

# Secure energy

Diversity is critical for protecting the world from interruptions to energy supplies. We are helping by investing in a wide range of energy options to avoid over-dependence on any one region or energy source.

# Security through diversity

Higher prices and the end of “easy” oil are helping make energy a political lever again. Big energy-consuming countries are increasingly worried about the vulnerability of their supplies.

Energy independence is not realistic for big consuming countries. For example, the USA uses about 25% of the world’s oil but has less than 3% of remaining proved oil reserves. The same is true for the European Union’s consumption and reserves of natural gas. Competitive international markets are the surest way to increase global supplies and promote a wide range of supply alternatives – both from different regions and different energy sources.

Massive investments and stable investment conditions are needed. So are sophisticated technology, the ability to manage complex projects and access to resources for the international oil companies that have this know-how. Energy efficiency measures, encouraged by governments, will also need to play an important role.

We are helping diversify energy options in four main ways: by extending the life of existing oil and natural gas fields; by opening up new fields and regions; by developing new ways to produce transport fuels; and by providing a wide range of options for generating electricity.

## Squeezing more out of existing fields

New technology is helping us extend the life of existing energy resources close to markets. Today, only 30–40% of oil contained in most reservoirs is typically extracted. Boosting recovery rates by just a few per cent can dramatically increase long-term supply. For example, injecting steam, gas or chemicals into reservoirs is slowing the natural decline in production from mature fields where we have an interest in California, Canada and Oman. A Shell team is investigating the possibility of injecting waste CO<sub>2</sub> into oil fields off the coast of Norway, which would boost production and reduce GHG emissions (page 13).

## Developing new fields

With new technology we are also developing new fields near major markets that were once thought too difficult or expensive to exploit. For example, we are developing a new project in water nearly 2.5 km deep in the Gulf of Mexico. With further technology advancement, unconventional oil sands and shales could also significantly increase supplies to some of the world’s biggest energy consuming countries (see box). Unmanned production platforms – like those in the North Sea, powered by renewable

energy from wind turbines and solar panels – are allowing us to tap ever-smaller deposits that were not previously economic (page 13).

### More options for transport fuel

Substitutes that can be blended with petrol or diesel can increase supply options and reduce dependence on oil in the transport sector. We are one of the world's leading distributors of transport fuel from plants (biofuels – page 15). Our Gas to Liquids (GTL) technology turns natural gas into cleaner-burning transport fuel. We operate one GTL plant in Malaysia and are building a second, the world's largest, in Qatar (see box).

Shell Hydrogen is exploring ways to promote hydrogen as a longer-term fuel option and in 2006 operated five demonstration refuelling stations around the world.

More refinery capacity will help avoid bottlenecks in fuel supplies. Subject to a final investment decision, construction could begin in 2007 to more than double production at our Motiva joint venture refinery in Port Arthur, Texas. After the expansion, the refinery would process 600,000 barrels of oil a day, producing enough petrol to fill up more than one million cars per day. The project would make Port Arthur the largest refinery in the USA.

### Electricity choices

Shell Renewables is a major developer of wind power and is investing in next-generation thin-film solar technology (page 15).

Our natural gas production provides customers with an alternative to coal and oil for power generation. Cooling natural gas to liquid form, so that it can be cost-effectively shipped long distances, gives natural gas users a wider choice of suppliers. We are a leader in LNG (see box). LNG operations we participate in supply more than a third of Japan's and Korea's total natural gas needs, as well as customers in Europe, India, North America and Taiwan.

Shell is also a leader in coal gasification technology. Turning coal into gas allows energy-hungry countries like China, India and the USA, to use their abundant coal reserves more cleanly and efficiently (page 13).

#### Additional web content:

- Our efforts to develop new energy technology.
- Shell's LNG business.
- How we are developing new sources of oil and gas.

 [www.shell.com/secureenergy](http://www.shell.com/secureenergy)



### DIVERSIFIED GAS

Today, we participate in operations that supply more than 35% of the world's LNG. Existing facilities in Australia and Nigeria are being expanded and new projects are under construction in Qatar and on Sakhalin Island, Russia (pages 34–35). By 2010, our aim is to have almost doubled our LNG capacity, compared to 2004.

Today, diesel containing GTL fuel from our plant in Malaysia is available in approximately 4,000 Shell retail stations in Europe and

Thailand. The Pearl GTL project in Qatar will produce natural gas from an offshore field and use proprietary Shell technology to turn that gas into transport fuel and other products. Enough transport fuel will be produced by the Pearl GTL plant to fill up more than 265,000 cars a day. Qatar has the third largest reserves of natural gas after Russia and Iran. The project will provide an additional way to bring this gas to energy users and contribute to reducing dependence on oil in the transport sector.



### UNCONVENTIONAL OIL

By 2015, 10–15% of our overall oil and gas production could come from unconventional sources like oil sands and gas-to-liquids (page 16). We are committed to pursuing their development in an environmentally and socially responsible way (page 14).

Canada's vast oil sands – a mix of tar-like heavy oil and sand – are thought to contain as much mineable oil as Saudi Arabia has conventional. Shell Canada's Athabasca Oil Sands Project already produces enough oil to meet the equivalent of approximately 10% of Canada's oil needs. In 2006, the decision was taken to expand the project's production by 65%, to 255,000 barrels of oil a day. Additional oil sands expansions are being considered that could increase production to

more than 500,000 barrels a day. Following a successful offer to buy out Shell Canada's minority shareholders, Shell is proceeding to acquire the remaining shares, a step that will strengthen our position in future oil sands production.

In Colorado, USA, the Shell Unconventional Resources Energy project (SURE) is testing technology to produce oil from oil shale. Heaters lowered into the ground increase the temperature underground to more than 300°C to convert the shale into high-quality light oil – a process that takes millions of years in nature. The USA Government estimates that oil shales contain one trillion barrels of oil in the USA alone – four times Saudi Arabia's proven reserves.