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# Economic Aspects of the Benefits of Renewable Energy Considered in the Legal Framework in Different Countries

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**Abstract**: The purpose of the research is to analyse the legislative initiatives of foreign countries in the field of regulation and development of renewable energy sources. Among the methods used are dogmatic, comparative law, legal hermeneutics, synthesis, induction, and deduction. The research explored issues relating to the development and improvement of Kazakhstan's current legislative framework for renewable energy sources. Kazakhstan's government initiatives, in particular, the introduction of renewable energy projects, were reviewed and analysed. There is a need to increase the proportion of renewable sources in the state's economic system.

Keywords: green economy; sustainable development; energy sources; environmental issues; economic security.

## 1. Introduction

In recent years, there has been an increasing focus on phenomena that relate to socio-economic and geopolitical implications, namely energy transformation, which is caused by the development of alternative energy. Notably, it combines energy efficiency and renewable energy technologies. It allows for the development of an innovation plan on several fronts at once. According to Qazi et al.[1)] using this type of energy provides an opportunity to fundamentally change the quality of economic growth, increase economic security, and modernise the economic system in general. In systems where alternative energy sources are being actively used, the energy infrastructure is being upgraded by replacing obsolete equipment with new, more efficient equipment. Thus, alternative energy reduces the state's dependence on fossil fuels, while using renewable energy enables the national economic system to achieve high growth rates while reducing greenhouse gas emissions.

Based on this, the development of alternative energy technologies is a rather powerful driver of innovation and the foundation for the green economy of the future with minimal environmental impact, high technological sophistication, and energy security. As noted by Sinsel et al.[2)], in the next decade the national economies of developed countries will be characterised by a science and technology innovation framework. According to Husin and Zaki[3)], the current period of societal development is referred to as Industry 4.0, or the Fourth Industrial Revolution. Its specific feature is that there is a broader focus on environmental and ecological issues. Accordingly, this increased global interest has resulted in the active promotion of alternative energy sources such as renewables, whose use significantly reduces carbon dioxide emissions into the atmosphere.

According to Halkos and Gkampoura[4)], was a milestone year for renewable energy development in the global community. It is explained by the fact that more of these alternative energy sources were generated and exploited than gas and coal sources combined. As Razmjoo et al.[5)] stated, the change in technological modes is characterised by corresponding shifts in the raw material base of the economic system. Thus, initially, the energy and transport infrastructure already in place is used while stimulating their further development. In the fast growth phase, there is an increase in the cyclical plan of production, consumption of the gross domestic product, and energy intensity. According to this, as the order develops, an entirely new kind of infrastructure is established that will overcome the limitations of the previous one, realise the transition to new types of energy carriers, and lay the resource base for the development of the future order.

The study aimed to explore the experiences of leading renewable energy countries, such as Germany, Denmark, the UK, the USA, France, and China, in order to identify the main areas for the establishment and growth of the renewable energy sector. Specifically, the main objectives of the study are the following:

- to examine Kazakhstan's current legal framework and public policies concerning renewable energy sources;

- to compare the laws, regulations, and incentive systems pertaining to renewable energy in the chosen benchmark countries;
- to provide well-informed recommendations that could improve Kazakhstan's current legislative environment and encourage the country's renewable energy industry to grow further.

## 2. Materials and methods

The methods of legal hermeneutics, dogmatic, and comparative-legal analysis have been used to examine the legal framework of several foreign states and Kazakhstan.

The method of legal hermeneutics has provided an opportunity to examine the enshrined provisions of states such as Germany, the United Kingdom (the UK), the United States of America (the USA), the People's Republic of China (PRC), Denmark, and France. Accordingly, the EU Green Deal[6], the Law of the Federal Republic of Germany "On Renewable Energy Sources"[7], the Decree of the Government of the Federal Republic of Germany "On the Energy Protection of Buildings and Energy-Saving Equipment"[8], the Law "On Modernization and Development of the State Electricity Service"[9], the Law "On Gas and Communal Electricity and Energy"[10], Climate Change Act[11], Energy Act[12], National Action Plan for Energy Efficiency[13], The Budget and Economic Outlook: 2015 to 2025[14], Economic Recovery Act[15] , whose provisions provide for the promotion of investment levels in energy efficiency without precedent, the Law of the People's Republic of China "On Renewable Energy Sources"[16]. With the use of this technique, the researchers were able to gain a thorough understanding of the fundamental ideas, motivators, and mechanisms that have fueled the expansion of the renewable energy industry in these developed nations.

In turn, the dogmatic approach made it easier to thoroughly analyse Kazakhstan's current legislative framework, which includes important laws and regulations pertaining to the country's shift to a green economy and promotion of renewable energy sources. This method assisted in determining the advantages and disadvantages of Kazakhstan's current legal system, paving the way for a comparative analysis. The analysed legal documents are the following: the Decree of the President of the Republic of Kazakhstan "On the Concept for the Transition of the Republic of Kazakhstan to a "Green Economy"[17], Environmental Code of the Republic of Kazakhstan[18], the Decree of the Government of the Republic of Kazakhstan No. 996 "On Approval of the Classification (Taxonomy) of Green Projects to be Financed through Green Bonds and Green Loans"[19] and the Law of the Republic of Kazakhstan "On support for the use of renewable energy sources"[20].

