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Research Article

DEVELOPMENTS IN THE RENEWABLE ENERGY SYSTEM POLICIES OF CHINA

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ABSTRACT

Cross-country studies on energy system policies have reached significant potential as a result of renewable energy resources and effects. Here, developments are evaluated especially on different characteristics of countries such as strategies, technological developments and environmental effects of energy. The scope and quality of these studies over China has changed, first of all, in 2001, according to economic studies and the legally protected features of investments in the diversity of renewable energy resources. Utilization of these energy resources was increased by providing various tax incentives to the sectors. The main targets in this direction can be stated as the goal of both maintaining the world leadership position in the field of economy, reducing environmental damage and ending dependence on imports by using the country's resources. In the research, topics such as the effects/results/developments of China's strategies and targets were mentioned and certain inferences were made.

Keywords: Renewable energy, China, Energy, Energy system policies, Incentives.

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INTRODUCTION

Changes in international systems have been accompanied by technological and economic developments. These developments, especially after the Cold War, have necessitated the development of system policies depending on issues such as security perception, welfare understanding, technological competence and globalization. Another development is related to economic development. Factors affecting economic growth have also changed the development mechanisms of countries, and one of these factors is energy. The steps taken by countries for energy system policies such as investments, incentive systems, legal regulations are important issues for economic growth. Energy system policies are among the targets developed in this direction.

For the People's Republic of China, the period before and after the Cold War, a pivotal moment in world history, represents a critical imperative to either remain isolated from the international system or to engage and integrate within the new world order established post-Cold War. In this context, it is essential for China to be highly successful, advanced, and robust in both state and private ventures across economic and social spheres. This article specifically addresses the topic of energy, with a particular focus on renewable energy, which constitutes the primary research problem of the paper. Our research evaluates the developments in renewable energy policies in the People's Republic of China and examines the purposes and objectives for which this energy source will be utilized.

In this China-specific study, renewable energy policies will be examined as a result of both an environment-oriented approach and the depletion of non-renewable energy resources. The perception of continuity in growth requires countries to increase their economic gains by utilizing existing energy resources. As a result of China's desire to have a continuously growing economy, it can be stated that it has improved its energy policies and supported parameters such as incentive systems and energy security. In line with these objectives, China has increased its efforts on renewable energy resources in order to meet its energy needs, reduce environmental pollution, ensure technological and economic developments, and increase energy security. Among the energy policy activities of the Chinese government, there are studies on incentive systems, legal regulations, targets focused on the Renewable Energy Law, and studies within the scope of the Electricity Market Regulatory Commission.

In line with the aforementioned, the overall research will be completed in three stages: in the first stage, renewable energy system policies will be analyzed, in the second stage, China's energy system policies and developments will be analyzed. In the third stage, the main objectives of China's adoption of renewable energy system policy will be stated. The main purpose of the research is to identify the issues that directly affect China such as energy supply, energy security, technological and economic developments, environmental pollution and to show the developments. Thus, China's energy system policies, current situation and goals will be analyzed. In addition, the issue of economic development, which is the main focus of such studies, will also be evaluated.

RENEWABLE ENERGY RESOURCES AND SCOPE

Energy is one of the most important elements of consumption today. Since it is a necessary resource in application tools, energy consumption is constantly increasing. However, especially the needs of developed countries for energy resources have increased as a result of technological developments and opportunities

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(Kocaslan, 2006: 1). Because energy consumption is a direct or indirect necessity. However, the increase in the energy consumed has also made it difficult to meet this energy. Therefore, the need for new energy resources has increased. The development of renewable energy resources is a result of these needs (Mele, 2019: 269). In addition, issues such as reducing air pollution and making energy consumption resources suitable for reuse have increased the tendency towards the use of renewable energy (Baydas and Tatli, 2018: 31).

Renewable energy resources are also associated with increasing population and industrialization. Because the increase in energy requirements as a result of the growing population has led to a rapid closing of the gap between energy production and consumption (Balat, 2004: 235). With the impact of industrial activities, 20 billion tons of carbon dioxide, 100 billion tons of sulfur compounds, 2 million tons of lead and other toxic chemical compounds are released into the atmosphere every year. There are also assessments that the resources used will decrease day by day. This emphasizes the importance of renewable energy resources (Kumbur et al., 2005: 1). As a result of the aforementioned developments, renewable energy resources have also affected the studies carried out around the world. Although the factors that pave the way for countries to carry out studies are based on various reasons, economic and social developments have also been experienced during the meeting of energy needs. The development levels of countries and the tendencies towards the use of renewable energy are also proportional to the goal of economic development. The use of countries' own resources in the use of energy has been achieved through renewable energy. This has affected the investments of countries in renewable energy. The impact and nature of renewable energy can also be examined in this respect (Koc et al., 2018: 87).

China is a world leader in the production of renewable energies and electric vehicles. A third of the world's solar power capacity is installed in China. Elon Musk commented on renewable energy and electric vehicles in a post on Twitter: "Few seem to realize that China is the world leader in renewable energy and electric vehicle generation. Whatever you think of China, that's just a fact". China is also the world's largest producer of hydro, wind and solar energy and therefore of renewable energies (Sonnenseite, 2022).

Characteristics, Types and Advantages of Renewable Energy

Non-renewable energy resources have now been replaced by renewable fuels. In other words, the use of fossil fuels has started to be reduced. Renewable energy resources, whose use is increasing day by day around the world, are examined in various categories. Varieties such as wind, sun, biofuels, biomass, geothermal, ocean resources, which are constantly found in nature, are examples of such resources (Panwar et al., 2011: 1513). The most important features of the use of renewable energy sources are that they are constantly repeatable and that the resource is renewed faster than the rate of consumption. In addition, the fact that it is environmentally friendly makes an important contribution to maintaining ecological balance. In this respect, renewable energy is also the equivalent of the expression clean environment (Karadag et al., 2009: 24).

