

# Research on the Low-Carbon Transformation Path of Shell Oil Company

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**Abstract.** At present, global warming has aroused widespread attention, and it is recognized that the greenhouse gas produced by burning fossil energy is one of the main factors affecting global temperature. Statistics suggest that the global temperature has increased significantly in recent years, and the average temperature in the Arctic has increased by more than 1.6 °C in the 21st century. In order to meet this challenge, the Paris Agreement on climate change has officially entered into force, proposing to achieve a peak in global greenhouse gas emissions as soon as possible, and to reduce global greenhouse gas emissions to 40 billion tons by 2030. Corresponding to the trend of green and low-carbon development, the major international oil companies have put forward new and targeted strategies.

**Keywords:** Low Carbon, Transformation, International Oil Company.

## 1. Introduction

According to the records of the World Meteorological Organization, the concentration of carbon dioxide and methane from 2019 to 2019 is higher than the average value of the past 10 years, which directly implies that it is urgent to solve the climate issues. In order to achieve the goal of controlling global warming within 2°C by the end of this century set by the Paris Agreement, many countries have begun to implement carbon emissions trading mechanisms, which will constitute a hard cost constraint on the oil and gas industry.

The latest research from the Climate responsibility Institute of the United States shows that 20 fossil energy companies around the world have contributed 35% of the world's carbon emissions in the past 50 years. In addition, the supply and demand of oil across the country has been loose in recent years, but oil prices fell off a cliff in 2015. In the face of huge carbon reduction pressure and the impact of low oil prices, green low-carbon development and the search for new business growth points will obviously be regarded as the most clear development direction of the major oil companies.

## 2. Shell's zero-carbon goal

With the transformation of the world energy system, Shell is committed to building a cleaner business portfolio, adhering to the concept of economic, environmental and social responsibility, and meeting the world's growing need for cleaner energy. In terms of energy transformation, Shell is in the forefront of many oil enterprises and has a clear strategic thinking for future development and transformation.

### 2.1 Objective statement

Shell, as a major energy producer, is willing to provide richer and cleaner energy solutions, sell integrated energy products with reduced carbon intensity, and is committed to serving the community and helping to improve global warming. Shell has set a goal of reducing the net carbon footprint of its energy products and aims to become a net zero-emission energy company by 2050.

## 2.2 Strategic path to achieve the goal

**Table 1.** Strategic path to achieve the goal in 2017-2021

Year	Strategic path
2021	<ol style="list-style-type: none"> <li>1. Launch a power progress strategy to accelerate the transition of our business to net zero emissions, including the goal of reducing the carbon intensity of the energy products we sell: 6-8 % by 2023, 20 per cent by 2030, 45 % by 2035 and 100 % by 2050.</li> <li>2. Release of 2021 Industry Associations Climate Review, expanding coverage to 36 industry associations.</li> <li>3. Provide advisory votes on Shell's energy transition strategy</li> <li>4. Increase the weight of energy transition performance indicators in the long-term incentive Program (LTIP) from 10% to 20%.</li> <li>5. Introduce absolute greenhouse gas (GHG) reduction targets into the annual bonus scorecard, and increase the total weight of measures related to greenhouse gas emissions from 10% to 15%.</li> </ol>
2020	<ol style="list-style-type: none"> <li>1. Announce the goal of becoming a net zero-emission energy company by 2050 keeps pace with social progress, as it is working towards the goal of the Paris Agreement to limit the rise in global average temperatures to less than 1.5 °C.</li> <li>2. Release industry association climate review updates, including Shell's updated climate-related policy position and our payments to major industry associations.</li> <li>3. Extend energy transition performance indicators to approximately 16500 employees through the performance sharing Program (PSP).</li> </ol>
2019	<ol style="list-style-type: none"> <li>1. Release the first industry association climate assessment report, which examines the consistency between our climate-related policy positions and those of the 19 major industry associations to which we belong.</li> <li>2. Announce a plan to invest in natural ecosystems as part of our global climate change strategy, including addressing customers' carbon dioxide (CO<sub>2</sub>) emissions when using their products. The plan will help Shell achieve its three-year goal of reducing its net carbon footprint by 2% to 3% by 2021 from 2019.</li> <li>3. Introduce energy transition performance indicators into LTIP. LTIP includes short-term goals related to net carbon footprint goals, as well as many other strategic business transformation goals that measure progress towards our long-term goals.</li> </ol>
2018	<ol style="list-style-type: none"> <li>1. Release of Shell's energy transformation report describing how we manage climate-related risks and opportunities as part of Shell's response to the recommendations of the Climate-related Financial Disclosure Task Force (TCFD).</li> <li>2. Promote the implementation of the TCFD recommendations and work with the Oil and Gas Preparedness Forum and the World Business Council for Sustainable Development to strengthen the response of the Shell sector to these recommendations.</li> <li>3. Sign a joint statement with key institutional investors on behalf of Climate Action 100 +, announcing Shell's decision to take steps, announcing Shell's decision to take steps to demonstrate consistency with the goals of the Paris Climate Change Agreement.</li> </ol>
2017	<ol style="list-style-type: none"> <li>1. Announce that the carbon intensity of the energy products we sell will be reduced by about half by 2050 and by about 20% by 2035, as measured by Shell's net carbon footprint, including the entire life cycle emissions generated by customers' use of energy products.</li> <li>2. Launch the methane guiding principles Alliance and announce methane emission intensity targets.</li> <li>3. Introduce greenhouse gas intensity measures into the annual bonus scorecard</li> </ol>

