

The Future of the Oil Industry in Light of the Global Trend Towards Alternative And Renewable Energy "A Case Study of the Chinese Experience"

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Abstract: This study aims to highlight the importance of the future of the traditional oil and energy industry, especially in light of the environmental and economic challenges and constraints it faces, and many countries of the world and China are seeking to move and expand the use of renewable and clean energy sources in order to preserve the environment and adapt to the repercussions of climate change.

The study was based on the Chinese experience in the volume of huge investments in solar and wind energy projects that exceed the investments of the countries of the world combined, in order to diversify energy sources that ensure sustainability in economic development and environmental friendliness. This puts it in a position to lead the energy transformation of the world.

Keywords: oil industry; global orientation; renewable energy; Chinese experience.

Jel Classification Codes : Q40, Q42, Q48.

1. Introduction :

Renewable energy projects in China are witnessing significant growth as part of Beijing's efforts to reduce emissions from the energy sector and meet the increasing demand for electricity. A recent study revealed that nearly two-thirds of solar and wind power plants under construction worldwide are located in China. Beijing is working on building infrastructure for renewable energy generation from these sources, with a production capacity of 339 gigawatts, which accounts for 64 percent of all similar projects under construction globally.

Recently, Beijing announced a number of new policies that enhance the potential for clean energy, including accelerating the pace of battery storage installations and increasing the capacity to build power lines to accommodate the transmission of surplus electricity from renewable energy in China.

I.1. Research problem: Therefore, the main issue raised by the study revolves around the following question:

What is the future of the oil industry in light of the global trend and China's direction towards alternative and renewable energy?

Through the main problem, we raise the following sub-questions:

- What is meant by the oil industry? And what are the basic concepts of renewable energy?
- What are the motivations behind the global shift, especially from China, towards alternative and renewable energies?

I.2. Study hypotheses: To answer the main problematic question and the sub-questions, we propose the following hypotheses:

- The oil industry is defined as the set of activities related to the exploitation of oil wealth, whether by discovering it as a raw material and converting it into useful commodity products; while renewable energy is the energy

generated from naturally replenishable sources, repeatedly present in nature in a spontaneous and cyclical manner, such as sunlight, wind, rain, tides, and geothermal heat.

- The motivations for the global shift, especially from China, towards alternative and renewable energies include the issue of climate change, the limitation of fossil energy, and the decreasing cost of renewable energy and its storage.

I.3. Research Objectives: The main objective of the study is about the future of the oil industry in light of the global trend towards alternative and renewable energy. China and countries around the world aim to transition to an economy based on clean energy in order to diversify energy sources that ensure sustainability in economic development and protect the environment from carbon dioxide emissions resulting from the use of traditional energy.

I.4. Study Methodology: In order to comprehend the research topic and to answer the main issue, we relied on the descriptive method to build the theoretical framework of the oil industry and energy sources present in China. We also employed the analytical method to clarify the importance of the transition from conventional energy to renewable energy.

2. Basic concepts about the oil industry and renewable energy.

The oil industry is one of the most important industries that has contributed to shaping the modern global economy. Since the discovery of oil in the 19th century, the industry has witnessed tremendous developments in exploration, extraction, and refining. Modern technologies such as horizontal drilling and hydraulic fracturing have increased production efficiency and contributed to the discovery of new reserves, as well as renewable energy, which has now become indispensable in light of the changes currently witnessed by the world.

2.1. Introduction to the Oil Industry:

Oil is one of the strategic commodities, important in the field of Industry, Energy and international trade, and its importance lies in the fact that this commodity is not available in all countries of the world, but it is in global demand, and even more so that oil is necessary for all the basic requirements of all humanity (industry, agriculture, motor fuel, transport). (Wehbe, 2018)

2.1.1. the origin and origin of the word oil:

The Arabs knew the word oil in the old days, and it was used to denote viscous oil derivatives such as tar (or bitumen) or pitch, as it was stated in the Arab tongue: "oil and oil are fat, and the fracture is more revealing. The son of his master said: the oil and the oil with which the camels are painted for scab, scab and monkeys, and it is without Al-Kahil. Abu Hanifa narrated that oil is Al-Kahil"; the origin of the word may be from the Akkadian "nabtu "or from the Aramaic"NAFTA". From there, it moved to the Greek, where the word naphtha was derived, which was used in the late nineteenth century to refer to oil in general; however, the meaning of the word naphtha changed over time, as it currently refers to a crude mixture of oil distillates obtained after a preliminary distillation procedure. The word "pteralawn" was also mentioned among the Arabs, and they said it was "the fat of the stone", Ibn al-Bitar said "pteralawn" means in Greek the fat of the stone, which is oil. (Wikipedia, 2025)

