The Role of Advocacy Coalitions in Shaping the Technological Innovation Systems: The Case of the Russian Renewable Energy Policy

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Abstract: Many hydrocarbon-rich countries have recognized the global shift towards renewable energy sources, and Russia is not an exception. Drawing on two strands of literature—technological innovation systems and the advocacy coalition framework—we investigate the roles of actors and coalitions in shaping the Russian renewable energy policy and explore why particular renewable energy sources have progressed more than others, and what the main reasons are for their sudden development. The results show that the more successful renewable energy industries are those that were promoted by influential actors from traditional energy industries. Moreover, these actors also promoted the specific design of support schemes for renewable energy policy in Russia. We discuss the importance of policy process theories for understanding energy transition studies and provide specific policy recommendations for policy creation in the renewables industry.

Keywords: technological innovation system; advocacy coalition framework; renewable energy; Russia

1. Introduction

Grand sustainability challenges such as climate change, lack of clean water, waste management, and degradation of ecosystems are becoming critical, and the need to solve these challenges is becoming more urgent [1]. Although in many ways, scientific and technical developments have reduced the impact that humans have on the planet, the development and implementation of other new technologies, along with a rise in material consumption, have led to increases in energy consumption and the volume of generated waste. As the special report of the Intergovernmental Panel on Climate Change (IPCC) argues, society and policy are acting so slowly that there will be inevitable consequences for climate change [2]. Research on sustainability transitions can be viewed as a response to grand sustainability challenges. Implicit normative assumptions of sustainability transitions are that sectors (e.g., energy, transport, agricultural, food) are unsustainable and have to change to achieve specific sustainability goals (e.g., Sustainable Development Goals). The inertia and dynamics of radical innovations are at the core of the sustainability transitions field of research [3]. In this case, transition studies can play an important role by creating new perspectives and methods to move society in the direction of sustainability [4].

Initially, sustainable development was considered to be primarily a political project, since the activity of social institutions does not create a sustainable development trajectory...
Politics is “the constant companion of socio-technical transitions, serving alternatively (and often simultaneously) as context, arena, obstacle, enabler, arbiter, and manager of repercussions” [6] (p. 71). Therefore, sustainability transition requires a broad understanding of political processes, including the identification of the reasons behind those processes, and the key implementers of the processes. Even though scholars recognize the need to focus on the politics of policy processes, the sustainability transition field has been criticized for not paying enough attention to the political aspects of explaining the success and/or failures of particular innovation systems.

Technological innovation has often been perceived as an essential part of any solution that is to tackle grand sustainability challenges [7,8]. From among the various frameworks that are typically distinguished in transition studies, the technological innovation systems (TIS) framework is taken as a theoretical point of departure in this paper, because this framework is a key approach for studying the dynamics of (new) technologies [9]. Because technology is a ‘common denominator’ in TIS, taking this view allows us to study how actors, networks, and institutions change over time as technology is developing [10]. TIS system functions (The functional pattern is evaluated by a set of seven system functions (entrepreneurial activities (F1), knowledge development (F2), knowledge diffusion (F3), guidance of the search (F4), market formation (F5), resource mobilisation (F6) and creation of legitimacy (F7)) Hekkert et al. [11]) help to analyse the interaction between TIS structural components and understand how the innovation system is performing [12,13]. Policy processes have always played an important role in TIS formation and development. Nonetheless, the TIS framework has often underestimated the role of political aspects in explaining the success and/or failures of particular innovation systems, which has resulted in TIS studies conveying oversimplified policy recommendations[14]. Thus, the TIS framework needs to be better positioned within its institutional contexts to be more policy-relevant [15]. This critique has been partially addressed by Markard et al. [16], and our study aims to further analyze the impact of political processes on TIS functional dynamics, which at present are understudied in the TIS literature.

Given the multi-component and multi-scalar nature of TIS [17,18,19], it is important to analyze specific policy mixes provided by a set of institutions in which TIS is embedded. To address this issue, scholars in the sustainability transition field e.g., [4,20] suggest combining (or borrowing some ideas from) sustainability transition frameworks with well-known policy process theories. Among the suggested policy process theories, the advocacy coalition framework (ACF) was chosen for this study, because it focuses on actors and their beliefs, and emphasizes the role of advocacy coalitions that compete for influence on policymaking. The framework incorporates “many of the explanatory variables advanced by other theories” [21] (p. 310). The ACF comprises the key research questions of how and by whom are advocacy coalitions formed, what are the reasons for their creation, how do they influence policy change, etc. [22,23]. That the ACF provides a framework in which to address these questions is, in turn, a good match with the aim of our study, which is to incorporate political aspects into TIS analysis by more closely investigating the roles of actors and coalitions and how they explain specific policy changes.

Considering the underlying TIS framework, we will place the initial emphasis on the function ‘creation of legitimacy’ (F7) since it plays an important role in many other functions, and the absence of legitimacy shows poor TIS functioning. Legitimacy is partly created and formed by arguments about expected performance, but to an even larger degree, it is created and maintained by individuals and organizations, in which formal networks play a crucial role (Some researchers use different terms for naming lobbying groups, such as advocacy coalitions e.g., [24], vested interests e.g., [25,26], and policy networks e.g., [27]. In this article, these terms are used interchangeably). The TIS acknowledges the role of networks in the policy process. However, it focuses on how networks affect system performance, or how policy can reinforce certain networks, but
not on how networks influence policy change, or on how power is balanced within networks [28]. Thus, adding ACF theory will be quite relevant and useful for TIS functional analysis, because it focuses on ideas and beliefs in the process of the policy change, and it helps to understand how policy beliefs can change over time. Using ACF theory will help us to look at how political dynamics (in the forms of actors and their networks) influence TIS analysis.

This article will present arguments for bringing together insights from two broad sets of literature on (1) socio-technical transitions (in the form of TIS) and (2) policy process theory (in the form of ACF). By building a bridge between these two bodies of scholarship, our goal is to improve the TIS analytical framework so that it can more effectively be used to study policy change and scrutinize analyses of technological innovation dynamics. Since we pay greater attention to micro-level analyses in order to enrich our understanding of the meso-level, we focus on the national institutional framework (part of national innovation system concept).

At present, the various types of renewable energy are developing, but quite differently in Russia. Hydropower is a mature, well-established source of energy in Russia. Geothermal energy share in Russian energy balance is negligible. Our choice is due to the fact that we want to explore why bioenergy shows quite modest development despite its enormous potential, while solar and wind energies are rapidly growing every year. We choose to investigate Russia’s policy development of solar, wind, and bioenergies as an empirical case for the analysis as they have recently gained momentum under the political support scheme in retail and wholesale markets. By applying some features of the ACF perspective into a TIS analysis, the paper aims to investigate the role of actors and coalitions in shaping Russian energy policy. In addition, we seek to explore why particular renewable energy sources are developing faster than some others, and what are the main reasons for the sudden development of these particular resources (see Figure 1). This empirical case will also contribute to the field of transition studies, as there are few studies of non-Western countries, or of developing or emerging economies as they deal with innovation processes [29,30,31].

The paper is structured as follows. Section 2 outlines the theoretical background, and explains and compares the conceptual frameworks the analysis is based on. Section 3 gives information about the analytical framework and methods used in this study. Sections 4 and 5 present the results and a discussion of our findings. Section 6 offers conclusions, reviews the limitations of the study, and gives suggestions for future research.

![Figure 1](image_url)  
**Figure 1.** The volume of electricity generation at qualified renewable energy facilities in the retail and wholesale markets, confirmed by certificates (thousand kW per hour of installed capacity) [32]
2. Theoretical Background

2.1. Technological Innovation System Framework

The technological innovation systems (TIS) framework, which has its roots in evolutionary economics and industrial dynamics [33,34,35], is defined as a “network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure or set of infrastructures and involved in the generation, diffusion, and utilization of technology”[36] (p. 111). The TIS concept encompasses the analysis of structural components (actors, networks, and institutions) and processes (known as system functions) that influence the formation, development, and use of new technology [11,12]. Many studies that have applied the TIS perspective have analyzed clean-tech sectors, and for this reason, it has become one of the major analytical tools for studying the transition to sustainability [3]. At present, the TIS framework is a popular analytical tool that helps to explain the success and/or failure of a technology’s development and diffusion, and this framework provides specific policy recommendations for overcoming barriers.

System functions are seen as key sub-processes that help to trace TIS performance [37]. From the seven system functions listed by Hekkert et al. [11], we chose the function F7, ‘creation of legitimacy’, for deeper analysis, because an absence of this function shows poor TIS functioning. Creation of legitimacy is of utmost importance for emerging innovation systems, as it helps to align institutions with the agents’ needs, and also helps to overcome vested interests in incumbent sectors that protect their technologies and favored institutional frameworks [11,38,39]. In a TIS life cycle, the following four stages of development are distinguished: a formative phase (“nascent TIS”), a growth phase (“expanding TIS”), a phase of maturity (“mature TIS”) and a phase of decline (“declining TIS”) [40]. In the formative stage, establishing legitimacy is “the politics of shaping expectations and of defining desirability” [41]. This process includes lobbying in political networks, the rise and growth of interest groups and their lobby actions, advocacy programs, brochures, awards, competitions, and so forth [37,41,42]. Lobbying is an essential process for convincing a government to change legislation, or to invest in or provide subsidies for a new technology [43]. Equally important, the ‘creation of legitimacy’ function plays a crucial role in enabling other system functions to work, such as ‘guidance of the search’ (F4), ‘market formation’ (F5), and ‘resource mobilization’ (F6).

Legitimacy is partly created and formed by arguments about expected performance, but to an even larger degree, it is created and maintained by individuals and organizations, in which formal networks play a crucial role. A formal network can be defined as “an organizational structure with clearly identifiable members where firms and other organizations come together to achieve common aims or to solve specific tasks” [44]. Actors cooperate to create formal networks to join forces to generate new knowledge, create system resources (e.g., specific R&D programs), organize collective lobbying actions, and counteract resistance to change, and ‘political entrepreneurs’ should take part as mediators in social discourses and promote discussions about the risks and benefits of new technologies, as well as interact with advocacy coalitions and offer transition-oriented policies [45]. By analyzing the empirical creation of a legitimacy system function, we will be focused on how key actors perceive the capability of technology and the formation of advocacy coalitions [17].

