Development Trend and Prospect of New Energy in Tibet under the Background of Carbon Neutrality

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Abstract. In view of the severe situation of global warming, China puts forward the carbon emission reduction target of "achieving carbon peak by 2030 and carbon neutrality by 2060". Among all production activities, the energy sector emits the most carbon dioxide of nearly 90%, followed by the industrial sector of more than 10%. Therefore, the focus of carbon emission reduction is to reduce carbon emissions in the energy sector. Tibet possesses unique natural conditions and geographical environment, which is rich in renewable energy and water energy resources. There is a huge space for the development of renewable and clean energy in Tibet. In order to provide sufficient energy for the Tibetan people and achieve the goal of carbon neutrality, Tibet needs to vigorously develop clean energy in the next 40 years. First of all, it is necessary to formulate a systematic energy development plan for the next 40 years, and formulate different energy development plans according to the natural conditions of different regions, so as to put the energy development plan in place. Tibet can not only achieve the goal of carbon neutrality on time, but also contribute to the power transmission from the West to the East.

1. Introduction
At present, the global warming situation is becoming more and more intense, because the greenhouse gas concentration in the atmosphere increases, which leads to the enhancement of greenhouse effect. Greenhouse effect refers to the earth mainly absorbs radiation from the sun through the surface, and uses long wave radiation (thermal radiation, infrared radiation) to the universe. Some long wave radiation is absorbed by greenhouse gases in the atmosphere. These absorbed energy radiates in all directions, and the upward radiation disappears from the cooler atmosphere to the universe, and the downward radiation increases the surface temperature [1].

Greenhouse gases mainly include carbon dioxide (CO\textsubscript{2}), nitrous oxide (N\textsubscript{2}O), methane (CH\textsubscript{4}), HFCs, PFCs, SF\textsubscript{6} and NF\textsubscript{3}. The concentration of greenhouse gases increases rapidly and is closely
related to human activities. In order to control greenhouse effect effectively, we must take positive measures to control carbon emission in production and life. Greenhouse effect is a global problem. In order to solve the greenhouse effect, all mankind must work together to shoulder their own responsibilities.

In September 22, 2020, President Xi Jinping delivered an important speech at the seventy-fifth session of the UN General Assembly. He formally put forward China's carbon dioxide emissions to reach its peak before 2030 and to achieve carbon neutrality by 2060" [2]. This provides direction guidance for China to deal with climate change and promote green development, and depicts a grand blueprint, and has been highly praised and widely responded by the international community. This shows that China actively undertakes ecological environmental responsibility, constructs a community of human destiny, and demonstrates the image of a large country in charge with practical actions. In the total carbon dioxide emissions, the energy part causes the majority of carbon dioxide emissions. So in order to control the carbon dioxide emissions, we must seize the "bull nose" in the energy field, actively realize the energy carbon neutrality, and then realize the carbon neutrality in all areas in all areas in China.

Tibet is located on the Qinghai Tibet Plateau, with its unique geographical environment: high average altitude, strong solar and ultraviolet radiation, long sunshine time, thin air, low air pressure, low oxygen content, and large temperature difference between day and night. This determines that Tibet's energy structure and development plan are also relatively special. The energy distribution in Tibet is uneven, and traditional energy such as coal and oil is scarce, and renewable energy resources such as water energy, solar energy, geothermal energy and wind energy are rich, of which the total amount of water energy and solar energy resources ranks the first in the country, and the geothermal and wind energy are rich [3]. Therefore, it is wise to focus on the development of clean energy such as water, solar energy, geothermal energy, wind energy and hydrogen energy, whether it is to maximize the utilization of energy in Tibet or from the background of carbon neutrality.

2. Carbon neutrality and energy carbon neutrality

2.1 Peak carbon and carbon neutrality

2.1.1 Background and connotation. The ultimate goal of carbon peaking and carbon neutrality is to reduce greenhouse gas emissions, the core of which is to reduce carbon dioxide emissions. The ultimate goal is to achieve carbon neutrality. First, CO₂ is the most important greenhouse gas, accounting for more than 80% of China's total greenhouse gas emissions. Second, under the existing technical conditions, CO₂ emission reduction is less difficult than other greenhouse gases [4]. At present, there are relatively clear implementation paths for CO₂ emission reduction, such as replacing fossil energy power generation with renewable energy power generation such as wind power and photovoltaic, so as to effectively reduce CO₂ emission of power industry; Through the use of hydrogen energy, the CO₂ emission of steel and other industries can be reduced; through large-scale afforestation, effective absorption of CO₂.