The word "Petroleum ", which is sometimes expressed verbally as petroleum, is derived from the Greek, and it consists of two syllables, the first (Petra) meaning rock and the second (Oleum) meaning oil; therefore, the full meaning is shale oil. Georgius Agricola used the word "petroleum" in his book "De Natura Fossilium", published in 1546, and meant mineral oil obtained from the distillation of pieces of Continental Coal and oil shale. (Wikipedia, 2025)

Oil has been known to some extent since ancient times, but its importance has significantly increased since the mid-nineteenth century, especially with the outbreak of the Industrial Revolution, the invention of the internal combustion engine, the spread of commercial aviation, and industrial advancements in various sectors. (Wikipedia, 2025)

2.1.2. Definition of oil:

Crude oil, or black gold, is a literary term for oil, which is a thick, flammable liquid that is blackish-green in color, found in the upper layers of the Earth's crust. It is an important primary energy source in the world. The latter is considered a raw material for many chemical products, including fertilizers, insecticides, and many plastic products, pipes, fabrics, nylon, artificial silk, synthetic leather, and pharmaceuticals. (Dawadi & Soleimani, 2016)

It is also known as a liquid substance which is the liquid hydrocarbons, referred to as crude oil. This substance has a specific and distinctive smell, and its color varies between (black, green, brown, yellow). It is also a viscous material, and this viscosity differs according to the specific gravity of crude oil. This specific gravity is dependent

and renewable based on the proportion of carbon atoms in the crude oil; the higher the proportion of carbon atoms, the greater its specific gravity or weight, and vice versa. (Al-Douri, 1983)

Petroleum is known as a liquid primarily composed of hydrocarbons, along with a small percentage of sulfur, oxygen, and nitrogen. It forms and accumulates in the Earth's interior and remains in place until it is brought to the surface by natural factors such as fractures, faults, or geological breaks, or it is extracted by humans through drilling wells. Petroleum exists in nature either in a solid state, as crude oil in a liquid state, or in a gaseous state (natural gases). (Dawadi & Soleimani, 2016)

From the previous definitions, we can derive the following definition: Oil or petroleum is considered one of the global energy materials, as it is composed of several components, the most important of which are hydrogen and carbon. The materials that make up this energy material are called hydrocarbons. It can exist in a liquid, solid, or gaseous form, and it is characterized by its flammability, tending towards black, brown, or dark green.

2.1.3. Components of oil :

Oil is mainly composed of a mixture of hydrocarbons, and primarily contains the following elements in the proportions shown in the following table:

Table No (01): The annual rate of the percentages of the elements constituting oil

Elements	Percentage (%)
Carbon	87-82
Hydrogen	15-11
Sulfur	4-2.0
Oxygen	1
Phosphorus	Less than 1
Mazut	0.1
The Ashes	0.11-0.05

Source: Amina Mekhlafi, **introduction to petroleum economics (oil economics)**, lectures for the benefit of third-year students of Bachelor'S degree L MD specialization : petroleum economics and Management University of Ouargla, academic year 2013/2014, Algeria, P: 8.

2.1.4. Properties of oil:

Among the characteristics considered to determine the quality of oil, are (Mahy, 2019/2020) :

2.1.4.1. Density and quality degree: It is considered one of the most important indicators indicating the presence of crude oil and is measured in the American Petroleum Institute (API) units, which refers to the ratio of the weight of the oil to the weight of an equivalent volume of water when their temperatures are equal. It ranges between 1 and 60 degrees; the lower the density of the oil, the higher its specific gravity and quality. Based on this measure, there are three types of oil (Naima, 2009-2008) :

2.1.4.1.1. Light oil: It is the finest type of oil with a high specific gravity starting from grade 35 and above. It is used to produce gasoline, kerosene, and natural gas... such as Algerian, Libyan, and Qatari crude oil.

2.1.4.1.2. Heavy oil: Its density grade is 28 degrees or lower, and its costs are high. The products extracted from it are heavy (such as diesel and asphalt), like Syrian and Egyptian crude oil.

2.1.4.1.3. Medium oil: Its specific gravity ranges between 28 and 35 degrees, and the derivatives extracted from it are moderate, such as (lubricating oil), like Saudi and Kuwaiti crude oil.

2.1.4.2. The sulfur content in crude oil: The quality of oil increases as the sulfur content decreases, because the presence of sulfur in large quantities in oil requires additional costs to meet the standard production specifications. Based on this, oil is classified into sweet oil (which has a low sulfur content) and sour oil (which has a high sulfur content).

2.1.4.3. Pour point: It is a term that refers to the degree of flow of petroleum substance as a liquid, meaning the viscosity of the oil. It is related to the percentage of waxy material in its composition; the higher the wax percentage, the higher the viscosity of the oil, necessitating heating which results in an increased pour point. This increases production costs and decreases quality.