2.2. Advocacy Coalition Framework

The advocacy coalition framework (ACF) is one of the most well-established and elaborated theoretical frameworks for understanding policy processes, changes, and stability over periods of a decade or more [46]. This framework was developed by Sabatier and Jenkins-Smith in the 1980s [46,47], and draws on classic works in political science such as those by Simon [48,49], Heclo [50,51], Putnam [52], Kiser and Ostrom [53], and Majone [54].
In any framework analyzing policy changes, institutional inducements will be key explanatory factors. To that, the ACF adds the importance of the (individual and collected) actors’ systems of beliefs, which are what drive individuals to attempt to transform policy (even if their empirical abilities to do so are limited) [55]. These beliefs guide the behaviors of individuals within a policy subsystem, and explain the aggregation of individuals into advocacy coalitions [56]. These various concepts crucial for understanding the ACF will now be explained individually.

The policy subsystem or domain is the basic unit of analysis for understanding policy process. A policy subsystem is defined as “consist[ing] of actors from a variety of public and private organizations who are actively concerned with a policy problem or issue, such as agriculture, and who regularly seek to influence public policy in that domain” [57] (p. 99). Within the policy subsystem, policy formation is considered to be a “product of competing coalitions who advance different belief systems to achieve specific policy goals” [58] (p. 214).

The ACF conceptualizes a belief system into three-tiered hierarchical layers, namely deep core beliefs, policy core beliefs, and secondary beliefs [46]. Deep core beliefs refer to fundamental values and ontological axioms, which are specific and applicable to multiple policy subsystems [22,24,59]. Deep core beliefs are the ‘product of childhood socialization’ that are very difficult to change [60]. Policy core beliefs deal with basic positions in a policy subsystem, which can be normative and empirical, and “bound by scope and topic to the policy subsystem and thus have territorial and topical components” [22] (p. 191). Policy core beliefs are quite stable over time, and coalitions based on policy beliefs usually do not change much. Secondary (aspects) beliefs refer to specific preferences and decisions that are more limited and taken within a specific policy subsystem, and are necessary for implementing policy core beliefs [59].

Taking the two previous topics together, an advocacy coalition can then be understood as an aggregate of individuals who share beliefs and are concerned with a certain policy subsystem. The ACF emphasizes the role of these coalitions (both public and private actors) and how they compete for influence on policymaking [46,47]. Policy participants or actors are usually thought of as agency officials, interest groups, and legislators, but participants can also be journalists and researchers who are specialized in a specific policy area, and judicial officials who regularly intervene in a policy subsystem [60]. A policy subsystem usually has between two and four advocacy coalitions, and usually one of these has the most influence on policy output [61].

The ACF can also be seen as a cognitive approach for understanding policy change. In addition to the importance of the actors’ ideas, the framework also recognizes the importance of and access to resources (e.g., legal authority, public opinion, finance, and information), which affect the ability of a coalition to influence policy change [20]. Both minor (e.g., adaptations of political programs and policy measures) and major (e.g., new or fundamentally different policy measures and goals) policy changes can take place in the ACF framework [24]. Minor changes can occur in secondary beliefs, whereas major changes are the results of changes in core beliefs [46]. However, core beliefs are very unlikely to change voluntarily [60], and for this reason, the ACF emphasizes the role of external reasons for policy change, such as external and internal shocks. External shocks are events that occur outside the policy subsystem (e.g., changes in policy decisions from other subsystems, or from new governing coalitions after elections) [62]. These shocks can cause major policy changes by modifying the policy core beliefs and/or redistributing political resources and decision-making venues (ibid). Internal shocks take place within a subsystem and emphasize the failures of policies in practice (e.g., environmental disasters and accidents).
2.3. Integration of Frameworks

Some studies integrate the ACF into sustainability transitions concepts. For instance, Markard et al. [24], Byskov Lindberg and Kammermann [63] combine the ACF with the Multi-Level Perspective (MLP) and analyze energy policy transition in Europe. However, to our knowledge, there are no studies that incorporate the ACF into the TIS framework. Advocacy coalitions play a crucial role in creating legitimacy. For that reason, this study seeks to improve the TIS analytical perspective by incorporating the advocacy coalition framework in the hopes that doing so will allow us to study policy change more effectively. The ACF is used to analyze policy processes characterized by ideological disputes and technical complexity [58], and it integrates most components of policy processes described by other theories [64]. The TIS acknowledges the role of networks in policy process. However, by itself, the TIS undervalues the way networks influence policy change, and how power is balanced in these networks [28].

Table 1 shows the main differences and similarities of two analyzed frameworks. The frameworks both aim to explain changes applying a systemic perspective. They have a long-term dynamic analysis of a system. In addition, the ACF and the TIS acknowledge the role of external events (shocks). The strength of the system functions is determined not only by the impact of structural components (internal context) but also by external events (see [65]). In the early phases of system formation, exogenous factors may even dominate if there has been weak development of system components [41]. Therefore, the ACF, which considers that policy change is formed by the interactions of competing coalitions and external shocks, may facilitate the research of policy influence in TIS by delineating the system boundaries and defining the actors that form coalitions.

| Table 1. Comparison of the ACF and TIS frameworks. This method of comparing the frameworks was inspired by Markard et al. [24]. |
| --- |
| **Technological Innovation System** | **Advocacy Coalition Framework** |
| **Starting point** | “Network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure or set of infrastructures and involved in the generation, diffusion, and utilization of technology” [36] (p. 111). | Cognitive approach to understand policy processes, change, and stability over periods of a decade or longer [46]. |
| **Focus** | Technology | Policy change |
| **Level** | Meso | Micro |
| **Key elements** | Actors, networks, institutions, technology | Policy subsystem, actors, advocacy coalitions (public and private actors) |
| **Key analytical concepts** | Seven key processes (system functions) are central in build-up process | Three levels in the belief system: deep core beliefs, policy core beliefs and secondary beliefs |
| **Key assumptions** | System failures: deeper causes (systemic problems) are found in TIS structure or external structures. | Recognizes the meaning of resources (e.g., legal authority, public opinion, finance, and information) that affect the ability of a coalition to influence on policy change. 12345678Policy changes can also be triggered by factors external to the policy subsystem. |
| **Policy implications** | Aims to accelerate the development and diffusion of a specific technology/industry.12345678Design instruments to overcome systemic problems.12345678Call for technology-specific policies. | Aims to understand changes in policy subsystem.12345678The key explanatory factors of policy results and changes are not (only) the institutional inducements but rather (individual and collective) actors’ belief systems that comprise the principle of advocacy coalitions’ aggregation. |
and guide actors’ behaviors and issues within the policy subsystem.

| How to analyze? | (1) Snap shot analysis 12345678 | (2) Dynamic analysis/event analysis |
|-----------------|---------------------------------|-----------------------------------|

The main differences in the frameworks lie in the level of analysis: the ACF is focusing on the micro level by analyzing actors and their beliefs, while TIS is more oriented towards the meso level. The frameworks also differ in a focal unit of analysis: TIS is a technological performance and ACF is a policy change. Even though the analysis of TIS system functions intends to cover political aspects on an analyzed technological system, the TIS framework is still needed to be better positioned in its institutional context to be more policy relevant [15]. Thus, the ACF seems to be a good complement to the TIS analysis, which can strengthen political aspects.

3. Analytical Framework and Methods

Almost all regions in Russia could use several types of renewable energy sources in economically feasible ways, meaning to such a degree that the economic advantages of the use of a specific renewable energy source are greater than its economic costs. The technical potential of these sources, which estimates the capacity of a renewable energy technology available for development after accounting for topographic limitations, land-use constraints, and system performance [66], is five times higher than the annual consumption of primary energy sources in Russia. The economic potential, “the subset of the technical potential where the cost required to generate electricity is less than the revenue available” [67], can meet the annual energy needs of the Russian economy by a third [68].

Our study represents dynamic analysis, in which we examined the main events from 2007 up to 2020. We believe that a longer historical (evolutionary) perspective is preferable to analyze the evolution of a particular industry or technology since it helps to explain a current event based on events that have taken place previously. It aims to find causes and consequences between those historical facts.

Networks can be formal with organised relations (e.g., supplier or public-private partnerships, standardisation networks) and informal with less organised relations (e.g., firms-customers, buyer-seller, industry-university, public associations, the social community, research groups) [12]. Our empirical analysis is focused on the formal networks and coalitions in the renewable energy industries in Russia (solar, wind, and bioenergy). In the interests of being consistent with Musiolik and Markard [37], we assign a more explicit role to formal networks, even though the innovation systems perspective emphasizes the role of informal networks. In this study, we mainly concentrate on the creation of advocacy coalitions and analysis of their activities, resources, and strategies. Because an advocacy coalition has two main features, ‘shared beliefs’ and ‘coordinated activities’ of coalition members [69], actors in advocacy coalitions were determined based on their formal cooperation and similarities in policy core beliefs. Their identifications could be primarily based on official documents, because energy policymakers are for the most part executive power officials and major energy business actors [70]. A qualitative content analysis of publications (surveys, document, and legislative content analysis, etc.) of advocacy groups is an appropriate method for studying their policy core beliefs [20,71]. Thus, discourse analysis was performed on a wide range of published presentations, reports, newspaper articles, and press releases published between 2007 until 2020.

At the same time, we acknowledge that key actors in governing the transitions do not only include policymakers, but also businesses, actors from the finance sector and civil society, and so forth [72]. The sample of industrial actors was collected through a modified snowball sample targeting those actors involved in Russian renewable energy issues. First, we started with a list of selected renewable energy projects recognized as qualified generating facilities [32]. In the next step, secondary data sources such as newspapers and
online publications (e.g., information from companies’ websites, press releases, and reports) were searched to identify additional actors that had not been included in the initial search. In addition, participant observations at interactive seminars, workshops, and conferences (both online and in-person) dedicated to the development of the Russian renewable energy industry were analyzed and codified. Participant observation is a good practice for enriching data [73] because these meetings have often been provided with the latest data by key informants (e.g., active network members, policymakers, associations, major energy business actors), which also allows with the possibility of asking specific questions. The collection of such data was provided in the period of 2017 until 2020. Such events are valuable because central actors in a particular field come together and share their experience and knowledge with the audience [74]. The interpretational step includes the coding activities [75] that were used to identify events that were created and shaped by advocacy coalitions.