By using a synthetic approach, the researchers were able to include the results of their analysis of the policies and legal frameworks of different nations. The synthesis technique allowed for the discovery of common trends, similar drivers, and overarching principles guiding the growth of renewable energy sectors internationally by bringing together the individual features seen across the many national settings.

The induction approach made it easier to draw broad conclusions and trends from the individual case studies that were examined. The researchers were able to infer general lessons and best practices that might be relevant to Kazakhstan's renewable energy environment by carefully examining the distinctive experiences and methodologies of other nations. By using an inductive approach, it was possible to find more broadly applicable insights rather than only describing the legal frameworks.

In addition to the inductive study, the deductive approach was also utilised to evaluate the reliability and relevance of these globally derived understandings in the context of Kazakhstan. The researchers assessed the recommendations and trends' applicability and practicality for implementation by deductively applying them to Kazakhstan's current legislative and policy framework. The formulation of customised policy recommendations was further informed by this deductive reasoning, which assisted in bridging the knowledge gap between global experiences and the unique circumstances and requirements of Kazakhstan's renewable energy sector.

Lastly, the researchers were able to make comparisons and contrasts between Kazakhstani policies and those that are applied globally thanks to the comparative-legal analysis. In order to support Kazakhstan's renewable energy ambition, this approach was helpful in condensing best practices and producing pertinent recommendations that would be appropriate for adoption in the country's law enforcement system. The study's findings and conclusions were informed by the comprehensive and multifaceted analysis of the subject matter made possible by the cooperative use of various methodological instruments.

## 3. Results

### 3.1 Global trends in sustainable energy development

The sustainable development of the energy sector provides an opportunity to identify several indicators that are linked to the level of technical, economic, and social progress and have a strong influence on the political factor. In this case, it is relevant to mention that one of the main prerequisites for this energy development is the affordability of energy and energy pricing policies. Generally, there is a commitment to developing the energy sector in a sustainable format in developing countries, but specific implementation is complicated by the lack of economic "strength" of these states, as they are frequently heavily dependent on imports of energy products. Notably, more intensive use of energy from renewable sources and the consequent introduction of cleaner technologies are limited by insufficient levels of public funds or domestic or foreign investment. It is essential to mention the price differential between

conventional and renewable energy sources, which has a significant impact on economic development strategy. The latter depends quite strongly on the amount of investment in "green" energy.

Using renewable energy sources is increasing significantly every year due to several advantages of this type of alternative energy. It is useful to consider the upward trend in the various world regions (Fig. 1).

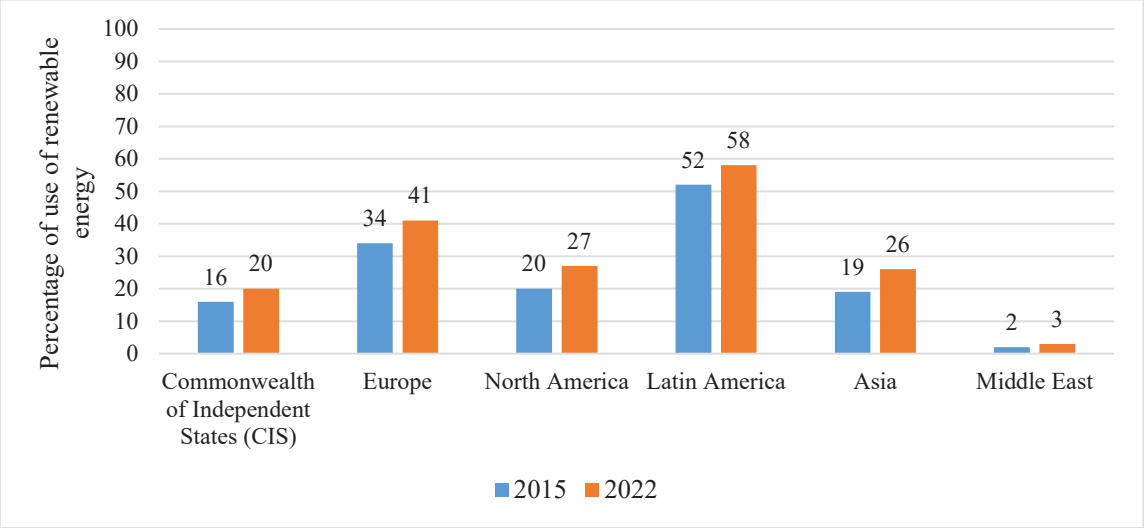


**Fig. 1:** Renewable energy trend in different regions of the world, %.
Source: compiled by the authors based on[4)].

Based on that, it is useful to mention that the indicators have changed considerably in the period in question. This indicates that international figures are more interested in the development of alternative energy sources and their further use for economic and political purposes, as well as to solve several environmental problems. According to the Europe Recovery Plan, or Green Plan, it is planned to increase the level to 30% of the budget for climate change investments by 2050 to achieve zero-carbon emissions[6)]. Thus, it implies an innovative policy that is inherently long-term and effective and considers all aspects of energy efficiency. Making the transition to a climate-resilient economy requires a continuous stream of significant investments.