The need for renewable energy is important to ensure that people's needs are met. The fulfillment of these needs has had an impact on the increase in the need for energy. In meeting energy needs, non-renewable energy resources are tried to be abandoned due to their damaging factors. Issues such as climate change,

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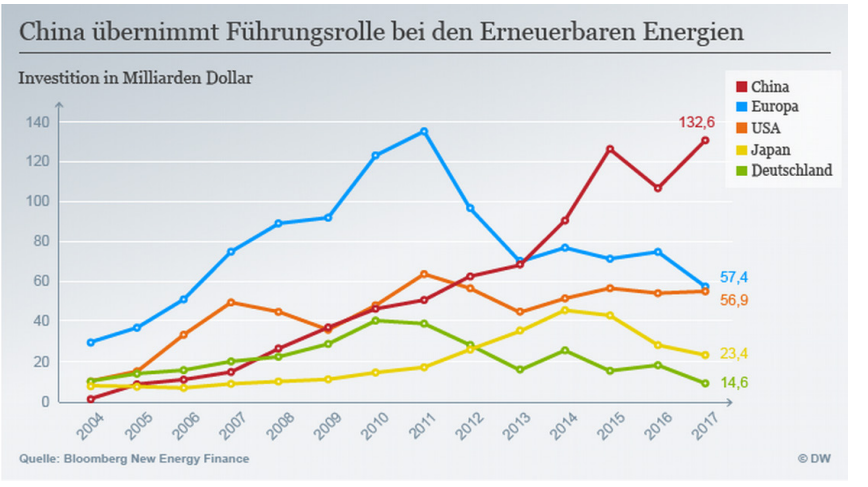
global warming, air pollution have developed as a result of the use of non-renewable energy resources (Keles and Bilgen, 2012: 5199-5200). The important and effective results of this are the negative effects on natural disasters such as floods and storms. Therefore, renewable energy resources are taken into consideration due to their characteristics and positive effects. The advantages of use are factors such as ensuring continuity in energy without harming nature, renewability, and restoration to nature. Not harming nature and human life is among the most important results in this direction (Seker, 2016: 809).

THE ROLE OF RESOURCES AND ECONOMIC DEVELOPMENTS IN CHINA'S ENERGY POLICIES

The People's Republic of China has become one of the great powers in modern world politics and economics. The resource of China's power is linked to the developments in its economy since the 1980s. In terms of its economic power and potential, China has opened the door to major developments, especially in energy relations. This is because China's need for energy and its economic development have been shaped in the same process. This shows that China is not only an energy producer for its own territory, but also an energy producer, transporter and marketer worldwide. The fact that China is an important energy resource for Central Asia is a case in point. In this respect, it can be stated that it has paved the way for China to become a great power in the world (Saki, 2018: 228).

China in particular is making great strides in future technologies and is expanding wind and solar power like no other country in the world (Figure 1). "China is taking on this leading role because it recognizes the enormous market opportunities and the economic benefits," says energy economist Prof. Claudia Kemfert from the German Institute for Economic Research (DIW), who also advises the German government on the German Council of Economic Experts (Rueter, 2018).

Figure 1. *China is Taking the Lead in Renewable Energy*



Source: www.dw.com

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As China has the largest population in the world, its energy needs have also increased. China is said to be the world's largest energy producer after the United States and the third largest oil importer after the United States and Japan. Accordingly, increases in energy needs have made China a country that requires rapid growth and development. However, this has shown that simply meeting energy needs is not enough. The main reason for this is that the economic developments in China are not distributed in a balanced way (Energy Information Administration, 2007). In addition, there is a mixed economic structure, but there is also a lot of work on the privatization of public areas. The main goal of the Chinese government here is to encourage foreign capital and ensure efficiency on energy by providing the necessary incentives. Accordingly, in line with its economic development goals, the Chinese government's efforts are focused on developing policies to increase energy efficiency. For example, tax, tariff and investment facilities provided to foreign investors are among the practices developed in energy policies (Muslume, 2008: 251).

The Chinese government's developments in energy geopolitics are also related to the improvement of its energy policy. In addition to these developments, which can be considered in terms of efficient resource utilization, China's emergence as a rising military, political and economic power is also important. In other words, efforts to improve its energy policy have been based on certain factors. In particular, China's growing population, developing industry and increasing manpower have paved the way for a policy that can meet its energy consumption. Moreover, recent developments such as China's increasing military expenditures, strengthening diplomatic relations with Central Asia and Africa, and playing an active role in regional politics are important goals in increasing its energy system policies. The goals of an interactive policy approach with international policies are also reflected in energy policies. Moreover, the development of an active policy is an important development in this respect (Ciftci, 2019: 80). Accordingly, both national and international policy understanding can be expressed within the scope of the Chinese government's overall work.

The elements that China takes into account when developing its energy policies include geopolitical implications. For example, the importance of maritime activities is an effective step in energy activities. At important points of energy resources, maritime activity has been a source of commercial routes. In this respect, China has not only exported and imported energy on the East Coast, but also carried out these activities through the South China Sea (Lazarou, 2017: 4). This issue is important for China, which aims to have a more active energy policy. Because the Chinese government, while using energy resources, is considered as an economic power and is among the great powers, which makes it important that all evaluations expressed in energy policies are in this direction. Because the Chinese government has tried to bring energy security (Ertekin, 2017: 189) to the forefront among the strategies of utilizing energy resources. For China, whose energy demand is increasing day by day, the scope of energy security has paved the way for the use of new resources and, in a sense, the development of a renewable energy policy. Because as a result of the advantages, characteristics and utilization effects of renewable energy resources, there is a tendency in this direction worldwide.

Necessity of China's Renewable Energy Policy Support and Goals under the Renewable Energy Law

Renewable energy and the advantages provided by this energy have opened the

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door for many countries to carry out effective studies. China is one of the countries operating for this purpose. Especially with the enactment of the Renewable Energy Law in 2005, investments in energy resources have increased. In 2006, the share of renewable energy in total electricity generation was 7%. Within the scope of the 2006-2010 Five-Year Plan, statements were developed that renewable energy production would be 15% in the future. However, China's total installed capacity only reached 25 GW by the end of 2009. By 2020, this ratio is targeted to increase to 120 GW.