Carbon dioxide emissions mainly come from two aspects, energy related emissions account for nearly 90%, and industrial process emissions account for slightly more than 10%. Carbon dioxide emissions from agricultural activities and waste disposal are relatively small and can be ignored.

Energy related carbon dioxide emissions can be divided into supply side and demand side to dismantle its structure. On the supply side, carbon dioxide emissions mainly come from coal and oil. On the demand side, carbon dioxide emissions mainly come from industry, construction and transportation [5].

2.1.2 Basic principles in the process of carbon emission reduction. It takes a long time to achieve carbon peak and carbon neutrality, and there are many challenges, involving a wide range. In the final process of carbon neutrality, we should pay special attention to order, balance and diversification [6].
Order, that is, from now to the realization of carbon peak and then to the final realization of carbon neutrality, is a relatively long process. We should respect the objective law of the development of things, promote the process of carbon emission reduction step by step, and not be in an emergency to seek success.

Balance is to realize that greenhouse gas emission is not only an ecological environment problem, but also a development problem. The speed of social emission reduction should be consistent with its economic and technological development.

Diversification, that is, because of the wide range of greenhouse gas emissions, it needs to work together in many fields, and apply diversified technologies to form a three-dimensional emission reduction system. Carbon emission reduction needs to promote the innovation and application of emission reduction technology on the basis of optimizing and adjusting energy structure, so as to achieve the carbon neutrality target at a lower cost. If a region wants to achieve carbon neutrality, it must use a variety of clean energy to replace the traditional fossil energy, such as wind power, photovoltaic power generation, hydrogen energy, geothermal energy, biomass energy and biogas.

2.2 energy carbon neutrality

2.2.1 connotation of energy carbon neutrality. To achieve the goal of carbon neutrality, we need to achieve carbon neutrality in many areas, especially in some areas with more carbon emissions, such as the energy and industrial fields mentioned above. Carbon dioxide emissions from the energy sector and industrial sector account for the vast majority of the total carbon emissions, while carbon dioxide emissions from the energy sector account for about 90% of the total carbon emissions. Therefore, as long as carbon dioxide emissions from the energy sector are effectively controlled and carbon neutrality in the energy sector is achieved as far as possible, then all-round and regional carbon neutrality has also been achieved [7].

2.2.2 situation and requirements of energy carbon neutrality. In 2020, we have won an all-round victory in the "fight against poverty", and our economic development has stepped onto a new level and entered a new stage of development. In the field of ecological environment, we put forward the "two carbon goals", and the key to achieve the "two carbon goals" lies in the field of energy. Carbon emissions in the energy sector account for more than 80% of the total emissions. Therefore, if we control the carbon emissions in the energy sector, we will seize the "bull's nose" to achieve the goal of carbon neutrality. In addition, in order to achieve energy carbon neutrality and ultimately achieve all-round and all-round carbon neutrality, we must adhere to the concept of system, coordinate economic and social, energy and power, environmental and ecological aspects, speed up the construction of green, low-carbon and sustainable development of modern energy system, and promote the steady and coordinated development of economy, society and ecology.

3. Development trend of new energy in Tibet under the background of carbon neutrality

3.1 Energy composition and development in Tibet in recent years

3.1.1 Energy resources endowment and characteristics of Tibet. Tibet is rich in energy resources and has remarkable regional and environmental characteristics. Although the reserves of traditional energy resources such as coal and oil are small, renewable clean energy resources such as hydropower, solar energy and wind energy have huge reserves, with obvious regional advantages.

| type | Resource overview |
|------|-------------------|
| water | The theoretical reserves are 201.36 million kilowatts, the annual power generation is 1763.9 billion kilowatt hours, the technology development capacity is 140 million kilowatts, and the annual power generation is 576 billion kilowatt hours |
There are more than 850 hot springs, hot water lakes and hot swamps, which are expected to generate 800000 kilowatts of electricity.