In general, the concept of "sustainable energy" should be understood to be multidimensional, comprising three key components: quality of life, energy security, and economic sustainability. Sustainable energy is the foundation of national development. The global community's engagement with the concept is a logical step, driven by the need to respond to the escalation of socio-environmental problems. In developing strategies, each state is guided by its national priorities because, depending on its economic, energy potential, and geopolitical location, each country has different capacities regarding the realisation of a reorientation towards sustainable development. In this regard, it is appropriate to analyse foreign experience in the functioning of the sector in question to consider various legislative recommendations for law enforcement practice in Kazakhstan.

### 3.2 Comparative analysis of renewable energy policies in different countries

The European Union (EU) is the leader in the transition to sustainable energy, while developing countries have been slower in implementing the process[21)]. But making the transition is essential for all nations due to the deterioration of the current state of the environment worldwide and the global concept of sustainable development. The EU strives to reduce emissions by 55% from 1990 levels by 2030 and to become climate neutral by 2050. Thus, each EU member state must develop its own decarbonisation strategy. It implies that countries will make the transition from fossil fuels to carbon-free electricity. Notably, this process is possible by using renewable energy sources, electrifying them, and increasing the corresponding efficiency of the energy segment[22)].

It should be mentioned that the EU strategy includes two approaches: states that have switched to renewable energy and whose priority is the stability of supply and energy security; and countries that have made the switch to renewable energy and are reducing their carbon footprint. In this case, there are some differences of opinion among EU member states when choosing a development strategy, and, in turn, the EU strategy of full decarbonisation only exacerbates them. Measures taken in line with decarbonisation have a major impact on various sectors, namely economic development, the environment, and political relations.

Based on this, it can be concluded that the decarbonisation process is not one-sided; in the long term, it must consider geopolitical and social aspects. As mentioned earlier, the EU's global purpose is to reach climate neutrality by 2050. So far, member states have

achieved success and positive results in this area, but there are differences between countries in the implementation of the visions. Thus, a more detailed analysis of the policies of each state should be conducted. Notably, Germany places a huge emphasis on energy conservation and renewable energy sources. There are about 20,000 wind turbines in the Federal Republic of Germany. The German Energy Agency is a centre of expertise on a range of issues relating to renewable energy, energy efficiency, and smart energy systems.

In 2008, the Law of the Federal Republic of Germany "On Renewable Energy Sources" was adopted[7]. According to the regulations, priority is established for electricity that is generated by renewable energy sources. It is mentioned that this law is an effective mechanism that provides an opportunity to promote energy produced from solar, water, wind, geothermal, and biomass sources in the field of energy production. This German law has had an impact not only on climate protection but also on the development of the renewable energy sector and has become an export product in its own right. Thus, some EU member states and other states have taken principles that are enshrined in legislation and interpreted them into their provisions.

Germany is one of the few states that encourages the development of the renewable energy sector through bonuses. Consequently, the Decree of the Government of the Federal Republic of Germany "On the Energy Protection of Buildings and Energy-Saving Equipment"[8] came into force in 2001, which provided for the payment of bonuses for measures to save heat and electricity consumption in dwellings.

Another EU member state with a high level of efficiency in developing the renewable energy sector is Denmark. Notably, as far back as the 1970s, the country was using wind energy for commercial rails, and as of today, 1/5 of all national energy comes from a renewable source. To implement close cooperation with Germany and Sweden in the investigated sector, Denmark has chosen the Kriegers Flak area, which is located in the Baltic Sea and is the first place in the world to produce offshore electricity. This offshore wind farm, which has a capacity of 600 MW, will transmit renewable energy simultaneously to three states: Denmark, Germany, and Sweden.

French policy has evolved in the development of renewable energy sources, following Germany's path. In September 2012, the French President spoke at the opening of the annual Paris conference on the environment and reaffirmed France's further long-term objectives[23]. They focus on reducing the level of nuclear energy in the state's energy mix to 50% by 2025, developing further the renewable energy sector, and their output per year should be 36 million metric tonnes of petrol equivalent, which is a twofold increase in 15 years.

According to the Law "On Modernization and Development of the State Electricity Service", environmental issues in France are regulated by the Environment and Electricity Agency[9]. This Act transposed the provisions of Directive 96/92/EU, which relate to the general rules governing the internal electricity market, into the regulations[24]. Accordingly, the objective has been set to organise an open electricity market in France with further integration of production from renewable sources[9]. The regulation of this segment has been supplemented by the Law "On Gas and Communal Electricity and Energy"[10].

The UK has quite a strong policy to introduce energy-efficient technologies and renewable sources. Notably, it is a logical consequence of the geographical location of the state, because of which the wind currents provide an opportunity for tidal action. The Climate Change Act committed the UK to reduce greenhouse gas emissions by at least 34% compared to 1990 levels[25]. Another piece of legislation, namely the Energy Act part 2, regulates issues related to using and sustainably developing renewable energy sources[12].

It is important to mention the experience in the USA. In this country, energy efficiency has long been widely used as a major resource. Thus, in 1992, the government's Energy Star programme was adopted, which is an international indicator of energy efficiency[25]. It is a voluntary labelling and certification programme for energy efficiency that identifies and promotes energy-efficient products and practices. Products that meet the programme's requirements typically use less energy without compromising performance compared to standard models. Countries such as Japan and Canada have subsequently joined the programme.

