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List of Issues That Require Legal Regulation as Part of the Renewable Energy Regulation in Component States of Federation

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Abstract: The transition to renewable energy is strongly affected by legal regulation. To increase the efficiency of the introduction of renewable energy into the energy systems of component states of federations and accelerate the energy transition, it is necessary to carry out systematic work to improve regional legislation in this area. The purpose of this study was to analyze the current regulatory legal acts on the renewable energy of the regions of a number of countries such as the USA, Germany, India, Switzerland and Russia in order to form a universal list of issues that need regulation at the regional level. The main methods for achieving the objectives set in this study were the comparative legal method and the method of analysis and synthesis. As a result, a number of recommendations were developed describing how legal relations primarily need to be regulated by regional legislation, and examples of different approaches to their settlement were presented. The issues in need of legal regulation were divided into three groups according to the degree of importance of their regulation by the legislation of the component state of the federation. Further development of this study will be aimed at identifying the most effective industrial practices for resolving each of the issues included in the compiled list which will help improve the efficiency of regional legal regulation of renewable energy.

Keywords: renewable energy source; green transition; energy law; regional legislation; renewable energy policy; regional law; national legislation; lawmaking; environmental law



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1. Introduction

The transition from fossil fuels to renewable energy sources is one of the most important tasks of our time, which is expedient from the point of view of reducing carbon dioxide emissions [1], ensuring energy security [2] and preserving exhaustible raw materials [3]. Successful implementation of renewable energy is determined by a number of factors, including policy and legal regulation in this area. There are a number of works describing the experiences of different countries with the implementation of renewable energy and demonstrating the impact of policies [4], climate factors and level of economic development [5] on the success of such implementation. It should be noted that climatic and demographic factors may differ significantly between different territories of the same country, and in the case of federations, differences in government policies can be expected. Consequently, to increase the efficiency of the introduction of renewable energy into the energy systems of constituent entities of federations and to accelerate the energy transition, it is necessary to carry out systematic work to improve regional legislation in this field. One of the ways to ensure sustainable development is the formation of legislation based on a methodology (Figure 1) based on replication and adaptation of the experience of

legal regulation of renewable energy in the component states of various federations that most successfully implement such energy installations in their territory. An important component of this methodology is a list of issues that need legal regulation at the level of regional legislation.



Figure 1. Components of the methodology for the development of regional legal regulation of renewable energy.

For the effective use of such, it is necessary to determine the scope of legal regulation and the forms of its implementation available to each region. In federal states, the division of power between the central government and component states is usually entrenched in the fundamental law of the country. Most of the fundamental laws predate the widespread adoption of energy installations based on renewable energy sources, so relations in the field of renewable energy are in most cases unregulated by fundamental laws. At the same time, the main part of legal relations in the field of renewable energy is an element of energy law and energy policy; therefore, if the fundamental law of the country provides for the classification of energy as the exclusive subject of jurisdiction of the central government, the subject of joint jurisdiction or the subject of jurisdiction of the regions, this includes renewable energy. For example, in Switzerland, the constitution assigns special responsibility to the cantons for measures relating to energy consumption in buildings [6]. Renewable energy development could also be influenced by the policies of other fields, such as innovation policy [7], that also may have its regional level. In addition, energy transition policy largely inherits national regulatory styles [8].

In countries that consider energy to be a regional responsibility, the need for legal regulation of renewable energy at the regional level is obvious; therefore, the necessity of existence of such legislation needs no further discussion. In states that classify energy as a subject of joint jurisdiction, each particular case must be considered separately. If federal legislation is sufficiently developed, and the region does not have unique climatic, demographic or economic characteristics that cannot be taken into account in general federal laws, there is no direct need for regional legislation. The adoption of norms that duplicate federal legislation is not a serious problem for the legal system, but it also does not contribute to the development of regulated legal relations. But in most cases, federations

are large countries covering several climatic zones, and the component states have quite unique characteristics including those that matter for the introduction of power plants based on renewable energy sources and for the development of the energy network as a whole, so that direct federal regulation would be less expedient than the adoption of regulatory legal acts in the region itself.

In countries that directly attribute energy to the exclusive powers of the central government, the issue of legal regulation of renewable energy cannot be raised. But even in countries where regulation is carried out primarily at the federal level, component states may still have mechanisms to limit or stimulate the development of renewable energy by regulating other related relations. In the Federal Republic of Germany, energy regulation, including renewable energy, is predominantly federal, but, for example, North Rhine-Westphalia has adopted a regional climate package of acts, which includes goals for the development of carbon capture and storage projects, since there are no federal projects in this area yet developed [9]. And this package can have an impact, among other things, on the development of renewable energy. In addition, different states can use different building codes for these purposes; in the same North Rhine-Westphalia, there was a restriction of 1 km between a wind turbine and residential buildings [10] and on the placement of such devices in forested areas, which were eventually eased [11].

Studies that compare several countries [12–14] show that the correlation between the climatic and demographic potential of renewable energy power plants and the actual success of their implementation is not always completely direct. It continues at the regional level as well; for example, in Alabama, USA, a state with enormous climatic potential for renewable energy, especially solar energy, renewable energy generation is rather underdeveloped. One of the serious factors that affects the implementation of renewable energy generation besides the climatic and other resource potentials is the regulation of this industry within the component state. In a region in which all legal relations in the renewable energy field are precisely and clearly defined, and from the content of regional laws and local acts it is obvious that the population and the authorities of the region intend to increase the share of renewable energy in the overall power generation, large investments in energy and infrastructure are more likely to be made, and small consumers will more easily transit to renewable energy from traditional energy sources.

Legal regulation of renewable energy by adopting only one law with a number of substantive rules, without a set of acts that provide procedural regulation, may also not lead to any results. For example, in the state of Iowa, USA, an act focused on the production of alternative energy was adopted back in 1983, but due to the lack of necessary enforcing provisions it was not actually implemented until 1996 [15]. This highlights the importance of the systematic and comprehensive development of renewable energy regulation.

Hence, a structural and substantive analysis of the legal norms regulating renewable energy power plants in component states that are the most successful with implementing renewable energy generation, taking into account their defining climatic, economic and demographic features, would allow for the development of a methodology for the composition and improvement of effective regional legislation in the renewable energy field.

The unified methodology for the development and reform of regional legislation in the renewable energy field for different component states of the same country also has the advantage of uniformity of legal regulation. Although some flexibility must be maintained to maintain efficiency, a unified structure of regulations, a similar system of regulatory bodies and other reproducible factors can ensure this uniformity. This, first of all, facilitates the work of government and corporate lawyers in organizations that have representative offices and own power plants in several component states of the federation. But it also makes life easier for small consumers, who will not have to face additional difficulties after changing their region of residence within the country.

Some states practice the formation of such methods in relation to their own legal systems. The Conference of Cantonal Energy Directors, which brings together regional

bodies that regulate renewable energy in the cantons, has developed a set of joint model cantonal provisions in the energy sector [16], which it updates as necessary [17].

Also, the development of legislation based on a methodology designed for its long-term support and evolution adds political stability. Investors who committed money into renewable energy must be confident that the development strategy will not change, at least in the medium term, and that renewable energy power plants will not lose support [18].

This study is intended to compensate for the lack of methodological materials aimed at improving the development of legislative techniques. Regional legal regulation of renewable energy is implemented in federations everywhere, given a suitable climate, but theoretically grounded guidelines for its development remain rare. Such methodological recommendations can help to strengthen the link between basic legal science and regional lawmaking bodies, to facilitate the development of a normative legal act in case of the need for its early adoption, when there is no possibility to conduct independent detailed research.

The purpose of this study was to formulate a universal list of issues that must be regulated by regional legislation in order to implement effective legal regulation of renewable energy in a region. For this purpose, it was necessary to fulfill a number of tasks: to determine which component states are most effectively implementing renewable energy, taking into account the possibility of reproducing their experience; to establish which issues are regulated most frequently in the legislation of these regions; to analyze what the purpose was behind the inclusion of the identified items in corresponding legislations and how this experience can be reproduced.

