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CHAPTER 8. ALTERNATIVE ENERGY IN THE LEGISLATION OF CERTAIN COUNTRIES

8.1. Alternative energy in the context of transition to carbon neutrality: modern and prospective legal mechanisms

As part of the implementation of large-scale transformational strategies in the world (among which the most striking should be called the European GreenDeal), ambitious goals of states to achieve carbon neutrality were stated. First of all, this provided for a gradual systematic transition to the use of renewable energy sources. However, when the world had not yet fully recovered from the fight against the pandemic recession of the economy, military actions began in Ukraine, which changed political, economic and social conditions, forcing the adaptation of GreenDeal and relevant legislation to these new circumstances. Given the rapid change in actual conditions, events, activation of rulemaking, conducting new related studies, there is a need to analyze the energy component of GreenDeal in response to the challenges posed by the war in Ukraine.

In a few years after the announcement of the European GreenDeal, domestic legal science has accumulated some progress, which analyzes the significance of this strategy and the ways of adapting Ukrainian legislation to its tasks. However, at the same time, the objective circumstances of the implementation of GreenDeal are rapidly changing, new legislation appears in response to military circumstances.

Fighting climate change is a process far from linear. If the main focus is on achieving carbon neutrality, then several interesting trends can be traced against the background of dynamic circumstances and active rulemaking.

So, the experience of the last decades shows that the world periodically experiences systemic crises. An interesting trend that combines the financial crisis of 2008 – 2009 and the pandemic crisis of 2020 – 2023 was the election of such a way to "disperse" the economy – the use of environmental ("green") stimulation. This trend is well traced to the developed countries of the world. For example, in the United States after the global financial crisis, a 2009 economic stimulus package called the American Recovery and Reinvestment Act included green elements. South Korea has acted even more powerfully to support its own economy, which

was hit hard during the financial crisis, and allocate an astonishing 95% of its $38.1 billion in fiscal stimulus to environmental initiatives, equating to nearly 3% of its GDP (no other country except China has made this level of green investment in response to the crisis)[1]. South Korea reused its experience and maximized its ambition when it applied environmental ("green") stimulus as a policy of recovery from the COVID-19 crisis.

The total economic downturn, which swept the entire planet during the pandemic, caught European countries during the rollout of the largest long-term initiatives. For example, the UK was the first in June 2019 to adopt the law that pledged to become the zero producer of greenhouse gases into the atmosphere by 2050: the British program to achieve the relevant climate goals embodied in the "NetZeroStrategy". Six months later, at the end of 2019, the EU announced its own ambitious plan to transform all public life called GreenDeal. However, loud discussions around such serious transformational plans of developed European states did not have time to subside as the world entered a period of severe economic crisis due to the pandemic. This was the first difficult test of idea strategies like GreenDeal, but it was not abandoned, on the contrary, they tried to use it to stimulate the economy.

This trend was picked up by other key states, in particular, in 2020 the South Korean GreenDeal was approved, which had three dimensions: green urban development, innovative green industry and, of course, low-carbon decentralized energy.

Although each country spelled out its own GreenDeal scenario, they have something fundamentally in common. Thus, the goal of GreenDeal environmental stimulus *"is not simply to use these policies as a short-term economic stimulus and recovery package; rather, it is to make a structural transition to a more ecological economy and society to address a variety of environmental imperatives, including climate change"*[2]. A clear trend towards restarting the economy and public life under the new realities of climate change, environmental crises, and depletion of resources has become a powerful mainstream in the legislation of not only a limited number of developed countries – it has become a catalyst for similar transformations in many related states.

An example of Turkey can serve as a vivid illustration. Thus, the European GreenDeal provides for several fairly sensitive legal mechanisms

[1] Barbier E. B. How is the global green new deal going? *Nature*. 2010. Vol. 464 (7290). P. 832–833.

[2] Han H., Lee T. Varieties of green stimulus policies: comparative analysis of the green growth and Green New Deal policies in South Korea. *The Journal of Environment & Development*. 2023. Vol. 32 (1). P. 61–82.

within the framework of decarbonization (the mechanism of borderline carbon regulation – CBAM and the action plan for the cyclical economy – CEAP). Anticipating future difficulties in trade, the business began to press the government in advance to demand an adequate response to the predicted problems for Turkish exports. The appropriate reaction was the adoption of the Action Plan for Turkey's adaptation to the European GreenDeal in 2021[3]. That is, there is a qualitatively different document, which is not so much generated by ambitious climate or environmental goals as it is intended to "slow down" the blow that awaits the Turkish economy as a result of the implementation of GreenDeal in the main trading partner of the state – in the EU.

The picture we see demonstrates the ubiquitous intensification of the energy transition – the qualitative transformation of the economy by increasing the production and use of energy from renewable sources and reducing the use of energy from fossil fuels. It is alternative energy that is an integral part of the state that humanity seeks, achieving sustainable development. However, it is important to emphasize that it is about the *process* – that is, the energy transition is not a one-time action. It is impossible just to abandon traditional energy without losing the level of economic development and the standard of living of society. Such a refusal should happen gradually, with the phased preparation of the economy, society, and infrastructure. Each state, making its energy transition, should be aware of and take into account its own starting conditions, national features, burdensome circumstances, and vice versa points of growth. In this regard, the energy transition initiated as part of the implementation of GreenDeal highlighted the need for differentiation. Yes, EU member states are heterogeneous in their economic indicators, energy resources, consumer and industrial energy needs, etc. Therefore, studies to prove the need to develop their ways and rates of energy transition within the framework of a single strategy to counter climate change are increasingly appearing[4]. This gave rise to the idea of a "just transition", which, among other things, tries

[3] Aşici Ahmet Atıl, Acar Sevil. Channels of cooperation between the EU and Turkey on green transformation. *Ankara Avrupa Çalışmaları Dergisi.* 2022. Vol. 21. Issue 1. P. 43–67.

[4] Ciot M-G. Implementation Perspectives for the European Green Deal in Central and Eastern Europe. *Sustainability*. 2022. Vol. 14. Issue 7. P. 3947; Gallop P. A Green Agenda for the Western Balkans: Where are the teeth? 2020. URL: https://bankwatch.org/blog/a-green-agenda-for-the-western-balkans-where-are-the-teeth (дата звернення: 01.07.2023 р.); Błaszczuk-Zawiła M. Poland and the European Green Deal amidst the pandemic. *The Economic and Legal Impact of Covid-19 : The Case of Poland. Edited By Jerzy Menkes* / Magdalena Suska. Routledge, 2021.

to substantiate theoretically the differences in the options for energy transformations of different states.

However, this situation received a new round and significantly worsened during 2022 – 2023, when European countries experienced energy problems provoked by the war in Ukraine. In response to the new military circumstances in 2022, the EU, trying not only to maintain the course under the auspices of GreenDeal but also to update it due to the new conditions, adopted "REPowerEU: a plan to quickly reduce dependence on Russian fossil fuels and accelerate the green transition" (***REPowerEU)***[5] – a new action plan to strengthen energy security and accelerate of energy transition. REPowerEU's plan updates GreenDeal's goals and aims to replace an annual 155 billion cubic meters of imported Russian natural gas with a combination of energy conservation, diversified fossil fuel supply, and expansion of low-carbon energy sources. The estimated cost of REPowerEU is €300 billion by 2030 (in addition to €1 trillion under GreenDeal). This amount will mainly be aimed at energy efficiency and savings (€97 billion), as well as solar photovoltaic energy (€86 billion). Thanks to REPowerEU, the EU expects the total installed capacity of photovoltaic solar panels to grow by almost 5-fold by 2030[6].

The main tasks of REPowerEU can be specified as follows: a) refusal to use Russian fossil energy sources; b) energy savings (increase from 9% to 13% of the mandatory indicator of reduction of final energy consumption by 2030); c) increase the EU's mandatory renewable energy target from 40% to 45% in 2030; d) increasing the use of hydrogen in industry.

As a tool to save the idea of GreenDeal and a way to take into account geopolitical circumstances, the adoption of REPowerEU is an important step, but it exposed a number of important issues and revealed at least three complex problems.

1) ***An existential problem,*** the essence of which can be reduced to one question: "Is it even possible to combine further economic progress with climate and environmental measures?". Against the background of the adoption of REPowerEU, opinions have increased about the need for a critical reassessment of the idea of green growth – the conceptual basis of GreenDeal. The fundamental possibility of implementing long-term and

[5] Communication from the European Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions COM (2022) 230 final REPowerEU Plan. 2022. (Communication REPowerEU).

[6] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: EU solar energy strategy European Commission, Brussels. 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A221%3A FIN (дата звернення: 01.07.2023 р.).

value strategies like GreenDeal is questioned. Researchers are reaching conclusions about the deceptiveness of green growth. In particular, solar energy is often used as a prime example.

