

Sustainable energy from renewable resources

shell.com/renewables



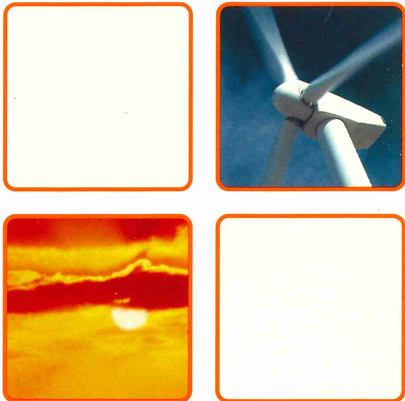
Shell Renewables



Our vision

For over a century, Shell has been at the forefront of energy – serving the current energy needs of society and business, and keeping a constant eye on the future to see how those needs might evolve. And we fully intend to be a leading player in energy a hundred years from now. That is why we are actively involved in the development of renewable sources of energy. Shell Renewables aims to break new ground by establishing a significant, commercially viable business in this sector.

We are building on proven strengths and new technologies to deliver energy solutions that are cost-effective, efficient and reliable to customers, communities and other stakeholders. At the same time, the sound economic and commercial principles and practices that underpin our business will ensure that Shell Renewables goes from strength to strength in the coming years.





“Renewables will become an important part of the energy mix of the future. We intend to create a significant business in this sector, making the most of the opportunities which this trend will bring.”

Karen de Segundo CEO, Shell Renewables

Making renewable energies pay their way

We believe that renewables will be an increasingly important part of the energy mix, driven by concerns over the availability of resources, technology development, and changing social and political priorities. While fossil fuels are unlikely to become scarce over the next two decades, pressure is rising in developed countries for cleaner fuels, and there is a growing demand from developing markets for state-of-the-art technology for the coming decades.

Shell has recently explored these trends developing two scenarios, “Dynamics as Usual” and “Spirit of the Coming Age”, in which we ask searching questions on how our energy systems could evolve.* All the evidence leads to the same conclusion – renewables will play an important role in the future of global energy. Independent analysis confirms this view. Public opinion supports such a shift. Governments are actively encouraging it. Finance is being

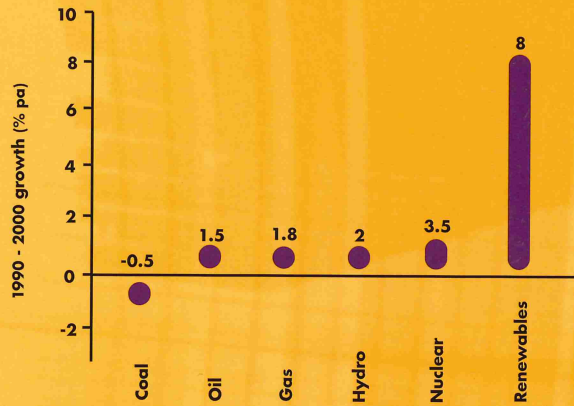
mobilised for renewable energy schemes in industrialised and developing countries.

But renewable energy will only deliver the benefits it promises on one condition: it must become big enough to make a difference. We cannot expect government to subsidise renewable energy indefinitely. But it is unlikely to be taken up by a significant number of consumers until the cost becomes competitive with conventional energy sources.

We have to make the renewable energy sector work commercially, as quickly as possible, to give it the long-term future it deserves. Shell Renewables is in business to meet this challenge. We are focusing on wind and solar energy, the fastest-growing renewable energy technologies. And we are working to expand markets, drive new technologies forward, lower costs, agree standards, and encourage trading.