2. Materials and Methods

The first part of this study was carried out by analyzing the legislation of the regions of the Russian Federation. The team of authors better understands their political and legal structure and is able to more competently compare the instruments of legal regulation with the general opportunities provided by the legal system, the geographical characteristics of the federation and its component states.

The initial basis for this study was the legislation on renewable energy of the Russian Federation, in which, at first glance at Art. 71 of the Constitution [19] which lists subjects under the exclusive jurisdiction of the federation, the impression might be formed that regions cannot deal with the topic of regulating renewable energy since there is a “federal power systems” clause. However, due to the absence of a definition of the concept of federal power systems in the legislation, and the fact that the draft of federal law “On Federal Power Systems” was withdrawn from consideration more than twenty years ago and was never resubmitted to the parliament, at present the component states of the Russian Federation carry out regional regulation of energy including power plants based on renewable energy sources. In addition, if in the absence of a legal interpretation of the term “federal power systems”, its literal interpretation is considered, and then renewable energy power plants that are in most need of a special legal regime, specifically those designed for small- and medium-sized consumers and not connected to the electricity grid, will not be covered by the aforementioned law; with the reduction in powers of the component states of the Russian Federation in the field of energy, this part of it will remain unchanged.

Despite the fact that the first stage of research was carried out on the basis of the regional legislation of the Russian Federation, the hypotheses developed in the process were confirmed or studied by cross-checking them during the analysis of the regional legislation of a number of other countries, such as the United States of America, the Federal Republic of Germany and others. With all the features associated with political processes, the Russian Federation still serves as a good basis for such study since its regions are very diverse in climate, demographics, economics, in the availability of traditional energy sources and in the prevalence of grid connection. A large amount of raw hydrocarbon reserves, large hydroelectric power plants and nuclear power plants may seem to be a significant distorting factor, since for many component states of the Russian Federation the introduction of renewable energy power plants is a matter of environmental priorities,

ensuring “carbon neutrality” and maintaining the energy security of the region and individual settlements, but the existence of a number of regions in which there are serious and insurmountable obstacles to energy supply from traditional energy sources, on the contrary, ensures the diversity and the meaning of the regional legal regulation. In addition, access to a large amount of hydrocarbon raw materials itself does not mean low demand for green technologies. For example, in the USA, the state of Texas is a leader in the production of crude oil and natural gas, but at the same time it is a leader in the generation of wind energy and is second in the country in solar energy. The key components of the methodology are not tied to specific territories but are aimed at creating tools that allow for the development of norms taking into account the defining features of the region. Most of the methodology is devoted to answering not the question “How to regulate correctly?” but the question “What needs to be regulated and what options are there to do this?”. Hence, the entire methodology, or at least most of its provisions, including the questions discussed here that require legal regulation at the regional level, can, with certain adjustments to the legal system and the nature of the relationship between the federal and the regional governments, be reproduced in other countries even if they differ in the energy balance.

After completion of the first stage of this study, when the main working hypotheses were formed, and the mechanism for analysis of the regional legislation was worked out, in order to expand the base of sources, double-check and supplement the formulated hypotheses and increase the flexibility of the developed methodology, this study was broadened on the legislation of component states of other federations that successfully implement renewable energy.

Important sources of information for Russian regions are investment ratings in the field of renewable energy sources, and the main of which is the rating compiled by the Russia Renewable Energy Development Association (RREDA) [20].

The algorithm for determination of successfulness in implementation of renewable energy (Figure 2) is as follows.

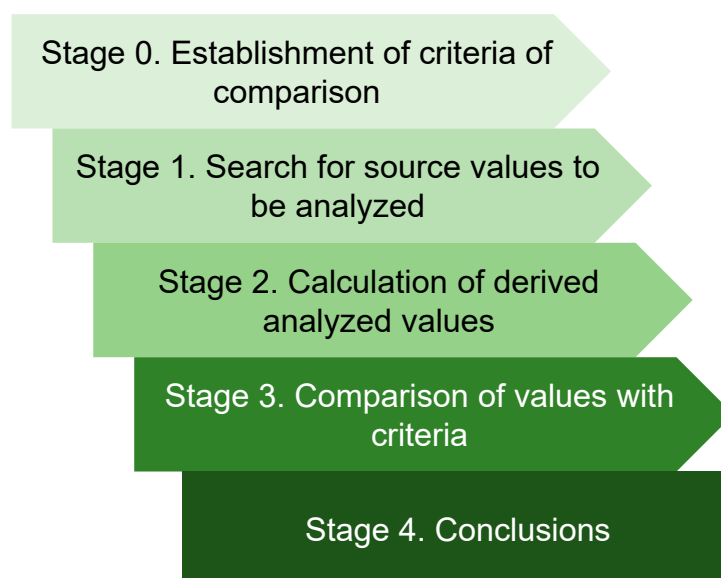


Figure 2. Algorithm for determination of regions most successful with implementing renewable energy.

At the preliminary stage (Stage 0), performance evaluation criteria are established by which the regions under consideration will be assessed, and the baseline values for the comparison are found. The selection of criteria depends on the purpose of the study. In our study, the baseline for gross potentials of renewable energy sources was the average value for the regions of federation, and the baseline value of any other value was the average value from those regions that generate meaningful amounts of renewable energy.

At Stage 1, the values for comparison that cannot be calculated are obtained from external sources. The types of values include gross potentials of renewable energy sources, installed capacity of renewable energy power plants and all types of power plants, total annual energy generation and annual renewable energy generation, capacity of newly installed renewable energy power plants and funding provided by government programs aimed at aiding the implementation of renewable energy. The potential of renewable energy sources in each region is obtained from maps and directories of renewable energy resources, energy agencies, government statistical bodies and other sources. The source data on the installed capacity of generating facilities and the amount of energy generated and consumed per year are found in reports of federal and regional energy network operators, reports on the operation of generating facilities, data from energy agencies, statistical bodies of the state and other sources. The budgets of funding of measures for the development of renewable energy can be found in texts of federal and regional programs aimed at increasing energy efficiency, energy saving and the use of renewable energy sources and in reports of energy agencies, statistical bodies of the state and other sources.

At Stage 2, the derived values are calculated from the source data or found in the sources that report such values. The derived values include share of energy generated by renewable energy installations from the total gross energy potential, the share of renewable energy generation in the regional energy balance, the share of renewable energy in fulfillment of regional energy demand, the installed capacity of renewable energy power plants sufficient for fulfillment of the existing deficiency of regional energy balance, the installed capacity of renewable energy power plants that would allow fulfilling regional energy demand solely by renewable energy sources, funding spent per unit of installed capacity of renewable energy power plants and funding spent per unit of generated renewable energy.

The share of energy generated by renewable energy installations from the total gross energy potential can be determined for each type of renewable energy source separately and for the total gross potential of renewable energy sources using the following (Equation (1)):

$$\eta_{RGP} = W_{RES} / W_{GP}, \quad (1)$$

where W_{RES} is the annual generation of energy from renewable energy source, kWh, and W_{GP} is the annual gross potential of renewable energy source, kWh. However, this parameter significantly depends on the area of the region under consideration. In order to reduce the effect of area, the values of the specific gross potential and specific generation can be used for calculations by Equation (2):

$$\eta_{SRGP} = W_{SRES} / W_{SGP}, \quad (2)$$

where W_{SRES} is the specific energy generation by a renewable energy installation per 1 km² of occupied area, kWh*km⁻²; W_{SGP} is specific gross potential of the energy source, kWh*km⁻². It should be noted that for different types of renewable energy sources, this parameter will significantly differ since the conversion coefficient of different types of energy resources significantly varies.