Additional data was collected through the official internet sources of the President of Russia (http://kremlin.ru), the Russian Government (http://government.ru), the Ministry of Energy (https://minenergo.gov.ru), and the Ministry of Natural Resources and Environment (https://www.mnr.gov.ru) to reveal the changes in beliefs of influential policy actors. The method of collecting data is consistent with the study of Smeets [76], who studied enabling and constraining factors of renewable energy policies in Russia. The coding procedure was performed using the scheme of Braun and Clarke [75]. The first step resulted in 407 publications that are specifically dedicated to the renewable energy sector in Russia. In the next step, full texts were analyzed and grouped into one of three categories (solar, wind, and bioenergy sources), and the final sample resulted in 108 texts published between 2010 and 2020: 28 presidential and 27 governmental documents, 45 publications from the Ministry of Energy and 8 texts from the Ministry of Natural Resources and Environment. It is worth noting that policy documents, standards, and laws were not included in the final database. Therefore, the final data consist of speeches, press conferences, interviews, and transcripts of meetings published on the four official internal sources.

4. Russia’s Transition toward Renewable Energy

4.1. External Events—Prerequisite for Reforms

The Russian energy sector is highly export oriented and the Russian government prioritizes international policy over domestic policy [77], so it is not surprising that external events have played the more important role in turning Russia in the direction of renewable energy development. Due to the high dependence on fossil fuel export revenues, Russia went through three crises in 1998, 2009, and 2014 and lost 17% of the GDP [78]. The 2008–2009 financial crisis entailed a steep fall in the world prices for natural resources, and the halt of energy export growth. The Russian financial crisis of 2014 was caused by a variety of factors, among which was the establishment of international sanctions towards Russia. A steep fall in global oil prices contributed to the crisis, as did the sanctions, which restricted Russia’s access to international financial markets. In March 2014, the OECD postponed Russia’s accession process, possibly due to the crisis of 2014 [79]. Several international organizations (such as the World Bank, the International Bank for Reconstruction and Development, the European Bank for Reconstruction and Development, and the International Finance Corporation) blocked decision making about new projects in Russia, and sanctions against Russian financial institutions had undermined their abilities to finance any long-term projects [80]. Most Western financial markets were also closed to Russian companies and banks [81]. The situation also caused massive capital outflows and a lack of investment resources, and restricted the ability of organizations in the energy sector to attract long-term financing from foreign investors. In addition, the Russian currency, the ruble, was devaluated, which made it more expensive for Russia to buy foreign equipment. The crisis also worsened Russia’s image
in the international arena and spoiled the relationship between the EU countries and Russia.

These events led to high uncertainty and often unpredictability of external conditions and factors, which forced Russia to reconsider its future direction of activity towards the energy sector. In the crisis years 2015–2018, the Russian government undertook short-term policies instead of a long-term proactive strategy to adapt to market developments [82]. International financial and technological sanctions revealed the critical dependence of Russian energy companies on the import of technologies, equipment, services, and software in a number of the most promising areas of energy development. In other words, Russia had become very sensitive to technology policy. Perhaps these circumstances caused the inclusion of mandatory levels of equipment localization in the support scheme for renewable energy technologies and the establishment of the import substitution programs. In this way, technology policies and the desire to mitigate ‘technological backwardness’ have become the critical drivers of the energy transition in Russia [83].

Another important issue is the Paris agreement, which Russia only approved in September 2019. In terms of greenhouse gas emissions reductions, the Agreement itself probably does not entail any serious costs for Russia (bearing in mind that the Paris agreement does not impose any specific emission-reduction goals or penalties for failing to meet requirements). However, the world’s transition towards low-carbon development can be regarded as a significant challenge for the Russian economy, because it is so dependent on hydrocarbon export revenues and other carbon-intensive industries (e.g., metallurgy, chemical, and petrochemical industries). These industries are a significant share of Russia’s GDP, exports, budget revenues, and employment, which makes Russia vulnerable to several serious risks [84]. These issues have changed the viewpoint of the Russian elites about renewable energy, because now they perceive that there is an urgent need for the country to mix its energy sector with carbon-free energy sources [83].

4.2. The Establishment of Support Mechanisms in the Wholesale Market and the Emergence of Solar Industry in Russia

In 2007, a legal framework (Federal Law No. 250-FZ) for the development of renewable energy sources was introduced into the main Federal Electricity Law, No. 35-FZ “On the Electric Power Industry” (2003). This event appeared to be the main step in the creation of legislation and a regulatory system for renewable energy in Russia. The Energy Strategy is the main strategic document in the field of energy that defines the directions and priorities of state energy policy, as well as the goals, key measures, and indicators of energy development for a long period [85]. Approved in 2009, the Energy Strategy up to 2030 set quantitative targets for the development of renewable energies, for the first time in the country’s history. A significant role in this Strategy was assigned to the development of new renewable energy sources (geothermal, solar, wind, bioenergy, etc.) in the fuel and energy balance that could help both to balance energy demand and reduce the environmental impact of energy enterprises. This strategy also acknowledged the technical potential of renewable energy in Russia, which is four times more than the level of consumption, and the importance of renewable energy for the environment, reducing healthcare costs, forming a rational energy balance, judiciously using fossil fuel resources, and supplying autonomous heat and power energy. The Strategy defined the goal of a 4.5% share of renewable energy in electricity generation by 2020 and to keep this level until 2030 [86]. However, this number was subsequently revised downwards. During the crisis of 2014, the new version of the State Program on Energy Efficiency and Energy Development was adopted, which cut the share of electricity generation from renewable energy sources from 4.5% to 2.5% by 2020 and did not provide any financial support for energy generation from biomass [87,88]. In the end, not even this figure was achieved.

In 2013, Decree of the Russian Government No. 449 of 28.05.2013 was established for the wholesale electricity and capacity market (see Box 1). This Decree defines a mechanism
for stimulating energy production from renewable sources in the form of a capacity-based scheme, which applies only to solar, wind, and hydropower installations connected to the Unified Energy System (UES) that are larger than 5 MW. It is worth noting that this capacity-based scheme was a novelty not only for Russia, but it also differed from similar support mechanisms widely used in the world. The introduced amendments envisaged two variants for promoting renewable energy, namely a premium-based feed-in tariff, which is widely used in many countries and supposed to remunerate renewable energy facilities according to their electricity output, and a capacity-based support scheme [89]. However, the Russian government suddenly switched to a capacity-based support scheme [90,91].

**Box 1.** Features of the support mechanism in the wholesale market.

The capacity-based scheme implies that a long-term power supply contract is concluded based on the results of competitive selection for various types of renewable energy generation. This scheme gives the right for renewable energy investors to supply electricity at increased regulated prices for 15 years, which depend on the installed capacity of the power plant. These long-term contracts are quite attractive for investors because they increase investment predictability and certainty, but limit investments to a fixed annual capacity [90]. On the other hand, such contracts allow the Government to control the financial expenses of the program and the volume of renewable energy capacity commissioning. The projects are selected annually on a competitive basis for each type of energy. The investor determines the geographical location. There are also limits on capital and operating costs. The selected projects must have a certain local content requirement, demanding renewable energy investment projects to guarantee the use of equipment that was produced or assembled in Russia at a certain defined level, in which the level of localization directly affects the amount of financial support. The required level of localization increases over time. The first version of the support program runs until 2024 and is aimed at creating up to 5.4 GW of renewable energy capacity.

Before the support scheme took effect in the wholesale market, Russia had technologies and R&D at a fairly high level for renewable energies such as small and large hydropower, tidal, geothermal, biomass, and solar (photovoltaic conversion and heliothermal) [92]. The exception was wind energy technologies. The Russian wind power industry was represented by several dozen outdated imported wind turbines (ibid), which is perhaps one of the reasons that solar rather than wind energy projects were stated in the first tenders for receiving a capacity-based support scheme. Investors in the solar generation sector have been active ever since the first competitive selection of projects, in which the volume of bids has consistently exceeded the number of quotas drawn at competitions [93].

The main reason for the success of the solar energy projects is the crucial support from the Renova Group, a major Russian industrial conglomerate company, and the government-owned development institute RUSNANO (Moscow, Russia) [25,76]. They have become the main investors in Russia’s solar industry. In 2009, they created the solar photovoltaic (PV) manufacturing Hevel Company. As an influential association, RUSNANO set up network management and organized a political interest group for the emergent solar industry, because the establishment of Hevel Company coincided with the development of the renewable energy support scheme [25]. Collaboration with foreign research organizations and institutes played a significant role in terms of solving the issue of equipment localization and finding partners for implementation. Hevel’s R&D center cooperates with such R&D centers as Fraunhofer Institute for Solar Energy Systems ISE (Germany), the Swiss Center for Electronics and Microtechnology (CSEM) (Switzerland), Centre National de la Recherche Scientifique (France), and Skolkovo (Russia) [94]. Nowadays, the Hevel Energy Group is a leading vertically integrated company in the (Russian) solar industry, which provides a full-line service for basic needs (such as the construction and maintenance of solar power systems) and more advanced functions, such as R&D in the PV sphere [95]. Since 2018, the company has started to export heterojunction solar modules to countries such as Austria, India, Italy, Germany, Japan,
Poland, Switzerland, Sweden, and Thailand [96]. The planned contract portfolio of Hevel (2019–2024) is to export at least 500 MW [97].

In Russia, the solar energy industry was built almost from the ground up, all the way from R&D and the production of PV modules to the construction of solar plants [97]. Some factories already produce important components for solar energy projects, and Hevel LLC alone increases the capacity production up to 340 MW per year. Helios-Resource LLC and Solar Silicon technologies LLC produce monocrystalline and multicrystalline silicon ingots and wafers for crystal PV modules that amount to 180 MW per year and 200 MW per year, respectively. Other examples include Solar Systems LLC, which produces full-cycle crystalline PV modules, and Schneider Electric, which manufactures inverters in Samara. By the end of 2019, the total solar generation capacity in Russia had reached 1265 MW, and another 2000 MW is stated for 2024. The annual production of solar modules in Russia has reached 700 MW from three plants based on different technologies [98].