So, REPowerEU involves an increase in the solar power capacity in the EU between now and 2030 of five times. On the one hand, this will achieve energy decarbonization goals, but on the other hand, it will demonstrate the failure of the natural resource tasks proclaimed under GreenDeal. This will happen because producing so much additional solar energy scaling equipment provided by the plan will require a significant increase in the extraction and use of the necessary natural resources: gallium, germanium, indium, and silicon. This contradicts one of GreenDeal's main postulates on economic growth without the burden on natural resources because the Agreement notes that it is a *"new growth strategy that aims to transform the EU into... resource-efficient... an economy where there are no net greenhouse gas emissions in 2050 and where economic growth is not linked to resource use"*[7].

In addition, by reducing dependence on fossil fuels of one state (in particular, natural gas of the Russian Federation), REPowerEU will increase dependence on the supply of necessary equipment from other states (first of all, China as the world leader in the production of such equipment)[8].

Thinking in this way and conducting relevant industry studies, scientists question the realism of the idea of green growth[9], more and more often, because endless economic growth is impossible on a limited planet with a limited amount of resources. The argument of scientists can be reduced to the fact that economic progress still needs to be paid for. A change in one price (for example, the volume of greenhouse gas emissions in traditional energy) does not mean the complete absence of such a price – it will simply

[7] Communication The European Green Deal (n 3) 2. URL: https://commission.europa.eu/publications/communication-european-green-deal_en (дата звернення: 01.07.2023 року).

[8] Vezzoni R. Green growth for whom, how and why? The REPowerEU Plan and the inconsistencies of European Union energy policy. *Energy Research & Social Science.* 2023. Vol. 101. URL: https://www.sciencedirect.com/science/article/pii/S2214629623001949?via%3Dihub (дата звернення: 01.07.2023 року).

[9] Hickel J., Kallis G. Is green growth possible? *New Political Economy*. 2020. Vol. 25. P. 469 – 486; Wiedmann T., Lenzen M., Keyßer L.T., Steinberger J.K. Scientists' warning on affluence. *Nature Communication*. 2020. Vol. 11. P. 3107; Parrique T., Barth J., Briens F., Kerschner C., Kraus-Polk A., Kuokkanen A., Spangenberg J.H. Decoupling debunked. Evidence and arguments against green growth as a sole strategy for sustainability. *European Environmental Bureau*. 2019. URL: https://eeb.org/wp-content/uploads/2019/07/Decoupling-Debunked.pdf (дата звернення: 01.07.2023 року).

be replaced by the exhaustion of natural resources necessary for the functioning of alternative energy.

As one study notes, *"empirical data on resource use and carbon emissions do not support the green growth theory"*[10]. In other words, the justification for criticizing green growth is simple: it is difficult to decarbonize an economy by transferring it to renewable (or at least decarbonized) energy sources if energy consumption is constantly increasing. From 2009 to 2019, there was an increase in energy consumption worldwide, and it absorbed double-digit growth in modern renewable energy production technologies, and the share of fossil fuels in total final energy consumption decreased from only 80.3 to 80.2%[11].

At the same time, the "natural resource cost" of the new equipment cannot be ignored. For example, *"an electric car needs six times more mineral resources than a regular car, and an onshore wind farm needs nine times more mineral resources than a gas-fired power plant"*[12]. As a result, demand for lithium, cobalt, nickel, rare earth elements, and copper is expected to grow rapidly in the next few decades – to such a level that *"raises huge questions about the availability and reliability of supply"*[13].

2) ***The problem of regress*** is that the EU climate ambitions, seasoned with the political component in the latest REPowerEU, give tangible side effects (for example, episodic reanimation of coal use, revision of attitude towards nuclear energy, investment in new liquefied natural gas terminals and gas pipelines, etc.). European countries at risk of energy security loss due to the abandonment of Russian gas consumption were forced to solve their own energy problems by methods that are not always climate-friendly. For example, in January 2023, Bulgaria announced the abolition of its climate goals and the postponement of the closure of coal mines on its territory in order to cope with the high cost of energy and ensure energy stability[14]. A similar situation that questions the justification for the

[10] Hickel J., Kallis G. Is green growth possible? *New Political Economy*. 2020. Vol. 25. P. 469–486.

[11] Renewables 2021 Global Status Report. 2021. URL: www.ren21.net/gsr-2021/ (дата звернення: 01.07.2023 року).

[12] IEA, 'The Role of Critical Minerals in Clean Energy Transitions'. 2021. URL: www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions (дата звернення: 01.07.2023 року).

[13] Mauger R.Finding a needle in a haystack? Identifying degrowth-compatible provisions in EU energy law for a just transition to net-zero by 2050.*Journal of Energy & Natural Resources Law*. 2023. Vol. 41. Issue 2. P. 175 – 193

[14] Bulgarian Lawmakers Back Coal Plants with Vote to Roll Back Green Targets. 2023. URL: https://www.reuters.com/markets/commodities/bulgarian-lawmakers-back-coal-plants-with-vote-roll-back-green-targets-2023-01-12/ (дата звернення: 01.07.2023 року).

galloping pace of the energy transition has emerged outside the EU, namely: in December 2022, the UK Secretary of State approved a planning application for a mine that could be the first coal mine in this country in 30 years[15].

A separate difficult issue was the need to resuscitate the idea of nuclear power as a kind of component of green generation. In this area, a whole range of problems was formed:

a) a significant share of atomic energy in the modern European market (almost 25% of the total balance of EU energy resources is nuclear, and more than 50% is produced in France. A total of 13 of the 27 EU member states have more than a hundred reactors, and in 2019 they provided about 50% of low-carbon electricity);

b) although nuclear power is considered low-carbon because nuclear reactors produce no direct CO_2 emissions, it nevertheless relies on uranium as a fuel whose extraction and processing is extremely energy-intensive;

c) contradictory views of European States: some countries led by Germany insist that nuclear power is not part of the goals of renewable sources; at the same time, the rest, led by France, are considering laws to accelerate the construction of new nuclear reactors and simplify the process of approving and building new stations.

In our opinion, the problem of regress illuminates two important theses. First, it became side evidence of the existence of an existential problem, that is, it confirmed the fact that accelerating the energy transition, despite its good intentions, inevitably entails increasing the burden on natural resources. Secondly, the problem of regress demonstrates the unwillingness of alternative energy at this stage of development to meet the needs of modern European society to the necessary extent.

3) ***The problem of energy solidarity***, which may be classified as an internal matter of the EU, but its manifestations have an impact on Ukraine because this principle is extended to our state through the Association Agreement (Article 338). The principle of energy solidarity enshrined in Article 194 of the Lisbon Treaty has long been considered just declarative, but in the case of "Germany v Poland", the EU Court in 2021 adopted a decision according to which the principle of energy solidarity received a reasoning content. It means, in particular, that EU institutions, in implementing measures in the context of EU energy policy, should take into account the interests of all stakeholders who may suffer, given, among other things, *"supply security, their economic and political viability and*

[15] Bogojević S. Legal Dilemmas of Climate Action. *Journal of Environmental Law*. 2023. Vol. 35. Issue 1. P. 1–9.

diversification of sources of supply"[16]. This approach opened the door to many potential controversies amid the complex implementation of REPowerEU. In the current climate of abandoning Russian gas and intensifying alternative energy, the principle of energy solidarity actually requires ceding certain national interests to satisfy the interests of other states of the Union. At the same time, according to foreign scientists, the war in Ukraine can prevent the use of this principle in favor of local energy supplies, even if this means an increase in coal dependence[17].

Despite these complex problems, REPowerEU requires its legal implementation. Indicative of the stated considerations will be the announced adoption of REDIII – the updated Renewable Energy Directive, the revision of which is due to the implementation of REPowerEU. According to the updated version, REDIII should increase a number of targets for the production and consumption of energy from renewable sources by 2030. The EU's mandatory 2030 renewable energy target is expected to rise to a minimum of 42.5% from the current target of 32% and almost doubles the existing share of renewable energy in the EU[18]. Currently, it is difficult to predict how this updated REDIII will be combined with solving the identified energy transition problems, since there are many poorly controlled factors for the impact on this relationship.

However, it can be concluded that the war in Ukraine provoked the second serious test of the European GreenDeal for viability. It was the energy component that came under the greatest pressure. Despite these new crises, *"the European Green Deal has not been sacrificed on the altar of energy security"*[19]. In general, it can be stated that Green Deal withstood, but had to adapt to the new conditions and retreat in a number of previously won positions.

