercial functions. They further the company's business aims by creating new and better products, improving existing operations and developing new ones. They provide expert advice for the company and to customers.

Shell's R&D programme has a twofold emphasis. It looks to:

1. make the best possible use of resources
2. take maximum care of the environment.

The continued commercial success of the business depends on meeting these objectives.

Some research cannot be expected to pay for itself in any foreseeable time span. Many companies allocate a proportion of their research budgets to so-called 'blue-sky' investigations. These may produce spectacular commercial results in the shortish term,



but their more likely contribution is long term e.g. to an understanding of physical, chemical and environmental processes.

Research may produce unanticipated 'spin-off' benefits e.g. chance discoveries that lead to new, more environmentally friendly fuel technologies.

Contributing to sustainable development



Shell looks to contribute to sustainable development in three closely interconnected ways, each of which relates to long-term investment in R&D.

1. Meeting the global energy challenge. This includes helping to:

- provide the extra energy required to sustain world economic development, including more oil and natural gas
- improve access to modern energy for the two billion people who currently live without it
- offer 'cleaner' products (e.g. low-sulphur petrol, GtL and diesel) and hydrogen products (hydrogen for new fuel cell vehicles)
- shift the world economy towards a low-carbon energy system by providing more natural gas (to replace coal), and by lowering the costs of alternatives like wind power, solar power, and biofuels (fuels from plants).

2. Working to improve the environmental performance of Shell operations: lowering emissions and impacts on biodiversity, and using less energy, water and other resources.

3. Acting to improve social performance: safeguarding employees' health and safety, reducing disruptions to communities, and creating lasting economic benefits e.g. by employing local people and using local contractors and suppliers.

All these actions have positive business benefits for Shell by reducing operational and financial risks, cutting costs through 'eco-efficiency', building closer relationships with customers, and helping the company to create new products to meet customers' needs.

Developing 'future fuels'

Contemporary transport systems depend on the internal combustion engine and liquid petroleum fuels. Liquid fuels are highly efficient for motor transport because they:

- provide a lot of energy in relation to their volume
- can be stored on vehicles in lightweight fuel tanks
- typically carry vehicles for long distances on a single tankful.



The technology to extract and refine crude oil is highly efficient and cost effective.

However, with oil and gas reserves in limited supply and given the dangers of global warming, it is essential to:

- make existing forms of fuel more eco-efficient
- establish new forms of eco-efficient fuels. A key benefit from 'future fuels' is that, compared with hydrocarbons, they will reduce the creation of greenhouse gases.

Petrol and diesel are expected to continue to be the major road transport fuels until at least 2030. One challenge is to use R&D to reduce risks associated with these fuels.

In the developed world, petrol has become lead-free. Lead is currently being phased out in the developing world. Likewise, the sulphur content, a natural constituent of crude oil, has been progressively reduced in petrol to increase the longevity and performance of engine catalysts.

The future challenge is to introduce even more fuel-efficient spark ignition technologies, while preserving their lower local emissions. This will require catalyst-friendly fuels. Low sulphur levels in petrol grades, which could reach 10ppm, will constitute a key enabling property for the introduction of new engine technologies such as direct fuel injection.

Diesel engine technology is already very fuel efficient. Shell has been developing new diesels with much lower Nitrogen Oxide (NOx) and sulphur content. Shell has invested more than \$1 billion in its refineries to produce fuels that meet tougher sulphur limits.

In over 50 countries, under the Optimax, Pura, V-Power and Defenda brands, Shell offers premium quality transport fuels that can improve engine performance and reduce fuel consumption and emissions.

Shell has pioneered the development of several new fuels e.g. hydrogen filling stations in Iceland, USA and the Netherlands. These fuel sources use water and renewable electricity to provide hydrogen to power cars. This hydrogen is free from carbon. Fuel cell engines running on hydrogen could make vehicle transport genuinely sustainable. Hydrogen can be made locally and water is the only direct emission. Carbon emissions can be zero if the hydrogen is produced by using renewable power to electrolyse water. Shell Hydrogen is building a commercial business to begin tapping this potential.

Shell has also created transport fuels from natural gas. Converting natural gas into zero-sulphur Shell 'Gas to Liquids' (GtL) Transport Fuel is another way to reduce local pollution. Last year in London, Shell co-sponsored the 'Driving Tomorrow's Clean Technology' trial. Four charities were given a car equipped with emission reduction technology and filled with GtL. Over three months the charities drove the cars around London, using them in their day-to-day work.

In Bangkok (Thailand), Shell sells Pura, a fuel that reduces engine black smoke from older vehicles by up to 25%. In Malaysia, Shell runs the only commercial GtL plant of its type, producing ultra-clean products. In Qatar, Shell plans a multi-billion dollar investment to build a plant on a world scale.

Derived from renewable sources, biofuels can result in lower overall carbon dioxide emissions. When burned, plants release the carbon they absorbed as they grew and this energy is used to fuel vehicles. Bio-fuels can be used either 'pure' or as a blend with standard automotive fuels.

Shell is the biggest blender of transport biofuels, but these are currently expensive to produce.

However, Shell is contributing funds for the construction of a plant to test the new technology and to make the fuel cheaper using waste wood and straw, with carbon emissions 90% lower than for conventional fuels.

Conclusion



For the past 100 years, the internal combustion engine and hydrocarbons have helped promote world economic growth. Today, however, we need to reflect on how best to use these fuels to sustain growth.

Shell is looking to continue to contribute to the sustainability of the world economy by making existing hydrocarbon-based fuels more efficient, and by removing the harmful effects of pollution while at the same time using research and development to develop fuels for the future.