Similar Goals, Divergent Motives. The Enabling and Constraining Factors of Russia's Renewable Energy Policy

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Abstract:

In 2009, Russia set its first quantitative renewable energy target at 4.5 percent of the total electricity produced and consumed by 2020. The country's lack of traditional drivers to develop renewable energy sources such as import dependence and environmental policy requires further investigation into the enabling and constraining factors of Russia's renewable energy policy (REP).

This article offers an in-depth policy analysis of various enabling and constraining factors of Russia's REP throughout the entire policy cycle – from goal setting to implementation – to avoid the trap that policy changes do not necessarily translate into changes in investment behavior. On the basis of field research in Moscow (2014-2015), the article scrutinizes four structural dimensions that – to a different extent and depending on the policy phase – have influenced Russia's REP between 2009 and 2015.

The article concludes that institutional and financial factors better explain actual implementation than claims of ecologic and resource-economic factors. Contrary to expectations, solar projects have been selected and implemented more accurate than wind, which has the highest technical and economic potential. The solar industry benefits from access to large oligarchic business groups and existing solar panel production facilities to meet the local content requirement.

Keywords: Russia; Renewable Energy Policy; Social Structurationist Approach; Policy Cycle Analysis; Neopatrimonialism

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"We should rationally use all natural resources, build ecologically safe installations, that work on solar, wind and water energy. In this way we stimulate the introduction of new technologies, and do not merely burn hydrocarbons." (Medvedev, 2015)

1. Introduction[2]

In 2009, Russia's energy strategy for the first time set the goal to achieve a 4.5 percent share of the total electricity produced and consumed from renewable sources by 2020. In 2013, the Russian government launched a support scheme for renewable electricity.

This emerging renewable energy policy (REP) cannot be fully explained by traditional drivers. The energy-endowed country has enormous coal, gas and oil reserves which makes the need to develop alternative indigenous energy sources to reduce import dependence superfluous. Security of supply issues seem to be less relevant as well: Russia has an oversupply of electricity production generated mainly from cheap gas, nuclear and coal sources. Stimulating investments in renewables solely on account of environmental concerns is also questionable, since the signing of Kyoto had been instigated largely by geopolitical and economic reasons (Henry and Sundstrom, 2007), Russia's environmental policy has been disintegrating since the second half of the nineties (Mol, 2009), and the green movement is too fragmented in Russia (Yanitsky, 2005). Given this low explanatory power of traditional enabling factors, this article seeks to contribute to the debate about the divergent drivers of renewable energy policy in the political context of petrostates. The objective of this article is to investigate the enabling and constraining factors of Russia's renewable energy policy.

To achieve this goal, this article first identifies four structural dimensions drawing on Aalto et al. (2014) social structurationist approach followed by a policy analysis that reveals enabling and constraining factors of Russia's REP within each dimension. The analysis does not restrict itself to renewable energy legislation and political discourse to avoid the trap that policy changes do not necessarily translate into changes in investment behaviour. Instead, the four dimensions have been scrutinized throughout the entire policy cycle – from goal setting to implementation (up to 2015).

The data about the commissioning of renewable energy projects originate from renewable energy companies and the annual tender results are provided by Russia's Administrator of the Trading System (ATS). These official statistics have been complemented and triangulated with stakeholder's interviews and conference proceedings in the Russian Federation during multiple research stays at the Russian Academy of Sciences in Moscow (2014-2015), as well as reports in Russia's main business oriented newspapers.

The remainder of the article is structured as follows. The next section reviews past research on enabling and constraining factors of REP. Section 3 presents four dimensions of a social structurationist model that might explain Russia's REP at each phase of the policy cycle. The subsequent section applies the model to each policy phase with the objective to reveal which

[2] Abbreviations. REP: Renewable Energy Policy; RES: Renewable Energy Sources; LCR: Local Content Requirement; ATS: Administrator of the Trading System; LCOE: Levelized Cost of Electricity

factors enable and constrain REP in Russia. The last section provides concluding remarks about the explanatory power of each dimension.