The world is currently experiencing a period of kind of turbulence: on the one hand, the vast majority of countries agree with the need for decarbonization and the importance of the development of alternative energy, but on the other hand, the alternative energy itself undergoes many tests for sustainability (reducing resource capacity, strengthening

[16] C-848/19P *Germany v Poland*, ECLI : EU:C:2021:598. URL: https://curia.europa.eu/juris/liste.jsf?num=C-848/19 (дата звернення: 01.07.2023 року).

[17] Bogojević S. Legal Dilemmas of Climate Action. *Journal of Environmental Law*. 2023. Vol. 35. Issue 1. P. 1–9.

[18] Political agreement reached on RED III. URL: https://www.eraa.org/political-agreement-reached-red-iii (дата звернення: 01.07.2023 року).

[19] Rybski R. Energy in the European Green Deal: impacts and recommendations for MENA countries**.** *The Journal of World Energy Law & Business*. 2023. Vol. 16. Issue 2. P. 127–142.

environmental friendliness, reducing cost, avoiding or reducing competitive confrontation with agriculture, biodiversity, etc.).

According to the results of the study, several intermediate conclusions can be drawn. Firstly, the phenomena provoked by the war in Ukraine did not lead to the rejection of the energy transition within the framework of GreenDeal, but on the contrary – are considered as incentives for its additional acceleration.

Secondly, the retrospective analysis demonstrates a change in approaches to the importance of alternative energy: in the second half of the 2000s, state assistance to the development of green generation was considered only as one of the levers for stimulating the economic growth of developed countries; a decade later, the scaling of alternative energy has formed the basis of fundamental transformation strategies.

Thirdly, the war in Ukraine has further strengthened the importance of alternative energy as a necessary substitute for unwanted fossil energy sources. At the same time, the "acceleration" of the energy transition, which is forced due to geopolitical processes, highlights a number of complex problems of the development of alternative energy: the existential problem, the problem of regression and the problem of energy solidarity. The legal difficulties identified on the example of other countries should be thoroughly studied and taken into account during the legislative support of the energy transition in Ukraine.

8.2. Peculiarities of state regulation and support for the development of alternative energy in the USA, Canada, and Latin American countries

Regarding the regulatory support for the functioning of the American market of alternative energy carriers, it is worth noting that the first attempts to regulate and support the development of renewable energy in the United States were made in the 1970s. Under the 1977 United States Congress Act "On the organization of the Department of Energy Organization Act", a federal department was created – the Department of Energy (DOE), which was entrusted with all the functions related to energy previously implemented by various bodies. The specified entity is responsible for coordinating the activities of all federal executive bodies in the area of energy, and the implementation of a unified energy policy. In 2010, the DOE Office of Energy Efficiency and Renewable Energy was established as part of the ministry. Also, in the system of the Ministry of Energy functions the Federal Energy Regulatory Commission (FERC) which is an independent federal agency that distributes electricity, natural gas, and oil to the states. It adopts regulatory acts on pricing, tariff

implementation, as well as investment in the energy sector. Energy issues are also part of the competence of other federal agencies, in particular, the Environmental Protection Agency (EPA)".

In 1978, due to the rapid spread of the global energy crisis, the federal Public Utility Regulatory Policies Act (PURPA) was adopted. Due to the situation, as well as the prospects for rising oil prices, the US Congress established a policy of reducing the country's dependence on external fuel supplies, diversifying the energy market, and supporting the development of alternative energy sources. One of the most important achievements of this Act was the beginning and gradual growth of energy production by independent companies that are not connected with the state or utilities. By the mid-2010s, the share of the latter had grown to 7% of the total electricity produced in the country. Note that before the implementation of the above Act, only utility companies had the right to own and manage generating power plants, and then, on the contrary, there was a requirement that the percentage of energy purchases from independent electricity producers be increased. So, thanks to the Public Energy Policy Act, the US renewable energy market has significantly increased due to solar and hydroelectric power plants.

The leading stage in the development of the US energy sector was the adoption of the Energy Policy Act in August 2005, which is basic for the development of alternative energy and energy efficiency, establishes tax incentives to encourage energy saving measures, as well as aimed at improving energy security, economic growth and meeting energy needs, etc. Despite these positive aspects of this regulatory act, its main achievement was an increase in budget financing of energy in the period 2005 – 2010, as well as 2010–2015.

In addition, a tax reduction system was provided. It is a measure of economic stimulus for energy producers, which is that they are provided with solar tax credit. They may reduce the amount of federal taxes paid by costs related to installation of equipment or other activities related to the production of alternative energy. So, the amount of the indicated loan in 2019 amounted to 30% of the costs of installing solar panels, in 2020 it decreased to 26%, and for 2021 it is 22%. The amount of tax credits is determined by the legislation of each individual state. At the same time, federal and state laws are very specific and are norms of direct action. They usually set the percentage of increase in the share of renewable energy sources in the energy sector for a certain period.

It must be noted that in the energy legislation of the United States, there is a tendency for state support and promotion of the development of the alternative energy industry. In 2007, the Energy Independence and Security Act (EISA) enshrined the provision that the production of energy from

renewable sources is one of the most important and effective means to solve not only energy but also environmental problems facing humanity. According to the American Recovery and Reinvestment Act, a number of federal projects and programs in this direction were financed from the federal budget in the form of grants, in particular, the production of biofuels (Biomass Program); Geothermal Technologies Program; production of new battery generation, as well as software for electric vehicles and hybrids; providing energy from renewable sources of buildings and structures of federal property during their design, construction, and modernization[20].

Currently, the US Congress is considering a draft of the Clean Energy Standard Act. Its goal is to ensure the generation of electricity at zero emissions into the atmospheric air of greenhouse gases (net-zero emissions) by 2050. The provisions of the project are based on the international legal principles of environmental protection, primarily on the prevention of climate change. Thus, one of the main directions of the proposed mechanism is the creation of an energy market, as well as the sale of loans for the development of alternative energy sources.

So, renewable energy in the United States has reached a high level and continues to develop rapidly [21].

The state structure of *Canada* and the huge size of the country create a very diverse picture of the energy market. Overall, Canada's energy consumption per unit of population is among the highest in the world. Interesting is the fact that despite the existence of significant energy resources, they are distributed unevenly throughout the state, so some provinces export energy, and others import it from abroad. Due to the size of the territory and the peculiarities of the population (most Canadians live in the south of the country along the border with the United States, although the largest energy producers are hundreds and thousands of kilometers to the north), the Canadian electricity market is closer to the United States than between the provinces. However, it is this integration that the energy sector owes its success.

The development of Canadian legislation in the energy sector is characterized by the fact that the constitution gives the provinces and territories the right to regulate the energy market – each of the 13 regions of

[20] Караханян К. М. Правові засади розвитку альтернативної енергетики в США. *Шості Таврійські юридичні наукові читання :* матеріали міжнар. наук.-практ. конф. (м. Київ, 05-06 лютого 2021 р.). Київ : Таврійський національний університет імені В.І. Вернадського, 2021. С. 68–71.

[21] Караханян К. М. Особливості правового регулювання альтернативної енергетики в країнах Америки (США, Канада, країни Латинської Америки). *Міжнародний науковий журнал "ІНТЕРНАУКА". Серія : "Юридичні науки"*. 2021. № 1(35). С. 68–75.

the country has a unique situation. Federal authorities are responsible only for the development of minimum environmental standards and rules for international trade in resources and energy. Currently, the state is implementing a number of federal projects aimed at the use of renewable energy sources: in particular, it provides significant subsidies to companies that introduce alternative energy, encourages producers of "clean" energy to increase generating capacity, sets some of the highest "green" tariffs in the world in order to attract additional investment.

In 2008, Canada adopted the Federal Sustainable Development Act, which officially announced support for renewable energy. In order to develop the provisions and support this Act, the Federal Sustainable Development Strategy (FSDS) for the period 2016 – 2019 was in force. The main areas of action of the strategy were measures aimed at preserving the environment and preventing climate change, including the production of energy from alternative sources. A plan for the production of so-called "clean energy" was introduced, which provided for the production of energy from renewable sources at the level of 90% of the total volume by 2030[22].

The specified task of the strategy already has certain positive developments. So, in particular, by 2017, federal and local governments in the energy sector, which agreed to a joint action plan, took important steps to expand the circle of participants using clean energy, and also provided significant investments in the construction of new alternative energy facilities. In order to accelerate the growth of companies using "clean" technologies, $14 billion was provided from the state budget. In addition, the government is going to invest $21.9 billion over 11 years to support green infrastructure, which will create a clean economy in Canada due to the development of renewable energy sources[23].