What can be considered important in these activities of China are the practices developed under the Renewable Energy Law. The obligation to purchase electricity from renewable energy producers was developed for grid operators. Along with this practice, various facilities are offered to producers. For example, tax reductions are seen as financial advantages. Feed-in tariffs and national incentive systems have reached an important dimension in renewable energy, especially in regional procurement, which applies to wind and solar energy. In the case of very small-scale electricity generation, the feed-in tariffs have basically diverted the feed-in tariffs into effective demand for renewable energy (Uluatam, 2010: 39-40).

In line with the aforementioned, China has taken incentive systems into account when developing its strategies to utilize renewable energy. The scope of incentives here is based on providing various financial facilities. These facilities provided to the producers basically privilege them to contribute to the country's energy production systems in order to prefer renewable energy. In addition, ensuring clean energy policies and sustainable energy are among the activities that take these developments into account. Accordingly, the studies developed by China from 2005 to 2020 are a reflection of these incentives and the nature of the law. Because these situations are also the result of important developments.

China's developments in the last 15 years with the Renewable Energy Law have been achieved through legal, political and economic processes. The policies implemented are also developed within the framework of these objectives. When the effects on investment volume are analyzed, China has become a leading country with its incentive systems. On the other hand, the impact of renewable energy resources in China's growing economy is also based on the country's alternative policies. As a result of being a rich country in hydroelectricity and modern renewable energy resources, China's investments are also high. Investments have been developed in this direction. Its position as a leading country is due to both the presence of rich resources and the investments made. This is an effective result showing that investments are supported by policy supports and incentive mechanisms.

The competence of these policies can be explained by the fact that they are basically capable of ensuring energy supply security. In addition, it can be stated that China is the country that consumes the most energy worldwide due to its large population, increasing industrialization and urbanization. The fact that around 70% of China's primary energy resource is coal has paved the way for air pollution and the disappearance of the concept of clean environment. In this respect, China's production of the highest amount of greenhouse gases in the world has been an important study requirement for both the country and the world in general. The prevention of air, water and soil pollution is intended to be ensured through energy supply security. These issues expressed in the development of renewable energy policies are not simple evaluations. Because China has created three different options for itself to ensure a clean environment and a sustainable life. The first is to risk low economic growth. The second is to redu-

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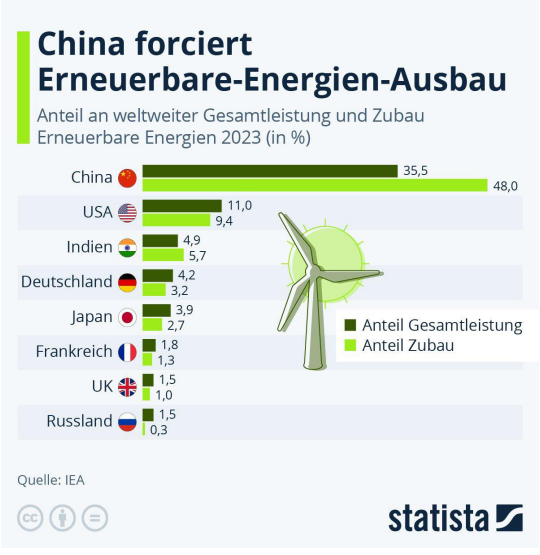
ce energy intensity. The third is to use renewable energy resources. But one area where China wants to be a world leader is in economic activity. It has developed to support both a clean environment and competent economic growth by utilizing renewable energy resources. In this direction, it provides energy systems, legal regulations and financial incentives for its targets that are effective with renewable energy resources (Kaya and Bayraktar, 2019: 164-166).

The goal and scale of China's policy support in this direction is focused on finding and developing an economic system based on energy security supply. An example of a related study can be cited based on tax incentives. A working paper in this direction was developed by the China Institute in 2016. The scope of the report is to consider the impact of China's subsidies and tax incentives. As a result of the report, it was assessed that the benefits of China's preferential policies would also boost developments in the renewable energy industry at the same rate (China Institute, 2016: 33-34). The domestic innovative work target is also taken into account by China in this direction. These issues in developing competitive structures will become more important with the steps to be taken by the government. Because China, which ranks first in terms of investments and capacities in renewable energy resources worldwide, is in a more prioritized position in hydroelectric, solar and wind energy than Japan, the United States, the United Kingdom and Germany (Ulusoy and Dastan, 2017: 131-136). Based on 2016 data, it can be stated that the government will take more comprehensive steps in the future.

China is the largest CO2 emitter in the world and continues to build new coal-fired power plants. The world's most populous country also has an ambitious civilian nuclear program. But the so-called Middle Kingdom is also the leading nation when it comes to the expansion of renewable energies, as a forecast by the International Energy Agency (IEA) shows (Figure 2). According to this, the installed capacity of renewable energy is set to increase by 170 gigawatts this year alone, which corresponds to almost half of all the capacity added worldwide. In total, China would then have a nominal capacity of over 1,400 gigawatts or 35.5 percent of the world's installed capacity (Brant, 2023).

Figure 2. *China Forced Renewable Energy Expansion*



Source: Statista, 2023

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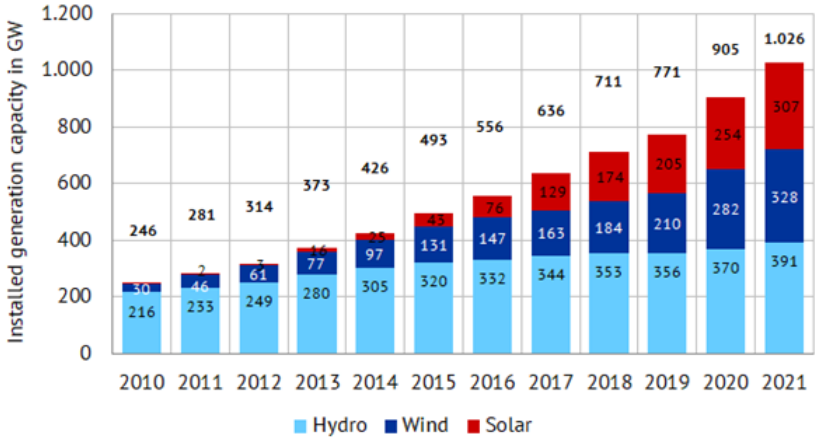
China's generation capacity from hydropower, wind and solar exceeded the 1,000 GW threshold last year. This means that China should easily reach its target of 1,200 GW of renewable capacity by 2030 (Goß and Stein, 2022). With the current expansion figures, it could even be exceeded by 300 GW. The development since 2010 is shown in Figure 3.