2. Literature Review: Explaining Russia's Renewable Energy Policy

Past research on enabling and constraining factors of REP mainly deals with energy importing countries (Darmani et al., 2014). This is not surprising, since these countries seek to stimulate indigenous energy resources as a means to reduce import dependence. Such studies mainly find explanations for different levels of REP implementation in 1) the resource-economic basis such as the different levels of solar radiation and wind speed (Trypolska, 2012) 2) differing financial instruments such as feed-in tariffs and investment grants (Kitzing et al.); 3) formal and informal institutional factors such as the strength of civil society and political party actors pushing for changing the current fossil fuel dominated energy sector (Lund, 2010) and privileged large companies with close links to the ruling elite, also known under the concept of neopatrimonialism (Schuman and Lin, 2012); 4) ecologic drivers such as the reduction of greenhouse gas emissions (Koljonen et al., 2009).

Exporting countries' incentives for developing an REP are, however, often overlooked. Empirically, this could be explained by the fact that support mechanisms of renewable energy sources (RES) in energy-endowed countries is of much more recent date whereas importing countries already gained interest in alternative energy sources in the wake of the 1970s oil crises.

This could also be explained from the different incentive structure of energy exporters since they do not depend on foreign energy suppliers. At the same time, significant constraining factors exist, not in the least the enormous oil and gas lobby, cheap domestic fuel prices and an important financial stake of political actors in the energy sector (Smeets, 2014). What is surprising then, is why, given this lack of clear incentives and substantial barriers, exporting countries do develop a REP. In order to reveal alternative enabling and constraining factors, this research focuses on Russia as a case of a hydrocarbon producer country with the world's largest proven natural gas and coal reserves and at the same time the third largest oil producer (2014), an extreme case in which genuine interest in renewables can be expected to be *a priori* very limited on the basis of import dependence and environmental concerns.

The literature offers analyses of Russia's support scheme from political, legal and economic perspectives. These approaches focus on the normative question why Russia should invest in renewables (International Finance Corporation, 2011), describe how the support scheme has been designed (Boute, 2013) and compute the (limited) impact it has on electricity prices (Vasileva et al., 2015). The implementation of Russia's RES policy has not been addressed. To fill up this gap, this article traces the enabling and constraining factors in shaping Russia's REP throughout the policy making process, including an extensive account of the implementation phase.

3. Four dimensions of a Social Structurationist Model

The research question builds upon the social structurationist model, developed by Aalto et al. (2014). The model is most appropriate since it similarly seeks to explain energy policy formation by using a holistic approach. The model conceptualizes the policy environment in terms of structural dimensions (resource-economic; financial; institutional; ecologic) and then identifies enabling and constraining factors within each dimension to explain energy policy formation. This study attempts to extend the model to domestic renewable energy policy of an exporting country. In what follows, each of the dimensions is applied to Russia's REP.

Resource-economic dimension

The resource-economic dimension in the field of renewable energy deals with the technical and economic potential of different renewable technology types. According to the Levelized Cost of Electricity (LCOE), onshore wind (73.6) will be the cheapest by 2020, closely followed by hydroelectric power plants (83.5); solar PV will remain relatively more expensive to other renewable technologies with a levelized cost of 125.3 (US Energy Information Administration, 2015). The International Energy Agency similarly concludes that at all modelled discount rates, solar remains more expensive than wind (IEA, 2015). On the basis of Russia's geographical location, it is expected that wind not only is the cheapest but also has the largest technical potential among renewable technologies (Lukutin, 2008). On these grounds, Russia's REP is expected to focus in the first place on wind energy projects, followed by hydro and solar technologies.

Financial dimension

The financial dimension comprises "*all financial transactions, incentives and constraints pertaining to energy*" (Aalto et al., 2014: 9). Renewable energy projects in particular are characterised by high capital costs and low maintenance and operation costs (Hearps and McConnell, 2011).[3] In this light, solar projects are roughly twice as capital intensive (per kWh) relative to wind projects.[4] On this dimension, the support scheme is expected to foresee higher capital expenditure limits for solar compared to wind and hydro projects. Additionally, Russia's REP is expected to develop in Russia's isolated regions in which locally available RES not only have the largest technical potential, but also minimize transportation costs and substitute more expensive diesel oil.