2.1.4.4. The percentage of other impurities (water and salts): The higher the percentage of impurities in the oil, the higher the production costs and thus its quality decreases.

2.1.4.5. Oil measurements: The measurement of oil is based on the following cases either by weight or volume:

2.1.4.5.1. According to size: The most common unit of measurement is the American barrel which equals 42 gallons or 159 liters, and it is also measured in cubic meters, with one cubic meter being equivalent to 6.28 barrels.

2.1.4.5.1. By weight: The unit used globally is the ton, which contains about 7 barrels of oil and includes three measurements:

- The long ton equals 1006 kg
- The metric ton equals 999 kg
- The short ton equals 906 kg.

2.1.5. The concept and stages of the oil industry:

2.1.5.1. The concept of the oil industry:

The oil industry is defined as a set of activities or actions or industrial processes related to the exploitation of oil wealth, whether by finding it in its raw form and transforming it into commodity products suitable for direct or indirect use and consumption by humans (Dawadi & Soleimani, 2016).

It is also known as the industry that involves several stages and different types, combining extraction industry, manufacturing, its states, phases, and integrated industries. The oil industry includes the production of oil and gas, transportation and refining, marketing and distribution, as well as the related industries, namely those based on petroleum products or what is referred to as petrochemicals.

2.1.5.2. Stages of the Oil Industry: The oil industry goes through several stages before the oil product reaches its final phase. According to specialists, there are five main stages and a sixth complementary stage that can be integrated or separated from the previous stages, which is the petrochemical manufacturing stage. The stages are as follows (Mahy, 2019/2020):

2.1.5.2.1. Exploration and drilling phase: The goal of this phase is to identify the presence of petroleum resources and to pinpoint their geographical and biological locations within the Earth's layers, as well as to estimate their quantities and types. Despite the tremendous technological advancements in exploration and drilling, drilling remains the only confirmed and reliable method to verify the existence of oil. Among the most important methods used in drilling wells are: percussion drilling, rotary drilling, and turbine drilling.

2.1.5.2.2. Extraction phase: It is a phase aimed at extracting crude oil from beneath the earth and bringing it to the surface to be ready or suitable for transportation, export, and manufacturing, whether in nearby or distant locations, within the region, country, or abroad.

2.1.5.2.3. Transportation Phase: This is the phase aimed at transporting oil or gas from production areas to export or refining areas. There is a distinction between land and maritime transportation, each with its own techniques and technologies.

2.1.5.2.4. The petroleum refining stage: This is the phase aimed at processing crude oil in refining plants to convert it from its raw form into various processed petroleum product forms to meet human needs directly or for manufacturing processes in subsequent and multiple industrial stages. This phase is referred to as the transformation industry stage, and it acts as a filtering process for petroleum to obtain various petroleum products that are in high and diverse demand.

2.1.5.2.5. Marketing and Distribution Phase: The goal of this phase is to dispose of and distribute petroleum products, whether they are raw materials or petroleum products, to the markets of their use and consumption on a national, regional, or global level. This is done through various technical, legal, administrative, economic procedures, and with different and extensive equipment.

2.1.5.2.6. Petrochemical Manufacturing Phase: Petrochemistry is a heavy industry that uses some petroleum by-products resulting from the refining process or natural gas as raw materials. Starting from the cracking process, the first stage of this industry yields what are called basic materials, which include ethylene, propylene, butane, and aromatics. From each of these materials, an infinite number of derivatives can be produced through very complex methods. These derivatives serve as a basis for producing plastics, detergents, fertilizers, pesticides, and other materials.

2.2. The nature of alternative and renewable energies:

2.2.1. Definition of renewable energies: It is the energy generated from renewable natural sources, its presence in nature is repeated spontaneously and cyclically, such as sunlight, wind, rain, tides and geothermal heat, as renewable energy sources are characterized by the possibility of continuous exploitation, without exhausting their source, so they are called renewable sources (omeimer, 2020/2021).

The International Energy Agency IEA defines renewable energies as follows: renewable energies are formed from energy sources generated by the spontaneous paths of nature, such as sunlight and wind, which are replenished in nature at a higher pace than the frequency of their consumption (Boudoubia, 2023/2024).

The concept of the United Nations Environmental Protection Program: renewable energy is an energy, the source of which is not a fixed and limited stock, in nature, periodically renewed, faster than the pace of its consumption, and appears in the following five forms: biomass, sunlight, wind, hydropower, underground energy (Elhannani , 2023).