Figure 3. *Total Installed Renewable Energy Capacity in China in GW per Year*



Source: Goß and Stein, 2022

China's Legal Regulations on Energy Policy

China's energy system policies were systematized in 2006 with the Renewable Energy Law. The studies carried out until this period, on the other hand, gained momentum in 2001. Until 2006, the legal regulations and policy supports can be expressed as the reduction of value added tax for renewable energy and preferential tax policies to increase the use of renewable energy (Kaya and Bayraktar, 2019: 167). Although China developed its energy regulation efforts after 1990, it reflected some efforts pointing to renewable energy in 2001. However, the main regulations consist of studies limited to energy saving until 2005 (Qiu and Li, 2012: 10687).

China's strategy to utilize and develop renewable energy includes the goal of effectively utilizing the natural energy market. China achieves these strategies through investment diversification. In future government steps in this direction, such investment diversification will be ensured through various policies and legal frameworks as well as the utilization of resources. This assessment is a result related to the investments made. The policies of the Chinese central government can generally be expressed in terms of markets across the spectrum. The use of highly preferential foreign channels is the structure of energy investments in general. However, supporting real international investments with an increase also requires a large domestic investment in the source of capital (Cunningham, 2015: 1-2). It can be mentioned that the legal structure related to this is being developed. An effective issue in investments is the legal privileges provided within the scope of the policies developed.

When China's legal policies in the context of renewable energy are evaluated in the period after 2006, it can be stated that it has primarily developed strategies for renewable energy development targets. In the same period, biofuel projects

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were supported and efforts were secured with the Renewable Energy Law. In 2007, a national climate change program and a medium and long-term development plan for renewable energy were established. In 2009, the legal policy was the development plan for offshore wind, the amendment of the law on renewable energy and the implementation of a tariff guarantee for wind energy. In 2010, feed-in tariff for biomass energy was developed. In 2011, a feed-in tariff system for solar energy was established. In 2012, a renewable energy feed-in tariff system was developed. In 2013, a feed-in tariff was introduced to support solar panels. In 2016, China developed an energy technology innovation action plan and renewable energy procurement regulations. In 2017, a renewable energy green certification and trading mechanism was established. In 2018, studies were developed for renewable energy quota applications (Kaya and Bayraktar, 2019: 167). The 11th Five-Year Development Plan was established in 2006, the 12th Five-Year Development Plan in 2012 and the 13th Five-Year Development Plan in 2014. The objectives set within the scope of these policies are primarily focused on supporting policies within the legal framework. This also plays an important role in the formulation of incentive policies.

China plans clean solar supply chain, when it comes to solar technology, the world is dependent on supplies from China. However, there are debates in the West about human rights violations in the supply chain. The People's Republic is now responding: it is planning its own "clean" supply chains for exports. The West would receive solar technology with a clear conscience but would remain dependent. In the debate about the West's dependence on China and forced labor in the production of solar technology, the People's Republic is now pursuing a dual strategy: the country is apparently establishing a second supply chain that is to be free of polysilicon from Xinjiang. In doing so, Beijing, which dominates the global market for solar technology, wants to avoid pressing questions about human rights when selling its products in Europe and the USA (Beckert, 2022).

The Place and Importance of Incentive Policies in China's Renewable Energy Systems

The scope of renewable energy and support policies has been provided more comprehensively with incentive policies. The place and importance of incentives within the scope of renewable energy policy can be stated with regard to the fact that developments cannot be achieved as desired with a single type of incentive. The main reason for this is due to potential differences. These differences also differ in terms of technological possibilities and capabilities. Another related result is the differences in terms of cost. All these statements show that it is necessary to create types of incentives as well as supporting incentive policies. Therefore, there is no single type of incentive. Tax incentive systems can be mentioned as an example of these incentives (Ulusoy and Dastan, 2017: 122). Diversification of incentive policies is considered important for renewable energy. Because incentive policies may also differ according to the renewable energy resource. For example, the fact that China is the world leader in wind energy differentiates its investments, supports and incentives for wind energy (Celikkaya, 2017: 56). It is also known for its leading position in terms of capacity and capacity increases (Karagol and Kavaz, 2017: 16). It is important to develop appropriate studies and activities. On the other hand, general comments on China's incentive policies and the methods it follows can be stated with its steps to ensure economic stability both nationally and internationally.

When commenting on China's energy strategy and changing policy, it can be mentioned that China has carried out studies that paved the way for differentiations, especially in its foreign policy. The basis of the studies developed within

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the scope of the economic program resulted in an increase in energy imports. In order to reduce energy imports and make the best use of domestic resources, the government worked on energy security and supply (Karaca, 2012: 93). The policies and incentives developed can also be linked to these statements. Yet another assessment can be made regarding the scope of policies and incentives. China has the highest share in the field of energy technology. Across the country, trends, practices, understandings, incentives, supports, policies, etc. are all aimed at ensuring the best contribution to China's economy. China has also not only been working recently, but has basically started to work since the eighties. The effective implementation of these studies based on renewable energy policies has been achieved with the provision of incentives. These developments have been experienced as a result of the investments made. In other words, the basis of incentives was shaped with the activities developed and investments made in the eighties (Ulgen, 2018: 82-85).

The People's Republic of China is now leading the way in the expansion of renewable energies. However, according to the IEA, new political and economic decisions are also turning the USA and India into new driving forces (Kollner, 2023).

For a while, it looked as if China might lose out on the expansion of renewable energies. However, towards the end of the year in particular, the Middle Kingdom put in a real final spurt - and was thus able to add more than 87 gigawatts of solar generation capacity (Stahl, 2023).