The leaders of energy production from alternative sources are also Latin American countries, in particular, Brazil, Argentina, Uruguay, Chile, Bolivia. In the 70s of the last century, during the first wave of the oil crisis, the Brazilian government introduced a program for the use of alcohol as a fuel (National Fuel Alcohol Program). The implementation of the program did not cause significant complications, since Brazil is one of the world's largest producers of sugar and sugarcane. However, the government helps private businesses implement this program by providing additional tax incentives and preferences. For example, these incentive measures to

[22] The official website of the Government of Canada. URL: https://www.canada.ca/en.html (дата звернення: 01.07.2023 року).

[23] Караханян К. М. Особливості правового регулювання альтернативної енергетики в країнах Америки (США, Канада, країни Латинської Америки). *Міжнародний науковий журнал "ІНТЕРНАУКА". Серія : "Юридичні науки"*. 2021. № 1 (35). С. 68 – 75.

support manufacturers of bioethanol, which is made of sugar, include the provisions of the legislation on the mandatory content of the latter in the fuel at the level of 20 – 25%. Thus, the state ensures the existence of a market for manufactured products. For consumers, meanwhile, subsidies are set in the form of a low price for such fuel, which makes it available for consumption.

In recent years, Latin American countries have made significant advances in the use of wind, solar, geothermal energy resources, as well as biofuels. If ten years ago it was about the energy revolution, then today we can safely say that the countries of Latin America are one of the world leaders in the development of alternative energy. For example, Brazil is the first major industrial power to achieve a record share of renewable energy. According to the National Report on the Energy Balance, 88.8% of the country's electricity is generated from renewable sources. Argentina recently entered the top ten of Ernst & Young's Global Renewable Energy Investment Attractiveness Index for the first time in history and with the help of the World Bank plans to produce 20% of its electricity from alternative sources. Such plans are very real, since Argentina includes a unique natural region of Patagonia, characterized by such resources of the sun and wind, which have no analogues in the world. The heyday of Argentina's alternative energy comes from 2017, when the Year of Renewable Energy was proclaimed. The most developed areas are wind, solar, hydro and bioenergy.

As for regulatory support for the development of alternative energy in Latin American countries, the national laws of the latter enshrine similar provisions of energy policy, the main of which are: economic and energy security guarantees, environmental protection policy, and environmental security, ensuring the use of stimulus measures, in particular, government donations and subsidies, investments in the energy sector, tax incentives, state support for renewable energy producers[24].

8.3. Specifics of Australia's alternative energy legal regulation

This country combines incompatible seemingly signs: on the one hand, it demonstrates impressive examples of the successful development of alternative energy, and on the other – rather modest overall indicators of

[24] Караханян К. М. Глобальні тенденції розвитку альтернативної енергетики на прикладі країн Латинської Америки. *Наукові дослідження : парадигма інноваційного розвитку :* збірник тез VI Міжнар. наук. конф. (Прага, Чехія, 15 лютого 2021 року). ГО "Міжнародний науковий центр розвитку науки і технологій", 2021. С. 57–59.

decarbonization of one of the world's well-developed economies (according to the Climate Change Efficiency Index in 2020, Australia was recognized as one of the countries showing the worst performance). This phenomenon is revealed through the characterization of Australia's alternative energy legal regulation, which has some key features.

1. *An internal political and legal confrontation over the development of renewable energy*, which unfolded against the background of several important prerequisites: a) the federal structure of Australia, which consists of six states, two territories and the federal government; b) the country's high dependence on fossil fuels (in 2018 coal accounted for 15% ($60 billion) and gas 8% ($38 billion) of Australia's export income); c) the federal government, coal states and the industrial lobby have an active and quite aggressive policy, opposing the development of alternative energy.

Against the background of these prerequisites, the crisis was inevitable, since in 2006 one of the states – South Australia decided to develop according to a different energy scenario. South Australia has shown absolutely impressive indicators of the evolution of renewable energy: in the 14 years from 2004 to 2018, there was a rapid transition from 100% of fossil fuel production and consumption to half of self-sufficiency through alternative sources – 50% of energy is generated by wind and sun[25]. From an electricity importer, the state became an exporter. Total renewable energy production is expected to reach at least 75% by 2025 and the state government's target level to 100% by 2030[26]. South Australia's growing success has attracted increasing opposition from the federal government. This led to a violent political struggle, when in 2016 – 2017 technical problems with blackouts were cynically used by federal politicians in public speeches to intimidate the population: "due to unreliable alternative energy, you may have the same as in South Australia".

The general outlines of the long internal political and legal conflict in Australia have some parallels with Ukrainian realities. For example, representatives of "brown" energy used the increase in electricity prices and the collapse of payments under the "green" tariff as a way to discriminate against alternative energy and delay its development in Ukraine. The same goal was pursued by the constitutional representation of people's deputies, according to which the question of compliance with the Constitution of

[25] McGreevy M., MacDougall C., Fisher M. Expediting a renewable energy transition in a privatised market via public policy : The case of south Australia 2004-18. *Energy Policy*. 2021. Vol. 148.

[26] Parkinson G. South Australia's Stunning Aim to Be "Net" 100 Per Cent Renewables by 2030. *Renew Economy*. 2019. URL: https://reneweconomy.com.au/south-australias-stunning-aim-to-be-net-100-per-cent-renewables-by-2030/ (дата звернення: 01.07.2023 року).

Ukraine with a number of provisions of the laws of Ukraine "On Alternative Energy Sources" and "On the Electricity Market". It should be understood that resistance to traditional energy will grow. This should be taken into account during regulatory and strategic planning, as well as in the development of long-term regional development strategies.

2. *Weak direct government management of the energy sector*. Back in the 1990s, Australia's energy network was privatized under the influence of neoliberal economic ideology. In a privatized market system, integration of environmental goals is even more complex[27], since there are practically no imperative levers for public administration. Instead, Ukraine still has quite significant regulatory influence, and this is most likely justified, taking into account Ukrainian conditions and experience.

3. *Legal enforcement of alternative energy support* in Australia is embodied in the dominant green certificate legal mechanism. Under the legislation, alternative energy is encouraged through federally issued trade certificates that electricity retailers are required to purchase[28]. Australia is also one of the first countries in the world to introduce a carbon tax. However, in the absence of proper political will, these positive rule-making actions did not create an effective engine for the transformation of the energy system, which is confirmed by the preservation of high rates of fossil fuel use.

Scientists criticize the regulatory provision of alternative energy in Australia. In particular, it is claimed that the adopted energy law – the "White Paper" of 2015 – focused only on the economy, completely ignoring the energy security policy and not paying enough attention to environmental protection issues[29]. In particular, the Australian federal renewable energy law would have to be expanded to address important issues that currently receive little legislative or political attention [30]. Modern Ukrainian legislation in the field of alternative energy also has a number of serious defects and requires scientifically justified improvement. In particular, the support system is waiting for its full launch. The Ukrainian protection

[27] Warren B., Christoff P., Green D. Australia's sustainable energy transition : the disjointed politics of decarbonisation. *Environmental Innovation and Societal Transitions*. 2016. Vol. 21. P. 1–12.

[28] Hua Y., Oliphant M., Hu E. J. Development of renewable energy in Australia and China : a comparison of policies and status. *Renew. Energy*. 2016. Vol. 85. P. 1044–1051.

[29] Marsden S. The "Triangle" of Australian Energy Law and Policy: Omissions, Connections and Evaluating Environmental Effects. *Journal Of Environmental Law*. 2017. Vol. 29. Issue 3. P. 475–503.

[30] Prest J., Soutter G. The Future of Australia's Federal Renewable Energy Law. *Australian Law Journal*. 2018. Vol. 92. Issue 10. P. 799–813.

model was originally implemented in the "green" tariff, which for several years they have been trying to replace with green auctions.

4. *Active role of state (regional) government.* Despite the combination of positive natural conditions, widespread access to solar radiation and powerful winds, the success of the state of South Australia would not have been possible without the consistent and active policies of the regional government. First, this manifests itself in the alternative energy stimulus available in the liberal economy. In particular, the purchasing capabilities of the government are used as efficiently as possible to attract new players to the energy market and thus create pressure on prices. Secondly, work is constantly underway to create a favorable regulatory framework. For example, a state law was passed in 2011 to support wind farms. When the construction of wind power plants for aesthetic reasons was challenged on its basis in the same year, the government showed consistency by promptly making the necessary editorial changes in order to eliminate such obstacles in the functioning of wind generation. Thirdly, the South Australian government is carrying out the necessary adaptation work, because the energy transition is not only an economic or ecological phenomenon – it is a system restructuring that has a strong impact on society. In particular, when a coal plant was closed in a small city, the state government gave this territorial community a grant of $6 million to build a tomato greenhouse equipped with solar panels – the enterprise formed 200 jobs.

The Ukrainian legislator cannot boast of such care and consistency. This is well illustrated by the declarative restructuring of coal regions and the high-profile scandal of 2020, associated with a sharp turn in the policy of supporting alternative energy.