Through the above, renewable energies can be defined as energies that have the quality of regeneration and permanence and that are derived from natural sources that are often not extractable, do not run out, and do not harm the environment. That is, their stocks are inexhaustible due to permanent consumption, and they help reduce dependence on non-renewable resources.

2.2.2. Renewable energy sources:

Renewable energy sources are considered to have a promising future, especially since their exploitation has achieved great success and progress, especially with regard to the production of solar energy and wind energy, followed by the rest of the other sources represented by hydropower, geothermal energy, biomass energy and nuclear energy..., The most important of these sources are (Suleiman, 2024):

2.2.2.1. Solar energy: it is the energy derived from sunlight in the form of heat and light, and solar energy is the most abundant of all renewable energy resources, as all countries can use solar energy as one of their energy sources, with different size and usage capabilities between different countries. Solar energy has many applications in various walks of life, which have developed with modernity and technical progress. In the past, a "solar cooker" was used, a box in which the heat of the sun is collected and used to cook food, heat water and sterilize medical instruments. sunlight is also used in agricultural fields to facilitate the planting process and the growth of plants in the off-season, as well as drying agricultural crops.

With the technical development, modern applications have emerged for the use of solar energy in electricity generation, including solar cell technology and solar energy concentration technology.

2.2.2.2. Wind energy: it is the energy generated by converting the movement of the wind into mechanical energy using turbines. There are multiple uses for wind energy, including direct use for specific tasks such as pumping water or grinding grain, or indirect use by converting mechanical energy into electrical energy.

The energy generated from the wind is related to several factors, namely wind speed, the higher the wind speed, the more energy generated; air density, where dense air through its pressure on the turbines produces more energy; this is in addition to the size of the turbine blades, as large turbine blades help to move more air and then generate more energy.

Despite the many benefits of wind energy, the expansion of its use faces several challenges, the most important of which are (Suleiman, renewable energy, 2024):

It is seasonal energy: there is no wind available throughout the year, and therefore no power generation on the days when the wind gusts are interrupted.

Environmental imbalance: wind turbines have a detrimental effect on the birds present on wind farms, especially during the migration time of these birds.

The noise factor: the movement of the turbines emits a loud sound that causes noise and inconvenience to residents of residential areas near wind farms.

Limited scope: the use of wind energy is limited to specific places where wind farms are available from wind power and large areas of land for wind farms, which are often in remote places.

2.2.2.3. Hydropower: Hydropower is the largest source of renewable electricity in the world, generating about 2.5% of total global energy in 2019. It is often cheaper than fossil fuels, and the best hydropower sites are usually located at high elevations and have high flows (like Niagara Falls). These sites can provide a large amount of

electricity at a relatively low cost. Hydropower generation increased by 124 terawatt-hours in 2020, reaching 4418 terawatt-hours, resulting in more capacity generated than all other renewable technologies combined (Abdul Rauf, 2023).

2.2.2.4. Biomass energy: this energy is produced from a variety of organic materials, known as biomass, wood, coal, animal waste and other manure to produce heat and energy, as well as agricultural crops to produce liquid biofuels. The use of biomass energy takes several forms (economic and Social Commission for Western Asia, 2019):

Conventional biomass by direct burning of organic matter to provide the necessary thermal energy for cooking, water heating and heating. The traditional use of biomass energy is widespread mostly among the poorest people in rural areas, for cooking, lighting and heating.

Modern biomass is converted by converting solid biomass into gaseous fuel (such as biogas / methane) by direct burning in an Air-Limited atmosphere, then the gas is used as a fuel to generate electricity through internal combustion engines or small turbines, or converted into liquid fuel through treatments such as fermentation to obtain alcoholic ethanol, or chemical to obtain biodiesel.

2.2.2.5. Thermal energy/ underground heat energy:

Geothermal energy refers to the heat stored beneath the Earth's surface, which increases with depth. It escapes from the Earth's interior through conduction, thermal transfer, hot springs, and volcanic eruptions. Its exploitation can be economically achieved using available technical methods. This type of heat manifests in hot water, both wet and dry steam, and hot rocks, with dry steam being the most efficient due to its high thermal capacity and its non-corrosive nature on equipment. Many regions around the world have natural fountains or hot water springs that are used for therapeutic or recreational baths. The first experiment to generate electricity using geothermal steam was conducted in Italy in 1904, with a production capacity of 280,000 kilowatts. Geothermal power plants also exist in Mexico, Iceland, New Zealand, Japan, Russia, and the United States (in Northern San Francisco). Among Arab countries, such a source is found in some nations like Djibouti, Algeria, Yemen, Morocco, and Saudi Arabia, and to a lesser extent in Jordan, Egypt, Sudan, and Tunisia (Mekhlafi, 2011).