4.3. The Rise of the Wind Industry in Russia

The local content requirement was the biggest challenge for creating the wind industry in Russia, since there were no factories that could create and assemble wind generator components [90]. The manufacturing of wind equipment started three years later than in the solar energy segment. By 2016, the consortia of global manufacturers of wind generating equipment, Russian investment groups, and generation companies were formed, which allowed Russia to move to the active implementation phase of investment projects [98].

The development of the wind industry is very similar to the solar PV industry. The state-owned nuclear energy company, Rosatom (Moscow, Russia), became the biggest investor in wind energy. Rosatom registered a management company called NovaWind JSC (Moscow, Russia) in September 2017 with a charter capital of RUB 1101 billion [99]. NovaWind JSC consolidates all of the wind energy assets of Rosatom for implementing its wind energy strategy. VetroSGC JSC (Moscow, Russia), which is a part of NovaWind JSC, realizes wind projects from the design and construction all the way to electricity production based on wind energy. Rosatom participates in tenders and organizes the production and import of wind turbines by its joint venture with the foreign investor Dutch company Lagerway. Similarly, RUSNANO JSC, together with Finnish Fortum PJSC, established the Wind Energy Development Fund in 2017. The target Fund size is RUB 30 billion, which are invested by RUSNANO and Fortum on a parity basis [100]. RUSNANO localizes the production of equipment for wind farms with the help of the Danish Vestas, which is a global leader in the production, installation, and servicing of wind turbines. The power generation company Enel Russia, of which 56% of belongs to the Italian Enel Group, has also invested in wind farms.

It is worth noting that the numerous excessive requirements (allocation of areas, construction of access roads, restrictions on the object’s height, etc.) substantially hampered the construction of wind farms in Russia. In 2019, the Russian government eliminated some requirements for the design, construction, and operation of wind farms and established protection zones for wind farms [101], which has led to a more rapid growth of wind energy installations.

4.4. The Establishment of the Support Mechanism in the Retail Market and Federal Neglect of Bioenergy

Unlike Decree No. 499, the Decree of the Russian Government No. 47 of 23.01.2015 for the retail electricity market can be applied not only to wind, solar, and small hydro installations, but also biomass, biogas, and landfill gas (see Box 2). The total potential of these retail market projects can be estimated at 3000 MW; however, a very limited number of projects have been implemented. Market stakeholders are not interested in the development of renewable projects in the retail segment; instead, the wholesale market has attracted most of their attention because the support mechanism for the retail segment
does not work properly and is limited in scope [25]. The significant barriers relate to a high level of risks for such projects in terms of tariff establishment, the period of receiving the qualification, and the conclusion of contracts with regional network organizations [98]. A large burden falls on regional executive authorities in terms of developing and approving a package of documents for regulating the conditions and procedures for making a competitive selection, which often becomes an obstacle to the development of the retail segment of renewable energy (ibid). Additionally, there is a lack of sufficient incentives for promoting renewable energy and the official regional targets, which could oblige regional authorities to support renewable energy resources. The timeline of main regulations in the renewable energy sector of Russia is presented in Table 2.

**Box 2. Features of the support mechanism in the retail market.**

The retail scheme covers Russia’s tariff zones and off-grid territories isolated from the UES. The Decree No. 47 sets the framework for providing electricity to grid companies at regulated rates within 5% of quotas for losses in the networks, which are set at the regional level. When the investment project is included in the scheme and development program, the object receives the right to establish a special tariff for electricity capacity for 15 years. In contrast to the wholesale market, there are no limits on the target volume of installed capacity in the retail market [98]. In addition, the localization requirement in the retail market was introduced in only 2017, and pertains only to solar, wind, and hydropower energy.

It is worth noting that all generating facilities above 25 MW are required to participate in the wholesale market. Generating facilities from 5 to 25 MW can be participants in both wholesale and retail markets. In general, the Russian government has adopted several policy documents for the development of renewable energy that are mainly related to the electricity market and, to a lesser extent, heat supply and transport.

Some promising markets (in particular, bioenergy) do not find governmental support or demand. Since the support measures in the wholesale electricity market are designed exclusively for solar, wind, and small hydro generation, the construction of large generating capacities based on biomass has not been stimulated by the Russian government. Even if investors in renewable projects based on the use of biomass, biogas, and landfill gas were not burdened with localization requirements, a very limited number of projects have been implemented under the support mechanism in the retail market: there is one project for landfill gas utilization in the Leningrad region (2.4 MW), another project based on biomass in the Volgograd region (6 MW), and two biogas stations (Luchki and Baitusy) in the Belgorod region (3.6 MW and 0.526 MW) [32].

Russia has the largest biomass resources in the world [88], and when compared with (potential) demand, there would even be a significant surplus for export. The most progressive type of bioenergy in Russia is solid biofuels, especially wood pellets. In 2003, there were only six or seven enterprises that produced wood pellets [102], but over the past 15 years, this industry has grown to about 240 wood pellet plants with different capacities [92], and at present, Russia is one of the top ten countries for the production of pellets. Almost all pellet production (up to 90%) goes to export; the domestic wood energy market is developing, but still is still negligible compared to the production scale [102]. The major export markets for Russian pellets are Europe (Denmark, Italy, Sweden, the UK, Latvia, Finland, the Netherlands, and Belgium) and South Korea. Even though the production of pellets in Russia is estimated to use 1% of the minimum quantity of forest residues suitable and available for energy production [88], the mitigation potential of the reduction in wood losses is significant and amounts to 61–76 Mt CO₂-eq year⁻¹ [103]. This potential can compensate for an additional 2–3% of current national anthropogenic GHG emissions and provide clean energy.

Another prospective type of bioenergy is biogas. Russia has a significant potential to use industrial, agricultural, and food waste for biogas production. The country is a home to a large agricultural industry [104], in which is one of the world’s leaders in the production and export of agricultural products [105]. The most well-known biogas plants
in Russia are Luchki and Baitsury (both started in 2012) in the Belgorod region. The best-known wastewater treatment plant in Russia is Moscow’s aeration plant Mosvodokanal, which also launched two cogeneration plants, the Kuryanov sewage treatment plant (started in 2009) and the Lyubertsy sewage treatment plant (started in 2012). The project has become one of the largest in the field of alternative energy and the first biogas-powered power plant in Russia [106].

At present, Russian biogas and pellet production can be characterized by a significant scientific foundation, high relevance, and readiness for commercialization in 0 to 3 years [107]. However, the demand for these products in the domestic market is quite small. In the field of bioenergy, most opportunities take place on the regional level, and various measures provided by the local governor play an important role, sometimes even determining the feasibility of the project [104]. The development of biogas technology depends significantly on incentive schemes not only at the national level, but also at the level of regions and individual municipalities, since generations based on this technology are usually local, small-scale, and parts of purely municipal energy and heating supplies. For example, Belgorod’s municipality, which is the most progressive region in terms of biogas production, established various regional initiatives that helped to implement the biggest biogas plants in Russia (Luchki and Baitsury) and sell energy from the plants to the grid. However, in terms of investments, municipalities can implement only a rather limited number of biogas projects without support from the government. In addition, there are no official regional targets that can oblige municipalities to support biogas or other renewable energy sources.

| Date | Description |
|------|-------------|
| 2007 | Introduction of the Federal Law No.250-FZ for the development of renewable energy sources into the federal Electric Law, No. 35-FZ “On the Electric Power Industry” (2003). The Law set the framework for the use of renewable energy, and the directions for the legislation development |
| 2009 | Establishment of the Energy Strategy up to 2030 with the official targets intended to increase renewable energy share |
| 2013 | Establishment of the Decree of the Russian Government No. 449 of 28.05.2013 for the wholesale electricity and capacity market |
| 2015 | Establishment of the Decree of the Russian Government No. 47 of 23.01.2015 for the retail electricity market |
| 2016 | Russia signed the Paris agreement |
| 2019 | Russia approved the Paris agreement |
| 2020 | Establishment of the “Energy Strategy of Russia up to 2035”, which does not set any future numerical indicators for the development of renewable energy in Russia |

5. Strategic Relevance of Created Advocacy Coalitions

5.1. Overview of Advocacy Coalitions

Table 3 gathers the main stakeholders of each type of renewable energy. It can easily be seen that the total number of stakeholders is higher for bioenergy. However, the companies in the bioenergy area are mainly small- and medium-sized enterprises. Conversely, the stakeholders of Russia’s wind and solar industries are large and state-owned enterprises.

| Solar Energy | Wind Energy | Bioenergy |
|--------------|-------------|-----------|
| Russian companies | RUSNANO Management Company12345678Vershina Development LLC12345678VYGON | GC Corporation GazEnergoStroy12345678JSC |
In this section, we concentrate on established associations since there are no large well-known ‘green’ political parties in Russia, and thus the Government regularly
receives input from outside actors, including from scientific communities and associations. Various associations have been established to assist and promote different types of renewable energy and lobby for the interests of its members. Currently, the most influential advocacy coalition in the renewable energy field in Russia is the Russia Renewable Energy Association (RREDA) established in 2016. RREDA is a non-profit organization that regulates the process of governmental policy formation of the renewable energy sector and promotes the use of renewable energy in Russia [108]. This Association includes only 16 members; however, these 16 are the key players of solar and wind power industries in Russia (e.g., RUSNANO, Hevel, Enel, Helios Resource, NovaWind of Rosatom, Fortum, Vestas). RREDA can be perceived as the shared advocacy coalition of solar and wind energy, and it plays an important role in lobbying for the solar and wind power industries. RREDA takes an active part in the creation and adjustment of support mechanisms for renewable energy and submits amendments to the Russian Ministry of Energy [108].

The wind and solar industries are also represented by individual organizations. The wind power industry has the Russian Association of Wind Power Industry (RAWI), which also partners with RREDA. RAWI is a nonprofit entity that promotes the development of the wind energy business of its members “thanks to an established wide circle of associates in relevant government agencies and state-owned corporations” [109]. This Association consists of 171 Russian and foreign organizations, including engineering, design and construction, logistics, insurance companies, R&D, and educational institutions. For solar, the Russian Solar Energy Association (RSEA) was designed to be an authoritative body representing the interests of participants in the solar industry at the national level. This Association consists of 11 companies and research centers. The supervisory board chairman is the Chief Executive Officer of the energy group Hevel, which is the biggest solar company in Russia. Many of the RSEA participants are also members of RREDA.