5. *Work on the mistakes*. The outages, which occurred at peak times, did not force the South Australian government to abandon the chosen course – on the contrary, the difficulties contributed to the organization of additional measures to strengthen energy security. In particular, backup power was created (the largest battery for energy storage was designed and a state gas power plant was built). Instead, the total strategic and tactical miscalculations of the Ukrainian rulemaker in recent years did not entail a thorough work on the mistakes made.

The presented political and legal experience of Australia well illustrates the problem of the energy transition, which covers the modern world. The difficulties faced by modern Ukrainian society are not unique – they have similar analogues in more developed countries. However, the main thing that the experience of Australia proves is: a) the detrimental effect of the internal political and legal confrontation regarding the development of alternative energy; b) the need to determine policy priorities and ideological foundations to which energy legislation should comply. This is critically

important for Ukraine, because we constantly urgently and chaotically solve some tactical tasks without a clear vision of the strategic goal[31].

8.4. Legal experience of China, India and Japan in the field of alternative energy development

This country is impressive for its achievements in the field of alternative energy. China's economy has made extraordinary strides since the introduction of reform and openness policies in 1978; the next 30 years of rapid growth are known as the "Chinese miracle". However, the mechanism of extensive economic growth, which is characterized by high levels of costs, emissions, pollution and energy consumption, has caused intense pressure on resources and the environment. At the same time, mass consumption of energy resources caused a large amount of greenhouse gas emissions[32]. In 2013, China's carbon dioxide emissions reached 10 billion tons, which is 28% of total global emissions and exceeds total carbon emissions in the United States and the EU. As the world's largest producer of carbon dioxide, China is also the world's largest energy consumer[33]. At the same time, energy demand in China tends to grow. Amid these objective prerequisites, the government promises that China will peak carbon emissions by 2030 and carbon neutrality by 2060.

Awareness of the need for energy ecology was embodied, in particular, in the purposeful creation of legislation to stimulate the use of renewable energy sources. In 2005, the Renewable Energy Act of the People's Republic of China was adopted, which actually laid the legal foundations for the active development of alternative energy. The main support mechanisms were provided by the following:

1) *Providing priority network access*. This technical and legal aspect is central to the specifics of China's energy system since the construction and launch of new energy facilities are not sufficiently synchronized with less developed network infrastructure. In this regard, it has become common for China to idle built renewable energy facilities that are not connected to the

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[31] Харитонова Т. Є. Правове регулювання альтернативної енергетики в Австралії: досвід для України. *До 60-річчя набуття чинності Закону "Про охорону природи Української РСР" : екологічне законодавство України через призму його історичного розвитку :* матеріали Міжнар. дистанц. наук.-практ. конф. (м. Київ, 12 квітня 2021 року). Київ : Видавництво *"Наукова столиця"*, 2021. С. 106 – 110.

[32] Kun Zhang, Zong-Yong Zhang, Qiao-Mei Liang. An empirical analysis of the green paradox in China : From the perspective of fiscal decentralization. *Energy Policy.* 2017. Vol. 103. P. 203–211.

[33] Chenxi Zhang, Dequn Zhou, Qunwei Wang, Hao Ding, Siqi Zhao. Will fiscal decentralization stimulate renewable energy development? Evidence from *China*. *Energy Policy*. 2022. Vol. 164.

network. However, despite the direct indication of the law, network enterprises, using a monopoly position, did not connect alternative energy facilities in the proper priority order.

A similar problem is manifested here and there in Ukraine. An illustration can be the case of the Botiiv wind farm. The owner of this wind farm signed an agreement on connecting the power plant to the network with the only possible entity capable of doing this – Zaporizhzhiaoblenergo OJSC, but due to many circumstances, such a connection occurred with a significant delay. In contrast to the "silent inaction" in such cases in China, in Ukraine, a similar situation entailed penalties imposed by the Antimonopoly Committee of Ukraine on Zaporizhzhiaoblenergo for abuse of monopoly position[34].

In the same aspect, the problem of planning the use of territories is also manifested. Thus, most wind power plants are located in the north of China, while high energy consumption is concentrated mainly in the south and east of the country. This further exacerbates the problems of compliance with the legislation on the priority of connecting alternative energy facilities to the network, because in the north there is an excess of such energy, and in the south, there is a shortage.

2) Guaranteeing the full purchase of energy produced from renewable energy sources. The importance of this mechanism can not be overestimated, since it is designed to guarantee investors the profitability of their deposits in the business. However, despite legislative consolidation, this mechanism also did not work to the fullest due to the lack of the following normative detail. To unlock this main protective mechanism, the rule-maker introduced changes in 2009, according to which network enterprises pledged to conclude contracts for the purchase of energy produced at renewable energy facilities. However, the legal "gap" remained: the network enterprise was relieved of its duty in the case of a threat to energy security. Due to the lack of clear definition of understanding the threats to energy security, in fact, this provision negated the legal obligation of network enterprises and the protection mechanism as a whole.

3) "Green" tariff – a protection mechanism typical of alternative energy, approved in most countries of the world, which sought to stimulate the use of the renewable energy industry. In China, it also had its features, in particular, its size was not guaranteed. Thus, in practice, producers are forced to agree to a lower tariff to be connected to the network, thereby

[34] Постанова Вищого господарського суду Українивід 15 березня 2017 року у справі № 908/1864/16. URL: https://zakononline.com.ua/court-decisions/show/65436767 (дата звернення: 01.07.2023 року).

“ensuring access to the network comes at the cost of sacrificing the financial viability of renewable energy producers”[35].

As a result of these mechanisms, a paradoxical situation developed in China: on the one hand, an impressive number of renewable energy facilities were built, but on the other hand, there was a rapid tendency to leave these combined capacities. Then the central leadership faced the task of modifying the system of state support to stop the negative regressive phenomena in alternative energy. To this end, other mechanisms of state support of research interest were additionally tested in China. We are talking about such interesting mechanisms as:

а) *environmental production control*, which aims to establish a dispatch sequence based on the energy efficiency level of each unit and the amount of pollutant emissions[36]. However, this idea has not shown its effectiveness in practice, instead demonstrating favorable conditions for abuse by local authorities;

б) *“green” certificates* (REC) – a mechanism whereby renewable energy producers are issued certificates for each megawatt-hour they produce. Under Chinese law, certain electricity market participants (including network businesses, electricity retail companies, and large end-users involved in direct trading of electricity) are required to purchase a set number of certificates to prove that a percentage of their electricity comes from renewable sources;

в) *establishment a “target share”*. This mechanism implies that the relevant authorities that manage the electricity sector are required to determine the expected contribution of electricity generated from renewable sources to the total amount of electricity generated in the country over a certain period (“target share”). At the same time, the relevant authorities should develop specific measures to ensure that the target amount of electricity generated from renewable energy sources receives priority access to the network and is fully purchased by network enterprises[37].

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[35] Hao Zhang. Prioritizing Access of Renewable Energy to the Grid in China: Regulatory Mechanisms and Challenges for Implementation. *Chinese Journal of Environmental Law*. 2019. Vol. 3. Issue 2. P. 167–202.

[36] NDRC, State Environmental Protection Agency, SERC and Office of National Energy Leading Group (dissolved), ‘Workplan for the Pilot Programs on Energy Efficiency Dispatching’ (节能发电调度试点工作方案). 2007. № 53. URL: http://www.gov.cn/zwgk/2007-08/07/content_708486.htm (дата звернення: 01.07.2023 року).

[37] Hao Zhang. Prioritizing Access of Renewable Energy to the Grid in China: Regulatory Mechanisms and Challenges for Implementation. *Chinese Journal of Environmental Law*. 2019. Vol. 3. Issue 2. P. 167–202.