2.2.2.6. Marine energy: marine energy sometimes called Ocean Energy, ocean force or ocean kinetic energy, it is the energy derived from technologies that use the kinetic and thermal energy of seawater (waves or currents for example) to produce electricity or heat. The strong movement of water in the seas and oceans can be exploited to generate kinetic energy, which can then be exploited to generate electrical energy. Marine power systems are still in an early journey of development, with a number of prototypes of wave and tidal current devices being explored (Suleiman, renewable energy, 2024).

3. Drivers of the global trend towards alternative and renewable energies:

The motivations of countries around the world towards alternative and renewable energies are as follows (Abdul Rauf, 2023):

3.1. The limitations of fossil fuels: Due to the growing demand and limited supply, it is inevitable that one day coal, oil and gas supplies will run out, therefore, it is important to look for alternative energy sources. Thus, the main motive for using renewable energy is to secure energy supplies, especially electric energy, and provide fossil fuels for future generations on the principle of equal rights.

3.2. The issue of climate change: the prevailing threat of global warming and climate change has brought attention to the relationship between economic growth, energy consumption and environmental pollution. Attempts have been made to reduce the share of emissions into the environment, while strong emphasis was placed on this issue in 1997, under the agreements of the "Kyoto Protocol" (Edenhofer, O. et al, 2012). After carbon emissions were estimated at 25.5 billion tons of oil equivalent in 2000, they reached 37 billion tons of oil equivalent in 2019, and due to the complete closure due to the emerging Corona epidemic, the intensity of emissions decreased to 35.26 billion tons of oil equivalent in 2020, but began to increase again at the beginning of 2021 (Abdul Rauf, 2023).

3.3. The cost of renewable energy is falling sharply in parallel with its increasing prevalence: the costs of solar and wind energy decreased by 85% and 49%, respectively, a decade ago, and this means that it is now possible to profit from renewable energy sources. Renewable energy attracted more than USD 2.6 trillion in investments from 2010 to 2019, and this corresponds to an estimated 1,200 TWh of new renewable energy capacity over the new decade, more than the entire US electricity generation fleet (International Renewable Energy Agency, 2020). The cost of building new wind or solar power is now less than adding the equivalent in coal or gas plants in two-thirds of the world. Massive investments in solar energy have pushed the supply of

energy to more than 8% of the world's generating capacity, and wind energy to almost 9% (World Resources Institute2019).

3.4. Lower energy storage costs: during 2020, the energy storage industry has experienced a significant cost reduction and innovation in Battery Technologies, International Cooperation for green hydrogen production has increased, and lithium-ion battery costs have fallen sharply to below USD 100 per kWh for the first time in 2020 (Ulucak, , 2021). And the development of new technologies for the extraction of thermal groundwater, with the aim of producing "green lithium" while reducing the environmental impact. With this increased interest, the cost of producing hydrogen from electricity has decreased, falling by 40% on average between 2015 and 2020.

3.5. The use of renewable energy in the context of crises and total shutdown: throughout 2020, the total shutdown showed a decrease in electricity demand by 20% on average, with fewer effects of partial shutdown. As a result, renewables accounted for a larger share of global electricity generation (about 29% in 2020, up from 27% the previous year), as the production of renewable energy sources is often less directly affected by electricity demand (Abdul Rauf, 2023).

4. The Chinese experience in the transition to clean and renewable energies :

In a world suffering from an urgent need for sustainable energy, China emerges as a key player in the global transition toward renewable energy sources. As the world's largest consumer and producer of energy, China is making ambitious efforts to transform its energy landscape from the dominance of coal and other fossil fuels to a diverse mix of clean and renewable resources. This transition is not only crucial for China's economic and environmental future, but it also carries significant implications for the global fight against climate change.

The Chinese government has laid out a clear strategy to achieve these goals, focusing on innovation, green development, and international cooperation. By achieving the goal of carbon neutrality by 2060, China is not only reshaping its domestic energy policies but also solidifying its position as a leader in global energy governance. China's actions over the next decade will play a pivotal role in determining the global energy trajectory (Energy, oil & gas magazine, 2025).

4.1. Strategy for Wealth of Supply and Energy Consumption:

China has relied on rapid economic growth in fossil fuel energy sources. The enormous wealth of domestic coal, along with China's imports of oil and gas, has played a central role in the development process. However, as the effects of climate change deepen, manifested in rising sea levels, changes in rainfall seasons, increased frequency of extreme weather events, a rise in the spread of infectious diseases, and a shortage of food, water, and healthcare, the leadership of the Communist Party has turned to adopt successive strategies to bring about a "revolution" in the shift to clean energy sources.