CHINA'S MAIN OBJECTIVES IN ADOPTING RENEWABLE ENERGY POLICY

China's main objective in developing its energy policy, and especially its renewable energy policy, is to achieve economic and political success. In order to maintain its success in this direction, China has turned to differentiated energy policy practices around the world. In the 21st century, it revises its energy policies and conducts more effective and comprehensive studies. The basic logic of these efforts can be expressed in the form of high level investments at both national and international levels. The studies here have been developed by adhering to energy supply and demand security. This is because the issue of security is as important as the diversity in energy resources. One of China's important steps in developing its energy policies is related to renewable energy policies. With its renewable energy policies, China has made significant contributions, first nationally and then internationally. In a general context, this is aimed at preventing the damages to the climate and nature caused by its investments in the right energy policy. Because China ranks first among the countries that harm nature with the energy resources it uses. Thus, it is aimed to reduce this damage with renewable energy resources and policies (Istikbal, 2019: 49-59). On the other hand, a related assessment requires the active use of renewable energy by China in addressing climate change. The dual active role in environmental protection can be successfully achieved in this direction (Fan, 2018: 1).

China's renewable energy policy is dominated by climate and nature-oriented practices as well as pragmatic variants of techno-nationalist ideology. To this end, China supports wind and solar companies. In other words, it adopts renewable energy system policies. When it has problems with other economic partners regarding the policies it develops, it shows its flexible policy approach (Kennedy, 2013: 909). The goal of developing another renewable energy policy

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is related to economic growth. The economic factor as one of the most important goals of China's energy policies can be explained by the fact that China is one of the most important countries in the world. It can be said that it has developed as a result of energy policies. Economic-oriented studies are generally accepted as a policy type. The policy objective has also been developed for renewable energy types.

Table 1 shows that China's policies relate to all renewable energy resources. This table, which is shown as an economic basis, refers to investments in wind and solar energy in particular as it makes investments according to the availability of resources. Renewable energy resources do not rank first among China's energy resources. An illustration of this is presented in Table 2.

Table 1. *China's Policy Supports in Renewable Energy (Subject, Type and Target)*

Name of Policy	Date	Policy Type	Policy Objective
Reduction of value added tax	2001	Economic	Wind and bioenergy
Development of a preferential tax policy	2003	Economic	All resources
Sea wind development plan	2009	Economic and political support	Wind energy
Amendment to the Renewable Energy Law	2009	Economic, political, and R&D	All resources
Feed-in tariffs linked to wind energy	2009	Economic and political	Wind energy
Feed-in tariffs linked to biomass energy	2010	Economic and political	Bioenergy
Feed-in tariffs linked to solar energy	2011	Economic and political	Solar energy
Renewable energy feed-in tariff system	2012	Economic	All resources
Feed-in tariff to support solar panels	2013	Economic	Solar energy
13th Five-Year Plan for solar energy development (2016-2020)	2014	Economic	Solar energy
Renewable energy green certification and trading mechanism	2017	Economic	All resources

Source: Kaya and Bayraktar, 2019: 167.

Table 2. *Types of Energy Resources in China's Energy Production (2017)*

Total Consumption	Coal	Hydro Electricity	Renewable Energy	Nuclear Energy	Natural Gas	Others	Petroleum
6495.1	4360.9	1155.8	471.7	248.3	196.2	47.4	14.9
Percentage (%)	67.1	17.7	7.2	3.8	3.0	0.7	0.2

Source: Istikbal, 2019: 60.

When the data on energy resources in Table 2 are analyzed, it is seen that China's energy systems are comprehensive. Policies have been developed based on economic activities upon the increase in renewable energy resources in energy consumption rates. In the 2017 data, the target and scope of the renewable energy resource that increased is the result of these evaluations. Accordingly, targets based on economic factors are based on strategic studies. These indicators show that China's targets among renewable energy system policies are comprehensive. However, the main effective mechanism is shaped towards economic activities.

China has been increasing the proportion of non-fossil energy sources (including nuclear power) in its energy mix for years. By 2030, it is set to rise to 25 percent of primary energy consumption and to 90 percent by 2060. By the end of 2023, it is expected to reach 18.3%, as announced by the National Energy Agency (NEA) in April 2023. The priority is energy security (Abele, 2023).

The Balance between Technological and Economic Developments

Countries that are increasing their investments in the use of renewable energy resources are not only developed countries. Interpretations made as a result of technological developments are generally based on the fact that renewable energy resources will be accompanied by certain opportunities. However, it can be stated that developing countries also accelerate economic development by using renewable energy resources. Spain is one of these countries. Its economic success with renewable energy resources shows that there will be promising developments for developing countries as well (Kum, 2009: 221). The relationship between renewable energy resources and the use of technology, as stated by Demir (Demir, 2012: 1) can be expressed as a tendency towards traditional energy use with the use of faulty technology. The investments that countries will make in technology should be supported by various strategies and developed with targets. Thus, the background of technology can be created. In addition, with the advancement of technology, the use of renewable energy resources is increasing.

It is important for countries to take effective steps towards technology investments. The example of China's technological and economic developments can be mentioned in this respect. China's renewable energy policies are based on energy and climate-related developments, energy systems, renewable energy targets and policies. It has determined its technological investments in line with its targets. China's technological investments have brought their role in the global energy transition to a significant potential. The effective contribution to the success of its investments, as examined in the study developed by SHURA (SHURA, 2018: 77-78) can be expressed in terms of the size of its land area, the ongoing growth of its economy and the fact that it has the highest CO2 emissions from the energy sector in the world. From this perspective, China wants to be among the world leaders in the economy, while at the same time struggling with energy demands and air pollution. It is turning towards technological investments at this level. Again, China's policy and success in this direction is related to its investments in wind and solar energy from 2011 to 2016. China achieved an average annual growth rate of 25% in wind energy and 86% in solar energy. One of the sources of this success is technological investments. Long-

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term energy planning and current environmental regulation are important issues in this context.

China's balance and relationship between economy and growth is to ensure a more service-oriented and cleaner energy mix. The rise in renewable energy resources can also be analyzed from this perspective (TMMOB, 2018: 139). The source of the upward trend mentioned in terms of solar energy can be stated in terms of the increase in the installed capacity every year. Again, the change in this installed capacity over the years by TMMOB can be shown in Table 3.