The share of renewable energy sources in the energy balance of the region shows the contribution of renewable energy power plants in the total energy generation; this parameter allows assessing the scale of implementation of renewable energy sources in the region. It should be noted that for regions with large energy production, it is more difficult to achieve high values of this parameter since the total capacity of renewable energy power plants must also be high. A similar parameter is the share of renewable energy sources in fulfillment of the energy demand of the region. Here, it is important to note that larger demands are harder to fulfill, and in evaluation of success of introduction of renewable energy facilities, smaller absolute value of renewable energy generation may result in larger values of generation-to-demand ratio if the demand itself is modest; see an example in Figure 3, where moderate generation in the Russian region of the Republic of Kalmykia covers a much larger fraction of regional demand in comparison with the

much larger generation of Stavropol region covering a smaller fraction of regional demand. This parameter is especially relevant for energy-deficient regions, since these regions are energy-dependent, which negatively affects their energy security. For such regions, it is necessary to determine what installed capacity of renewable energy power plants will be sufficient to cover the demand of the region. To analyze the effectiveness of government incentives for the use of renewable energy sources, it is necessary to estimate the increase in power per budget spent on funding of the incentive.

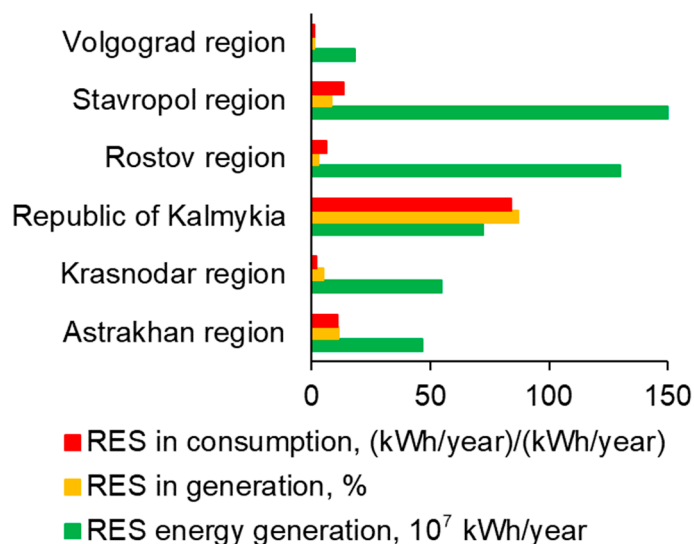


Figure 3. Total annual generation from renewable energy sources and its role in energy balance of several regions of the Russian Federation.

At Stage 3, the assessment of success of the introduction of renewable energy power plants in energy systems is carried out by comparing calculated parameters with baseline values in established criteria. Based on the results of the assessment, at Stage 4 the regions are ranked by successfulness of implementation of renewable energy power plants into regional energy systems.

For each region examined, the existence of legal regulation of renewable energy and energy in general in the statutory document of the region was checked. This is not the most common occurrence, but examples include Alaska, USA, where a grant fund for the development of renewable energy is provided for in the statutory document [21], and North Dakota, USA, where renewable energy targets are included in the Century Code [22]. Then, the specialized thematic regional laws dedicated to renewable energy were considered. Then, regional laws on energy saving and increasing energy efficiency, if they contained provisions related to renewable energy, were analyzed. Then, the provisions on power plants operating on the basis of renewable energy were searched for in the regional laws on ecology, on investment activities, on land-use procedures, on limiting of anthropogenic impact, on tax benefits and concessions, on administrative responsibility, on gasification and on farming. Acts inferior in legal force to the laws of the region were also added to the consideration, such as regional government-funded programs dedicated solely to renewable energy and to energy saving or renewable energy and provisions on competitions and investment projects in the field of renewable energy.

We studied the regional programs of the federative entities that were most successful in implementing renewable energy in their regions, if these programs were entirely dedicated to renewable energy, had a subprogram dedicated to renewable energy or had a broader theme but had a significant set of activities aimed at renewable energy development. If an eligible region simultaneously implemented several different programs devoted to renewable energy, we did not make any additional selection but included all programs with activities devoted to renewable energy development in our analysis. Additionally, we

also supplemented the individual theses with programs from other entities if they used unusual methods and approaches.

For each region, a list of bodies was compiled with indication of the limits of their powers in the field of regulation of renewable energy sources. The most important acts adopted by these bodies that determine the legal status of renewable energy sources in the region were also added to the system of regulatory legal acts.

An analysis was carried out of the appropriateness of the use of technical terms in the reviewed regulatory legal acts. The numerical values of physical quantities were scrutinized and compared with climatic conditions and operational characteristics of renewable energy installations. In certain provisions of regulatory legal acts that were related to the legal regulation of the direct operation of power plants, the consideration of the power plant design as well as the process of their construction, commissioning, scheduled maintenance, emergency repairs, decommissioning and dismantling were analyzed.

Further work on analyzing the content of the formed base of regulatory legal acts regulating renewable energy in the constituent entities began with compiling a list of legal regulation issues raised in them. From all the texts of normative legal acts of each examined region, a list of issues regulated in them was formed. From these, a consolidated list was compiled where the issues were sorted by weight, and the weight was determined by the number of regions in which the issue was regulated. The final consolidated list included issues that were regulated in more than half of the regions under consideration, and the present article focuses on eight issues that received the greatest weight based on the results of the analysis.

Legal principles were identified that were followed in each of the component states in lawmaking in the field of renewable energy. Also, the analysis of legal principles was supplemented by the analysis of the purposes of laws, if they were declared in them. A list of additional positive practices was also compiled, the adoption of which should have a positive impact on the effectiveness of legal regulation of renewable energy by a specialized regional law, and justifications for the usefulness of these practices were prepared.

3. Results and Discussion

3.1. *The List of Questions Is an Important Component of the Methodology*

The list of questions that require legal regulation at the regional level is one of the key components of the methodology for improving regional legislation in the field of legal regulation of renewable energy power plants. The determination of a list of questions that are regulated by the legislation of regions that are most successful in implementing renewable energy was precisely one of the primary tasks in developing the methodology.

Many other components of the methodology represent a detailed disclosure of options for legal regulation of each of the questions that need such regulation. The methodology is meant to be modular, and each individual component can be used independently of the others, but it seems most appropriate to consistently modernize legislation on all proposed questions. Legal regulation of renewable energy at the regional level is usually a complex system in which some elements significantly influence others. Gaps in the resolution of some questions may devalue the achieved results in the legal strengthening of the regulation of others. Hence, it is advisable to use the formulated list of questions that need legal regulation as part of the regulation of renewable energy in a region.

In addition, one of the purposes of forming the list of questions is to serve as a kind of checklist in writing a regional law on the regulation of renewable energy power plants or an amendment to a number of regulatory regional legal acts that regulate these relations. The list itself cannot suggest ready-made optimal solutions or eliminate conflicts, but its use, adjusted for the energetic and demographic potentials of a component state and its level of freedom in the legal regulation of this industry should help prevent the emergence of gaps.

3.2. *The Need to Adopt a Separate Regional Law*

There are three fundamentally different approaches to the legal regulation of renewable energy at the regional level. Each of them has its own advantages and disadvantages, and the choice rather depends on the current practice of industry legislation at the regional level in a country.

The first approach is to adopt a specialized regulatory legal act specifically dedicated to the regulation of renewable energy power plants. This approach is common, for example, in the USA, where many states have their own regional acts, but in the Russian Federation, as an example, only two regions can be cited—the Republic of Sakha (Yakutia) [23] and the Krasnodar region [24], which are as dissimilar to each other as possible in terms of climatic conditions, demographic and economic characteristics. This illustrates that the choice of how to consolidate the norms governing renewable energy is determined precisely by the legal practices adopted in the region.

The second approach involves establishing the norms governing renewable energy power plants in sections of laws on energy saving or on increasing energy efficiency. The third is the distribution of norms across a variety of regulatory legal acts on the environment, building standards, gasification, heating and so on, without incorporating them into one single document.