The National Action Plan for Energy Efficiency was developed in the USA in 2006[13]. According to it, the main barriers that reduce efficiency and hinder the development of the energy sector have been identified. Based on this, economic recommendations have been highlighted, and the foundations of The Budget and Economic Outlook: 2015 to 2025, which provides a list of actions to assess and achieve progressive renewable energy development outcomes, are outlined[14]. On February 17, 2009, the Economic Recovery Act entered into force, with provisions to stimulate investment levels in energy efficiency in an unprecedented way[15]. For example, in New York City, there are plans to develop primary school buildings that consume energy sparingly and produce energy simultaneously by using renewable sources.

Work to promote using renewable energy sources should be mentioned. In this area, experts from the Natural Resources Defence Council, together with the National Renewable Energy Laboratory, have established a dedicated map of the potential of existing and planned alternative energy sources. Thus, the purpose of this capacity map is to increase people's awareness of renewable energy and to increase their

willingness to contribute to the development of the sector.

The experience of the PRC demonstrates an increased level of renewable energy development. The Law of the People's Republic of China "On Renewable Energy Sources" has increased the energy supply, improved the structure and security of the energy sector, and improved environmental, social, and economic sustainability[16]. China is one of the most productive wind energy producers in the world; the PRC can produce twice as much as the USA. Notably, China has 1/3 of the world's solar power generation capacity, with the largest number of systems in the world already built by 2019. Yet only 23% of the energy consumed in the PRC comes from "clean" sources, while 58% comes from coal, one of the most polluting options the world currently uses.

An analysis of the experience of foreign countries demonstrates the significant development of the renewable energy sector (Fig. 2). Consequently, it is useful to note some of the state programmes explored for further legal application in Kazakhstan. Subsequent studies will explore the prospects for improving the efficiency of renewable energy sources in the post-Soviet states.

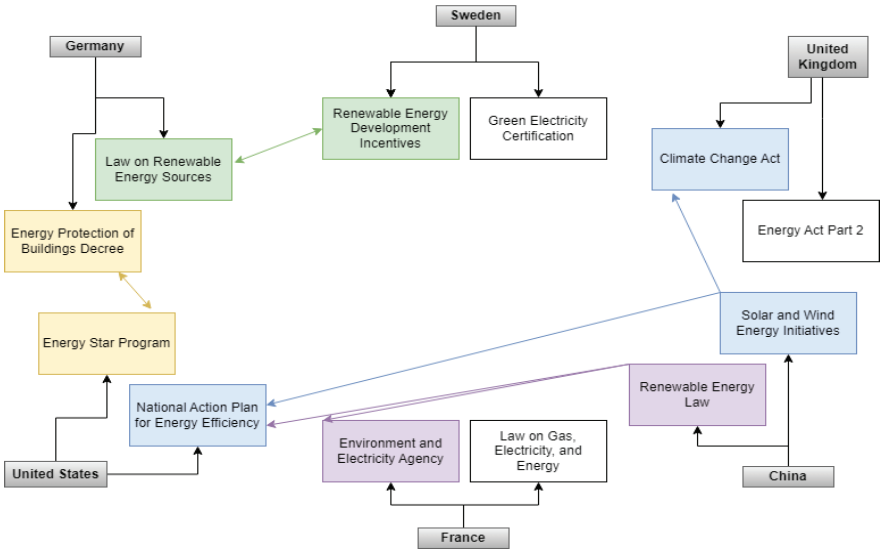


**Fig. 2:** International legislative framework on renewable energy development.

### 3.3 Economic implications of renewable energy within legal frameworks

The economic aspects of renewable energy are multifaceted and encompass a wide range of factors, from direct financial benefits such as cost savings and job creation to indirect impacts like health cost reductions due to cleaner air. To understand these economic benefits within the legal frameworks of various countries, we must delve into the mechanisms that govern renewable energy subsidies, the market dynamics of energy pricing, and the strategic investments made by nations in renewable technologies.

Renewable energy sources present a unique economic advantage due to their inexhaustibility and widespread availability. Unlike fossil fuels, which are concentrated in specific geographic regions and are subject to volatile market conditions, renewable resources can be harnessed in virtually any location, leading to a more democratized energy landscape. This decentralization not only fosters energy independence for countries but also stimulates local economies by creating jobs in the installation, maintenance, and management of renewable energy systems.

In addition to job creation, renewable energy projects often lead to the development of new markets and industries. For instance, the push for solar energy has led to significant investments in photovoltaic cell technology, driving down costs and making solar power increasingly competitive with traditional energy sources. Wind energy, similarly, has seen technological advances that have improved efficiency and reduced the cost of energy production. These advancements have been supported by legal frameworks that incentivize innovation, such as tax credits, feed-in tariffs, and renewable portfolio standards that require a certain percentage of energy to come from renewable sources.

The legal frameworks also play a crucial role in shaping the economic landscape of renewable energy by setting the stage for investment security. Long-term policies and stable regulatory environments are essential for attracting both domestic and foreign investments into renewable energy projects. Countries that have succeeded in this regard often feature comprehensive legislation that addresses not only the production of renewable energy but also its integration into the national grid, the transition from fossil fuels, and the socio-economic aspects of such a transition.