The annual sunshine duration is 1500-3400 hours, and the total radiation in most areas is 6000-8000 MJ/m².

In addition to the shortage in Southeast Tibet, most of the wind energy is rich and available, with an annual wind energy reserve of 93 billion kWh.

The total volume of standing trees in Tibet is 2.295 billion cubic meters, ranking the first in China. The annual crop straw is 2.1157 million tons, equivalent to 1.039 million tons of standard coal, and the manure is 2.9105 million tons, equivalent to 1.45525 million tons of standard coal.

About 100 million tons coal.

The total proven coal reserves are less than 300 million tons, and there are more than 8.1 million tons of peat reserves.

(1) Uneven distribution of resources: for hydropower resources, the first is the imbalance of regional distribution. Hydropower resources are mainly concentrated in Southeast Tibet, and more than 2/3 of the natural hydropower reserves are concentrated in the lower reaches of the Yarlung Zangbo River, Lancang River and Nujiang River, as well as the Chayu River and danlongqu river basins; Second, the time distribution of water resources in rivers is extremely unbalanced. The time period with large amount of water is mainly concentrated in 1/3 of the whole year, and the amount of water in other time is very small, especially in winter and spring.

Similar to the distribution of water resources, the distribution of solar energy and wind energy in Tibet is also closely related to the geographical location and climatic conditions, which has a great imbalance. For example, wind energy resources are concentrated in the areas with few or no people, and forest resources are concentrated in the mountainous areas in the southeast.

(2) Poor development conditions: Tibet has complex geology and topography, frequent geological movements in some areas, and frequent natural disasters such as earthquakes and debris flows. If large-scale water conservancy projects are built in such areas, a series of technical and economic problems will arise. Generally speaking, the investment per kilowatt of hydropower stations in Tibet is 1-2 times higher than that in the mainland. In addition, the quality of coal found in Tibet is not high, the mining conditions are poor, and it does not have the prospect of large-scale mining and utilization, and the mining is not conducive to the realization of carbon neutrality target.

3.1.2 Achievements of energy industry development in Tibet. In recent years, according to Tibet's energy statistics (2005-2010), Tibet's energy consumption demand is accelerating, but the growth rate of energy production has not increased, but decreased. Tibet is rich in natural resources, but its local energy production and supply are still in short supply. From 2005 to 2010, Tibet's total energy consumption has been increasing year by year. There are four types of energy consumption that can be counted: coal, coke, oil and electric power. Biomass energy (non commodity energy) such as solar energy, firewood, crop straw, wood, biogas and livestock manure are not included in the current energy statistics; The four kinds of energy consumer goods that can be counted, except for electricity, are imported from outside the region.

From this, we can draw some characteristics of Tibet's energy consumption: first of all, coal, coke, oil and electric power are the main types of energy consumption in Tibet, and in addition to electric power, they basically rely on external transfer. Secondly, the proportion of energy consumption in the three industries is relatively stable. Third, the proportion of energy consumption of residents has increased steadily, and the energy consumption of urban residents and rural residents has increased. Fourth, there is a great consistency between the growth rate of Tibet's GDP and the growth rate of total energy consumption.

Supply and operation support capacity of energy facilities in Tibet: In order to improve the backward infrastructure conditions, the state has invested a huge amount of money to vigorously
develop Tibet's power projects. A large number of power stations have been built, including Najin hydropower station, Yanghu hydropower station, Yangbajing Geothermal Power Station, Lhasa thermal power station, Jinhe Hydropower Station, etc. During the 11th Five Year Plan period, the total installed power capacity of Tibet's newly started construction or put into operation reached 1.18 million kilowatts (including projects under construction). Zhikong Hydropower Station was established in Lhasa, Shiquanhe Hydropower Station was established in Ali, and Xueka hydropower station was established in Linzhi. At the same time, Huaneng Tibet hydropower station was also started construction one after another. The power grid structure has developed from "one large and three small" at the end of 2005 to "one large and two small" at the end of 2010. The completion and operation of Linzhi Lhasa 220 kV power transformation project has realized the leap forward development of Tibet power grid from 110 kV to 220 kV.