There are a number of advantages to adopting a specialized law dedicated exclusively to renewable energy sources. Firstly, it simplifies the work of lawyers, small consumers and investors in finding the necessary information before implementing the appropriate energy installations. Secondly, it is easier to keep one normative legal act up to date and consistent with both the economic and environmental agenda than track a set of norms distributed across many normative acts. However, this effect is also achieved by creating a specialized section in the law on energy efficiency. Thirdly, the adoption of a specialized law signals to consumers and investors that regional authorities take renewable energy seriously. In most countries of the world, only significant legal relations are regulated precisely at the level of adoption of a separate regional law, and this increases confidence in regulated relations.

Undoubtedly, the key factor here is the prevailing practice in a country. The existence of laws on renewable energy in other regions is a significant incentive for choosing this particular approach for three reasons. First, the law could be developed based on the norms of those regions that have been most successful in introducing renewable energy power plants into their energy systems. Secondly, when other regions introduce promising novelties in law, it will be easier to adapt and reproduce them under the same structure of legal regulation. Thirdly, investors coming from other regions, as well as small- and medium-sized consumers who are relocating, will have the opportunity to work with legislation similar to their previous experience.

On the other hand, all of the above points also apply to the situation where all the rules governing renewable energy are collected in one section of the act dedicated to broader energy topics. Here, however, it should be taken into account that a situation may arise where in different regions these are sections of different laws (for example, on energy saving, energy efficiency or regional energy systems), so in the matter of convenience this approach is inferior to a specialized regulatory legal act.

The current practice in countries with regulation distributed over many acts is not so appropriate for reproduction. When developing a regional law, one can still rely on the norms of the most successful regions, simply adding the necessary fragments to the consolidated act or references to the norms of other acts. At the same time, reproducing practices by copying them into similar acts does not provide any advantages and, moreover, may be complicated by the fact that the list of normative legal acts adopted by regions may differ, or the subjects regulated by acts of the same name may differ.

The current practice in the Russian Federation clearly illustrates that the adoption of a specialized regional law in itself is not a prerequisite for effective legal regulation of renewable energy power plants. Nine of the ten regions which were found to be most successful by the RREDA agency [20] do not have a specialized law. In four of these nine

regions, the norms are collected in one law on a broader energy topic; in the rest, they are distributed across a large list of regulatory legal acts. In the United States of America, some states such as New Jersey, Washington and New York have dedicated laws on renewable energy sources while a number of states, e.g., Illinois, have included renewable energy regulation in their “clean energy” laws. This is a broader concept [25], but renewable energy is an important part of it. The example of the legal regulation of renewable energy in the Federal Republic of Germany also illustrates that the adoption of a specialized regional law is not necessary, as none of the German lands have adopted one. Neither approach demonstrates any obvious advantages when it comes to theoretical assumptions, but there are advantages to the actual implementation of renewable energy power plants into regional energy systems. When the state-level renewable portfolio standard was first introduced in the United States of America, the studies showed its significant positive effect on the development of renewables [26,27], but recent analysis [28] of the influence of state and federal regulation on renewable energy generation “calls into question the need for state-level renewable portfolio standard initiatives to mandate the adoption of renewable electricity generating capacity”. Hence, the relative roles of federal-level and state-level regulations and incentives remain unclear.

It should be noted that despite the current practice in the other regions of a country and any other additional assumed advantages, if the region already has a regional law on renewable energy, all further work should be carried out on its improvement. Changing the approach and transferring norms to other regulatory legal acts is extremely undesirable. Without abandoning the current law, this will create duplication of rules, leading to a more complex legal framework that will not only confuse generator companies and energy consumers but will also create room for mistakes by legislators. The repeal of a specialized law might have two negative consequences. Firstly, the need to preserve its necessary provisions in the form of norms of other normative legal acts so as not to miss anything, not to create conflicts and not to complicate the structure of recipient acts creates a large burden on the legislative body and its apparatus. Secondly, the cancellation of a regional act of this type looks like a negative news feed, and if the media would not reflect the entire context that the pre-existing norms will be preserved in other regulatory legal acts but would present the news in a simplified manner, the investment climate for projects in the field of “green energy” could be spoiled, and public protests among the environmentally conscious population may arise.

3.3. Which Energy Sources Are Considered Renewable?

Regardless of whether the regional legal regulation of renewable energy power plants is concentrated in one act or distributed over many, a list of questions that must be covered by it might be determined, and the first such question is which energy sources are classified as renewable in the regional legislation.

One of the reasons for the need to strictly regulate this question is that the use of renewable energy might provide certain privileges, benefits and concessions, and it may be beneficial for large business entities to lobby for the application of these measures to their facilities that use energy sources different from traditional ones, even if they are not considered renewable, taking advantage of gaps in legal regulation. The second reason is that unscrupulous performers could also use an insufficiently strictly defined list of renewable energy sources and use cheaper and simpler but less efficient and less environmentally friendly technologies related to renewable energy in order to meet target reported indicators.

It should also be taken into account that each region has its own unique resource potential, and it is not always advisable to extend a privileged position to all existing renewable energy sources, since the use of some of them in the region may be inappropriate and may not suit the needs of both direct energy consumers and the entire population of the region. For example, hydropower often does not require additional support because it is more cost-effective than other renewable sources even without additional measures, it

creates competition with other types of renewable energy and has a negative impact on the environment.

If federal legislation has already adopted an exhaustive and unproblematic list of renewable energy sources, there is no need to duplicate it at the regional level, and it would be better to use the blanket norm.

If federal legislation does not contain a specific list but only provides a general description, if the list is open or if the list is completely absent, regulation at the regional level is necessary. It may be enshrined in a separate article of a normative legal act or contained in an article containing definitions of terms. Another way to establish such a list is a blanket norm with reference to the acts that will contain it and will be inferior in legal force to the laws of the region. This also makes sense as a temporary measure taken in order to simplify the process if it is expected that changes will be made to the list. To avoid the previously mentioned abuses, the list should be made closed and it should be based on environmental and economic indicators and on the resource potential of the region.

The most unfavorable scenario for regional legal regulation is when federal legislation approves a list of renewable energy sources, but it is not optimal for the region. In this case, everything depends on the format of distribution of subjects of authority between the central and regional governments. If the degree of freedom available to the region allows changes to be made to the list of renewable energy sources, it is advisable to make a note in the corresponding article that the list is relevant specifically for the region and differs from federal legislation.

Sometimes, a situation may arise when, for both socio-economic and environmental reasons, it would be advisable to equate one of the non-renewable energy sources with renewable ones, extending all the provided benefits to energy installations based on them. This is not the best practice, as it creates room for mistakes in the further maintenance and reproduction of legislation, including possible mistakes in replication by other lawmaking entities. It seems more reasonable either to adopt a separate regulatory legal act that would indicate that, in certain aspects, power installations based on a given energy source are subject to a legal regime similar to the regime set for power installations based on renewable energy sources or to adopt a separate regulatory legal act in which the rules will be duplicated.

For example, in California, USA, renewable energy sources encompass renewable biomass (solid fuel, solid waste to energy and biogas), wind, solar, geothermal energy and hydropower. The suitability of biomass-based energy for decarbonization and feasibility of bioenergy-focused renewable energy systems is debated [29,30], and several studies highlight the ecological disadvantages of growing crops specifically for biomass-based energy generation [31]. At the same time, there is a discussion about the inclusion in this list of some non-renewable technologies such as fuel cells that have the main advantages of renewable ones [32]. The main criterion is the proximity to zero carbon footprint, that is, decarbonization is the basis of the energy transition.

Sometimes, it was considered beneficial to encourage certain practices based on the types of energy installations that are most in demand in the region. For example, in the Indian state of Gujarat, additional incentives are provided for hybrid energy plants that combine several energy sources [33].