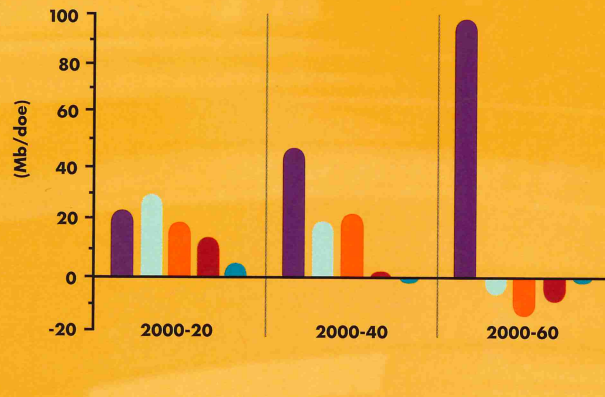
Renewables are growing faster than traditional energy sources...



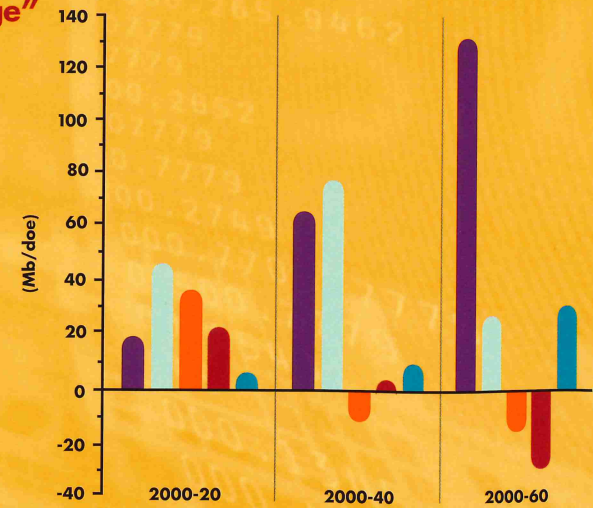
...with the fastest growth in wind and solar



"Dynamics as Usual"



"Spirit of the Coming Age"



Incremental Energy Supply by 20 Year Periods (millions of barrels per day oil equivalent)

"By 2050 renewables reach a third of the world primary energy and are supplying most incremental energy."*



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“Solar PV is one of the fastest-growing of all the renewables technologies. We have the people, the reach and the resources to build a sustainable, commercially successful solar PV business around the world.”

Philippe de Renzy Martin Executive Vice President, Shell Solar

Shell Solar

Meeting the market challenge

Of all the renewable energy technologies, solar photovoltaic (PV) is one of the fastest-growing. Over the last 10 years, the costs of providing solar energy have fallen by more than 50%. As this downward cost trend continues, solar PV is becoming an increasingly attractive and viable choice for businesses and consumers. It's an exciting and highly competitive market, with many challenges to overcome. Our ambition is to build a commercially-successful business in this sector by providing our customers with energy solutions for today's needs.

Following the acquisition of Siemens Solar Shell Solar is now one of the world's largest solar PV companies. In more than 90 countries around the globe, we work with customers to devise PV-based energy systems tailored to their particular requirements: grid-connected and off-grid, domestic and commercial, urban and rural. We are the only company that provides an integrated product range based on mono-crystalline, multi-crystalline and thin-film technologies – offering greater choice, performance and reliability.

And we are working on major technology development programmes that will make it easier to employ solar technology in a wider range of applications. We are also continuing to work successfully with governments around the world, helping to find systems of incentives and support that match each country's solar energy aspirations with its circumstances and needs.

We have the geographic reach, economies of scale, advanced technology capabilities and range of applications – remote and grid connected – to extend our position as a top-tier player in the global market for photovoltaic systems and energy supply.

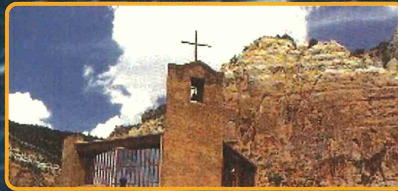
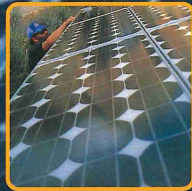
Deutsche Telekom is installing payphones with solar modules in places where connection to the public electricity grid is impossible or not cost-effective



The solar power rooftop at the Floriade exhibition near Amsterdam is the largest installation of its kind in the world. Built by Siemens Nederland, the 2.3MW roof comprising 19,000 panels is expected to generate 1.23GWh per year