3.1.3 Main problems of Tibet energy industry. Although the level of energy supply in Tibet has been continuously improving in recent years, restricted by the special geographical conditions of Tibet and under the social background of rapid economic development leading to massive energy consumption, the main problems faced by Tibet's energy are still insufficient energy supply, unreasonable energy structure and lack of systematic long-term planning.

(1) The contradiction between energy supply and demand is prominent
In recent years, with the steady development of Tibet's economy, the power consumption of residents and industries has been increasing. According to the data, in 2005, the energy transferred from outside accounted for 65.3% of the total energy consumption in Tibet, and in 2010, the energy transferred from outside accounted for 69.9% of the total energy consumption. In addition, due to the imperfect power infrastructure, the lag of power equipment construction projects, and the unreasonable power supply structure, Tibet still can not get stable power supply. Due to the lack of electricity, industrial enterprises in some areas will still have the situation of switching off and limiting electricity during the peak period of power consumption, which affects the output and economic benefits of enterprises. It is still a problem to be solved in Tibet to realize the regional power coverage as soon as possible.

(2) Single structure of energy industry
At present, Tibet's energy industry is still dominated by hydropower, followed by thermal power, while the total installed capacity of photovoltaic, wind power and geothermal power is less than 5%. The energy structure is single and the development is unbalanced. Although the proportion of hydropower in the total energy has been high, the utilization of hydropower in Tibet is far from enough. The overall average utilization rate of water resources in China is about 20%, of which the Yellow River, Haihe River, Liaohe River and Huaihe river basins have even exceeded 50%, while the utilization rate of hydropower resources in Tibet is only 1%, far below the reasonable level. Moreover, there is a big difference in power generation capacity between wet season in summer and dry season in winter, which leads to a structural power supply problem when the power consumption in winter is large.

(3) Lack of systematic analysis and long-term planning
In recent years, the research on the development of Tibet's new energy industry has increased significantly by both the government and academic circles, but most of them focus on hydropower, photovoltaic, wind energy and geothermal energy, and seldom formulate or study the development strategy of Tibet's whole energy industry from the macro and development point of view; And most of the existing studies are mainly qualitative description, lack of quantitative research through data and quantitative models, especially combined with Tibet's unique geographical environment and ecological environment protection requirements, to examine Tibet's energy industry from the perspective of "economy energy environment" system, and to use quantitative methods to optimize the future energy industry structure.

At the same time, there is a lack of long-term planning research on the development of Tibet's energy industry. At present, most scholars focus on the next few years, and have not studied the
development of Tibet in the next 20 years, 30 years or more. However, the goal of carbon neutrality will take 40 years of unremitting efforts to achieve. So the goal of carbon neutrality is likely to be missed.

3.2 The influence of energy carbon neutrality on the energy composition in Tibet
To achieve the goal of carbon neutrality is a big system engineering. We should start from the overall situation and formulate a long-term emission reduction plan, so as to achieve the goal of carbon neutrality on time. If we want to achieve the goal of carbon neutrality, we should start from three directions: one is to reduce carbon emissions; Second, increase carbon absorption; Third, increase carbon capture and fixation. Among the three directions, the first should be the main direction of our efforts, the second the third, and the best the second. Because the best way to achieve carbon neutrality is to exhaust as little carbon dioxide as possible; However, the production and life of human beings will always emit some carbon dioxide gas more or less, so we must find ways to deal with these gases. One of the ways to deal with these gases is to capture and fix other carbon, and the other is to absorb the emitted gas, that is, carbon sink.

For the first direction, reducing carbon emissions. To reduce carbon emissions, the first thing we need to do is to understand the current problems of "which production and living of human beings emit carbon dioxide", "how much carbon dioxide these production activities emit respectively", "which production activities emit more carbon dioxide". Only after we have a clear understanding of these problems can we have a deeper understanding of the topic of "carbon emission reduction", and we can take more targeted measures to reduce emissions. According to the above statistics, we can conclude that the energy industry has the largest carbon emissions, accounting for more than 80% of the total carbon emissions, followed by the industrial carbon emissions, accounting for more than 10% of the total carbon emissions. Although other industries also emit carbon dioxide, compared with the energy and industrial industries, their carbon dioxide emissions can be almost ignored. We want to achieve the most effective carbon emission reduction, the most effective way is to reduce the carbon emissions of energy and industry, especially the carbon emissions of energy industry. As long as we grasp the "bull nose" in the field of energy, we will have the "magic weapon" of carbon emission reduction.