A very detailed closed list of energy sources classified as renewable can be found not in the regional legislation but in the federal act of Germany [9]. In the German Renewable Energy Sources Act, the term “renewable energy source” covers “hydropower including wave, tidal, salinity gradient and marine current energy, wind energy, solar radiation energy, geothermal energy and energy from biomass including biogas, biomethane, landfill gas and sewage treatment gas, and from the biologically degradable part of waste from households and industry”.

3.4. Terms

René Descartes argued that much controversy could be avoided if there was agreement about the meaning of words. Despite the fact that energetics is an exact science, many terms have definitions that allow for certain different interpretations. This can both cause inconvenience and contain the potential for deliberate abuse. An example of this inconvenience is found in [34], where the change in the legal definition of “small RES power plant” from 50 kW–500 kW to 50 kW–1 MW in Poland on 30 October 2021 received the following comment: “Some difficulties were encountered during the research, especially related to amendments of legal definitions of the facilities investigated in Poland, and the impossibility of comparing results in subsequent years.” The use of external sources such as dictionaries, professional literature or established practice seems, at best, a compromise solution. Regulatory legal acts establishing preferential regimes must clearly indicate who can apply for them and in what cases, which means that any terms that may cause disagreement must either be defined in the same act or in a document that is developed with the participation of the same group of lawyers that works to regulate the fundamental law.

A situation may also arise when the terms are already defined at the level of federal legislation. If their list is exhaustive and covers all the needs of the regional law, it is enough to get by with a blanket norm, but if additional definitions of terms need to be approved, it is advisable not to combine a reference to a federal act and several new definitions but to duplicate all the necessary definitions, supplementing them with new ones.

If the definitions of terms are included in a separate regulatory legal act, with the legal force of which and the authority required to amend them being lower than that of the main regional law regulating renewable energy, an incompletely correct situation arises. The law that regulates renewable energy in a region becomes partially determined by the content of a regulatory legal act of lesser legal force.

There also are two main approaches to defining the terms directly in the laws in which they are used. The first one involves listing all terms with their definition in a separate article, usually one of the first in a regulatory legal act. The second approach is to expand the definitions of terms as they appear in the text. The choice of approach primarily depends on the legal technique adopted in the country and in the region, but in the aspect of the considered topic the second approach has certain disadvantages. When amending a normative legal act, it would have to be taken into account whether the new text uses a term the definition of which is disclosed only in subsequent articles and whether it is necessary to make corresponding changes.

When forming a terminological dictionary, it should be additionally checked for each term whether it is possibly given a differing definition in other regional or federal regulatory legal acts. If some terms are already defined and not in a context in which it is convenient for the purposes of the renewable energy law, it is important to determine the legal force of the act defining them. If it is not higher in legal force, a different definition of the term can be introduced by adding the necessary clarifications about the context of use without concern of possible abuse. Otherwise, it is worth checking whether the term itself can be adjusted by adding a clarifying element to it which would narrow the use specifically to the scope of renewable energy power plants.

To develop a terminological dictionary, it is advisable to form a working group that includes lawyers and engineers—specialists in the field of renewable energy.

3.5. Principles

Renewable energy law is not a full-fledged branch of law, and even as a sub-branch of energy law it is not singled out by all researchers of legal systems. Therefore, renewable energy law does not have a developed generally accepted traditional system of principles that could work even without their direct consolidation in normative legal acts. Consolidating the fundamental principles of operation is not a mandatory element of every regional law, but since a normative legal act on renewable energy is exceptionally socially, economically and environmentally significant, the formulation of principles in it seems appropriate. The

system of principles allows the legislator to check whether further lawmaking activities are being carried out in the correct direction and makes it easier for law enforcers and judicial authorities to interpret other norms.

Before formulating the principles of regional legal regulation of renewable energy, it is necessary to refer to both federal legislation and regional legislation determining broader areas of activity.

If the principles are formulated in federal law, there is no direct need to introduce them by regional legislation. But they can be duplicated or made use of with a blanket norm. It is worth paying attention to the fact that the sphere of relations relating to renewable energy is also covered by energy law; in addition, it is worth checking the presence of principles in the legislation on energy saving or on energy efficiency.

Based on the analysis of the legislation of the component states of the Russian Federation and some component states of other federations, such as the USA and the Federal Republic of Germany, it is possible to form a synthetic list of principles that would be reasonable to use as the basis for regional legal regulation of renewable energy power plants. This list is not mandatory and is only advisory in nature; it can be modified depending on the characteristics of both the federation and each of its component states, and the list was intended to be as universal as possible.

The principles in the list are arranged hierarchically in order of importance but, depending on the priorities of the federation, the position of individual principles in the list may shift; the current version of the list is relevant for the Russian Federation and for countries with a similar approach to the legal regulation of energy.

The first principle is to ensure the energy security of the federation as a whole. In most countries, the interests of the region in such an industry as power supply cannot be placed above the interests of the entire country, and if some regional initiatives, for example, the decommissioning of large power plants based on traditional energy sources, create a real threat to the energy security of the entire federation, even if the distribution of subjects of jurisdiction allows the region to carry this out, such actions should not be carried out without creating joint working groups with the federal center in order to minimize negative consequences.

The second principle is to ensure the uninterrupted and reliable operation of energy facilities in the region itself. For entrepreneurs or other small- and medium-sized consumers, a balance between the stability of energy supply and its environmental friendliness and economic feasibility is a disputable matter, but the vital social infrastructure of the region must reliably and uninterruptedly be provided with heat and electricity. Therefore, any initiatives to introduce distributed generation or renewable energy sources for their energy supply can only be considered if the condition of maintaining the previous level of reliability of the operation of energy supply facilities is met.

For example, in Texas, USA, after a devastating snowstorm that left millions of people without power, there was a rise in voices advocating for a reduction in the pace of development of renewable energy in favor of more stable gas power plants [35], although the advantages of such power plants in the conditions under consideration are debatable. This region also provides examples of tools aimed at ensuring a stable energy supply; in Texas [36], more money would be paid to companies that generate energy that will be available when grid conditions are tight and, on the contrary, penalties are established for those who are not ready to produce energy in a period of high demand, which was supposed to stimulate owners of power plants based on renewable energy sources to supply them with additional accumulators.

The third principle is maintaining a balance of interests between generating companies and consumers. The transition to distributed generation and independent energy supply, on the one hand, should be simplified as much as possible for the consumer, and on the other hand, it should not create critical risks for generating companies in the region. Capital investments in energy infrastructure, including linear facilities, can have extended payback periods, and a systematic occurrence of a significant number of grid-connected consumers

deciding to go off-grid can cause heavy losses to generating companies; therefore, it is necessary to anticipatorily consider compensation measures that would soften this process and prevent risks for those subscribers who would decide not to switch to distributed generation and to remain connected to main power grids. Wyoming, USA, for example, has attempted to impose a one-year moratorium on the construction of new renewable energy power plants to protect the state's traditional coal-fired power plants and to keep energy rates from rising for ratepayers [37].

The fourth principle is to ensure the environmental safety of power generation and to reduce the level of negative impact on the environment. Federations and regions can decide to move this principle to the top of the list since it is of greatest importance from the point of view of long-term planning and sustainable development of the region for generations to come. The reduction of negative environmental impact caused by traditional energy sources is the main motivation for the transition to renewable energy, valid even for those regions that do not have a direct economic need for it. At the same time, the negative impact may not be limited to the territory of the state itself. Thus, California, USA, declares a responsibility to take steps to ensure that the state's transition to carbon-free energy does not lead to an increase in greenhouse gas emissions in the rest of the country [38].

The next principle is relevant only for countries that seek to increase their energy autonomy and is to ensure the technological independence of the energy industry. Full energy security is unattainable without the ability to support the operation of power plants by means of local industry. To accomplish this, it is necessary to create economic incentives for the development of the production of main and auxiliary generating equipment.