In New Mexico, the Benedictine monastery of Christ in the Desert is completely solar powered, enabling the brothers to support their community through one of the world's newest vocations - designing internet sites



The flexibility and adaptability of solar technology is particularly beneficial in developing markets. For example, in the Ethiopian desert, medicines and vaccines are transported in solar-powered fridges on the backs of camels



Solar panels on the roofs of houses at Amersfoort in The Netherlands reduce domestic electricity costs by storing power for heating and lighting systems, washing machines, fridges and even computers



"We are strong in deal structuring, finance and project management. Within the next three years we will be a major player in this sector, developing and operating wind farms and generating green electricity"

David Jones Executive Vice President, Shell WindEnergy

Shell WindEnergy

Generating wind power on a commercial scale

Of all the renewable sources of energy, wind power is the closest to achieving commercial viability. Improvements in turbine technology are bringing down wind farm operating costs and government-backed fiscal incentives have provided extra stimulus.

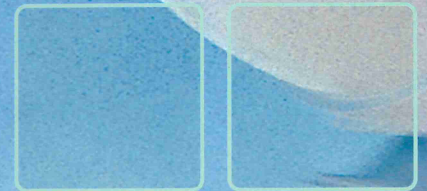
The installed generating capacity of wind turbines has grown by 40% year on year since 1994. Shell WindEnergy's capacity is growing rapidly. From just four

megawatts in 2000, it is expected to be over 200 megawatts by the end of 2002, demonstrating our determination to become a major player in this industry. Shell WindEnergy focuses on developing and operating wind farms, and selling 'green' electricity. We are building a business that is underpinned by our proven capabilities across the value chain, particularly in areas such as deal structuring, project management, operations and marketing.

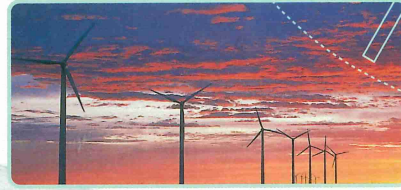
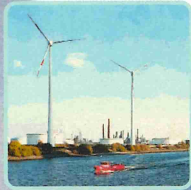
In this process, we rely on our financial strength, the wealth of skills and expertise we have gained on- and off-shore in the oil and gas industry, and the great strengths of our industry partners.

Together we have successfully taken on a host of technical and other challenges to supply wind power. Our earliest projects at Blyth in the North Sea and Harburg in Germany provided invaluable experience of working in harsh conditions and

connecting output to the public electricity grid. At Rock River, Wyoming, our first commercial-scale wind farm took less than four months from breaking ground to generation start-up. The 80 megawatt wind farm at White Deer in Texas was constructed in 15 weeks and provides enough power for 30,000 households.



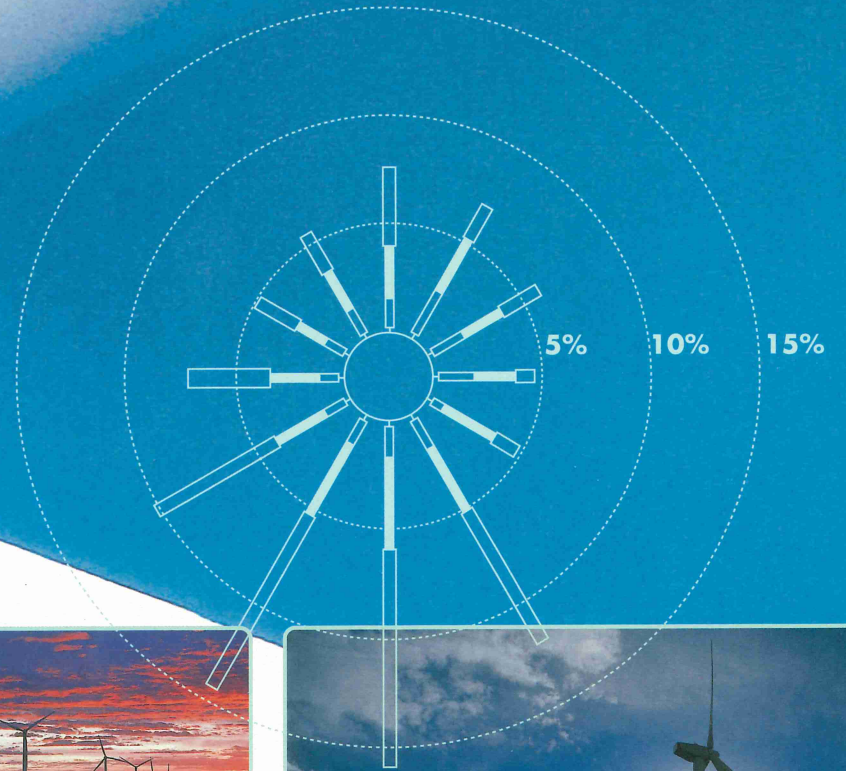
Shell's wind project at Blyth in the UK North Sea was the world's first offshore development