For bioenergy, there is a Russian Biofuel Association (RBA), which was created to actively promote and support the production and export of industrial biotechnology and biofuels (biodiesel, bioethanol, biobutanol, syngas, etc.) and encourage cooperation with foreign investors and equipment suppliers. Another advocacy group in the bioenergy area is Technological Platform Bioenergy, which intends to be a center for coordinating and lobbying efforts to promote bioenergy, environmental regulations, and laws, and to work closely with Federal Executive authorities in Russia (the Ministries of Agriculture, Energy, Natural Resources, etc.). By the end of 2018, the platform counted 169 organizations as registered members, of which the most active organizations in the platform are scientific, industrial, and educational organizations [110]. The platform Bioenergy can provide only expert and organizational support for projects, in the form of letters to the relevant ministries and departments with expert confirmations of the project’s relevance and its compliance with the priorities of bioenergy development (ibid). The advocacy group has resource limitations, and thus considers it necessary to create a specialized financial fund for bioenergy projects. However, as the representatives of Bioenergy have noted, innovative development institutions such as Vnesheconombank, the venture company RUSNANO, Skolkovo innovation center, and so on are not so interested in small, local projects (up to 1 million US dollars), which comprise most bioenergy projects [110]. Furthermore, there is very little support for bioenergy by the government and investors. The lobbying group does not have enough impact to put bioenergy on the political agenda.

5.2. Influence of Created Advocacy Coalitions on Future Policy Development

The Russian energy sector is characterized by enhanced state control with domination of national energy companies, which demonstrates the role of certain, particularly influential groups in shaping Russian energy policy. Our analysis shows that the wind and solar lobbying groups are closely linked to Russia’s policy makers. In their
speeches, policy elites have only named solar and wind energies as prospective renewable energy sources in Russia (see Table 4). For instance, “Russia is actively developing renewable energy on an industrial scale. A full cooperation chain has already been established in the Russian solar energy—from scientific laboratories and the production of solar modules to the construction and operation of solar power plants. In the wind power industry, consortia are being created between the leading players of the Russian market and major global manufacturers, including companies from Europe, and work is underway to develop the production of equipment and components” Dmitry Medvedev, Deputy Chairman [111]. Solar energy is presented as the most developed type of renewable energy in Russia: “The modules have an efficiency of more than 22% and are among the world’s top three leaders in terms of efficiency in mass production. Currently, export contracts are already being concluded” [112]. For the wind power industry, the state-owned company Rosatom is seen as a key actor in the development of wind power installations: “I have no doubt that if Rosatom makes the best nuclear reactors, it will eventually start making the best wind farms in the world. This will allow us [Russia] to export not only nuclear technologies, the best and safest in the world, but also to offer foreign colleagues modern high-tech wind farms”, said Alexey Teksler, the former Deputy Minister of Energy [113].

Table 4. Energy sources mentioned in the speeches/newsletters of various authorities.

| Authority | Number \(^1\) of Documents | Solar Energy | Wind Energy | Bioenergy |
|-----------|----------------------------|--------------|-------------|-----------|
| President of Russia (http://kremlin.ru) | 28 | 13 | 10 | 5 |
| Russian Government (http://government.ru) | 27 | 10 | 10 | 7 |
| Ministry of Energy (https://minenergo.gov.ru) | 45 | 24 | 20 | 1 |
| Ministry of Natural Resources and Environment (https://www.mnr.gov.ru) | 8 | 2 | 2 | 4 |
| **Total:** | **108** | **45%** | **39%** | **16%** |

This is the total number of speeches/newsletters that were geared toward a specific renewable energy.

There are two main reasons to develop solar and wind power in Russia. The first is the need to develop domestic technological competence, and a scientific and technical base with a focus on technological export. “The development of our own competitive developments in the field of renewable energy and their export to international energy markets will become the foundation for solving the urgent task for us of making Russia one of the world’s technological leaders”, said Alexey Teksler, former Deputy Minister of Energy [114]. The second reason is the need to solve the problem of energy supply in isolated regions of Russia: “… we have gained competence in the production of solar panels, and we are developing their production. (…) We have opportunities to develop wind energy, especially in certain regions of the Russian Federation, for example, in the Far East. We have a huge territory where such generation can be installed to supply entire regions of our country”, stated Vladimir Putin, President of Russia [115].

Nevertheless, the Russian authority continues to regard the Russian electric power sector as one of the most ‘green’ in the world, since more than one third of Russian energy comes from hydropower and nuclear energy, and more than 50% from natural gas, “which is known to be the most environmentally friendly fuel of all hydrocarbons” [115]. “We are still a country rich in hydrocarbons, this is our competitive advantage, and we should never forget that we must use this competitive advantage effectively. However, we should not stand aside from the main trend [renewable energy development]; we should not think about what will happen tomorrow. (…) We must engage in modern, alternative types of energy, including hydrogen energy, and we are doing it” [115].
Such a sentiment can be found in the latest version of the national energy strategy, “Energy Strategy up to 2035”. The working group for updating the draft of the national energy strategy was formed by an order of the Ministry of Energy of the Russian Federation and included the representatives of the Ministry of Energy and other Federal Executive authorities, fuel and energy companies, experts, and the scientific community [85]. The first version of the energy strategy was planned to be adopted in 2014, but due to sanctions and falling oil prices, its consideration was postponed to mid-2015[116]. Even then, the energy strategy could not be approved for quite a long time due to a continuing lack of consensus among stakeholders about the future key directions of Russian energy policy [82]. After many years of discussion, the Russian Government officially published the approved version of Energy Strategy up to 2035 on 9 June 2020 [85]. It took five years to reach the agreement and approve the document. Nevertheless, Energy Strategy up to 2035 has received much criticism from its stakeholders, and its appropriateness remains questionable [82,97].

The new strategy intends to maximize the contribution of the hydrocarbon oil and gas industry and to foster the energy security of the country, while also introducing digital technologies in the energy sector and localizing the production of energy equipment in Russia. Besides the improvements in the efficiency, accessibility, and quality of energy supply from oil products, gas, and electricity, much attention is paid to the increase in liquefied natural gas (LNG) production, development of natural gas infrastructure, and using natural gas as motor fuel [117]. The Russian Government has given a crucial role to the natural gas industry, with dominant positions taken by PJSC Gazprom in producing and exporting pipeline gas and PAO Novatek in managing LNG. In addition, the Russian Government, the Russian Ministry of Energy, and Gazprom actively subsidize and carry out organizational support for the development of natural gas transport in Russia.

Energy Strategy up to 2015 shows that Russia’s development goals in the energy sector differ markedly from current global trends in energy and climate policies. It focuses primarily on the development of the hydrocarbon oil and gas industry, and the document does not set clear goals for developing low-carbon energy sources. In contrast to the previous version of the energy strategy, this new Strategy does not set any quantitative targets for renewable energy and pays little attention to its development. However, quantitative targets are one of the most important institutional driving factors for investors because having goals demonstrates stability [76]. The exception is only hydrogen energy. The new energy strategy also focuses on the production and consumption of hydrogen, with the goal of making Russia a global leader in this field, since the country has abundant resources for its production. However, the major suppliers of hydrogen are going to be Gazprom, Novatek, and Rosatom (another of the larger Russian energy companies). The Paris Agreement is mentioned only once in Energy Strategy up to 2035. Additionally, the Strategy repeats the view of the Russian authorities that, among the world’s largest economies, the Russian fuel and energy balance is one of the most environmentally friendly, because more than a third of electric power is generated from nuclear power, hydropower, and other renewable energy sources, and about half from natural gas.

5.3. Capacity Market vs. Retail Market

In 2019, the Russian Government approved extending the capacity-based support program in the wholesale electricity and capacity market until 2035, despite the lack of goals for the development of low-carbon energy sources in Energy Strategy up to 2035. Notably, the distribution of available investment resources within the support program for renewable energy sources is not homogeneous, but instead wind energy is prioritized. For the period 2024–2035, the total amount of support amounts to RUB 400 billion, of which RUB 231.25 billion (57.81% of total support) is directed to wind power projects, RUB 138.75 billion (34.69%) to solar power projects, and RUB 30 billion (7.5%) to small hydropower projects. This solution will allow projects with a combined capacity of 7–9
GW to be implemented in the new investment cycle [98]. The new support program will demand a higher level of equipment localization, as well as the minimum volume of exports to be provided by equipment suppliers for projects implemented under the program [98]. In the second phase of the support program, companies are intended to export renewable energy technologies and components rather than produce renewable electricity. Perhaps this fact can explain why there are no quantitative targets for renewable energy production under Energy Strategy up to 2035. After 2035, it is planned to remove the support mechanism for renewable energy production, because by then it is thought that renewable energy should be competitive with traditional generation.

Bioenergy is still not included in the second stage of the wholesale market support program even though constructing large facilities based on generating energy from biomass could benefit all participants in the energy market [98]. Enterprises could receive an incentive to upgrade their generating facilities and optimize the use of fuel resources by increasing their share of ‘green’ fuels. At the same time, the Government would be able to improve the environmental situation in the country through the rational utilization of waste and the replacement of traditional energy sources.

The previous support scheme in the retail market has failed and key players in the wholesale market have started to look elsewhere. For instance, solar actors have already started developing exports and implementing projects intended for the retail market. In 2020, the Russian Prime Minister signed a Decree “On issues of stimulating the use of renewable energy sources (RES)” [118], which aims to improve support mechanisms for renewable energy projects in retail markets. The approved changes introduce a comprehensive approach to selecting and implementing projects for constructing renewable energy generation in retail markets. The amendment gives hope for a more active realization and support of bioenergy projects.

6. Conclusions

6.1. Contributions to the Technological Innovation Systems Framework

The study aimed to incorporate a political dimension into TIS analysis by more closely investigating the roles of actors and coalitions (networks) in influencing policy change. In order to achieve this aim, analysis of the ‘creation of legitimacy’ (F7) system function was complemented with the main features of ACF theory, because this framework focuses on ideas and beliefs in the process of the policy change and helps us to understand how policy beliefs can change over time. This approach was used to compare the development of political support towards solar, wind and bio-energies in Russia.