## 3. Company's Natural Gas Business

Shell has been committed to developing its natural gas business in recent years. Shell acquired BG Group in 2015 and combined natural gas integration with new energy into a single business unit in 2016. In addition, Shell announced that natural gas would continue to account for a high proportion of the company's oil and gas portfolio for some time to come. By the middle of the 21st century, natural gas will account for about 50% of the company's business revenue. The following table shows the natural gas business developed by Shell in recent years.

**Table 2.** Shell's newly commissioned natural gas projects in 2015-2019

Project Name	Production Time	Project Description	Region
Changbei Project	December 2018	This is Shells first onshore upstream cooperative development project in China, which mainly develops and produces tight natural gas in Changbei block.	China
LNG Canada	October 2018	This is a large liquefied natural gas (LNG) project under construction on the west coast of Canada.	Canada
KAIKIAS	May 2018	This is a deep-water project with a submarine recharge design. Shell made the final investment decision to develop Kaikias in February 2017 and began production in the first phase of the project in May 2018.	U.S.
MALAMPAYA PHASES 2 & 3	2015	The Malampaya deepwater natural gas power generation project marks the birth of the Philippine natural gas industry. It uses local natural gas, the cleanest hydrocarbons, to meet 20% of the countrys electricity needs and reduces the demand for imported oil. In 2001, it began to operate on the first offshore platform and launched the second platform in 2015.	Philippines
PRELUDE FLNG	2018	The Prelude floating liquefied natural gas (FLNG) facility produces natural gas off the coast of Australia. In June 2019, it reached an important milestone when it delivered the first LNG shipments to Asian customers.	Australia

## 4. Company's Low-Carbon and New Energy Business

### 4.1 Development scale of new energy business

Obviously, the development of integrated energy is not just about expanding the natural gas business. New energy has also aroused the investment enthusiasm of energy giants. Shell specializes in power projects, from photovoltaic and wind power to electric car charging and transportation energy, including advanced biofuels and hydrogen.

#### 4.1.1 Wind energy

##### A. Offshore Wind Power

Offshore wind is Shell's main growth area. Shell, which owns 50 % of Mayflower, is working to develop a rental area off the coast of Massachusetts. The site will have the potential to generate 1.6GW electricity, which will power more than 680000 American homes. Shell is also exploring new technologies. Shell has partnered with Makani, an independent company within Alphabet, to bring its aerial wind power system to the offshore environment. Shell is also a major shareholder in Tetraspar Demo, the new floating turbine foundation. Tetraspar Demo is the foundation of a new type of floating turbine that provides more streamlined manufacturing, assembly and installation, thereby reducing costs.

##### B. Onshore wind power

Shell first invested in onshore wind power in the United States in 2001. Today, Shell operates four onshore wind farms in the United States, namely:

Rock River (Wyoming): shell has been providing renewable wind energy at the Roque River Wind Farm in Wyoming since 2001. The Roque River owned by Shell and Terra-Gen, an American renewable energy company, generates enough electricity to power 25000 American homes.