Institutional dimension

The institutional dimension ranges from informal norms and rules of the game to formal sectoral interests and decision-making capacity (Aalto et al., 2014). At the informal side of the spectrum, neopatrimonial relations as the symbiotic relationship between Russia's executive power and oligarchic business actors greatly affect policy making (Gel'man, 2015). On account of this factor, one could expect that a newly emerging renewable subsector will be scrutinized closely by Russia's energy elite and Russia's REP would be regulated top-down.

Apart from the neopatrimonial factor, Russia's population expects the government to provide energy at low prices as an inheritance of the Soviet Union. Low electricity prices facilitate political and social stability (Godzimirski, 2013: 177). The main challenge of organizing a support scheme for renewable electricity within the limits of this social constraining factor is

[3] Fossil-fired power plants generally have lower capital costs, yet higher operation costs because of the fuel (gas, diesel, coal) that has to be burned.

[4] Investment costs vary greatly by region and over time, yet for simplicity, the following average capital costs have been used: solar: 3000$/kW ; onshore wind: 1500 $/kW; small hydro: 1300 $/kW as an approximation of Irena statistics, available at:
http://www.irena.org/documentdownloads/publications/ irena_re_power_costs_2014_report.pdf

its upward pressure on the end-consumer's electricity price. On this basis, one might hypothesize that the support scheme is designed to minimize the additional burden on domestic consumers.
A third institutional factor consists of the implementation capacity of a renewable energy company. This factor strongly correlates with the neopatrimonial factor that provides access to large financing groups. A positive relationship can be expected: the better the neopatrimonial access to resources, the stronger the financial backing and the larger the implementation capacity.

Ecologic Dimension
Public and political attention to the ecologic dimension of energy policy increased dramatically over the last two decades. Combating air pollution and climate change have climbed on the national and international political agendas. In 2011, Russia's energy sector accounted for 82.7 per cent of the country's anthropogenic greenhouse gas emissions. If ecology is one of the main genuine reasons for advancing the implementation of Russia's REP, one might expect that energy technologies that pose the greatest threat to the environment, coal and nuclear energy, would be replaced by much cleaner gas and renewables.

In a social structurationist model, actors interact with these structural dimensions. Given that Russia is a non-democratic country, the actor mix is different. The article argues that merely two groups of seamlessly interconnected actors are dominant during the policy formation process: the political and economic elite. In contrast to democracies, green parties do not find representation in Russia's State Duma. The notable absentees are societal actors such as environmental NGO's (Yanitsky, 2005). In particular, the Russian NGO *EcoDefense* had to stop its activities as it has been put on the 'Foreign Agent' list. According to the self-assessment of *Green Peace Russia*, their influence on Russian policy making is extremely limited.[5]

To explicate the dynamics of policy making, this article combines the social structurationist model with the policy cycle literature (Jann and Wegrich, 2006). The concept of policy formation, the dependent variable in the social structurationist approach, is broken down into phases. In this way, the trap that policy formation remains a black box in which policy changes do not necessarily translate into the implementation of renewable energy power plants is avoided. The policy cycle is used as an analytical tool, rather than a prescriptive, normative process (Lasswell, 1956). This allows for assessing diverse enabling and constraining factors within separate phases of the policy formation process. Four policy phases have been identified: goal setting, policy design, policy implementation and policy feedback. The next section will subsequently identify enabling and constraining factors in each of these phases.