Shell's site at Harburg in Germany was the world's first refinery location to host wind turbines



Shell WindEnergy's first commercial-scale wind farm at Rock River, Wyoming, USA has a generating capacity of 50 megawatts



The 80 megawatt wind farm near Amarillo, Texas can provide power for up to 30,000 households



“The energy system evolves in response to consumer preferences, technology options, and the needs of society. We have a responsibility to anticipate change and meet our customers’ expectations”

Robert Kleiburg Vice President of Strategy & Planning, Shell Renewables

The future

Developing new energy sources for the future

The energy sector has a history of tremendous change and volatility. There is no reason to think the future will be any different. Concerns about climate change, together with the need to secure energy supplies for the future, mean that the energy chain must become progressively decarbonised as we move forward into the 21st century.

Shell’s analysis of long-term energy scenarios suggests different possible routes to decarbonisation. The world may follow a direct path to renewables, supported by gas in the medium term. Or it may take an

indirect path, via a global hydrogen economy that grows out of new developments in fuel cells and other technologies.*

Either way, expect the renewables share of the energy mix to increase. And, within the basket of renewables, expect wind and solar to continue growing faster than the other new energies.

In Shell Renewables, we aim to ensure that we will be ready for the future – whatever form it takes. While much of our effort focuses on wind and solar photovoltaics, two of the fastest-growing and most mature

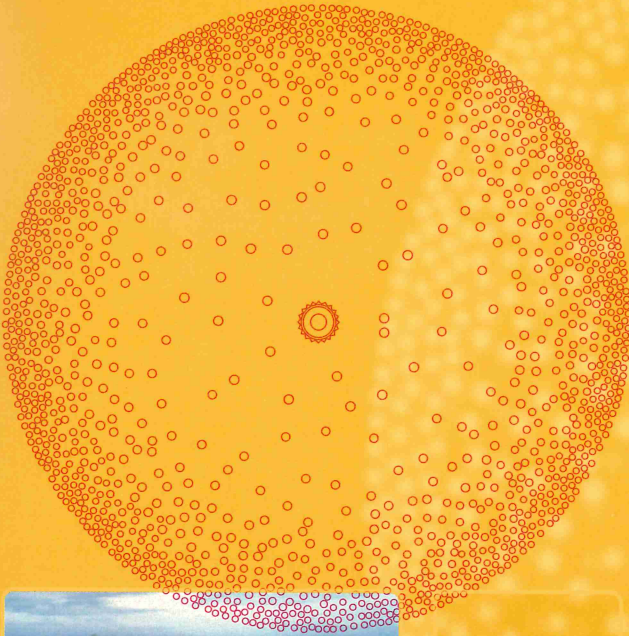
forms of renewable energy, Shell is also actively pursuing developments in biofuels, geothermal and hydrogen.

Shell is involved in the marketing of biofuels in the United States and South America and has purchased an equity stake in Iogen Energy Corporation, a world-leading bioethanol technology company. Shell’s investment will enable Iogen to develop more rapidly the world’s first commercial-scale biomass to ethanol plant.