Table 3. *Changes in China's Solar Electricity Installed Capacity (MW)*

Resource	2012	2013	2014	2015	2016
Renewable Energy (Solar)	6.750	17.740	28.380	43.530	78.070

Source: TMMOB, 2018: 93

Table 3 shows the impact of China's strategies and technological investments in solar energy. It can be stated that China has achieved a result related to its efforts to increase the installed capacity. A goal of achieving technological and economic balance can be expressed in terms of the scope of installed capacity. Especially in 2016, these developments may not be limited to China's desire to make economic progress. This is because political relations have required the security and energy supply of countries to reach the desired potential. China has also carried out certain studies on this issue and, especially after this process, has increased its technological investments and turned more towards developing its economy.

Impact of Renewable Energy on Energy Security and Supply

It is considered that energy-related security problems and threats can be solved with the use of renewable energy. It is thought that long-term security can be ensured with renewable energy resources. In addition, sustainable growth and climate change are also important in terms of energy security. The assessments that certain security-related problems can be eliminated are basically expressed in coordination with the share in energy production. However, it is not capable of directly eliminating all security problems. New security threats may also develop. Therefore, confidence in renewable energy resources depends on energy policies. Many issues ranging from energy supply, pricing, access and transportation costs to inter-country relations are affected by the types of renewable energy resources (Citak and Kilinc Pala, 2016: 79-81). It is important for countries to develop a system policy according to the type of energy resource. This helps to target the investments that countries will make in line with their resources with policies. When this issue is analyzed through China, the scope of the system policy for energy security in renewable energy resources can be expressed in terms of high investments in wind and solar energy. Some resources make it easier for countries to carry out operations such as production and distribution more quickly. Studies on resources for energy production are important in this respect with the system policy. In addition, the productive results of China's energy policy investments were evaluated by Sangroya and Nayak (Sangroya

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and Nayak, 2015: 2-3) in terms of meeting 28% of the world's wind energy capacity alone. This ratio can be considered in the context of China's position linking the issue of energy supply and security with the economic system as well.

Energy security has evolved as a consequence of countries' dependence on energy imports. This issue affecting energy security has become a tool to make security more effective with renewable energy. Activities aimed at protecting national security and interests are closely related to energy security (Erkan, 2013: 1). It is also important for China. In addition to energy security, another factor that can be considered important is energy supply. China's assessment that it will be able to provide 20% of its energy supply from non-fossil resources by 2030 is the result of the developments in renewable energy resources. China has also linked energy security to measures based on system integration as a result of energy supply. It has developed additional measures to integrate wind and solar energy into the sector. These integration efforts are related to battery storage services provided by electric vehicles, technology for converting electrical energy into heat, heat storage batteries, digitalization, modernization of thermal power plants (SHURA, 2018: 79). Investments in integration efforts are mainly aimed at ensuring energy security and achieving energy supply targets. Accordingly, energy security and supply, which are interrelated, are brought to a more measured potential through integrated efforts. Moreover, Kaya and Bayraktar (Kaya and Bayraktar, 2019: 164-166) consider China's energy approach within the scope of energy supply security. In terms of energy supply security, as a result of the 50% oil import dependency rate, it can be stated that it takes into account the renewable energy policy in order to ensure security in this regard. Accordingly, the issue of energy supply security has an important place in the energy system policy.

Relationship between Meeting Energy Needs and Environmental Sensitivity

Another consideration in China's renewable energy system policy relates to environmental sensitivity. The increasing use of fossil fuels has irreparable consequences for the world climate and the environment. In this context, the fact that renewable energy resources affect the possibilities of use with almost no harm to the environment and at the same time are much more cost-effective than fossil fuels creates such a result (Celikkaya, 2017: 53). In addition, the China Renewable Energy Outlook 2019 (China National Renewable Energy Centre, 2019: 10) report has set a strategic measurement that the key objective of China's strategies is the need to achieve coal control. On the other hand, the report also emphasized the need for strict control of coal production and the need to reduce the use of coal due to its environmental problems. A related view is expressed by Sun et al. (2016: 1) on the need to end the decades-long reliance on coal for China's energy consumption in order to protect the environment and prevent anthropogenic climate change. The element emphasized here is also seen as a necessity to prevent climate change. These developments that can be achieved with renewable energy resources show that the principle of environmental sensitivity is examined as a result of other resources. For example (Kaya and Bayraktar, 2019: 166), the use of fossil fuels has a negative impact on food and water security. This is particularly reflected in its impact as a source of

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soil pollution. These factors that reduce the quality of life have increased the importance of renewable energy system policy. Within energy resources, this aspect, which is linked to the issue of energy security and supply, has shown its impact and quality as a more successful measure. The importance for countries of making an assessment between the need for energy and the environmental damage caused by energy resources should be examined by taking into account the results related to these issues. For countries with large populations, such as China, the relationship between energy and environmental sensitivity needs to be evaluated.

China currently covers most of its electricity consumption from coal-fired power plants. However, renewable energy sources also grew strongly in 2020: solar energy by more than 16 percent, wind energy by 15 percent, hydropower by 4 percent (Schmidt, 2021).

CONCLUSION

Studies on energy resources include applications developed based on their exhaustibility. In addition, these applications have brought studies on different issues such as their negative effects on nature, evaluations on energy supply and security, and the effects of establishing a balance between economy and technology to an important potential. Since countries generally import energy, they have turned to studies aimed at ending this dependence. Countries' energy system policies also include these efforts. Among the energy system policies developed by China, renewable energy resources, which is an important issue for all countries, reflected certain activities after the 2000s. Within the scope of the research, the strategies developed by China in this direction cover the activities in which certain steps were taken in 2001 and three important development studies were carried out. Accordingly, legal studies were first developed in line with development plans and targets. The consideration and implementation of renewable energy resources by the sectors was supported by certain incentives. With these incentives regarding tax rates, cost reductions are made. Another evaluation in this context can be made regarding the steps taken according to technological developments. Studies on the establishment of an economic balance between technological developments and economic balance in renewable energy system policies attract attention within the scope of China's energy policy. As an example, it can be stated that China has become the world leader in renewable energy resources, especially as a result of the studies on wind and solar energy policies. In addition, in relation to the increasing demand for energy supply until 2030, issues related to energy security have been developed on a more effective scale.