Another significant economic aspect of renewable energy is its impact on the stability of energy prices. Renewable energy sources, particularly wind and solar, have low variable costs because they do not require fuel purchases. This can lead to lower and more stable energy

prices for consumers and reduce the economic vulnerability associated with fossil fuel price spikes. However, the integration of renewable energy into national grids requires upfront investments in infrastructure, which can be a hurdle for developing countries.

Despite the initial costs, the long-term economic benefits of renewable energy cannot be overstated. Countries that have invested heavily in renewables are seeing a reduction in health-related costs as air pollution declines. Moreover, renewable energy systems require less water, mitigating the economic impacts of water scarcity and competition, which are becoming increasingly prevalent issues worldwide. Transitioning to renewable energy also presents economic opportunities in the form of new financial instruments and markets. Green bonds, renewable energy certificates, and carbon credits are examples of tools that can mobilise private capital for renewable energy projects. Such financial innovations, underpinned by legal support, can significantly enhance the attractiveness of renewable energy investments. Finally, it is critical to address the economic benefits of renewable energy within the broader context of climate change mitigation. The cost of inaction in the face of climate change is projected to be substantial. By investing in renewable energy, countries are not only reducing their greenhouse gas emissions but also positioning themselves to avoid the future costs associated with climate change impacts (Fig. 3).

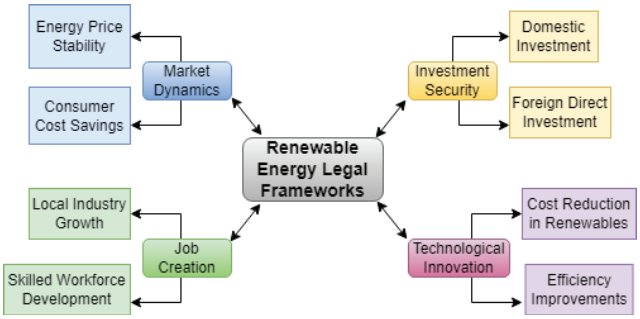


**Fig. 3:** Economic and legal synergies in renewable energy

In summary, the economic aspects of renewable energy are deeply intertwined with the legal frameworks that countries put in place. These frameworks can either catalyse or hinder the transition to a sustainable energy future. As such, they are as much an economic tool as they are a legal one, shaping the incentives and market dynamics that will determine the pace and success of this critical transition.

## 4. Discussion

At the moment, the dependence of Kazakhstan's economic system on exports of heavy energy sources slows down the transition and further development of the green economy quite considerably, and as a consequence, the energy push remains at the level of "conception". But, therewith, according to President Kassym-Jomart Tokayev, the state will implement a transition to increase the indicators of renewable energy sources in the country's balance sheet, which will provide an opportunity to implement global changes in the future policy of Kazakhstan[17]. In addition, the Head of the Republic of Kazakhstan has indicated that the development of "smart" policies and increased investment will improve the green global economy. Based on this, Tokayev has presented initiatives to the international community, which are provided according to the Decree of the President of the Republic of Kazakhstan "On the Concept for the Transition of the Republic of Kazakhstan to a "Green Economy""[17].

According to the provisions enshrined, the concept should be implemented in three phases. The first phase, until 2020, was the government's priority to optimise energy use, increase the level of efficiency of environmental plan activities, and establish "green" infrastructure. The second phase is valid until 2030, according to which the course of current policy is the transformation of the national economic system, stimulating the development and wide implementation of renewable energy sources, the construction of structures based on high standards of energy efficiency. The third phase, until 2050, involves the functioning of the national economic system according to the principle of the "third industrial revolution", which involves using natural resources subject to their sustainability and renewability[17].

In 2017, in Kazakhstan, solar panels were installed on bus stops, which provided the opportunity to provide heating for closed stops in winter and lighting due to special panels. As Suyeubaeva et al.[26] accumulator batteries were introduced, which allowed the storage of electrical energy during the day and the release of electrical energy in the evening. It should be added to the authors' position that it allows air pollution to be avoided by reducing emissions of solid waste, exhaust fumes, and oil products. As a consequence, an alternative was introduced in Kazakhstan: LLP "Astana LRT" purchased 100 electric city buses, which reduced pollutant emissions into the air[27].

As written by Dogan et al.[28] cycle-sharing is one of the alternative transport projects of an eco-plan that corresponds to green economy standards, contributes to infrastructure development, and promotes public outreach. It should be agreed, as this automated bicycle rental system is an alternative to other means of transport. However, notably, there are disadvantages that are inherent to cycle-sharing: the modernisation of cities of national importance is prioritised over other localities, which raises the problem of uneven coverage of the development of Kazakhstan's cities in the green economy segment. Accordingly, to overcome this issue, it is necessary to invest in development in all

administrative-territorial units of Kazakhstan, implement environmental projects, and implement a full transition to a "green" economy.

It should be mentioned the importance of improving the effectiveness of the legal framework, namely improving the regulation of renewable energy sources by attracting investment and supporting innovative technologies. In particular, Anna Bjerde, who is the World Bank's Vice President for Europe and Central Asia, noted Kazakhstan's efforts to transition to a "green" economy during her first official visit and provided a pledge of support for an ongoing foundation[29]. She noted that the process would have a significant impact on regional development and employment and provide an opportunity to plan for alternative incomes and sources of income.