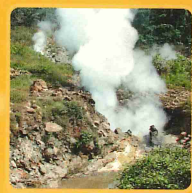
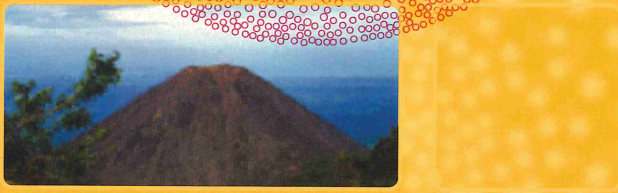
In our joint venture with Geotermica Salvadoreña, new technology to tap energy from ‘hot rocks’ thousands

of metres beneath the earth’s surface is being tested in a pilot project. If successful, this geothermal energy will generate up to five megawatts of power for the El Salvador electricity grid, opening up the possibility of using this technology in parts of the world where geothermal energy had not been previously considered viable.

Meanwhile, Shell Hydrogen is engaged in several collaborative ventures focusing on fuel processing design and applications, hydrogen storage products, and zero-emission power generation.



Extracting energy from hot rocks
Generating electricity from heat deep beneath the earth's surface – geothermal energy has the potential to become more widespread with Shell's hot fractured rock pilot project in El Salvador



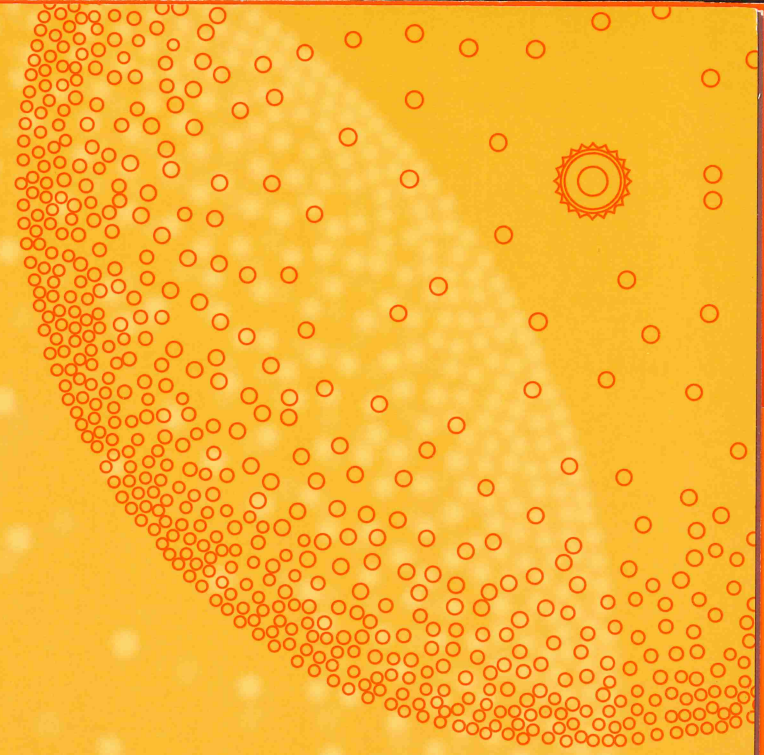
Biofuels marketing
Bioethanol is made from the fermentation of sugars derived from the plant fibre in renewable feedstocks such as wood and straw. Compared with gasoline, ethanol made from plant fibre releases over 90 percent lower carbon dioxide emissions.



Shell Hydrogen
Shell is part of a consortium planning to enable Iceland to become the first country in the world to replace traditional fossil fuels with hydrogen. The consortium,

which includes DaimlerChrysler and Norsk Hydro, will work with the Icelandic authorities to test the technologies and distribution systems. If the trial is successful, eventually all

Iceland's transport systems, including its large fishing fleet, could use hydrogen.



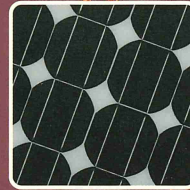
Shell Renewables

A global presence

Shell Renewables is active in over 90 countries spanning Europe, the Americas, Africa, the Middle East and Asia Pacific. Across the globe, we leverage our technology and project experience, our brand and our partnership skills.