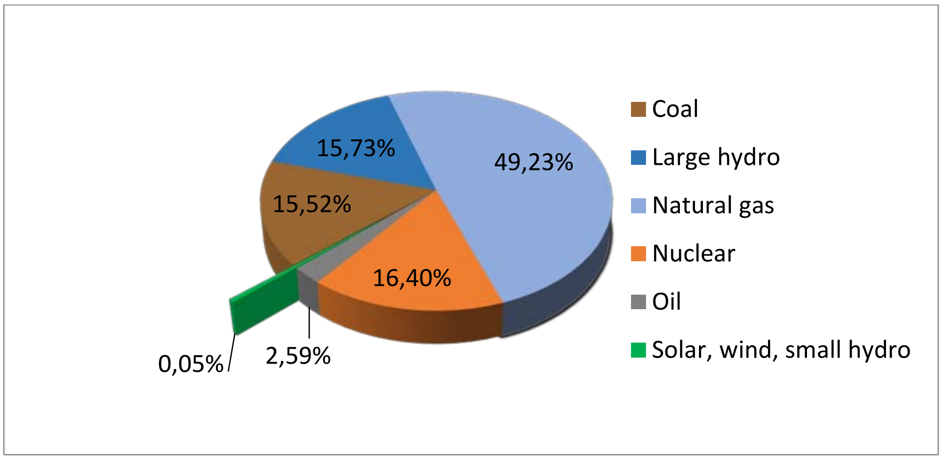
[5] Interview with Greenpeace Russia, Moscow, 04.08.2014.

4. Four Policy phases

4.1 The Goal Setting Phase: the 4.5 percent renewable target

In 2009, Russia's government for the first time defined a quantitative renewable energy target that 4.5 percent of the total electricity generation should originate from renewable sources by 2020. In addition, intermediate goals of 1.5 percent by 2010 and 2.5 percent by 2015 have been set (Government of the Russian Federation, 2009b). This raises the question what factors contributed to this goal setting.

Figure 1. Russia's Electricity production by source 2011 (% of total production)



Source: World Bank, World Development indicators

In the wake of the 2008 global financial crisis and the collapse of world oil prices, Russia's economy was confronted with its dependency on oil and gas exports. Russia's Energy Strategy in response interpreted the dominant role of gas in the domestic electricity mix as a threat and suggests to diversify the energy mix, inter alia by increasing the share of renewables (Government of the Russian Federation, 2009a). Other resource-economic enabling factors that Russia's Ministry of Energy mentions are the need to save fossil fuel for future generations[6] and to improve the reliability of power supply to local businesses. An important enabling factor concerns long-term resource-economic development: to catch up with the West in respect of this knowledge-intensive high-tech equipment (Ministry of Energy, 2014). First deputy minister of energy and chairman of the board of Russia's oil company Bashneft, Aleksey Teksler, bluntly stated that "*this [support scheme] program has been launched solely to support domestic competence and, in particular, to keep up with the scientific-technical revolution in the energy sector, especially renewables* (Pogosyan, 2015)" given that Russia's electricity demand is falling since 2009 and each year, 20 GW of traditional energy supply remains unused. From a financial perspective, Russia's political elite seek to reduce transmission and distribution costs of electricity and heat through investments in renewables.

[6] This would also save fossil fuel for export purposes, extending future rents.

If these resource-economic and financial concerns are genuine enabling factors, a decentralised support scheme would be expected in the design phase. A decentralised system would fully exploit the available RES in Russia's energy-deficit isolated regions, improve reliability of electricity supply and lower electricity prices through the minimization of transport and transmission costs.

Apart from these dimensions, an ecologic enabling factor is mentioned. Russia's political elite declare that they seek to reduce greenhouse gas emissions and hazardous emissions through the use of renewables in electricity and heat generation. The ecologic concern seems to be at odds with the diversification goal within the resource-economic dimension. If ecologic concerns dominate, renewable power plants would be given priority over new coal-fired power plants. The Energy Strategy nonetheless also foresees a diversification towards new coal and nuclear plants (Government of the Russian Federation, 2009a), which has been put into practice in Russia's Far East.[7]