The sixth principle is to ensure the availability of information on the composition and implementation of measures to realize state policy in the field of regulation of energy installations based on the use of renewable energy sources. Regional government programs, preferential regimes, subsidies and competitions gain maximum effectiveness as a tool for increasing the share of renewable energy in the region only if information about them is available to all interested parties. Governor J.B. Pritzker of Illinois, USA, listed "Strengthen utility company transparency and ethics requirements" first among the principles that represent guideposts for crafting a legislative proposal that puts consumers and climate first [39]. Approaches to providing information will be discussed in a separate section of the article.

The last principle is the recognition of the activities of legal entities and individuals related to the production of energy by renewable energy power plants as environmentally friendly activities. This approach allows the region to assign the appropriate incentives and benefits to organizations that promote the introduction of renewable energy by manufacturing generating equipment, by installing and servicing plants, by providing technical, economic or legal support for their operation and so on.

In addition to what is discussed above, there are also less common but also promising principles that are recommended to be used. For example, in California, USA, one of the principles is to influence policies in other sectors of the economy so that they promote the development of renewable energy [38]. In Minnesota, USA, there are separate provisions "ensuring that all Minnesotans share the benefits of clean and renewable energy and the opportunity to participate fully in the clean economy" and "the provision of affordable electric service to Minnesotans, particularly to low-income consumers" [40].

3.6. Energy Accounting

Fuel and energy resources accounting is a system of measures and technical means the main purpose of which is to obtain information on the amount of extracted, produced, processed, transported, stored and consumed fuel and energy resources.

Organization of fuel and energy resources accounting is the legal, organizational and technical support for commercial and technical accounting of fuel and energy resources.

Accounting should be carried out at all technological stages and should not depend on the scale of production and consumption. The organization of accounting relates to

issues of standardization and metrology and is usually regulated in federations at the federal level and does not need to be enshrined in regional legislation. The corresponding section of the regional act contains norms that refer to federal acts establishing accounting rules, duplication of federal norms and the establishment of a body of the executive branch responsible for organizational issues of resource accounting in the region.

As a result, it can be concluded that for federations in which accounting falls under the competence of the federal authorities, the corresponding section is not mandatory since its content can be placed in other sections or in other regulatory legal acts without violation of the internal logic of legal acts.

If the component states themselves determine the features of renewable energy resources accounting, it is necessary to strive for maximum unification with other regions of the federation, focusing on the uniformity of measurements using standardized instrumentation. This is also necessary for compliance with the principle of ensuring the energy security of the state, since without proper organization of accounting the effectiveness of any forecasting and assessment of the risks facing the country are reduced, and for communication on energy issues between different component states of the federation.

3.7. Regulatory Bodies

The next step should be to enshrine the powers in the field of legal regulation of renewable energy power plants for all federal and regional regulatory bodies directly involved in the process.

Prior to listing the powers of bodies in the field of regulation of renewable energy in the law, it is necessary to determine which bodies in the region actually have the corresponding powers. This will certainly include the legislative body of the region since the very power to adopt the normative legal acts regulating the legal status of renewable energy power plants will already suffice. Next, it should be found whether the head of the region and the head of executive branch of the region are vested with the appropriate powers (if the head of the region is also the head of executive branch, the main executive body subordinate to him or her should be checked). Then, it should be checked whether the region has a regulatory body whose core competence includes resolving issues in the field of renewable energy. Then, based on the previously drafted system of legal acts of the region regulating renewable energy power plants, all the remaining bodies of regional government that have separate powers in the considered field should be found. At the last step, it is necessary to check whether local self-governments have the appropriate powers.

Enshrinement of all the powers of each body involved in the process of regulating renewable energy in one regulatory legal act has several advantages and one disadvantage. The disadvantage is that some of these norms will duplicate the norms enshrined in other normative legal acts (for example, in regional laws on bodies of regional government), and the legislator will need to ensure their timely synchronization in order to avoid conflicts. The advantage for the legislator is that legal regulation organized in this way is easier to improve and maintain. Such consolidation protects against assignment of the same power simultaneously to several bodies and prevents both the risk of overburdening one of the bodies with powers and responsibilities and the danger of involving an excessive number of bodies in the regulation of simple relations, which overcomplicates the bureaucratic part of regulation. In addition, enshrining the powers of all bodies in one legal act also simplifies legal regulation.

For consumers, the advantages are the easier determination of the authority that needs to be contacted to solve a specific problem and the simplification of the composition of a step-by-step plan for renewable energy transition of their enterprise.

As an analysis of the current regional practice of legal regulation of renewable energy shows, one of the most important conditions for increasing the efficiency of regulation is the determination of the regulatory body responsible for renewable energy in the region. In most cases, this is a body in the executive branch of the region, such as the regional Ministry of Energy in which the corresponding department has been formed. The existence of a

regulatory body, the main competency of which will include the introduction of renewable energy into the energy structure of the region and a constant reporting indicator of which will be the effectiveness of this implementation, simplifies interaction between the bodies of the regional government, the local self-government and the consumers. The regulatory body shall monitor the energy supply and demand and their structure in the state and shall compose the recommendations for legislation and non-government initiatives that will cause the necessary institutional and regulatory changes that would aid in achieving the planned objectives of energy development in a manner that balances the interests of involved bodies from the economy, environment and culture fields.

If the legislation of the country and the region allows, the regulatory body must have the right of legislative initiative in the field of its jurisdiction and must be able to exercise departmental control over the activities of other bodies and officials in the field within the limits permitted by the general rules for similar bodies in the country acting in other fields. To operate most effectively, the regulatory body must set targets for the development of renewable energy in the region and must calculate the costs of innovation, which is the ratio of actually obtained results to the funds spent to achieve them. These targets may belong to one of the following but are not limited to: further introduction of renewable and alternative energy to energy markets, increasing the number of research and development and generating companies that work with clean energy technologies, adopting incentives for commission and retrofitting of the existing generating facilities operating on alternative and renewable resources. The absence of a directly designated regulatory body leads to a dilution of authority and, most importantly, the dilution of responsibility. The need to coordinate actions between a number of elements formally at the same level of the system of bodies of regional government without a clearly defined leading one delays the bureaucracy, hinders the response to challenges and threats and confuses the consumer in their search for the body they need to contact to resolve their issue. At the same time, in order for the regulatory body to perform its functions and be obliged to perform them effectively, it is necessary to outline both its competence and responsibility, including the forms of reporting on the work performed, in regional legislation as specifically and unambiguously as possible.

For example, in California, USA, the regulator uses programs to implement energy policy and reports to the state body of the legislative branch [38]. The report includes an overview of current policies, including technologies used; forecasts; conclusions on achievements in policy implementation; assessment of financial costs and benefits; barriers to energy policy implementation; alternative scenarios for the development of renewable energy in the region. This report structure can be used as a model of an annual report in the responsibility of the regulatory body.

The regulatory body may not be selected from pre-existing bodies of the regional government or be newly organized for this purpose by regional authorities but may be established at the federal level and become uniform for every component state of the country. For example, in India there are State Nodal Agencies which are appointed by the federal Ministry of New and Renewable Energy [41].

The allocation of a regulatory body in the field of legal regulation of renewable energy power plants does not pose any additional risks for democratic procedures, since the practice of allocating regulatory bodies to individual fields at the regional level has been repeatedly worked out, for example, in healthcare, tourism and education.

The powers of the legislative body of the region in most cases include the adoption of laws and other regulatory legal acts in the field of regulation of renewable energy, including those establishing, within acceptable limits, liability for violations in this area.

If regional parliamentary control is allowed in the country, the powers may include monitoring the implementation of acts adopted by the legislative body in the field of regulation of renewable energy, as well as monitoring the implementation of programs of regional government if such programs exist.

In addition, if regional parliaments participate in the formation of regional budgets, the powers of allocating funds for the regional budget for the events aimed to increase the share of renewable energy in regional generation should be listed.