The empirical case shows that incumbent advocacy coalitions with broad authority prioritized the interests of those incumbent innovation systems. This is particularly evident in the case of bioenergy, where there was a distinct lack of interest from the state and political actors. It would have been possible to create a thriving bioenergy sector if this was desired—for example, in contrast, in a quite short period, the Russian solar energy industry was built almost from the ground up, starting with R&D and the production of PV modules all the way to the construction of solar plants [97]. This rapid progress in the solar industry happened despite the difficulties of forming advocacy coalitions for an emerging TIS that are strong enough to coordinate existing institutional conditions with their needs [38]. Our findings also demonstrate that advocacy coalitions might not only play a role for their members or the development of a particular TIS, but could also contribute to an entirely different TIS, as was seen in the formation of solar and wind industries. In this case, a legislative mechanism promoting renewable energies in the wholesale market that was initially driven by advocates of the solar industry came to also benefit the advocacy of wind power, to the point where the new distribution of available investment resources within the support program in Russia prioritizes wind energy over other renewable energy sources. These cases demonstrate that investigating
the composition and activities of advocacy coalitions provides the opportunity to explore how various actors with their own interests collaborate and compete for influence on policymaking. Such insights also show how the influence of lobbying groups increases when business and state interests are aligned [28].

By focusing only on the creation of the legitimacy system function, we do not diminish the role of other system functions. However, our empirical case vividly shows that advocacy coalitions have played an important role in creating legitimacy (including the design of renewable energy subsidy mechanisms) for the solar and wind industries in Russia. Conversely, in the case of bioenergy, the absence of a powerful advocacy coalition undermined political support. The analysis showed that the creation of the legitimacy system function has played an important role for all other system functions, since advocacy coalitions were strategically established and used to create supportive structures for the technological innovation system. Having supportive structures implies that there is access to different R&D programs and financial resources, that favorable support mechanisms can be created, and that the novel technology has a good reputation (see also the study of [37]). The importance of advocacy coalitions is that no single actor can gather all necessary resources (e.g., finance, lobbying, R&D, expertise, administration, legitimacy) to implement the transition.

In accordance with the theoretical assumptions of the advocacy coalition framework, we can see that external events played an important role in turning Russia towards renewable energy development. These external events were particularly important as fossil fuels had (and still have) a strong advocacy coalition in favor of their continued use. However, the Russian elites have changed their views on renewable energy, and even stakeholders who had held conservative policy core beliefs started to see economic potential in renewables. Transition advocates included new actors from emerging industries but also some incumbent companies that expected to benefit from the transition (e.g., the state-owned nuclear energy company Rosatom, which became an active player in the wind industry).

The ACF was shown to be an appropriate complement to the TIS framework because it helped us recognize the key actors and created coalitions and their policy beliefs, and revealed their intentions and future developments in the innovation system. By addressing the above-stated issues, this article contributes to the discussion about the role of politics in technological innovation systems in particular and sustainability transition studies as a whole.

To the best of our knowledge, there is no such research that integrates the advocacy coalitions framework in TIS functional analysis. Thus, this study makes some primary steps towards solving this issue. We believe that our study provides a modest heuristic contribution [119] to the literature on technological innovation systems, and it is our hope that this work will result in improvements to the conceptual and methodological foundations of combining these two analytical frameworks.

6.2. Implications for Policymaking

Russia is an important actor in the global energy system, as it is the world’s largest exporter of energy resources [83]. Overall, the key aim of Russia’s first phase of its support program for renewables was not to produce energy but to create the domestic innovative power engineering cluster in the renewable energy sector. This program helped to build effective cooperation between industrial enterprises and research centers, and encouraged cooperation with major international industrial companies that transferred technology and organized the production of renewable energy equipment in Russia, with the maximum involvement of Russian enterprises in the supply chain. As of 2020, Russia has built new production facilities of renewable energy equipment with a total annual potential of 1900 MW [98].

The experience of most other countries has been that small- and medium-sized enterprises are primarily the ones that develop renewable energy sources. In contrast, in
Russia, large and state-owned enterprises have formed the renewable energy sector. The Russian energy sector functions in a highly centralized way, in which the institutional framework is characterized by high corporate concentration [83]. Our analysis showed the strong involvement of state and political actors in the solar and wind networks but their near absence in the bioenergy network. The study demonstrates differences in governmental support towards different types of renewable energy development, i.e., the support measures in the wholesale electricity market are designed exclusively for solar, wind, and small hydro generation, which diminishes the construction of large generating capacities based on biomass. It is also acknowledged by many stakeholders that support mechanisms in the retail market are not well elaborated and are much more limited in scope.

The main driver of bioenergy development is the demand from the business sector. The role of the government is key and critical; it must create conditions under which businesses will be interested in new technologies and developments so that government and business will continue to move forward together. In Russia, several interesting technological developments for heat and electricity production from biomass already exist, and these have practical applications and can be used by businesses. However, currently, there is not much state support, which could help to achieve the rapid growth of bioenergy technologies in Russia. Widely used technologies for generating energy from various types of biomass, including waste, are poorly implemented and hardly utilized, even though many scientific groups have worked to develop them.

Our empirical findings are important for policymakers, researchers, and other practitioners who seek to initiate and/or expand the diffusion of renewable energy technologies in Russia. In addition, even though this study focuses on Russia, these findings are expected to be useful for other countries with similar economies that seek to advance sustainability transitions but have economically important (yet unsustainable) established industries. This research can also be useful for policymakers and practitioners in other countries who are looking to implement energy projects in Russia.

6.3. Limitations and Suggestions for Future Research

The main goal of this study was to explore how the advocacy coalition framework can improve the analysis of policy processes in the technological innovation system and thus inform transition studies. However, some limitations open up opportunities for further research. For instance, the exact scheme of ACF analysis [120] was not followed since it was slightly modified to our case. However, we took important features of this framework that could highly enrich our analysis of advocacy coalitions. Moreover, in our study, the ACF brings more policy than political processes and thus future research can try to show how the advocacy coalition framework facilitates exploration of political factors in TIS analysis. Additionally, this study is limited to the case of Russia and further testing in other empirical contexts is needed.

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References
1. Markard, J.; Geels, F.W.; Raven, R. Challenges in the acceleration of sustainability transitions. Environ. Res. Lett. 2020, 15, 081001.
2. IPCC. Global Warming of 1.5 °C. Summary for Policymakers 2018. Available online: http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf (accessed on 19 October 2018).
3. Markard, J.; Raven, R.; Truffer, B. Sustainability transitions: An emerging field of research and its prospects. Res. Policy 2012, 41, 955–967.
4. Kühler, J.; Geels, F.W.; Kern, F.; Markard, J.; Onsongo, E.; Wieczorek, A.; Alkemade, F.; Avelino, F.; Bergek, A.; Boons, F.; et al. An agenda for sustainability transitions research: State of the art and future directions. *Environ. Innov. Soc. Transit.* 2019, 31, 1–32.

5. Meadowcroft, J. Who is in charge here? Governance for sustainable development in a complex world. *J. Environ. Policy Plan.* 2007, 9, 299–314.

6. Meadowcroft, J. Engaging with the politics of sustainability transitions. *Environ. Innov. Soc. Transit.* 2011, 1, 70–75.

7. Malhotra, A.; Schmidt, T.S.; Huenteler, J. The role of inter-sectoral learning in knowledge development and diffusion: Case studies on three clean energy technologies. *Technol. Forecast. Soc. Change* 2019, 146, 464–487.

8. Kuhlmann, S.; Rip, A. Next-generation innovation policy and grand challenges. *Sci. Public Policy* 2018, 45, 448–454.

9. Van de Ven, A.; Poole, M. Explaining development and change in organizations. *Acad. Manag. Rev.* 1995, 20, 510–540.

10. Coenen, L.; Lopez, F.J.D. Comparing systems approaches to innovation and technological change for sustainable and competitive economies: An explorative study into conceptual commonalities, differences and complementarities. *J. Clean. Prod.* 2010, 18, 1149–1160.

11. Hekkert, M.; Suurs, R.; Negro, S.; Kuhlmann, S.; Smits, R. Functions of innovation systems: A new approach for analysing technological change. *Technol. Forecast. Soc. Change* 2007, 74, 413–432.

12. Bergek, A.; Jacobsson, S.; Carlsson, B.; Lindmark, S.; Rickne, A. Analyzing the functional dynamics of technological innovation systems: A scheme of analysis. *Res. Policy* 2008, 37, 407–429.

13. Suurs, R.A.; Hekkert, M. Competition between first and second generation technologies: Lessons from the formation of a biofuels innovation system in the Netherlands. *Energy* 2009, 34, 669–679.

14. Kern, F. Engaging with the politics, agency and structures in the technological innovation systems approach. *Environ. Innov. Soc. Transit.* 2015, 16, 67–69.

15. Coenen, L. Engaging with changing spatial realities in TIS research. *Environ. Innov. Soc. Transit.* 2015, 16, 70–72.

16. Markard, J.; Hekkert, M.; Jacobsson, S. The technological innovation systems framework: Response to six criticisms. *Environ. Innov. Soc. Transit.* 2015, 16, 76–86.

17. Binz, C.; Truffer, B.; Coenen, L. Why space matters in technological innovation systems—Mapping global knowledge dynamics of membrane bioreactor technology. *Res. Policy* 2014, 43, 138–155.

18. Coenen, L.; Bennenworth, P.; Truffer, B. Toward a spatial perspective on sustainability transitions. *Res. Policy* 2012, 41, 968–979.

19. Stephan, A.; Schmidt, T.S.; Bening, C.R.; Hoffmann, V.H. The sectoral configuration of technological innovation systems: Patterns of knowledge development and diffusion in the lithium-ion battery technology in Japan. *Res. Policy* 2017, 46, 709–723.

20. Kern, F.; Rogge, K.S. Harnessing theories of the policy process for analysing the politics of sustainability transitions: A critical survey. *Environ. Innov. Soc. Transit.* 2018, 27, 102–117.