For the second direction, increasing carbon absorption. For the grand goal of carbon neutrality, increasing carbon absorption can not be our main focus. Increase carbon absorption, namely carbon sink, mainly including forestry carbon sink. According to the general survey report of China's forest resources published by the State Forestry and grassland administration in 2019, China's annual forest carbon sequestration is about 434 million tons. If converted into carbon dioxide, it is only 1.2 billion tons. China's total greenhouse gas emissions in 2019 will be 14 billion tons, and the greenhouse gas emissions caused by fossil energy will be 10.2 billion tons \(^9\), so it is not feasible to use forest resources to achieve the goal of carbon neutrality. In addition, some scholars have put forward the concept of "photovoltaic carbon sink". These scholars interpret "photovoltaic carbon sink" as: using photovoltaic power generation to replace traditional fossil energy power generation, generating the same amount of electricity. The difference between the amount of carbon dioxide emitted by traditional fossil energy and that emitted by photovoltaic system is "photovoltaic carbon sink". But I think the essence of this concept is to use photovoltaic energy to replace traditional fossil energy in order to reduce carbon dioxide emissions. This can be put in the first direction, that is, to use clean energy to replace traditional fossil energy in order to reduce carbon dioxide emissions.

For the third direction, increasing carbon capture and fixation. At present, there is no mature technology and industrial means for carbon capture and fixation. To achieve carbon neutrality through this direction, the most important thing is to increase carbon capture and fixation through technological innovation, and capture and fix carbon dioxide in the air or other places through new technological means. After that, the fixed carbon dioxide gas can be converted into some organic matter, such as ethanol, by certain chemical means. Ethylene and other common organic compounds in industry. In this way, we not only achieve the goal of carbon emission reduction, but also synthesize
some organic raw materials. In order to completely realize all-round carbon neutrality in the whole region, technological innovation is essential, especially to increase carbon capture and fixation.

3.3 Development trend of new energy in Tibet under the background of carbon neutrality

To achieve carbon neutrality, the most important thing is to reduce carbon emissions in the energy sector and achieve carbon neutrality in the energy sector. In order to achieve the goal of carbon neutrality on time, Tibet needs to formulate an energy development plan from now to 2060. The general policy of the energy plan is to focus on the development of clean energy and reduce the proportion of fossil energy. In addition, different types of clean energy have different characteristics. According to the characteristics of different types of clean energy, we should reasonably arrange the energy structure of Tibet in the next few decades. Energy planning specifically includes: how to increase the total energy supply of Tibet in the next few decades, how to adjust the energy structure of Tibet in the next few decades, how to adjust the energy consumption structure of Tibet in the next few decades and so on. This energy development plan for Tibet in the coming decades should not be formulated for every kind of energy, but should include all the current energy forms in Tibet [10].

First of all, we should focus on the development of water resources in Tibet. Water resources can not only be used for power generation, but also for hydrogen production from electrolytic water. Tibet is rich in hydropower resources. It can not only build hydropower stations in some large river basins, but also use electrolytic water to produce hydrogen. Hydrogen energy is also an important clean energy in the future. Water energy and hydrogen energy are mainly used in some industries and transportation. Buildings and other large power areas.

Secondly, we should vigorously develop solar energy resources in Tibet. The average altitude of Tibet is high, so the average sunshine time is long, and the solar radiation is strong, so the use of solar photovoltaic power generation has unique advantages. Moreover, solar energy is a renewable clean energy, which can help achieve the goal of carbon neutrality. Solar energy resources can be used in some industries or government administrative organs. Water energy resources can be divided into wet season and dry season. In dry season, solar energy resources can be used to meet the power demand of large-scale industries.