The powers of the highest body of the regional executive branch depend, first of all, on what degree of freedom is allocated to the regulatory body. Thus, the development, approval and implementation of regional government-funded programs for the development of renewable energy can be attributed to the powers of the highest body of the regional executive branch, the powers of the regulatory body or distributed between them, optionally, with the involvement of the legislative body.

In some of the analyzed regions the powers include the designation of a regulatory body in the field of use of renewable energy sources, but it seems more appropriate for it to be determined at the level of a regional law rather than by an act of an executive authority.

In any case, the highest body of the regional executive branch will retain powers related to the implementation of state policy on the development of renewable energy.

Depending on the nature and features of the separation of powers and the system of checks and balances in the region, its head may receive any of the powers discussed above except for the right to pass laws regulating renewable energy. The analysis did not show any examples of unique competency that the head of the region may possess; moreover, some regulatory legal acts do not assign to this person any powers in the field of regulation of renewable energy.

Depending on the established distribution of subjects of competence in the component state, the powers of bodies of local self-governments can either be limited to providing assistance to individuals and organizations in manufacturing and the installation of the equipment for the use of renewable energy sources or fully duplicating the powers of regional bodies at the local level.

The answer to the question of legal regulation of international cooperation in the field of renewable energy should begin with the clarification of whether the participation of individual component states in international cooperation is in principle allowed. If such a possibility exists, the regional law must strictly regulate a specific list of questions on which it can be formed and principles on the basis of which it should occur. This is important for the fulfillment of the priority principle of the energy security of the federation. The list of specific forms of international cooperation based on the developed principles can be formulated as closed if it is approved by an act inferior in legal force to the laws of the region which can be amended easily and quickly so as not to miss the prospects opening up for the region due to bureaucratic delays associated with amending the regional law. If the list of forms of cooperation is established precisely at the level of the regional law, it is better to leave it open since, in compliance with the principles established by law, if the cooperation follows the framework of the permitted questions on which cooperation can be made, any of its forms should not pose a danger. It is possible to maintain such a list in reverse, according to the principle “everything is permitted that is not directly prohibited by law”.

3.8. Methods for Implementing Information Support

In general, all information support can be divided into informing about the regional regulation of renewable energy power plants and advocating for the introduction of renewable energy. Information support in the field of use of renewable energy sources should be organized by the regulatory body, but the events can be implemented by a variety of entities. For example, in addition to the regulatory body, informing about the regulation can be carried out by the legislative body of the region or its head, and in addition to public authorities, any interested parties can advocate for the introduction of renewable energy.

The principle of ensuring the availability of information on the planning and implementation of measures to implement state policy in the field of regulation of renewable energy power plants can be implemented without government participation. Taking into account modern opportunities for access to information, with a sufficient level of civic

consciousness in the regions involved and with the active participation of the media, all interested consumers will receive all the information they need. But in our opinion, the responsibilities of the legislator should include establishing guarantees for the implementation of each of the declared principles. Therefore, it is necessary to establish methods for implementing official information support and incentives for the implementation of non-official information support and to separately regulate the creation and maintenance of the functionality of the infrastructure necessary for information support.

The analysis of regional legal regulation allowed for the formation of a base of recommended methods of information support which are practically independent of the political and legal conditions in a particular federation and its component states.

Regional programs for the introduction of renewable energy sources and projects for the creation of large-scale renewable energy power plants must be submitted to public hearings. In many federations, this is a mandatory procedure, and in this case, it is only necessary to ensure sufficient publicity for the opportunity to take part in the hearings. In regions of those countries that do not establish such a duty, it should not be introduced for energy installations, since this, on the contrary, has the potential to become an additional obstacle to their implementation. But a public discussion of the regional program with the participation of energy workers, environmentalists and representatives of interested groups would allow for identifying possible shortcomings in the regional program, would increase its legitimacy after adoption and, importantly in the discussed context, would serve the purposes of information support. The presence of a permanent body that is engaged in public control in the field of renewable energy is an additional advantage. The example of such body is the Community Solar program (CSCNM) [42] in New Mexico, USA, which works in parallel with the New Mexico Public Regulation Commission and Renewable Energy in New Mexico [43], reviewing community solar initiatives and developing recommendations for their implementation.

Another almost obligatory element of official information support is the provision of information on the use of renewable energy sources upon the direct request of consumers. Generalized experience shows that the universal principles of forming sustainable feedback between the government body providing the service and the consumer of the service are at work here. The most effective measures are hotlines organized by the regulatory body, online consultations including the use of bots to answer simple questions, the preparation of a publicly available F.A.Q. and regular meetings of authorized employees with interested consumers. An example of a very simple but effective method is a clear and concise document published in Colorado, USA, containing general information and links to all renewable energy support programs available in the state [44].

The next element depends on the features of regulation of work with information and on the degree of digitalization of data in a federation. The regulator could be charged with establishing and maintaining a regional renewable energy information system. This could be one of the building blocks of a larger regional information system in the field of energy saving and energy efficiency. In addition to information support, such a system allows consolidating information about the features of the distribution of energy installations across the region, highlighting weaknesses and points of growth.

Official advocacy of renewable energy can be achieved through a variety of tools. One of them is the preparation of demonstration projects for the use of renewable energy sources. Demonstration projects can be either open to the public through specially created demo stands that perform only educational tasks or projects modeling the operating features of actual installations demonstrated during special events.

Another method is to organize exhibitions of equipment and technologies related to renewable energy sources. Regional authorities can hold such exhibitions on their own, in collaboration with major participants in the energy market, or provide information and organizational support to exhibitions organized by external participants.

If there are sufficient resources, the regulatory body can organize media dissemination of thematic awareness-raising programs about events and methods of transition to renew-

able energy sources, about achievements in this field both among producers and consumers of the region and the entire federation and about scientific discoveries and breakthroughs at the world level. In the same way that information can be disseminated about the environmental and economic potential of the transition to renewable energy, the incentives and benefits will be provided to consumers and anyone involved in the production of energy by renewable energy power plants. These individuals should also include those whose activities are aimed at popularizing renewable energy and bring measurable results.

3.9. Regional Programs

Regional programs have proven to be one of the most effective tools for regulating the development of renewable energy at the regional level in the Russian Federation. A regional program is an act inferior in legal force to the laws of the region which is adopted by the regulatory body that establishes target efficiency indicators for the introduction of renewable energy into the regional energy system, a list of events that must be carried out to achieve these indicators, the timeframe within which they must be carried out and the form of reporting.

At the same time, there is often no direct need to adopt a separate regional program aimed specifically at the introduction of renewable energy power plants. Depending on what principles and goals are prioritized in the transition to renewable energy, this may be a specialized subprogram within broader programs for energy conservation, energy efficiency, carbon neutrality or energy security.

In order for regional programs to work as an effective tool, they must meet a number of requirements. In case of partial or complete discrepancy, they can either continue to produce a beneficial effect or create space for imitation of activities or the development of corruption.

Regional programs must be adopted by the regulatory body or the highest body of the regional executive branch. If the regional program is adopted by the regulatory body, it must be approved by the body of the legislative branch or the highest body of the regional executive branch that would check for compliance with the principles of regulation of renewable energy stated in the regional legislation, with the goals set for the regulatory body in this area and with the regional resources.

Regional programs should be submitted for professional and public audits, the results of which should be mandatorily available for those representatives of the regional authorities who will make decisions on the approval of the program. Regional programs should not be adopted for periods exceeding the term of office of the bodies approving them. If the regional program should include activities that are impossible or impractical to implement within such a time frame, they should be divided into logical stages, each of which should not exceed the duration of the regional program. Any changes to the regional program related to a reduction in target indicators must be made through its re-approval, accompanied by an explanatory document outlining the reasons for such a change, and a new version must also undergo a professional audit.

To establish the procedure for the adoption of regional programs (or subprograms) in the field of renewable energy, the procedure for making changes to them and the procedure for conducting audits, as well as the procedure for accepting reports, it is necessary to adopt a number of rules either within the framework of the regional law on renewable energy or a separate regional law. In any case, this must be made in a regional act which should be higher in legal force than regional programs and higher than those acts that the body adopting the programs can issue.