According to Muratbekov[30], one of the most significant regulatory developments in Kazakhstan was the adoption of a new Environmental Code of the Republic of Kazakhstan in January 2021. Due to this, the fundamental principles of national legislation in the sector examined have been reviewed[18]. It should be agreed with this author, however, that the introduction of the "polluter pays" principle has been a particular landmark. It entails the provision of compensation for the damage caused by the enterprise that pollutes the environment with its emissions. It should be noted that the precautionary principle provides an incentive for such enterprises to reduce the level of pollution due to costs in the form of penalties and additional tax payments.

The green taxonomy is an innovation that should not be overlooked. According to Ang et al.[31] for the effective development of this innovation, it is necessary to systematise indicators of a regulatory nature for the energy costs of production by product and facility operation, in particular, the energy efficiency of those buildings for which using renewable energy sources is compulsory. It should be agreed with this author's position, which is explained by the fact that the mandatory use of alternative forms of energy is quite essential for the development of this segment[32)-34].

The Decree of the Government of the Republic of Kazakhstan No. 996 "On Approval of the Classification (Taxonomy) of Green Projects to be Financed through Green Bonds and Green Loans" was adopted on December 31, 2021[19]. Here, the green taxonomy is to be understood as a unified system of classification according to activities of an economic nature, asset categories, and projects whose purpose is to improve the efficiency of already existing natural resources, reduce the adverse effects on the environment, mitigate and adapt to climate change, and increase the savings and efficiency of the energy plan.

Note the Law of the Republic of Kazakhstan "On Support for the Use of Renewable Energy Sources", namely the amendments initiated to introduce a category of conditional consumers of the qualified plan[20]. It does not provide a transparent mechanism for certifying data on electricity generation by this category of consumers at renewable energy facilities[35)-37]. Therefore, the enshrined provisions of the regulation require further amendments to ensure an efficient and transparent mechanism. While Kazakhstan's national policy on renewable energy development is not sufficiently effective currently, there are positive developments in the sector. Thus, as Shaikenova writes, in June 2022, an agreement was signed between the Ministry of Energy, TotalEnergies, JSC "SAM-RUK-KAZYNA" and JSC NC "KazMunayGas"[38]. The purpose is to regulate the principles that guide the implementation of a large-scale 1 GW renewable energy project according to a decree of the President of Kazakhstan. In this case, it should be added that the implementation of this agreement provides for the construction of a wind park in Zhambyl Oblast; it provides an opportunity to implement "green" economy targets, attract additional investment, increase renewable energy generation, and, importantly, establish new jobs for the population[39)-41].

To summarise the above, Kazakhstan is currently targeting the development of renewable energy sources, as this has enormous economic, political, and environmental potential for the state. Several recommendations can be made to enhance Kazakhstan's approach to renewable energy development. First, in order to encourage investment in clean energy sources, Kazakhstan ought to think about passing legislation like the Law of the Federal Republic of Germany "On Renewable Energy Sources"[7], which offers feed-in tariffs and priority grid access. Imitating the Climate Change Act[11] and Energy Act[12] of the UK may also fortify Kazakhstan's legislative framework for emissions reduction goals and sustainable energy transitions. Furthermore, creating cross-border renewable energy projects, as Denmark has done, might support Kazakhstan's energy security and regional cooperation. Lastly, Kazakhstan should investigate the use of financial incentives to promote energy efficiency and innovation in renewable energy to hasten the country's transition to a greener energy source. By implementing strong legislative and policy frameworks, Kazakhstan may more successfully overcome present obstacles and realise the full potential of renewable energy by incorporating these best practices from the global community.

## 5. Conclusions

This study offered a thorough examination of the renewable energy industry, emphasising its increasing significance in tackling global environmental and economic issues. The study looked at Kazakhstan's national laws and policies pertaining to renewable energy, as well as the experiences of other nations that

are at the forefront of this field, including China, Germany, the UK, France, Denmark, and the USA.

The analysis showed that although Kazakhstan has made great strides to strengthen its legal framework and encourage the expansion of renewable energy, there are still problems that need to be fixed to prevent the industry from expanding. The nation's shift to a green economy has been hampered by its excessive reliance on exports of fossil fuels. The Concept for the Transition of the Republic of Kazakhstan to a "Green Economy" is one of the ambitious goals the government has unveiled. It describes a gradual strategy to change the country's economic system and raise the proportion of renewable energy sources.

The analysis of international best practices provided Kazakhstan with insightful information. Examining historic law papers from China, Germany, and the UK showed the various strategies these countries have put in place to accelerate the switch to sustainable energy. Several recurring themes surfaced, such as the creation of financial incentives to encourage private investment in renewable energy initiatives. In a similar way, the inclusion of energy efficiency standards, emissions reduction objectives, and targets for renewable energy in the legal systems of nations like the USA and France highlighted the significance of a thorough, multifaceted approach. The general goal of these worldwide legislative frameworks was to establish an environment that facilitates the faster deployment of sustainable energy solutions, even though the specific policy mechanisms used varied.