Brazos (Texas): the total installed capacity is 160MW, which consists of 160 Mitsubishi turbines that power about 48000 American homes.

Whitewater Hill (California): shell co-owns Whitewater Hill with Terra-Gen, an American renewable energy company. The wind farm has a total installed capacity of 61.5MW, with more than

1400 turbines and more power than 520MW. It is estimated that the project will generate enough energy to power about 12000 American homes each year.

Cabazon (California): Cabazon and Terra-Gen jointly own 62 turbines capable of producing 660 kilowatts. 41MW's wind farm is located in San Gorgonio Pass, west of Palm Springs, California. It is estimated that the electricity generated by the project can power about 12000 American homes each year.

#### 4.1.2 Solar energy

Shell uses more solar energy on its sites, including its offices, retail outlets, distribution terminals, oil refineries and offshore facilities. Shell also invests in residential solar storage. In addition, Shell bought Sonnen, a company that allows families to produce and store solar energy in their homes.

#### 4.1.3 Hydrogen fuel

In Germany, Shell has formed a joint venture with industrial gas manufacturers Air Liquide and Linde', car manufacturer Daimler and energy companies Total and OMV to develop a nationwide network of hydrogenation stations. In the United States, Shell has four hydrogenation stations in California and is currently working with Toyota with the support of California to further develop its hydrogenation network. Shell is also developing hydrogenation stations in the UK, the Netherlands and Canada. Shell has been a member of the California consortium since 2018 to develop new high-capacity hydrogenation stations for Toyota and Kenworth Truck Company. These gas stations will be the first hydrogenation network of hydrogenation trucks in California and will help reduce emissions from heavily polluted roads connecting the port of Los Angeles and major inland warehouses.

### 4.2 New Energy Business Mergers and Acquisitions

**Table 3.** New energy projects acquired by Shell

Year	Type	Project Description
2017	Charging service	Shell acquires New Motion, Europe's largest operator of electric vehicle charging stations
2017	Solar energy	Shell has set up a venture capital fund office in China to focus on investment in energy storage, micro solar power grid, smart mobile and other areas.
2017	Energy storage	Shell acquires First Utility, a UK home energy and broadband provider, to enter the UK energy retail market.
2018	Solar energy	Return to the solar industry by acquiring a 43.83% stake in Silicon Ranch, an American solar company, for USD 217 million.
2018	Solar energy	Shell announced plans to build a 20MW solar power plant at the chemical production site in Mordike, the Netherlands. The project involves the installation of more than 50,000 solar photovoltaic panels at the chemical production base, which can generate electricity to power 7000 homes.
2018	Charging service	Shell Venture Capital provides financing to Ample, a start-up that provides charging solutions for electric vehicles and the manufacture of charging piles.
2018	Energy storage	Shell Ventures registers EUR 60 million with German energy storage solution provider Sonnen
2019	Energy storage	Shell announces the acquisition of the largest European energy storage battery manufacturer and German household energy storage giant Sonnen
2019	Charging service	Shell acquires Greenlots, a developer of new energy charging piles and management software, to advance the layout of the new energy vehicle industry.
2019	Solar energy	Shell invests in ESCO Pacific to acquire a 49% stake in the business. ESCO Pacific is one of Australia's most successful solar companies, dedicated to the development of utility-scale solar projects and long-term asset management.
2019	Solar energy	Shell acquires a 49% stake in clean tech solar.
2019	Wind power	Shell completes its acquisition of EOLF.
2019	Charging service	Shell acquires Greenlots

The new energy portfolio is built through organic growth and acquisitions.

The development of comprehensive energy is obviously not just to expand the natural gas business, new energy has also attracted the investment enthusiasm of energy giants. According to the company's energy transformation report released by Shell in 2018, Shell plans to expand investment in its new energy business unit over the next two to three years, investing USD 10 billion to USD 2 billion a year in renewable and low-carbon energy. Most of the investment is expected to go into power generation, including photovoltaic and wind power, as well as fuel cells and biofuels. In 2019, the power generation business, which belongs to the natural gas and new energy business, has become the key support direction of Shell. Shell will continue to expand its leading edge in the natural gas and new energy business, strengthen its portfolio optimization capabilities, and achieve growing cash flow and profit returns through the establishment of a strong financial system and flexible portfolio. Table X combs some cases of Shell's investment in new energy business since 2015.

## References

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