It should be noted that the regional program does not necessarily have to be aimed only at global changes and the opening of new energy facilities. Some regions are not the most successful in introducing renewable energy into the energy system, yet small steps that move the region closer to increasing the share of renewable energy in its energy balance are also useful and valuable. In the Indian state of Madhya Pradesh, the main goals

for solar energy development include hawkers and street vendors being encouraged to use solar lanterns; solar-powered street lighting would be encouraged too.

Regional programs can also be a tool for influencing the development of renewable energy in federations where legal regulation of energy is carried out primarily at the federal level and the component state does not adopt its own specialized laws. Regional programs are actively used in Germany: in Bavaria, it is the “Energy Storage Photovoltaic Program”, and in Baden-Württemberg, it is the “Grid-Serving Photovoltaic Battery Energy Storage”. Through this program, states allocate subsidies for the development of renewable energy, and individual cities subsidize the financing of new energy sources and require the construction of photo panels on new buildings [45].

Despite the fact that one of the main advantages of regional programs is their flexibility and the ability to quickly respond to new challenges and to introduce new technologies, it is advisable to establish a certain framework at the level of regional law to maintain stability. One of the issues that it is desirable to regulate in this way is the target indicators set by regional programs and the procedure for their calculation. Specific values of target indicators should be determined by the body adopting the program, but general directions should be given in the regional law. The most commonly used target indicators are the power generated by renewable energy power plants; the share of total power consumption covered by renewable energy and distributed generation; the volume of products shipped to renewable energy power plants; the capacity of newly commissioned renewable energy power plants; the amount of components produced for renewable energy facilities. Indicators related to the training of personnel and government employees are also targeted, and this could be the absolute or relative number of employees per period. Some programs add indicators related to information support for renewable energy, measured either by the work performed such as the minutes of screen time, the pages of text of materials promoting renewable energy or by audience coverage and statistical data on its impact (views, reactions, comments, shares and other parameters).

When drawing up a regional program, it is necessary to ensure that the list of activities aimed at increasing the share of renewable energy in the region does not include distantly related activities and purchases of equipment that can be used not only at renewable energy facilities. The construction and repair of linear facilities, even those associated with renewable energy power plants, should not constitute the main part of the activities within the regional program. Particular attention should be paid to setting tasks that do not require large capital investments: popularizing renewable energy, improving technical regulation, training of personnel, improving technical documentation for the construction and reconstruction of power plants and linear facilities and carrying out research work.

As the program progresses, it is advisable to require interim annual reports from performers which the regulatory body will collect and consolidate in an annual summary report which, in turn, will be presented to the highest regional body of executive or legislative branches and submitted for professional audit.

Due to the differences in the economic potential of the regions of different countries having a strong impact on the possibility of developing a fairly universal strategy, we deliberately avoided considering financial institutions for stimulating renewable energy, focusing in the methodology on those recommendations that can be used by a component state of any federation, regardless of the material resources at their disposal. An example of a detailed overview of regulatory incentives, including the possible economic incentives, can be found in a recent review [46].

3.10. Control and Supervision

Regulatory legal acts of the component states may duplicate the norms of federal legislation, and it is advisable to indicate in the regional law on renewable energy which federal bodies are responsible for control and supervision in this area. This will facilitate both the appeal of acts or actions of officials by energy producers and consumers and the regulatory consolidation of control and supervision at the regional level.

It is worth stating specifically in the regional law on renewable energy which bodies exercise control and supervision in this area at the regional level, even if this duplicates provisions from other regional regulatory legal acts. In the legal regulation of renewable energy, in addition to the obvious bodies involved in the control and supervision of energy, bodies performing, for example, environmental control may be involved, so it is better to directly consolidate the entire list of subjects of control in one act.

It is also advisable to establish in the act specific methods and forms of control and supervision within the industry. This will provide the necessary legal support, allowing better organization of activities of the authorities adopting new acts, energy producers, investors and other persons involved in the process of transition to renewable energy.

4. Conclusions

The issues most often covered by the regional legislation of federated states that successfully introduce renewable energy into their energy systems are the following: which energy sources are considered renewable; definition of the meanings of terms used in legal regulation; principles on which regional legal regulation is based; energy resources accounting in the subject; list of bodies implementing regional legal regulation; methods of information support; regulation of regional state programs for the development of renewable energy; control and supervision over bodies executing their powers in the field of renewable energy.

Based on the results of the analysis of the content of the regional acts, regulated issues can be divided into three groups, as shown in Figure 4.

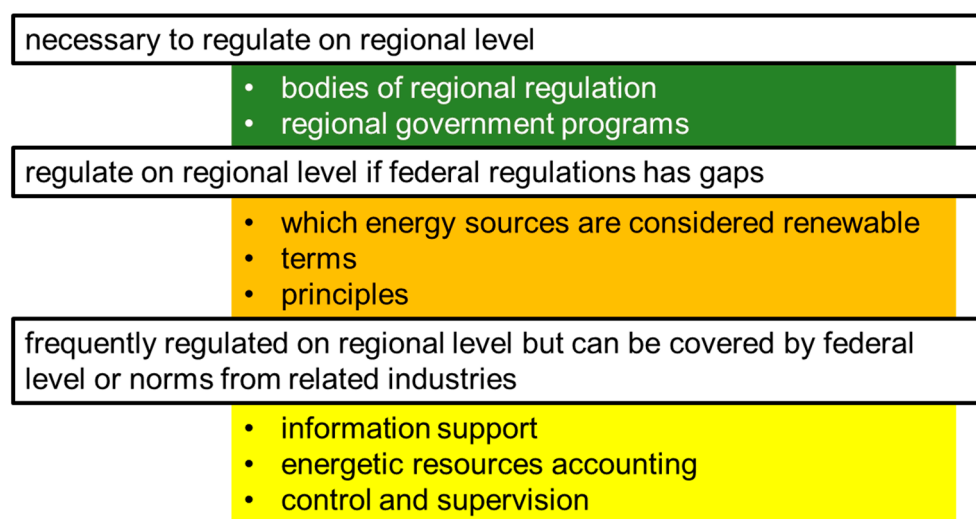


Figure 4. Necessity of the question of regulating renewable energy at the regional level.

The first group includes issues whose regulation in regional legislation is universally mandatory regardless of the nature of the relationship between the region and the federal center—this is a list of bodies that implement regional legal regulation and the regulation of regional state programs for the development of renewable energy.

The second group includes issues the settlement of which on the regional level is necessary in the absence or insufficiency of federal legal regulation, but in other cases such regional regulation may be absent itself or simply duplicate federal legislation. These are issues of determining which energy sources are considered as renewable, definition of the meaning of terms and definition of principles of legal regulation of renewable energy.

The third group includes issues that are often regulated within the framework of regional legislation on renewable energy but can be almost completely covered by federal legislation or regulations from related industries, so the resolving of these issues in regional regulation of renewable energy is of an auxiliary nature. These are issues of energy resources accounting, methods of information support and issues of control and supervision.

Regardless of the final internal structure of the document, the formation of a regional law on renewable energy should begin with the settlement of issues related to the first group. If a regional legislator, for whatever reason, does not have the competence to regulate the issues referred to in the first two groups, or these issues have already been fully regulated at the federal level to a sufficient extent and quality, the adoption of a specialized regional law may not be an optimal solution. In such a situation, the issues referred to in the third group can be regulated within the framework of regional programs, other sectoral laws and departmental acts.

Further research in this direction seems appropriate for focusing on revealing other components of the methodology of regional legal regulation of renewable energy such as determining the optimal set of principles and objectives of the regional law, defining the preferred competence of all the bodies involved in regulation and determining which specific economic and organizational mechanisms have the most positive impact on increasing the efficiency of renewable energy deployment at the regional level.

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