Analysis of professional foreign literature allows to distinguish three important problems faced by the development of alternative energy in China:

1) *local (regional) protectionism of coal generation.* China's impressive economic gains have been built on fossil fuels – mostly coal, which the country is rich in. The flip side of the situation was the growth of pollution (especially air), the specialization of the regions, the problems of unemployment. These phenomena and processes dealt an insidious blow to alternative energy, which began to develop in the country. Thus, despite the violation of the requirements of the law on priority access to the network and the guaranteed full redemption of "green" energy, state authorities do not want to fine network enterprises, worrying about the security of energy supply. In addition, contrary to the tasks of the central government, regional authorities can restrain the development of "green" generation by their actions. For example, based on local interests, the local government will buy its own coal energy rather than "green" energy produced in the neighboring province. Thus, the decentralization reform of the energy system carried out in China demonstrates its side effects, which are not obvious, but very significantly affect the development of alternative energy;

2) difficult access to justice. In cases where there is any dispute between the network enterprise and the power-generating enterprise regarding priority access, they may apply for mediation by a public authority. If both parties refuse to settle the dispute through mediation, the dispute may be settled through civil proceedings. However, a feature of Chinese legal proceedings is the need to present sufficiently convincing evidence of a violation of the plaintiff's rights so that the case is generally accepted for consideration in court. However, this is actually very difficult to implement, since network enterprises, due to their monopoly status, often force renewable energy producers to agree on various exceptional circumstances in contracts. In this regard, most often renewable energy producers cannot sue a network enterprise on the basis of a contract. The result of such limited access to justice, in particular, was the lack of cases in which the rights of alternative energy producers would be upheld;

3) institutional deficiencies. This problem is quite complex because of its versatility. It is the result of a number of processes and circumstances, namely: a) a specific model of decentralization (when local authorities are granted autonomy in regional economic development and distribution of resources, but the central government retains strong levers of governance[38]);

[38] Chenxi Zhang, Dequn Zhou, Qunwei Wang, Hao Ding, Siqi Zhao. Will fiscal decentralization stimulate renewable energy development? Evidence from China. *Energy Policy*. 2022. Vol. 164.

b) pluralism of regulatory actors (central government agencies and provincial governments, which often have different programs and priorities[39]); c) imperfection of the legal status of special bodies in the field of energy regulation (studies indicate that such bodies did not receive appropriate powers and resources to be effective regulators[40]).

The analysis of China's problems in developing its own alternative energy is of particular interest to Ukraine, as it allows us to draw some important conclusions. There are no absolute (ideal) legal solutions that would guarantee unconditional success in stimulating alternative energy. China for almost twenty years has tested most of the common legal mechanisms developed in the world to support the use of RES, but they all worked with varying degrees of efficiency due to the specific domestic legal, organizational, institutional, economic, and political context.

India. The Indian experience is an interesting example of the active formation of alternative energy in a developing country. Showing significant economic growth and a rapid increase in the population, India is constantly experiencing an acute shortage of energy, because it is very dependent on imports, especially crude oil (80%) and natural gas (40%)[41]. Own traditional resources – mostly coal – are exhaustive and climatically unfriendly. This has become a serious motivator for finding political and legal ways to ensure the current and future energy security of the country.

The climatic and weather conditions of India form an extremely powerful potential for the development of various types of "green" generation, but such resources are geographically dispersed[42] and not fully developed. At the same time, India has already become a recognized global player in the area of alternative energy, because, since 2010, the size of investments in the development of alternative energy in this country has varied from 5.11 to 11.9 billion euros per year[43]. This is paying off: in 2021,

[39] Edward A CUNNINGHAM. The state and the firm : China's energy governance in context. Boston University GEGI Working Paper 1, 2015. URL: http://ash.harvard.edu/files/chinas-energy-working-paper.pdf (дата звернення: 01.07.2023 року).

[40] Ngan H.W. Electricity regulation and electricity market reforms in China. *Energy Policy*. 2010. Vol. 38 (5). P. 2142–2148.

[41] Kar S. K.,Gopakumar K. Progress of renewable energy in India. *Advances in Energy Research.* 2015. Vol. 3 (2). P. 97–115.

[42] Shyam B., Kanakasabapathy P. Renewable Energy Utilization in India – Policies, opportunities and challenges. *Proceedings of 2017 International Conference on Technological Advancements in Power and Energy (Tap Energy) : Exploring Energy Solutions for an Intelligent Power Grid. 2017.* URL: https://www.webofscience.com/wos/woscc/full-record/WOS:000463856000109 (дата звернення: 01.07.2023 року).

[43] Топ-5 країн, які вкладають у ВДЕ більше всіх. URL: https://cern.com.ua/2018/09/29/top-5-krayin-yaki-vkladayut-u-vde-bilshe-vsih/ (дата звернення: 01.07.2023 року).

India ranked third in the world in terms of renewable energy capacity growth (15.4 GW) after China (136 GW) and the United States (43 GW).

Such indicators are not an accident – they have become a natural result of long-term purposeful work. The state actively promotes climate, economic, and environmental ambitions in the field of alternative energy, having formed its own unique legal space that contributes to this. For the purposes of our study, we can point out some special features of stimulating the use of RES in India.

1) *Institutional provision*. India is the first country in the world to establish a special agency in the early 1980s focused on promoting green generation – Ministry of New and Renewable Energy of Ukraine[44]. Its forty-year functioning is justified, in particular, by the achieved actual indicators of the development of alternative energy in the state. The analyzed institutional solution is particularly interesting in comparative terms against the background of new initiatives on the potential merger of the Ministry of Energy and the Ministry of Environment in Ukraine. If India follows the path of specialization of institutional and functional support for "green" energy, then Ukraine demonstrates a reverse movement that will not contribute to achieving successful results in this area.

2) *Legislative support*. In India, electricity reforms have been taking place since the early 1990s, but this process remains incomplete given the constant increase in energy needs amid new challenges[45]. Nevertheless, India has developed special energy legislation, which regulates the electricity market and provides for the main legal mechanisms in this area. At the same time, the legislation for a long time (until 2003) did not contain specific provisions that would contribute to renewable or unconventional energy sources. Despite this shortcoming, in 1994 – 1995 the Ministry of New and Renewable Energy tried to give impetus to this sector through political guidance, which had mixed results. However, the Electricity Act adopted in 2003 changed the regulatory basis for the functioning of renewable energy. The Act provides for nationwide policy-making by the Government of India and obliges State Electricity Regulatory Commissions (SERC) to take action to promote renewable and unconventional energy sources within their jurisdiction[46].

[44] Jadhav O. H, Jadav S. M. Aspects of renewable energy potential in India and Future scope. *International Conference on Nascent Technologies in Engineering* (ICNTE-2017). 2017.

[45] Kaushal N. An. Insight into Energy Crisis in India. Proceedings of 2012. *International Conference on Public Administration (8TH).* 2012. Vol. I. P. 76–92.

[46] Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews.* 2013. Vol. 27. P. 1–10.

3) *Software*. The experience of India is characterized by the active use of software tools to stimulate the use of RES. The most prominent example should be a large-scale program called the National Solar Mission named after Jawaharlal Nehru, initiated by the Government of India in early 2010. This program provides for the conclusion of long-term (25 years) contracts between energy producers from alternative sources and enterprises controlled by the government at fixed favorable tariffs. Next, state-owned enterprises supply purchased energy to distribution utilities, which, in turn, sell electricity to consumers[47].

The use of the country's powerful solar potential is also stimulated at the level of household production and consumption. An example is the program on "solar roofs". There are inherent advantages of using building roofs for energy purposes: fewer land requirements, economic advantage, accelerating the achievement of targets for renewable energy procurement obligations, and targeted delivery of reliable electricity to micro, small, and medium enterprises[48]. Thanks to the support of the government of India, almost all states and union territories have developed policies to stimulate "roof" energy, however, despite this, its implementation is still relatively low (about 17%)[49]. India's government has adopted an unprecedented and ambitious goal to deploy 40 GW of rooftop solar by 2022 but has reached just 7.7 GW by June 2021[50].

Programmability is quite a defining feature of India's alternative energy incentive. It can be further noted that the National Energy Efficiency Mission, the National Green India Mission, the National Hydrogen Mission, etc. have also been adopted in this country. Unlike domestic program documents, mostly suffering from declarative and inefficient, the Indian

[47]Marianna Karttunen, Michael O. Moore. India – Solar Cells : Trade Rules, Climate Policy, and Sustainable Development Goals. *EUI Working Paper RSCAS*. 2017. № 64. URL: https://cadmus.eui.eu/bitstream/handle/1814/49745/RSCAS_2017_64.pdf?sequence=1 (дата звернення: 01.07.2023 року).

[48] Sarangi Gopal K., Taghizadeh-Hesary Farhad. *Rooftop Solar Development in India: Measuring Policies and Mapping Business Models*. 2021. ADBI Working Paper 1256. Tokyo: Asian Development Bank Institute. URL: https://www.adb.org/publications/rooftop-solar-development-india-policies-mapping-business-models (дата звернення: 01.07.2023 року).

[49] Nuvvula Ramakrishna S.S., Devaraj Elangovan, Rajvikram Madurai Elavarasan, Seyed Iman Taheri, Muhammad Irfan, Kishore Srinivasa Teegala. Multi-objective mutation-enabled adaptive local attractor quantum behaved particle swarm optimisation based optimal sizing of hybrid renewable energy system for smart cities in India. Sustainable Energy Technologies and Assessments. 2022. Vol. 49.

[50] Tarun Dhingra, Anita Sengar, Shambhu Sajith. Identifying, analyzing, and prioritizing barriers in the Indian industrial and commercial rooftop solar sector. *Solar Energy*. 2023. Vol. 254. P. 15–26.