The overall conclusions offer a thorough grasp of the political and financial dimensions of the growth of renewable energy, emphasising the necessity for Kazakhstan to keep improving its legal and policy frameworks in order to fully tap into the potential of this industry. Subsequent investigations need to probe more deeply into the experiences of other post-Soviet nations to pinpoint the best practices and customise remedies for Kazakhstan's particular situation.

## References


1) A. Qazi, F. Hussain, N.A. Rahim, G. Hardaker, D. Alghazzawi, K. Shaban, and K. Haruna, "Towards sustainable energy: A systematic review of renewable energy sources, technologies, and public opinions," *Institute of Electrical and Electronics Engineers Access*, 7 63837–63851 (2019). doi: 10.1109/ACCESS.2019.2906402.
2) S.R. Sinsel, R.L. Riemke, and V.H. Hoffmann, "Challenges and solution technologies for the integration of variable renewable energy sources," *Renewable Energy*, 145 2271–2285 (2020). doi: 10.1016/j.renene.2019.06.147.
3) H. Husin, and M. Zaki, "A critical review of the integration of renewable energy sources with various technologies," *Protection and Control of Modern Power Systems*, 6 3 (2021). doi: 10.1186/s41601-021-00181-3.
4) G.E. Halkos, and E.C. Gkampoura, "Reviewing usage, potentials, and limitations of renewable energy sources," *Energies*, 13 (11) 2906 (2020). doi: 10.3390/en13112906.
5) A. Razmjoo, L.G. Kaigutha, M.V. Rad, M. Marzband, A. Davarpanah, and M. Denai, "A technical analysis investigating energy sustainability utilizing reliable renewable energy sources to reduce $CO_2$ emissions in a high potential area," *Renewable Energy*, 164 46-57 (2021). doi: 10.1016/j.renene.2020.09.042.
6) "EU Green Deal," 2019. https://www.consilium.europa.eu/en/policies/green-deal/ (accessed March 11, 2024).
7) "Law of the Federal Republic of Germany "On Renewable Energy Sources"," 2008. https://www.erneuerbare-energien.de/EE/Redaktion/DE/Dossier/eeg.html (accessed March 10, 2024).
8) "Decree of the Government of the Federal Republic of Germany "On the Energy Protection of Buildings and Energy-Saving Equipment"," 2001. https://www.umweltbundesamt.de/themen/klima-energie/energiesparen/energiesparende-gebaeude#eigentuemer (accessed March 10, 2024).
9) "Law "On Modernization and Development of the State Electricity Service"," 2000. https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000000750321 (accessed March 8, 2024).
10) "Law "On Gas and Communal Electricity and Energy"," 2013. https://www.collectivites-locales.gouv.fr/competences/lenergie-et-les-communications-electroniques (accessed March 9, 2024).
11) "Climate Change Act," 2008. https://www.legislation.gov.uk/ukpga/2008/27/contents (accessed March 11, 2024).
12) "Energy Act," 2013. https://www.gov.uk/government/collections/energy-act (accessed March 7, 2024).
13) "National Action Plan for Energy Efficiency," 2006. https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/national_action_plan_for_energy_efficiency_report_chapter_6_energy_efficiency_program_best_practices.pdf (accessed March 6, 2024).
14) "The Budget and Economic Outlook: 2015 to 2025," 2015. https://www.cbo.gov/publication/49892 (accessed March 7, 2024).
15) "Economic Recovery Act," 2009. https://www.cms.gov/Regulations-and-Guidance/Legislation/Recovery (accessed March 8, 2024).
16) "Law of the People's Republic of China "On Renewable Energy Sources"," 2005.