The balance established between energy supply and security also results in the impact of technological developments. Accordingly, the energy system policies developed by China are based on the diversity of renewable energy resources, changes in energy systems, technological elements, incentives, and legal regulations.

The global market for renewable energy technologies has seen strong growth since 2000. In 2013, for the first time, more renewable energy power generation

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plants were installed than coal, gas and nuclear power plants combined and nuclear energy combined. Wind and solar plants are now the most cost-effective form of electricity generation in more and more form of electricity generation. As they reach significant shares, renewable energies are becoming increasingly system-relevant at many points - leading to additional investment requirements and necessitating changes in regulation.

In particular, the specific characteristics of wind and solar power plants (high capital intensity, low marginal costs, fluctuating electricity electricity generation) mean that, despite the sharp fall in costs, a proactive policy in favor of renewable energies is still required in favor of renewable energies.

In this context, China attaches great importance to renewable energy as a state. Of course, it has made great progress in renewable energy and is increasing its activities day by day. In addition, China is an example for many countries in the world in this regard.

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REFERENCES

Abele, C. (2023). GTAI Trade & Invest, China - The world's largest CO2 emitter wants to protect the climate. 04.09.2023, Shanghai.

Balat, Mustafa (2004). "The Use Renewable Energy Sources for Energy in Turkey and Potential Trends". *Energy Exploration and Exploitation*, 22 (4): 235-251. doi: https://doi.org/10.1260/0144598042886317

Baydas, Abdulvahap, Halim Tatli (2018). "Imalat ve Hizmet Firmalarinin Yenilenebilir Enerji Ile Ilgili Algi ve Tutumlarinin Belirlenmesine Yonelik Uygulamali Bir Arastirma". *Journal of Balkan Social Sciences*, 14(7): 30-50.

Beckert, Nico (2022). China plans clean solar supply chain. Table. Media, Analysis. Last update: December 2, 2022.

Brant, Mathias (2023). Statista-Renewable Electricity, China accelerates expansion of renewable energies.

Celikkaya, Ali (2017). "Yenilenebilir Enerjinin Tesvikine Yonelik Uluslararasi Kamu Politikalari Uzerine Bir Inceleme". *Finance Magazine,*, 172: 52-84.

China Institute (2016). China's Renewable Energy and Clean-Tech Market, Summary Report (March).

China National Renewable Energy Centre (2019). China Renewable Energy Outlook, Energy Research Institute of Academic Macroeconomic Research.

Cifci, Orhan (2019). "Cin'in Enerji Jeopolitiginde Artan Rolu ve ABD'nin Enerji Politikasinin Yeniden Sekillenmesi". *Turkish Journal of Security Studies*, 21(1): 79-98.

Citak, Emre E. and Pinar Buket Kilinc Pala (2016). "Yenilenebilir Enerjinin Enerji Guvenligine Etkisi". *Journal of Suleyman Demirel University Institute of Social Sciences*, 25: 79-102.

Cunningham, Edward A. (2015). "The State and the Firm: China's Energy Governance in Context". *Gegi Working Paper*, pp. 1-44. doi: https://doi.org/10.1080/10192557.2022.2045711

Demir, Elif (2012). *Avrupa Birligi (AB)'nin Enerji Politikasi ve Turkiye*, Yuksek Lisans Tezi, Master's Thesis, Istanbul University Institute of Social Sciences, Istanbul.

Energy Information Administration (2007). International Energy Outlook. Retrieved from http://www.env-edu.gr/Documents/International%20Energy%20Outlook%202007.pdf. Accessed: 10.05.2023.

Erkan, Anil Caglar (2013). *Europe's Dependency on the Russian Federation in Terms of Energy Supply Security*, Master's Thesis, Adnan Menderes University Institute of Social Sciences, Aydin.

Ertekin, Meric Subasi (2017). "Cin'in Buyuyen Enerji Talebinin Karsilanmasinda Afrika'nin Onemi". *Igdir University Journal of Social Sciences*, 12: 189-222.

Eurasian Research Journal
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Vol. 6, No. 1.

Fan Jingli, Wang Jiaxing, Wei Shijie and Zhang Xian. (2018). "The Development of China's Renewable Energy Policy and Implications to Africa". *Materials Science and Engineering*, 394(1): 1-6. doi: https://doi.org/10.1088/1757-899X/394/4/042034

Goß, Simon and Gerhart Stein (2022). China's renewable energy target for 2030 - Renewables versus emissions, 12 May 2022.

Istikbâl, Deniz (2019). "Rejimin Mesruiyeti ve Enerji Guvenligi: Cin Komunist Partisinin Enerji Politikalari". *International Journal of Economics, Business and Politics*, C. 3(1): 49-68. doi: https://doi.org/10.29216/ueip.513987

Karaca, Recep Kutay (2012). "Cin'in Degisen Enerji Stratejisinin Dis Politikasina Etkileri (1990-2010)". *Journal of International Relations*, 33(9): 93-118.

Karadag, Cigdem, Isil Isik Gulsac, Atilla Ersoz and Mustafa Caliskan (2009). "Cevre Dostu ve Temiz: Yenilenebilir Enerji Kaynaklari". *Science and Technology*, Mayis, pp. 24-27.

Karagol, Enes Tanas and Kavaz Ismail (2017). "Dunya'da ve Turkiye'de Yenilenebilir Enerji". *SETA Analysis*, S. 19.

Kaya, Halil Ibrahim and Yuksel Bayraktar (2019). "Hukuki Duzenlemeler, Politika Destekleri ve Mali Tesviklerin Yenilenebilir Enerjinin Gelisimindeki Rolu: Cin Halk Cumhuriyeti Ornegi". *Cumhuriyet University Journal of Economics and Administrative Sciences*, C. 20(1): 164-180.