21. Nohrstedt, D. Do advocacy coalitions matter? Crisis and change in Swedish nuclear energy policy. *J. Public Adm. Res. Theory* 2009, 20, 309–333.

22. Jenkins-Smith, H.C.; Nohrstedt, D.; Weible, C.M.; Sabatier, P.A. The advocacy coalition framework: Foundations, evolution, and ongoing research. *Theor. Policy Process.* 2014, 3, 183–223.

23. Weible, C.M.; Sabatier, P.A.; Jenkins-Smith, H.C.; Nohrstedt, D.; Henry, A.D.; DeLeon, P. A quarter century of the advocacy coalition framework: An introduction to the special issue. *Policy Stud. J.* 2011, 39, 349–360.

24. Markard, J.; Suter, M.; Ingold, K. Socio-technical transitions and policy change – Advocacy coalitions in Swiss energy policy. *Environ. Innov. Soc. Transitions* 2016, 18, 215–237, doi:10.1016/j.eist.2015.05.003.

25. Boute, A.; Zhikharev, A. Vested interests as driver of the clean energy transition: Evidence from Russia’s solar energy policy. *Energy Policy* 2019, 133, 110910.

26. Haukkala, T. Does the sun shine in the high north? Vested interests as a barrier to solar energy deployment in Finland. *Energy Res. Soc. Sci.* 2015, 6, 50–58.

27. Normann, H.E. Policy networks in energy transitions: The cases of carbon capture and storage and offshore wind in Norway. *Technol. Forecast. Soc. Change* 2017, 118, 80–93.

28. Normann, H.E. The role of politics in sustainable transitions: The rise and decline of offshore wind in Norway. *Environ. Innov. Soc. Trans.* 2015, 15, 180–193.

29. Binz, C.; Coenen, L.; Murphy, J.T.; Truffer, B. Geographies of transition—From topical concerns to theoretical engagement: A commentary on the transitions research agenda. *Environ. Innov. Soc. Transit.* 2020, 34, 1–3.

30. Van Weele, M.J.; Cherunya, P.C.; Truffer, B.; Murphy, J.T. Analysing transition pathways in developing cities: The case of Nairobi’s splintered sanitation regime. *Technol. Forecast. Soc. Change* 2018, 137, 259–271.

31. Hansen, U.E.; Nygaard, I.; Romijn, H.; Wieczorek, A.; Kamp, L.M.; Klerks, L. Sustainability transitions in developing countries: Stocktaking, new contributions and a research agenda. *Environ. Sci. Policy* 2018, 84, 198–203.

32. Association NP Market Council. Electricity and Capacity Market. 2020. Available online: https://www.np-sr.ru/ru/market/vie/index.htm (accessed on 14 September 2020).

33. Freeman, C. *Technology Policy and Economic Performance: Lessons from Japan*; Pinter Publishers: London, UK, 1987.

34. Lundvall, B.A. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*; Pinter Publishers: London, UK, 1992.

35. Nelson, R.R. *National Innovation Systems: A Comparative Analysis*; Oxford University Press: Oxford, UK, 1993.

36. Carlsson, B.; Stankiewicz, R. On the nature, function and composition of technological systems. *J. Evol. Econ.* 1991, 1, 93–118.
37. Musiolik, J.; Markard, J. Creating and shaping innovation systems: Formal networks in the innovation system for stationary fuel cells in Germany. Energy Policy 2011, 39, 1909–1922.
38. Hekkert, M.; Negro, S. Functions of innovation systems as a framework to understand sustainable technological change: Empirical evidence for earlier claims. Technol. Forecast. Soc. Change 2009, 76, 584–594.
39. Jacobsson, S.; Bergek, A. Innovation system analyses and sustainability transitions: Contributions and suggestions for research. Environ. Innov. Soc. Transf. 2011, 1, 41–57.
40. Markard, J. The life cycle of technological innovation systems. Technol. Forecast. Soc. Change. 2020, 153, 119407.
41. Bergek, A.; Jacobsson, S.; Sandén, B.A. ‘Legitimation’ and ‘development of positive externalities’: Two key processes in the formation phase of technological innovation systems. Technol. Anal. Strateg. Manag. 2008, 20, 575–592.
42. Kebede, K.Y.; Mitsufuji, T. Technological innovation system building for diffusion of renewable energy technology: A case of solar PV systems in Ethiopia. Technol. Forecast. Soc. Change 2017, 114, 242–253.
43. Planko, J.; Cramer, J.; Hekkert, M.P.; Chappin, M. Combining the technological innovation systems framework with the entrepreneurs’ perspective on innovation. Technol. Anal. Strat. Manag. 2016, 29, 614–625.
44. Musiolik, J.; Markard, J.; Hekkert, M. Networks and network resources in technological innovation systems: Towards a conceptual framework for system building. Technol. Forecast. Soc. Change 2012, 79, 1032–1048.
45. Purkus, A.; Hagemann, N.; Bedtke, N.; Gawel, E. Towards a sustainable innovation system for the German wood-based bioeconomy: Implications for policy design. J. Clean. Prod. 2018, 172, 3955–3968.
46. Sabatier, P.A.; Jenkins-Smith, H.C. The advocacy coalition framework: An assessment. In Theories of the Policy Process; Sabatier, P.A., Ed.; Westview Press: Boulder, CO, USA, 1999; pp. 117–116.
47. Sabatier, P.A. An advocacy coalition framework for policy change and the role of policy-oriented learning therein. Policy Sci. 1998, 21, 129–168.
48. Simon, H.A. Administrative Behavior: A Study of Decision-Making Process in Administrative Organization; Free Press: New York, NY, USA, 1947; p. 259.
49. Simon, H.A. Models of Man: Social and Rational; John & Wiley: Hoboken, NJ, USA, 1957.
50. Hecko, H. Social Policy in Britain and Sweden; Yale University Press: New Haven, CT, USA, 1974.
51. Hecko, H. Issue networks and the executive establishment. In The New American Political System; King, A., Ed.; Aei Press: Washington, DC, USA, 1978, pp. 87–124.
52. Putnam, R.D. The Comparative Study of Political Elite; Prentice Hall: Englewood Cliffs, NJ, USA, 1976.
53. Kiser, L.; Ostrom, E. The three worlds of action. In Strategies of Political Inquiry; Ostrom, E., Ed.; Sage: Beverly Hills, CA, USA, 1982; pp. 179–222.
54. Majone, G. Evidence, Argument, and Persuasion in the Policy Process; Yale University Press: London, UK, 1989.
55. Weible, C.M. An advocacy coalition framework approach to stakeholder analysis: Understanding the political context of California marine protected area policy. J. Public Adm. Res. Theory 2006, 17, 95–117.
56. Blake, K.; Nahrath, S.; Ingold, K. Combining the Institutional Resource Regime (IRR) framework with the Advocacy Coalition Framework (ACF) for a better understanding of environmental governance processes: The case of Swiss wind power policy. Environ. Sci. Policy 2020, 112, 141–154.
57. Sabatier, P.A. The advocacy coalition framework: Revisions and relevance for Europe. J. Eur. Public Policy 1998, 5, 98–130.
58. Larsen, J.B.; Vrangbaek, K.; Traulsen, J.M. Advocacy coalitions and pharmacy policy in Denmark—Solid cores with fuzzy edges. Soc. Sci. Med. 2006, 63, 212–224.
59. Zafonte, M.; Sabatier, P. Short-term versus long-term coalitions in the policy process: Automotive pollution control 1963–1989. Policy Stud. J. 2004, 32, 1963–1989.
60. Sabatier, P.A.; Weible, C.M. The advocacy coalition framework: Innovations and clarifications. In Theories of the Policy Process; Sabatier, P.A., Ed.; Westview Press: Boulder, CO, USA, 2007; pp. 189–220.
61. Weible, C.M.; Sabatier, P.A.; McQueen, K. Themes and variations: Taking stock of the advocacy coalition framework. Policy Stud. J. 2009, 37, 121–140.
62. Ardie, O.; Annema, J.A.; Van Wee, B. Non-implementation of road pricing policy in the Netherlands: An application of the ‘Advocacy Coalition Framework’. Eur. J. Transp. Infrastructure. Res. 2015, 15.
63. Byskov, M.; Kammermann, L. Advocacy coalitions in the acceleration phase of the European energy transition. Environ. Innov. Soc. Transitions 2021, 40, 262–282, doi:10.1016/j.eist.2021.07.006.
64. Schlager, E. A comparison of frameworks, theories, and models of policy process. In Theories of the Policy Process; Sabatier, P.A., Ed.; Westview Press: Boulder, CO, USA, 2007.
65. Bergek, A.; Hekkert, M.; Jacobsson, S.; Markard, J.; Sandén, B.; Truffer, B. Technological innovation systems in contexts: Conceptualizing contextual structures and interaction dynamics. Environ. Innov. Soc. Trans. 2015, 16, 51–64.
66. NREL. Technical Potential Assessment for the Renewable Energy Zone (REZ) Process: A GIS-Based Approach. 2018. Available online: https://www.nrel.gov/docs/ft18osti/71004.pdf (accessed on 20 September 2021).
67. Brown, A.; Beiter, P.; Heimiller, D.; Davidson, C.; Denholm, P.; Melius, J.; Lopez, A.; Hettinger, D.; Mulcahy, D.; Porro, G. National Renewable Energy Laboratory. 2016. Estimating Renewable Energy Economic Potential in the United States: Methodology and Initial Results. Available online: https://www.nrel.gov/gis/re-econ-potential.html (accessed on 20 September 2021).
68. Grechukhina, A.; Kudryavtseva, O.; Yakovleva, E. Evaluation of the development of the renewable energy markets in Russia. *Econ. Reg.* 2016, 12, 1167–1177.
69. Sabatier, P.A.; Weible, C.M. *Theories of the Policy Process*; Sabatier, P.A.; Ed.; Westview Press: Boulder, CO, USA, 2014.
70. Romanova, T. Russian energy in the EU market: Bolstered institutions and their effects. *Energy Policy* 2014, 74, 44–53.
71. Sabatier, P.A.; Jenkins-Smith, H.C. *Policy Change and Learning: An Advocacy Coalition Approach*; Westview Press: Boulder, CO, USA, 1993.
72. Kern, F.; Rogge, K.S. The pace of governed energy transitions: Agency, international dynamics and the global Paris agreement accelerating decarbonisation processes? *Energy Res. Soc. Sci.* 2016, 22, 13–17.
73. Zilber, T.B. Stories and the discursive dynamics of institutional entrepreneurship: The case of Israeli high-tech after the bubble. *Organ. Stud.* 2007, 28, 1035–1054.
74. Nezvoroza, T. Biogas production in the Russian Federation: Current status, potential, and barriers. *Energies* 2020, 13, 3620.
75. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* 2006, 3, 77–101.
76. Smeets, N. The Green Menace: Unraveling Russia’s elite discourse on enabling and constraining factors of renewable energy policies. *Energy Res. Soc. Sci.* 2018, 40, 244–256.
77. Romanova, T. Russia’s neorevisionist challenge to the liberal international order. *Int. Spect.* 2018, 53, 76–91.
78. Tass, N.A. Nobel Prize Winner: Developing the Raw Material Model of the Economy, We Import Crises. 2019. Available online: https://tass.ru/ekonomika/6568815 (accessed on 15 September 2020).
79. OECD. Statement by the OECD Regarding the Status of the Accession Process with Russia & Co-Operation with Ukraine. 2014. Available online: www.oecd.org/newsroom/statement-by-the-oecd-regarding-the-status-of-the-accession-process-with-russia-and-co-operation-with-ukraine.htm%20 (accessed on 17 September 2020).
80. Makarov, I.A. Russia’s participation in international environmental cooperation. *Strat. Anal.* 2016, 40, 536–546.
81. Tuzova, Y.; Qayum, F. Global oil glut and sanctions: The impact on Putin’s Russia. *Energy Policy* 2016, 90, 140–151.
82. Mitrova, T.; Yermakov, V. Russia’s Energy Strategy-2035. Struggling to Remain Relevant; Institut Français des Relations Internationals: Paris, France, 2019.
83. Mitrova, T.; Melnikov, Y. Energy transition in Russia. *Energy Trans.* 2019, 3, 73–80.
84. Makarov, I.A.; Chen, H.; Paltsiev, S.V. Impacts of Paris agreement on Russian economy. *Vopr. Ekon.* 2018, 4, 76–94. (In Russian)
85. The Ministry of Energy of the Russian Federation. Energy Strategy of the Russian Federation until 2035 Approved. 2020. Available online: https://minenergo.gov.ru/node/18038 (accessed on 10 August 2020). (In Russian)
86. The Ministry of Energy of the Russian Federation. Energetitcheskaya Strategiya Rossii na Period do 2030 Goda (Energy Strategy of Russia up to 2030). 2009. Available online: https://minenergo.gov.ru/node/15357 (accessed on 26 January 2021).
87. Russian Government. Decision No. 321. The State Programme on Energy Efficiency and Energy Development. 2014. Available online: https://www.climate-laws.org/geographies/russia/policies/state-program-on-energy-efficiency-and-energy-development-approved-by-government-decree-no-321 (accessed on 17 August 2021). (In Russian)
88. Namsaraev, Z.; Getovtsev, P.; Komova, A.; vasilov, R. Current status and potential of bioenergy in the Russian Federation. *Renew. Sustain. Energy Rev.* 2018, 81, 625–634.
89. Lanfsinha, T.A.; Laitner, J.A.; Potashnikov, V.Y.; Barinova, V.A. The slow expansion of renewable energy in Russia: Competitiveness and regulation issues. *Energy Policy* 2018, 120, 600–609.
90. Smeets, N. Similar goals, divergent motives. The enabling and constraining factors of Russia’s capacity-based renewable energy support scheme. *Energy Policy* 2017, 101, 138–149.
91. Boute, A. A comparative analysis of the European and Russian support schemes for renewable energy: Return on European experience for Russia. *J. World Energy Law Bus.* 2011, 4, 157–180.
92. Kopylov, A.E. Economics of Renewable Energy; Ridoro, Yekaterinburg, Russia 2015. (In Russian)
93. Russia’s Administrator of the Trading System. The Results of Selected Projects. 2020. Available online: https://www.atsenergo.ru/vie/proresults (accessed on 31 July 2020). (In Russian)
94. Hevel Energy Group, Research and Development. 2020. Available online: https://www.hevelsolar.com/en/research-and-development/ (accessed on 31 July 2020).
95. Hevel Energy Group. About Hevel Group. 2020. Available online: https://www.hevelsolar.com/en/about/ (accessed on 31 July 2020).
96. Hevel Group. Production. 2020. Available online: https://www.hevelsolar.com/en/catalog/solnechnye-elementy/ (accessed on 16 October 2020).
97. Bashmakov, I.A.; Bashmakov, V.l.; Borisov, K.B.; Dzedzichek, M.G.; Drummond, P.; Lunin, A.A; Lebedev, O.B; Karvalho, P. Monitoring the Use of Low-Carbon Technologies in Russia: Opportunities for Acceleration and Risks of Lag. 2020. Available online: http://www.conef.ru/file/Report%202020.pdf (accessed on 11 January 2021). (In Russian)
98. RREDA. Russia Renewable Energy Association. The Renewable Energy Market in Russia: Current Status and Development Prospects. 2020. Available online: https://rreda.ru/information-bulletin-2020 (accessed on 11 July 2021).
99. NovaWind. About Us. 2020. Available online: http://www.novawind.ru/eng/company/ (accessed on 3 August 2020).
100. Rusnano. New Investment Funds. 2020. Available online: https://en.rusnano.com/porfolio/investment-funds/wedif (accessed on 3 August 2020).
101. Russian Government. On the Elimination of Excessive Requirements in The Construction of Wind Farms. 2019. Available online: http://government.ru/docs/35429/ (accessed on 25 March 2021).
102. Pristupa, A.; Mol, A.P. Renewable energy in Russia: The take off in solid bioenergy? *Renew. Sustain. Energy Rev.* **2015**, *50*, 315–324.