"analogs" of the latter are quite effective, detailed, and therefore viable normative regulation of energy legal relations.

4) *Financial support*. Not limited to multi-billion dollar budget investments, India is trying to arrange additional financial flows to the alternative energy industry, for example, by:

a) establishment of national development banks, that lend, including energy projects. In general, in this aspect, India is of particular interest, since in 1980 – 1990 it had an essentially large-scale experiment with the creation of development institutions, which included state-owned banks and financial and investment corporations to support the energy and shipbuilding industries[51]. National development banks play a special coordination role through three main mechanisms: 1) providing expertise and directing market information that optimizes regulatory and management support for RES; 2) easing political gaps or barriers; 3) providing a coherent and holistic set of financial services to concentrate resources on national priorities[52];

b) creation of a clean energy fund, whose funds are accumulated by a tax on environmental friendliness. The latter took the form of a tax on coal of $1 per metric ton of domestic and imported coal, which is used to produce electricity[53]. For the practical implementation of this mechanism and the disposal of foundation funds, an interdepartmental group was created in the Ministry to approve projects and requirements for access to funds [54];

c) active policy on attracting domestic and foreign investments in the field of alternative energy. In particular, 59 projects of solar parks – large specialized centers of "green" energy – have been approved in India. Investors from all over the world are invited to join the financing of these projects, and for convenience and accessibility, electronic platforms have been formed for this purpose. At the same time, the right to build a solar park is sold by the state at auction, and the winners are those applicants who offer the lowest prices for electricity. This stimulates cheaper electricity by constantly updating technology;

[51] Свистун А. О. Порівняльний аналіз державних банків розвитку Індії та Китаю. *Економіка, управління та адміністрування*. 2020. № 2 (92). С. 126–129.

[52] Fang Zhang. The policy coordinator role of national development banks in scaling climate finance: Evidence from the renewable energy sector. *Climate Policy*. 2021. Vol. 22. Issue 6. P. 754–769.

[53]Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

[54]Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

d) *use of green or renewable energy certificates (REC).* The state uses the mechanism of obligations to purchase energy from RES, thereby forming a new object of law – a "green" certificate. This document is legally separated from the electricity itself, so they are sold/purchased separately. In India, trading of certificates through electricity exchanges began in 2011[55];

e) *fixing "green" tariffs*. The specificity of this mechanism in Indian law lies in the variability of "green" tariffs, in particular, they vary by state depending on the resources of the region, the cost of the project, and, more importantly, the tariff provisions established by the authorized body[56].

5) *Technical support*. For the development of alternative energy, the necessary condition is the use of the necessary equipment. Taking into account the active research work that is being carried out in this direction, energy equipment is regularly obsolete and constantly updated. India is making significant efforts to develop domestic production of relevant equipment. In this way, it uses such legal mechanisms that, under international trade law (in particular, WTO law), are considered discriminatory and distorting competition and trade. We are talking about the requirements for the use of domestic goods in preference over imported. This was the subject of an international trade dispute *"India – solar panels"*, which was initiated by the United States[57]. Under the terms of the Jawaharlal Nehru National Solar Mission, potential recipients of support were required to use a certain percentage of Indian-made technical equipment. Thus, India tried to support its young industry – the production of equipment for alternative energy. Of course, we must agree that Indian measures are not only about environmental goals – they relate to the development of domestic industry, entrepreneurship, and job creation. India, as a densely populated developing country with a significant amount of population living below the poverty line, just cannot ignore such goals. From this perspective, measures to use domestic equipment serve a dual purpose: economic progress and environmental protection through sustainable energy production[58].

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[55] Girish G. P., Singhania K.,Vincent EN. Solar REC Trading in India. *International Journal of Renewable Energy Research*. 2017. Vol. 7 (4). P. 1529–1534.

[56] Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

[57] India – Certain Measures Relating to Solar Cells and Solar Modules (DS456). URL: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds456_e.htm (дата звернення: 01.07.2023 року).

[58] Ghori U. "Reverse Permissibility" in the Renewable Energy Sector : Going Beyond the US-India Solar Cells Dispute. *Asian Journal of International Law*. 2018. Vol. 8 (2). P. 322–349.

Using the example of legislative regulation of India, scientists draw conclusions about the optimization of such a protective mechanism. So, in order for the requirements for domestic content to be effective, they must be: (1) limited in duration and include planned evaluation steps, (2) focus on technologies and components for which technical expertise is available and barriers to entry into the global market are available, and (3) relate to training and facilitating business connections, and relate to supporting other stages of the value chain and broader services integral to the success of renewable energy industries[59].

5) *International legal support*. India is committed to regional leadership in solar energy development. She embodies her aspirations, in particular, in the initiative to create the International Solar Alliance. The framework agreement on its creation was signed by 83 states (including Australia, Japan, Great Britain, the Netherlands, Egypt, 31 African states, 7 Pacific states, 9 countries of Latin America and the Caribbean and 3 countries of South Asia).

Despite such strong and multi-vector support for the development of "green" generation, India faces problems along the way that are generally typical for a developing country:

a) *bureaucracy and administrative* in the implementation of energy projects. Lack of coordination and cooperation within and between various ministries, departments, institutions, and other stakeholders delays and limits progress in the use of RES. An example was when the Indian Renewable Energy Development Agency (IREDA) began accepting applications for state support for wind energy shortly after the announcement of this scheme, ignoring procedural requirements regarding the need to publish an official printed notice. As a result, the Government of India rejected applications that had been submitted before such notification and considered only applications submitted after its official publication[60];

b) *difficulties with acquiring land rights*. According to Indian law provides for the existence of such categories of land that cannot be acquired for the needs of placing "green" power plants. However, given the growing number of solar and wind power plants in the country and the progressive shortage of permitted areas with the necessary energy potential, the Ministry asked state governments in 2012 to revise their land policy on

[59] Johnson O. Promoting green industrial development through local content requirements : *India's National Solar Mission. Climate Policy*. 2016. Vol. 16. Issue 2. P. 178–195.

[60] Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

wind power plants[61]. A side result of land and legal problems was the development of offshore alternative energy (creation of floating solar parks, water wind power plants, etc.);

c) *lack of transparency in the regulatory environment, low degree of guaranteed rights of investors*. The inconsistency of normative actions aimed at the development of alternative energy was a problem for India. As a result, the independent policies of many states only created uncertainty for investment in RES[62]. In some cases, regional authorities to some extent discredit energy projects, because their price is environmental and social problems. Thus, the government of the Indian state of Uttarakhand has developed and introduced laws for the development of hydropower, abandoning environmental considerations and violating the rights of communities to water[63]. Of course, this approach grossly violates the principles of sustainable development, which rejects such extremes, requires compromise and finding a balance between economic, environmental and social needs.

So, having survived two powerful energy crises of the 1970s, India identified energy "self-sufficiency" as the main development priority[64]. The legislation built for this purpose, aimed at stimulating alternative energy, is yielding abundant fruits. India's experience is important for Ukraine both in terms of using positive developments and in terms of analyzing ineffective legal decisions.

Japan. Japan's legal experience in the development of alternative energy has some interesting and instructive milestones that are useful for Ukraine in comparative legal analysis. Currently, Japan boasts a stable entry into the top five states – leaders in the production of energy from renewable sources. However, this is not an easy victory, but the result of a long and complex political and legal process. The main objective prerequisites for such a result can be indicated by the following:

1) *Energy-resource poverty amid rapid industrial development*. Japan is poor in traditional fossil fuel resources. This, on the one hand, makes it vulnerable and import-dependent in the energy sector, and on the other – eliminates the need to make a difficult choice between economic benefits and environmental needs. In addition, the lack of proper own resource

[61] Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

[62] Vikas Khare, Savita Nema, Prashant Baredar. Status of solar wind renewable energy in India. *Renewable and Sustainable Energy Reviews*. 2013. Vol. 27. P. 1–10.

[63] Karambelkar S. Hydropower development in India: the legal-economic design to fuel growth? *Natural Resources Journal*. 2017. Vol. 75. Issue 2. P. 361–394.

[64] Пришляк Н. В. Відновлювальна енергетика в Індії : сучасний стан та перспективи розвитку. *Інвестиції : практика та досвід*. 2018. № 21. С. 15–20.

provision frees Japan from the need to solve typical problems faced by other states – owners of traditional energy resources (for example, regarding the retraining of coal regions, etc.).