Keles, Sedat and Selcuk Bilgen (2012). "Renewable Energy Sources in Turkey for Climate Change Mitigation and Energy Sustainability". *Renewable and Sustainable Energy Reviews*, 16(1): 5199-5206. doi: https://doi.org/10.1016/j.rser.2012.05.026

Kennedy, Andrew B. (2013). "China's Search for Renewable Energy". *Asian Survey*, 53(5): 909-930. doi: https://doi.org/10.1525/as.2013.53.5.909

Koc, Ali, Huseyin Yagli, Yildiz Koc and Irem Ugurlu (2018). "Dunyada ve Turkiye'de Enerji Gorunumunun Genel Degerlendirilmesi". *Engineer and Mechanical*, 692 (59): 86-114.

Kocaslan, Gelengul (2006). *Turkiye'nin Enerji Kaynaklari ve Alternatif Bir Kaynak Olarak Ruzgâr Enerjisinin Degerlendirilmesi*, Master's Thesis, Istanbul University Institute of Social Sciences, Istanbul, 2006, p. 1.

Kollner, Christian (2023). China is driving forward the expansion of renewable energies. August 11, 2023.

Kum, Hakan (2009). "Yenilenebilir Enerji Kaynaklari: Dunya Piyasalarindaki Son Gelismeler ve Politikalar". *Journal of Erciyes University Faculty of Economics and Administrative Sciences*, 33: 207-223.

Kumbur Halil, Zafer Ozer, Duygu Ozsoy and Emel Deniz Avci (2005). *Turkiye'de Geleneksel ve Yenilenebilir Enerji Kaynaklarinin Potansiyeli ve Cevresel Etkilerinin Karsilastirilmasi,* Proceedings of the III. Renewable Energy Resources Symposium, October 19-21, Mersin.

Lazarou, Stavros (2017). "Energy Security Considerations Driven By Geography and Policy Regulation for China: European Best Practice". *Journal of Energy and Environmental Research and Technology*, 1(1): 1-5. doi: https://doi.org/10.24218/jeert.2017.02

Mele, Marco (2019). "Renewable Energy Consumption: The Effects on Economic Growth in Mexico". *International Journal of Energy Economies and Policy*, 9(3): 269-273. doi: https://doi.org/10.32479/ijeep.7460

Muslume, Narin (2008). "Buyuyen Cin Ekonomisinde Artan Enerji Talebi ve Dunya Enerji Piyasasina Etkileri". *Ataturk Higher Institution of Culture, Language and History*, pp. 249-270.

Panwar, N.L, Kaushik, S.C. and Kothari, Surendra (2011). "Role of Renewable Energy Sources in Environmental Protection: Review". *Renewable and Sustainable Energy Reviews*, 158(1): 1513-1524. doi: https://doi.org/10.1016/j.rser.2010.11.037

Qiu, Xin and Honglin Li (2012). "Energy Regulation and Legislation in China". *Environmental Law Institute*, 7(1):10687-10693.

Rueter, Gero (2018). Nature and Envroment: Renewbles: China takes on Europe's pioneering role. January 26, 2018.

Saki, Caglar (2018). *Buyuk Gucler Politikasinda Orta Asya Enerji Kaynaklari: Jeopolitik Mucadele*, Master's Thesis, Ankara University Institute of Social Sciences, Ankara.

Sangroya, Deepak and Jogendra Kumar Nayak (2015). "Development of Wind Energy in India". *International Journal of Renewable Energy Research*, 5(1): 1-13.

Schmidt, Sandro (2021). Federal Institute for Geosciences and Natural Resources BGR-Analyse: China is massively expanding its coal and renewable energy capacities. Pressemitteilung, Hannover, 31.03.2021.

Seker, Arzu (2016). "Yenilenebilir Enerji, Turkiye'de Yenilenebilir Enerji Potansiyeli ve Yesil Pazarlama ve Yenilenebilir Enerjinin Pazarlanmasi". *Journal of International Social Research*, 46 (9): 809-828. doi: https://doi.org/10.17719/jisr.20164622645

SHURA (2018). Ruzgar ve Gunes Turkiye'de Enerji Donusumunu Nasil Hizlandirabilir? Kuresel Ornekler, Agora Energiewende. Retrieved from https://shura.org.tr/wp-content/uploads/2018/12/SHURA-2018-12-Ruzgar-ve-Gunes-Turkiyede-Enerji-Donusumunu-Nasil-Hizlandirabilir-Kuresel-Ornekler.pdf. Accessed: 07.10.2023.

Sonnenseite (2022). China: Weltweit führend bei Erzeugung von erneuerbaren Energien und von Elektrofahrzeugen. Retrieved from https://www.sonnenseite.com/de/wirtschaft/china-weltweit-fuehrend-bei-erzeugung-von-erneuerbaren-energien-und-von-elektrofahrzeugen/. Accessed: 03.11.2023.

Stahl, Tobias (2023). Renewables: China takes on Europe's pioneering role. January, 23 2023.

Eurasian Research Journal
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Vol. 6, No. 1.

Statista (2023). China forciert Erneuerbare-Energien-Ausbau. Retrieved from https://de.statista.com/infografik/30417/prognose-anteil-weltweiter-gesamtkapazitaet-und-zubau-erneuerbare-energien/. Accessed: 03.11.2023.

Sun, Xiaoyang, Baoshen Zhang, Xu Tang, Benjamin C. McLellan and Mikael Hook (2016). "Sustainable Energy Transitions in China: Renewable Options and Impacts on the Electricity System". *Energies*, 980(9): 1-20. doi: https://doi.org/10.3390/en9120980

TMMOB (2018). Turkiye'nin Enerji Gorunumu, *Chamber of Mechanical Engineers*.

Ulgen, Anil (2018). *Yenilenebilir Enerji Kullanimini Tesvik Yollari Uzerine Bir Degerlendirme*, Master's Thesis, Hacettepe University Institute of Social Sciences, Ankara.

Uluatam, Ela (2010). "Yenilenebilir Enerji Tesvikleri". *Economic Forum*, October, pp. 34-41.

Ulusoy, Ahmet and Ceyda Bayraktar Dastan (2017). "Yenilenebilir Enerji Kaynaklarina Yonelik Vergisel Tesviklerin Degerlendirilmesi". *Labor and Society*, 17(7): 122-160. doi: https://doi.org/10.31199/hakisderg.381941.