103. Romanovskaya, A.A. Greenhouse gas fluxes and mitigation potential for managed lands in the Russian Federation. *Mitig. Adapt. Strat. Glob. Chang.* **2020**, *25*, 661–687.

104. Larive International. Market Study: Bio-energy in Russia Opportunities for Dutch Companies. 2013. Available online: https://www.larive.com/wp-content/uploads/2017/04/Larive-International-Market-Survey-2013-Energy-Efficiency-RF.pdf (accessed on 25 March 2021).

105. FAO. FAOSTAT. Food and Agriculture of the United Nations. 2019. Available online: http://www.fao.org/faostat/en/#data/QL/visualize (accessed on 9 November 2019).

106. Khramenkov, S.V.; Pakhomov, A.N.; Khenov, K.E.; Streltsov, S.A.; Khamidov, M.G.; Belov, N.A. Utilization of Biogas and Creation of Autonomous Sources of Power Supply at Treatment Facilities. 2010. Available online: http://unilibru.ru/articles/journals/vst/vst-2010/vst-2010-10-01/hramenkov-sv-pahomov-an-khenov-ke-streltsov-sa-hamidov-mg-belov-na-utilizacija-biogaza-i-sozdanie-avtonomnih-istochnikov-jenergosnabzhenija-na-ochistnih-sooruzhenijah.html (accessed on 16 February 2021).

107. TP Bioenergy. Bioenergy in the Russian Federation. Roadmap for 2019–2030. 2019. Available online: http://www.tp-bioenergy.ru/upload/file/dorozhnaya_karta_tp_bioenergetika.pdf (accessed on 21 April 2021). (In Russian)

108. RREDA. Russia Renewable Energy Development Association. About Us. 2020. Available online: https://rreda.ru/en (accessed on 3 September 2020).

109. RAWI. The Russian Association of Wind Power Industry. About RAWI. 2020. Available online: https://rawi.ru/en/about-rawi/ (accessed on 2 September 2020).

110. TP Bioenergy. Report on the Implementation of Work by the Technology Platform ‘Bioenergy’ in 2018. 2018. Available online: http://tp-bioenergy.ru/publications/ (accessed on 11 June 2021). (In Russian)

111. Russian Government. Dmitry Medvedev’s Interview to the Luxembourg Edition of ‘Luxemburger Worth’. 2019. Available online: http://government.ru/news/35917/ (accessed on 25 March 2021). (In Russian)

112. Russian Government. Renewable (‘Alternative’) Energy: Some Important Facts and Solutions in 6 Years. 2018. Available online: http://government.ru/info/32121/ (accessed on 25 March 2021).

113. The Ministry of Energy of the Russian Federation. The Ministry of Energy of the Russian Federation Held a Presentation of a Special Review of IRENA on the Prospects for the Development of Renewable Energy in Russia. 2017. Available online: https://minenergo.gov.ru/en/node/7636 (accessed on 25 March 2020).

114. Ministry of Energy of the Russian Federation. Alexey Texler Took Part in the Eastern Economic Forum. 2016. Available online: https://minenergo.gov.ru/en/node/5884 (accessed on 26 March 2021).

115. President of Russia. Plenary Session of the Russian Energy Week Forum. 2017. Available online: http://kremlin.ru/catalog/keywords/68/events/55767/work (accessed on 26 March 2021).

116. Starinskaya, G.; Peschinskij, I.; Serov, M. The Ministry of Energy has Finalized the Energy Strategy until 2035. Vedomosti, 2015. Available online: https://www.vedomosti.ru/business/articles/2015/08/28/606622-minenergo-dorabotalo-energostrategiyu-do-2035-g (accessed on 1 August 2020).

117. Enerdata. Russia Adopts the Final Version of Its New Energy Strategy to 2035. 2020. Available online: https://www.enerdata.net/publications/daily-energy-news/russia-adopts-final-version-its-new-energy-strategy-2035.html (accessed on 16 October 2020).

118. Renwex. Russia to Improve Mechanisms for Supporting Renewable Energy Projects. 2020. Available online: https://www.renwex.ru/ru/media/news/index.php?id=14201 (accessed on 16 October 2020). (In Russian)

119. Tracy, S.J. Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qual. Inv.* **2010**, *16*, 837–851.

120. Weible, C.; Sabatier, P. A guide to the advocacy coalition framework. In *Handbook of Public Policy Analysis*; Routledge: Oxford UK, 2018; pp. 123–136.