https://encyclopedia.pub/entry/27609 (accessed March 7, 2024).
17) "Decree of the President of the Republic of Kazakhstan "On the Concept for the Transition of the Republic of Kazakhstan to a "Green Economy"," 2013. https://adilet.zan.kz/rus/docs/U1300000577 (accessed March 10, 2024).
18) "Environmental Code of the Republic of Kazakhstan," 2021. https://adilet.zan.kz/rus/docs/K2100000400 (accessed March 9, 2024).
19) "Decree of the Government of the Republic of Kazakhstan No. 996 "On Approval of the Classification (Taxonomy) of Green Projects to be Financed through Green Bonds and Green Loans"," 2021. https://online.zakon.kz/Document/?doc_id=37598502 (accessed March 11, 2024).
20) "Law of the Republic of Kazakhstan "On Support for the Use of Renewable Energy Sources"," 2009. https://online.zakon.kz/Document/?doc_id=30445263 (accessed March 9, 2024).
21) J. Lowitzsch, C.E. Hoicka, and F.J. van Tulder, "Renewable energy communities under the 2019 European Clean Energy Package – Governance model for the energy clusters of the future?" *Renewable and Sustainable Energy Reviews*, 122 109489 (2020). doi: 10.1016/j.rser.2019.109489.
22) L. Sotiroski, "Consolidation and crisis: The evolution of the European Union's legal framework in pursuing peace, stability, and unity amidst global challenges," *Social and Legal Studios*, 6 (3) 171-177 (2023). doi: 10.32518/sals3.2023.171
23) "Statement by Mr. François Hollande, President of the Republic, on the challenges and priorities of France's foreign policy, in Paris on August 27, 2012," 2012. https://www.vie-publique.fr/discours/185772-declaration-de-m-francois-hollande-president-de-la-republique-sur-les (accessed March 10, 2024).
24) "Directive 96/92/EC of the European Parliament and of the Council of 19 December 1996 Concerning Common Rules for the Internal Market in Electricity," 1996. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31996L0092 (accessed March 10, 2024).
25) "Energy Star," 1992. https://www.energy.gov/eere/buildings/energy-starr (accessed March, 8, 2024).
26) S.N. Suyeubaeva, E.V. Varavin, M.V. Kozlova, and I.B. Betimbaeva, "Investments in renewable energy sources as a lever for achieving the sustainable development goals of the Republic of Kazakhstan," *Bulletin of the Turan University*, 2 89–99 (2022). doi: 10.46914/1562-2959-2022-1-2-89-99.
27) Ch. Ualikhan, "State Procurement Bulletin: Details about buses for 17.9 billion tenge in Astana," 2019. https://factcheck.kz/vestnik-goszakupok/vestnik-goszakupok-detali-ob-avtobusax-za-179-mlrd-tenge-v-nursultane/ (accessed March 8, 2024).
28) E. Dogan, M. Madaleno, D. Taskin, and P. Tzeremes, "Investigating the spillovers and connectivity between green finance and renewable energy sources," *Renewable Energy*, 197 709–722 (2022). doi: 10.1016/j.renene.2022.07.131.
29) "Kazakhstan President held a meeting with World Bank Vice President for Europe and Central Asia Anna Bjerde," 2021. https://www.akorda.kz/en/kazakhstan-president-held-a-meeting-with-world-bank-vice-president-for-europe-and-central-asia-anna-bjerde-144545 (accessed March 9, 2024).
30) D.H. Muratbekov, "Background to the construction of renewable energy sources in Kazakhstan," In *Materials of the International Scientific Conference Dedicated to the 30th Anniversary of the State Symbols of the Republic of Kazakhstan: "State Symbols and National Architecture," L.N. Gumilyov Eurasian National University*, Astana, pp. 203–208 (2022).
31) T.Z. Ang, M. Salem, M. Kamarol, H.S. Das, M.A. Nazari, and N. Prabaharan, "A comprehensive study of renewable energy sources: Classifications, challenges and suggestions," *Energy Strategy Reviews*, 43 100939 (2022). doi: 10.1016/j.esr.2022.100939.
32) L. Rubino, and G. Rubino, "Electrical Power Center with energy management capability for aeronautical applications," in: *2016 International Symposium on Power Electronics, Electrical Drives, Automation and Motion, SPEEDAM 2016* (pp. 940–945). Capri: Institute of Electrical and Electronics Engineers (2016). doi: 10.1109/SPEEDAM.2016.7525944
33) I. Shchurov, "An economic approach to strategic vectors' formation for strengthening the state energy security," *Economics of Development*, 20 (4) 16-23 (2021). doi: 10.57111/econ.20(4).2021.16-23
34) I. Shukurov, "Turkmenistan's strategy and policy regarding energy resources," *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 9 (2) 38-45 (2022). doi: 10.52566/msu-econ.9(2).2022.38-45
35) M.M. Rahman, S. Saha, M.Z.H. Majumder, T.T. Suki, M.H. Rahman, F. Akter, M.A.S. Haque, and M.K. Hossain, "Energy conservation of smart grid system using voltage reduction technique and its challenges," *EVERGREEN*, 09 (04) 924–938 (2022). doi: 10.5109/6622879.
36) M.J. Hoque, "Causes, mechanisms and outcomes of environmental degradation in Bangladesh: A study

in Sylhet," *EVERGREEN*, 09 (02) 310–325 (2022). doi: 10.5109/4793670.

37) M. Al-Ghriybah, "Assessment of wind energy potentiality at Ajloun, Jordan using Weibull distribution function," *EVERGREEN*, 09 (01) 10–16 (2022). doi: 10.5109/4774211.
38) A.B. Shaikenova, "On the Issues of improving standard regulation of the use of renewable energy sources," *Bulletin of the Institute of Legislation and Legal Information of the Republic of Kazakhstan*, 2 271–276 (2022). doi: 10.52026/2788-5291_2021_69_2_271.
39) M. Yaremova, L. Tarasovych, O. Kilnitska, O. Buluy, and N. Kravchuk, "Global trends in the development of a sustainable bioeconomy for rural growth in Ukraine," *Scientific Horizons*, 27 (3) 117-129 (2024). doi: 10.48077/scihor3.2024.117
40) O. Dovgal, T. Borko, N. Miroshkina, H. Surina, and D. Konoplianyk, "Circular economy as an imperative for sustainable development," *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 11 (1) 19-28 (2024). doi: 10.52566/msu-econ1.2024.19
41) I.Q.K. Al-Hussein, R. Hesarzadeh, and F.N. Zadeh, "The effect of social responsibility disclosure on corporate performance in five Arab countries: Evidence on the moderating role of stakeholder influence capacity and family ownership," *EVERGREEN*, 09 (04) 939–949 (2022). doi: 10.5109/6622880.