The renewable energy law issued in 2006 represented a turning point towards reducing the focus on fossil fuels. In 2007, the medium- and long-term renewable energy development plan was adopted, which set a target to increase the share of clean energy sources from 7.5% of total energy sources in China in 2007 to 15% by 2020, along with a plan to increase nuclear energy to 40 gigawatts by 2020 (Emirates Policy Center, 2023).

In 2017, the Development and Reform Commission of the Communist Party and the National Energy Administration published the 'Energy Supply and Consumption Revolution Strategy' which outlined five main priorities in this sector, which are (Emirates Policy Center, 2023):

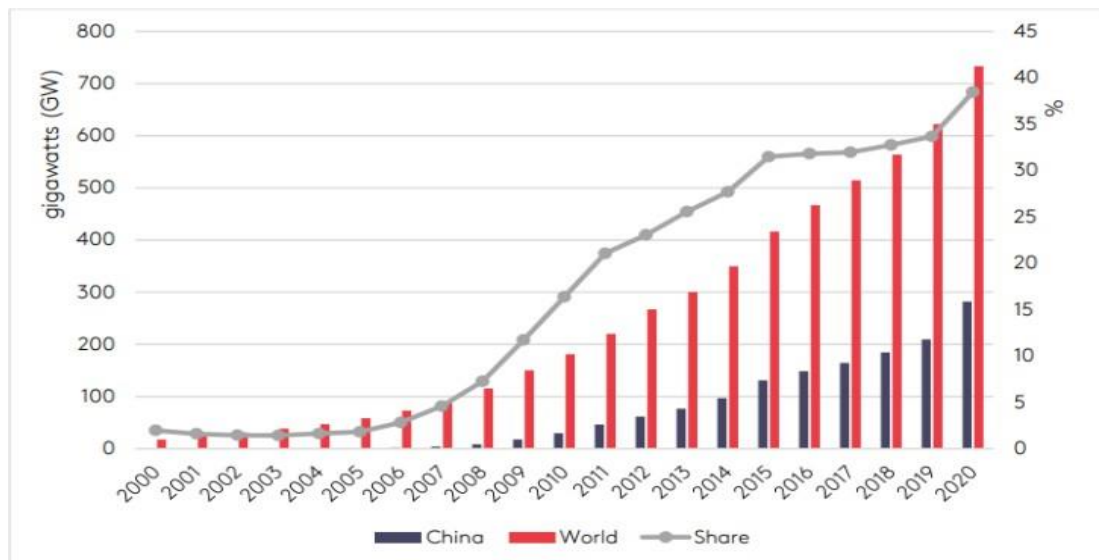
- Rationalizing energy consumption;
- Diversifying energy supplies;
- Encouraging innovations in energy technology;
- Reforming the energy and electricity system at the national level;
- Enhancing energy security through increased international cooperation.

The year 2021 was another turning point in China's energy system. In March of that year, President Xi Jinping pledged to build a 'new energy system' where renewable energy would be at the center, as part of plans to achieve the goals of peaking emissions by 2030 and reaching carbon neutrality by 2060. In the same year, during the leaders' summit on climate and later at the COP26 summit in Glasgow, President Xi committed to controlling the increase in coal use during the 14th Five-Year Plan (2021-2025) and gradually reducing reliance on it during the 15th Five-Year Plan (2026-2030). During the United Nations General Assembly meetings in September of the same year, China promised to stop building coal-fired power stations abroad as part of Belt and Road Initiative projects, which was indeed realized later.

Beijing aims for 25% of China's total energy sources to come from renewable energy by 2030, and more than 80% by 2060. Additionally, China seeks to generate 33% of its electricity from clean energy sources by 2025 (Emirates Policy Center, 2023).

Regarding global competition in energy transition, China produces energy from clean and renewable energy sources each year with a capacity that exceeds that of all countries combined. For example, China adds about 75% of the total wind and solar energy capacity in the world annually, and about 80% of the total hydropower capacity. In addition, China now owns nearly half of the global wind energy capacity, as shown in Figure 01.

Figure 01: wind power in China and its global share during the period (2000-2020)