2) *Failure of the nuclear direction of energy.* Realizing the need to meet the growing needs of the developed economy in stable energy supply, Japan in the early 90s of the twentieth century chose the path of becoming a powerful nuclear power industry. Such a vector was recognized by the state strategy for the formation of Japan's energy security. In order to achieve the stated national emission reduction target, Japan has established the Kyoto Protocol Target Achievement Plan[65], which addresses measures to be taken to reduce energy-related greenhouse gases, with a major focus on voluntary activities[66] and the significant role of the nuclear sector[67], which is seen as an important technology related to global warming[68]. As part of the implementation of this strategy, the Third Strategic Energy Plan was approved, which set the task of achieving the production of 70% of electricity from zero-emission energy sources, mainly nuclear (supplemented by RES) in 2030[69]. However, this direction of development could not withstand a strict test of stability and constancy. Thus, the accident at the nuclear power plant "Fukusima – 1" in 2011, which occurred as a result of the tsunami generated by a strong earthquake, forced the government to urgently and thoroughly review Japan's energy development strategies. The consequences of this accident, in particular, were: a) the shutdown of almost all nuclear power plants in the country and the decision to close all 54 such power plants by 2040[70]; b) changing the legislative basis for the functioning of energy facilities; c) changing the priorities of state incentives, in particular, the introduction of mechanisms to support alternative energy.

[65] Kyoto Protocol Target Achievement Plan (Tokyo, 28 May 2005, partially revised 11 July 2006, totally revised 28 March 2008).

[66] Schreurs M. Multi-Level Governance and Global Climate Change in East Asia. *Asian Economic Policy Review* 2010. Vol. 5 (1). P. 88–105.

[67] Tiberghien Y., Schreurs MA. Climate Leadership, Japanese Style : Embedded Symbolism and Post-2001 Kyoto Protocol Politics / K. Harrison and L. McIntosh Sundstrom (eds). *Global Commons, Domestic Decisions : The Comparative Politics of Climate Change*. MIT Press, 2010. P. 145.

[68] Kyoto Protocol Target Achievement Plan (n 22) 53.

[69] Vance R., Henderson D., Moore L. *Impacts of the Fukushima Daiichi Accident on Nuclear Development Policies* (Organization for Economic Co-Operation and Development 2017).

[70] "Блакитні батареї" Японії : історія та сьогодення. URL: https://uhe.gov.ua/media_tsentr/novyny/blakitni-batarei-yaponii-istoriya-ta-sogodennya (дата звернення: 01.07.2023 року).

Interestingly, the accident at the Fukushima nuclear power plant has prolonged legal consequences that affect the development of state energy policy. In particular, the efforts of pro-nuclear organizations to restore the operation of nuclear power plants, which temporarily closed after March 2011, led to a large number of lawsuits in the district courts of Japan: against commercial nuclear power plants in the period from 2011 to 2020, 30 lawsuits were filed[71]. These lawsuits challenged, among other things, the government's actions to grant permits to launch nuclear power plants, the level of safety of which did not meet the current high requirements of our time.

3) *Suboptimal consideration of regional weather-climatic and geographical features* during the development of alternative energy. So, in Japan, hydropower is very well developed, and it is believed that almost all the existing natural potential has been mastered in this area. Solar energy also developed quite actively but faced with an objective problem – the lack of free territories to accommodate power plants. For some time, the so-called "solar lobby" promoted the interest in solar energy, but the objective conditions of a densely populated country with limited free space still established a kind of "glass barrier" for the further scaling of solar energy. However, even in this situation, according to economists, due to the higher cost of solar photovoltaic energy than wind electricity, Japan spends more economic resources than other countries on the use of renewable energy[72]. That is, due to the non-consideration of certain regional features, the active stimulation of solar energy has become a dubious state decision.

After the failure of nuclear energy strategies and stabilization of solar energy, the government began to actively stimulate wind energy projects. Despite the fact that wind energy has much greater potential than other renewable energy sources in Japan[73], there were legal obstacles to the large-scale deployment of wind energy in the market. Thus, the limited network capacity, the structure of the electricity market and the practice of operating the network by existing electricity companies limited the access of wind projects to the network. The passage of administrative permitting procedures increased the uncertainty, risk and time of the project. The difficulties of social perception were also quite high due to some past

[71] Koppenborg F. Nuclear Restart Politics: How the "Nuclear Village" Lost Policy Implementation Power. *Social Science Japan Journal.* 2021. Vol. 24. P. 115, 123.

[72] Aitong Li, Yuan Xu, Hideaki Shiroyama. Solar lobby and energy transition in Japan. *Energy Policy.* 2019. Vol. 134. URL: https://www.sciencedirect.com/science/article/abs/pii/S0301421519305373?via%3Dihub (дата звернення: 01.07.2023 року).

[73] Farhad Taghizadeh-Hesary, Han Phoumin, Ehsan Rasoulinezhad. Assessment of role of green bond in renewable energy resource development in Japan. *Resources Policy.* 2023. Vol. 80.

mistakes – especially regarding the violation of the interests of individual local communities[74].

Offshore wind energy projects currently have the greatest potential in Japan. However, the lack of legislation regarding the long-term private use of specific marine areas and opposition from fishing communities has hindered the development of offshore wind power. To eliminate these legal obstacles, on April 1, 2019, the Act on Promoting the Utilization of Sea Areas for the Development of Marine Renewable Energy Power Generation Facilities entered into force in Japan[75]. The law allows private use of certain areas of Japan's inland waters and territorial sea for the development and production of offshore marine renewable energy for a maximum period of 30 years[76]. At the same time, although the Act aims to allow relatively independent use of marine areas by commercial entities engaged in the production of marine renewable energy, it does not allow energy producers to exclude any fishing activities in a certain zone. Such a decision aims to prevent violation of the balance of interests of different groups of the population, business, and the state in such complex legal relations as special water use. It is important to note such an institutional flaw in the development of offshore wind energy in Japan as "deeply rooted traditional sectionalism, which can slow down the progress of the energy transition". It is primarily about the existing interdepartmental competition and the lack of cooperation between government agencies[77].

4) *Use of legal mechanisms to stimulate alternative energy.* The main protective mechanism aimed at state support for the development of alternative energy in Japan has become the well-known "green" tariff. At the same time, a feature of the Japanese experience was the long and complex adoption of the law by which such a tariff was introduced. The Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities (FIT Act), adopted in July 2012 and amended in April 2017 in Japan, gave rapid results, stimulating the expansion of alternative energy capacities within the first three years of its effect[78]. However, due to its shortcomings (in particular,

[74] Mizuno E. Overview of wind energy policy and development in Japan. *Renewable & Sustainable Energy Reviews.* 2014. Vol. 40. P. 999–1018.

[75] Chie Kojima. Japan Legislation on Marine Renewable Energy. *Asia-Pacific Journal of Ocean Law and Policy.* 2020. Vol. 5. Issue 2. P. 383–386.

[76] Chie Kojima. Japan Legislation on Marine Renewable Energy. *Asia-Pacific Journal of Ocean Law and Policy.* 2020. Vol. 5. Issue 2. P. 383–386.

[77] Aitong Li, Yuan Xu. The governance for offshore wind in Japan. *Energy Procedia.* 2019. Vol. 158. P. 297–301.

[78] Kenji Asano. Enactment and Enforcing Processes of the Japanese Feed in Tariff Law: Difficulties for Maximizing Renewable's Diffusion while Minimizing National Burden. Journal of East Asia and International Law. 2017. Vol. 10 (2). P. 357–378.

the non-transparent mechanism for determining the purchase price for energy from RES, the lack of a fixed upper limit of the “green” tariff, etc.), there was some bias, namely: alternative energy began to develop much faster, but the national financial burden of paying the “green” tariff also increased. In this regard, a typical consequence appeared: the “green” tariff, which, according to its plan, was aimed at expanding new renewable energy facilities, deviated from its original goal and became the main commercial source of income for existing producers of such energy. This leads to increased financial burden on society and the economy as the main consumers of “green” energy.

At the same time, such a financial burden is not temporary, judging by the recently adopted program documents. So, in October 2021, the Sixth Strategic Energy Plan was approved, which offers a basis for action aimed at achieving carbon neutrality by 2050. Japan’s ambitious climate goals should be achieved in a relatively short time, which implies further state stimulation of “green” generation.

The study of Japan’s legal experience gained during the generally effective development of alternative energy allows us to draw several important conclusions. In particular, Japan has become a great example of how a country with poor traditional energy resources can persistently build its own energy security and move towards energy independence through the use of renewable energy sources.

The history of Japan clearly illustrates the situation when significant flaws were identified in strategic plans, but this did not become an occasion to abandon ambitious environmental goals – it became an occasion to quickly reformat the legislative principles and state policy, taking into account new conditions and challenges. Ukraine, which is in the new harsh realities of warfare and the need for the next post-war recovery, faces the task of rethinking its energy security and making decisions adequate to dynamic external circumstances. The example of Japan proves that this path can be passed, relying, among other things, on the development of alternative energy.