Then, we will vigorously develop geothermal resources in Tibet. Tibet is one of the most abundant geothermal resources in China. We should give full play to the advantages of abundant geothermal resources and actively develop geothermal resources. In the past, the development and utilization of geothermal resources were not enough. Now we should make full use of the abundant geothermal resources, which can not only meet the energy demand, but also help to achieve the goal of carbon neutrality. Geothermal resources can provide energy demand for some enterprises or families, and geothermal resources can provide relatively stable energy demand.

After that, wind power in Tibet will be developed. There are three large wind belts in Tibet, most of which are in areas where no one or few people are. On these large wind belts, large wind turbines can be built, and then a region will be connected with the wind power generation grid, which can provide more stable power resources. Wind power can be directly transmitted through electric lines.

In addition, the biomass resources in Tibet will be developed. The difference of natural geographical environment in Tibet leads to the difference between biomass resources and low altitude areas. There are some special biomass resources in Tibet, such as barley, yak bone, etc. Biomass resources can provide stable energy for families and meet the energy needs of general families.

At the same time, to reduce the use of fossil energy, the carbon emission in the energy field is mainly caused by the large amount of fossil energy. Therefore, to effectively control the carbon emissions in the energy field, we must control the use of fossil energy. But it is not a long-term requirement that we immediately stop using fossil energy and achieve carbon neutrality. In the process of gradual progress, it is impossible to achieve it in one step. We should gradually reduce the proportion of fossil energy in the total energy, and finally achieve the carbon emission reduction target in the energy field.

In addition, considering the different conditions in various regions of Tibet, Tibet can adjust the
proportion of different clean energy according to their own actual situation, and formulate a set of energy planning suitable for their own region. In short, according to the above energy planning, Tibet can achieve the carbon emission reduction target in the energy field by 2060 years. For the carbon emission reduction in the industrial field, it can also be used to establish a decades industrial development plan. In this way, the carbon reduction targets in energy and industry can be achieved as scheduled by 2060 years, and the carbon neutrality targets in Tibet can be achieved by 2060 years ago.

4. Conclusion
In recent years, with the rapid development of Tibet's economy, people's demand for energy is growing, and the contradiction between energy supply and energy consumption is becoming increasingly acute. Moreover, economic development has not changed the status quo of single energy structure. In the context of carbon neutrality, in order to better solve these problems, first of all, it is necessary to make a systematic analysis and long-term planning of Tibet's energy development in the next 40 years, and each region should also formulate its own energy development plan in the next 40 years according to local conditions.

In order to solve the contradiction between energy supply and demand, and to achieve the goal of carbon neutrality, it is a good choice to vigorously develop clean energy in Tibet. Tibet is rich in water energy, geothermal energy, solar energy, wind energy and biomass energy resources. Among them, hydropower, solar energy and wind energy resources can be used for power generation. Some of these power resources can be supplied to Tibet's enterprises, and the other part can "transmit power from the west to the East"; Geothermal energy and biomass resources are mainly supplied to local residents to provide sufficient energy support for their normal life, and the surplus energy can be centrally stored and used as standby energy. In addition, considering that different regions have different clean energy, different regions complement each other and help each other to solve the contradiction between energy supply and demand and achieve the goal of carbon neutrality.

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References
[1] Zou C N, Xiong B, Xue H Q, Zheng D W, Ge Z X, Wang Y, Jiang L Y, Pan S Q and Wu S T 2021 Petrol. Explor. Develop. 48(2) 480–91
[2] Liu Z Y 2021 Power equipment management 03 20-23
[3] Tang X J and Chen X X 2015 Journal of Dalian University for nationalities 17(04) 356-9 + 374
[4] Pan J H 2011 China Economic and trade journal 09 11-13
[5] Pan J H and Yu X 2011 Open guide 04 13-15 + 19
[6] Li X, Damartzis T, Stadler Z, Moret S, Meier B, Friedl M and Maréchal F 2020 Front. Energy Res. FER08(2020)549615
[7] Lau H C, Ramakrishna S, Zhang K and Radhamani A V 2021 Energy & Fuels 35(9) 7364-86
[8] Zhi H J 2016 Research on the development strategy of Tibet's energy industry under the constraints of resources and environment Beijing University of technology
[9] Pan J H 2020 Environmental economic research 5(04) 1-10
[10] Liu Z Y 2016 Contemporary power culture 03 10