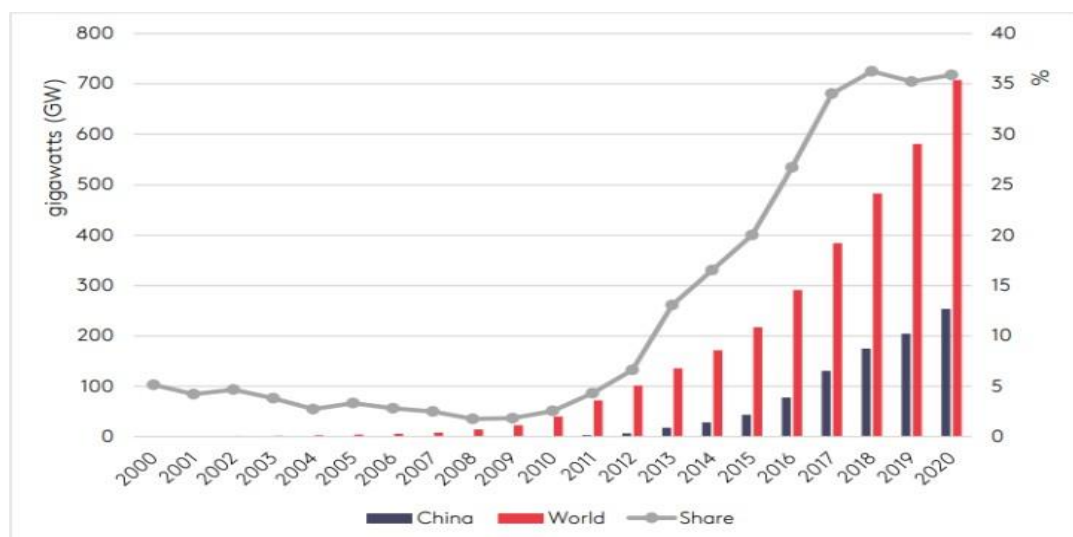
Source: Emirates Policy Center, **China's dominance in the clean and renewable energy market**, accessed on: 25/06/2025; <https://epc.ae/ar/details/featured/haymanat-alsiyn-ala-suq-altaqa-alnazifa-walmutajadida-maladhi-taanih-lidual-alkhalij-walsharq-alawsat>

In the year 2020, China alone accounted for more than half of the new wind and solar energy added

In fact, in the two decades between 2000 and 2020, China achieved a huge industrial revolution

And it completely controlled the global energy growth. Between 2015 and 2020, China achieved about (35%, 700 TWh) of the global growth in solar energy and the recorded increase in energy production. As shown in Figure (02).

Figure 02: photovoltaic solar cell capacity in China and its global share during the period (2000-2020)



Source: Emirates Policy Center, **China's dominance in the clean and renewable energy market**, accessed on: 25/06/2025; <https://epc.ae/ar/details/featured/haymanat-alsiyn-ala-suq-altaqa-alnazifa-walmutajadida-ma-aladhi-taanih-lidual-alkhalij-walsharq-alawsat>

4.2. China's strategy in promoting investment projects in renewable energies:

China has aimed to encourage investment in renewable energies at home and abroad, and this is evident in the expansion of its activity in many countries of the world, in addition to its partnerships with other countries such as Brazil, Canada and Germany.

4.2.1. Electric Power Company (power china) :

The electric power company (power china) is a state-owned entity that provides planning, design, construction and Consulting in the field of hydropower, renewable energy, thermal energy and infrastructure. The group was ranked 200th in the fortune global 500 in 2016, with assets of USD 77 billion, and employed 210,000 workers at the end of January of the same year. The company also completed 1863 projects in Abroad across 116 countries at the beginning of 2016, a lot of projects have been completed abroad under the international brand, which include (Sinohydro, SEPCO, HydroChina and HYPEC) (Amrouche , 2018) .

4.2.2. The company "Sinohydro ":

"Sinohydro is interested in the development of transport infrastructure, water and major construction works, as well as energy projects in Africa, which is the largest market for many Chinese state-owned energy and construction companies. These companies dominate the sub-Saharan energy market, five Chinese companies added three quarters of the power generation capacity for the period from 2010 to 2015 and Sinohydro achieved 24 projects During this period, with the addition of a total capacity of 3,8 GW, there is another subsidiary of the company "PowerChina", the company "" SEPCO, which achieved four projects totaling 1.8 GW. China has become an effective engine in the field of renewable energy, and is the world's largest investor in clean energy (Amrouche , 2018).

4.2.3. The battery project :

The Chinese company CATEL invests in the manufacture of the central battery for the benefit of the government, making China a leading country in the supply chain of electric vehicles globally. In 2016, GW 7.6 (CATEL) produced an hour of batteries, and it also has battery supply arrangements with BMW and Volkswagen, and China sold more than 5 GWh in the first half of 2017. China could dominate the global market for electric car batteries, which could reach 40 billion dollars by 2025 (Tim Buckley and al, 2017).

4.2.4. The electric car project :

China worked to add 4,300 electric cars to its streets between 2014 and 2015 . This transformation has helped the city of "Nanjing" to reduce emissions by 246,000 tons of carbon dioxide equivalent in 2014, while saving more than 71 million US dollars in low energy bills.