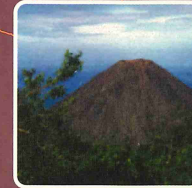
Whether we're supplying solar installations to consumers and businesses in Germany and the Netherlands, or providing stand-alone systems to generate electricity for villages in the Philippines, our ultimate aim is the same: to develop a business that is both fast-growing and commercially sound.

That business depends on striving for excellence in everything we do. From researching and developing solar technology in Germany to cell production in North America. Whether generating reliable 'green' electricity from wind farms in the US, or installing solar systems that power telecommunications in Cameroon. Collaborating through joint ventures in South Africa or supporting micro-credit schemes in India or Sri Lanka.

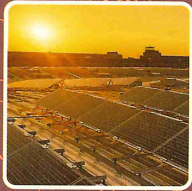


California
Shell Solar has world-class facilities for growing crystals, producing cells and manufacturing modules

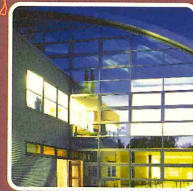
Wyoming/Texas/California
Shell WindEnergy has commercial scale wind farms that generate 230 megawatts of power



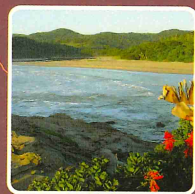
El Salvador
Shell is testing new technology to tap energy from 'hot rocks' below the earth's surface



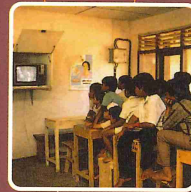
Germany
The solar power rooftop plant at the Munich Trade Centre delivers an energy output of one million kilowatt hours per year, achieving a reduction of around 1,000 tons of carbon dioxide



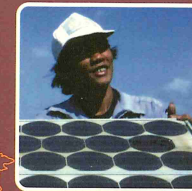
Germany
At Gelsenkirchen, Shell Solar has one of the most modern manufacturing facilities in the world, with state-of-the-art technology



South Africa
At the Hluleka Nature Reserve, a hybrid mini-grid system delivers cheap, efficient energy from wind and sun. Visitors can now enjoy this beautiful place without the constant noise of diesel generators



India/Sri Lanka
A single Shell Solar Home System can provide enough electricity for lighting and a few hours of television



Philippines
Working with local banks, NGOs and micro-credit organisations, Shell Solar makes installation of solar units affordable in rural villages

The future of renewable energy

Shell believes there is a viable and exciting future in renewables: from an economic, social and environmental perspective.

Renewables can have an important impact on greenhouse gases and climate change. But energy businesses like Shell cannot embrace renewables just because of environmental and PR benefits. Nor can we expect governments to keep funding renewable energy indefinitely, or consumers to pay more for it, when cheaper energy sources are available to them.

We have to make the renewable energy sector work commercially, as quickly as possible. Because unless consumers buy renewable energy, it has no future. If we want consumers to buy renewable energy, they have to see what's in it for them. Environmental benefits on their own won't be enough. For the majority of consumers convenience and cost are just as important in their choice of what to buy, if not more so, than "what's good for you". Consumers want things to be simple, transparent and attractive.

That means we need action: to lower costs by expanding markets, which in turn will accelerate experience and lead to even lower costs. We must create an adequate market structure for green certificate trading. Because the costs of renewable energy are still so high, in relative terms, this income stream from certificates is very much needed. At the moment, standards have yet to be agreed about what constitutes renewable energy production.

Until those standards, and the market structure, are in place, a key enabler for renewables growth is missing. Everyone has a role, direct or indirect, in making this happen: governments, the energy industry, other businesses, financial institutions and consumers, in both developed and developing countries.

Shell Renewables looks forward to playing its part.



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Electrical power was generated from renewable sources and the inks used are all vegetable-based.

The paper used for this brochure is Revive Silk. A minimum of 75% of the raw materials are made from 100% de-inked, post-consumer waste. All mill waste is recycled and can be as much as 25% of the total fibre content.