The government has supported this transformation by building a compatible infrastructure for electric vehicles, introducing tax breaks, subsidizing electricity prices for consumers, and encouraging the use of renewable-powered vehicles in public services. The Chinese company " BYD " also intends to open a new facility for the manufacture of electric trucks in Canada . With the support of the government, Chinese electrical equipment manufacturers are rapidly building domestic capacity. Achieving a strong start in the electric car winding sector locally is considered a prelude to entering the international markets (Tim Buckley and al, 2017).

4. 3. Leading the global transition to clean energy:

In October 2021, China adopted the "Action Plan for Reaching Peak Carbon Dioxide Emissions Before 2030." The plan represents a qualitative shift, as it laid the foundations for the dimensions and tools of China's international cooperation with the global community. The "Concept Paper" issued later by the plan identified five key channels for international cooperation, including: striving to organize the International Forum on Energy Transition in 2023 in collaboration with the International Renewable Energy Agency; exploring the possibility of establishing an international coalition for energy transition; leveraging China's influence in international organizations to promote the transition; expanding investments in clean energy projects in emerging markets; and attracting clean energy experts to work in China.

Previous achievements in the domestic market have placed China in the position of global leader in supply chains, and therefore in leading the transition to clean and renewable energy sources, in several respects (Emirates Policy

Center, 2023):

On the first hand: This significant accumulation has allowed Beijing to expand globally, primarily in the member countries of the Belt and Road Initiative, under the initiative of the 'Green Belt and Road,' considering it a supportive force in transferring engineering expertise, construction, and purchasing the necessary equipment in a vast network of clean and renewable energy projects around the world. This also relies on the increasing demand for renewable energy in the member countries of the initiative that are striving to achieve their national goals of reducing carbon emissions. For example, the International Energy Agency has stated that emerging markets need to invest \$573 billion in non-fossil energy projects between 2026 and 2030 for countries around the world to reach the goal of carbon neutrality by 2050.

China is the largest producer of green hydrogen and has the third largest global market for fuel cell vehicles. The authorities are currently working on a national strategy for green hydrogen.

On the other hand: In addition to the Belt and Road Initiative and bilateral cooperation, China's role in international organizations is central to leading the transition to clean and renewable energy sources. For example, China is leading discussions at the G20 Energy Ministers' meetings and in the G20 Energy Transition Working Group on issues of support, funding, and investments in clean and renewable energy projects.

In April 2016, the New Development Bank of the BRICS group presented its first package of long-term green loans to group members, worth \$811 million, to finance clean energy projects. The Asian Infrastructure Investment Bank, which is led by China, announced a plan to redirect 50% of its total investments towards "green investment" by 2025.

On the third hand: the transition to clean and renewable energy sources depends not only on investments, financing and the creation of new projects at high speed, but also requires the ability of electricity grids to absorb, integrate and benefit from these investments. China is expected to play a pivotal role in helping developing countries, in terms of technical and legal aspects, to increase the contribution of solar and wind energy to electricity production.

Besides, China is a global rising power in the field of peaceful nuclear energy. Increasing investments in nuclear energy is a Chinese strategy to offset emissions from reliance on coal for power generation. China wants to move from self-sufficiency in the design and construction of reactors and fuel circuits to becoming a major player in global nuclear energy supply chains by exporting reactor pressure vessels, turbines and generators. One of China's most successful foreign projects in this field is the partnership of the Chinese "CGN" with the French "EDF" in the construction of the "Hinkley Point" reactor and its operation in Britain (Emirates Policy Center, 2023).

5. Conclusion:

Global interest, especially from China, in expanding the use of renewable and clean energy sources comes in light of the environmental, economic, and social challenges and constraints facing traditional energy sources, particularly the oil industry in terms of extraction, consumption, and production methods. China aims to gradually transform into a dominant global power in the field of alternative and renewable energy. This is supported by the massive investments in solar and wind energy projects that exceed the investments of all other countries combined, positioning it to lead the global energy transition, especially amid the global consensus on addressing climate change.

Results: Some of the most important findings of the study are:

- Increased global reliance, especially by China, on using renewable and clean energy in all fields, and a limited use of fossil fuels.
- Emphasis on innovation, green development, and international cooperation, with the goal of achieving carbon neutrality by 2060.
- China's ambition to lead the world in the transition to clean and renewable energy.
- Increase in massive investments in solar and wind energy projects, along with technological advancements.

Recommendations: Based on the results of the study, we conclude the following recommendations:

- The necessity of establishing strategies, policies, and programs aimed at investing in renewable and clean energy.

- Encouraging and developing scientific research and supporting it in the field of renewable energy to transition towards diversification in clean energy sources and to reduce carbon dioxide emissions resulting from the use of traditional energy.

- Funding projects and investments related to clean and hydrogen energy to increase their expansion in all areas and sectors.

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