Although numerous enabling factors have been mentioned, the intermediate target of 1.5 percent by 2010 has not been met: the share of renewables in electricity generation amounted to a mere 0.05 percent in 2011 (Fig.1.) and by 2014, Russia's Ministry of Energy had to ascertain that less than 1 percent of consumption and production of primary energy originates from renewables (Ministry of Energy, 2014: 80). This failure can be partly explained by an important institutional constraining factor. Unclear targets and frequent policy changes that can negatively influence risk-return perceptions of investors (Wüstenhagen and Menichetti, 2012: 5). The Russian government created regulatory uncertainty by decreasing the 2020 objective for electricity production from RES to 2.5% (Government of the Russian Federation, 2014: 16). In addition, the switch from a premium to a capacity-based support scheme created investment uncertainty, discussed in the subsequent policy design phase.

4.2 Policy Design Phase: Characteristics of the support scheme

4.2.1 Enabling and constraining factors of Russia's support scheme

To achieve the 4.5 percent renewable target, a support scheme is necessary. As a major energy producer, regulated domestic gas prices and fully amortized nuclear power plants imply low electricity prices. Additionally, the government caps the rise in electricity prices on an annual basis.[8] These financial constraints entail that renewable projects have to be subsidized in Russia to compete with cheap substitutes (Smeets, 2014; Wittmann, 2013).

Institutionally, the government took several implementing regulations to enable renewables, yet the resulting regulatory uncertainty became a constraining factor. In 2007, amendments to the Federal Electricity Law introduced a support scheme under which a premium was added to the wholesale electricity price (Federal Assembly of the Russian Federation, 2003). However, this premium scheme was never implemented inter alia because of a social constraint within the institutional dimension: fears that it would put upward pressure on electricity consumer prices (Boute, 2013).

[7] To power Russia's energy-deficit Far East, *RusHydro* for instance builds three new coal-fired power plants, instead of using locally available renewable resources.

[8] In 2016, electricity prices are allowed to increase by a maximum of 7 percent, which is far below the 15 percent inflation rate.

In 2011, Government Decree No 449 introduced a support scheme for renewables on Russia's capacity market[9] of the wholesale electricity market. This capacity-based support mechanism significantly differs from feed-in tariffs, premiums or green certificates that are usually linked to electricity production (MWh). In contrast, Russia's support scheme finances installed capacity (MW) (Boute, 2013). This institutional choice allows the state to keep control over quantity and price of RES projects thereby minimizing the risk of electricity price hikes as a consequence of capital intensive renewable capacity (Vasileva et al., 2015).

To manage the process, the Administrator of the Trading System (ATS) organises an annual tender in which this institution determines which companies and what projects will be eligible for support. Companies willing to invest in small hydro, solar or wind installations are invited to place bids for RES projects to be commissioned in the subsequent four years.[10] Each year, a maximum capacity for each of the three resource types has been predefined that could benefit financial guarantees (Table 1.). By 2020, a projected total of 5.871 GW renewable capacity (2.5% of Russia's currently installed electricity capacity)[11] would be put into operation.[12] Projects with the lowest capital expenditure that remain within the annual capacity limit receive the guarantee to sell their renewable capacity over the course of 15 years at preferential prices that ensure a 14% return on investment (Boute, 2013).

Table 1. Annual Installed Capacity Limits per Type of RES (MW)

	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**	**% of Total**
Wind	100	250	250	500	750	750	1000	**3600**	**61.3**
Solar	120	140	200	250	270	270	270	**1520**	**25.9**
Small Hydro	18	26	124	124	141	159	159	**751**	**12.8**
Total	**238**	**416**	**574**	**874**	**1161**	**1179**	**1429**	**5871**	**100**

Source: Government resolution No 861-R of 28 May 2013 "On Amendments to Guidelines for State Policies in Increasing the Effectiveness of Use of Renewable Energy Sources for the Period until 2020"

Digging deeper into the components of the support scheme design reveals several enabling and constraining factors. First, the resource type has been limited to solar, wind and small hydro projects. In line with the resource-economic dimension, wind energy as the most promising technology from a technical-economic perspective should provide for the greater part (61.3 percent) of new renewable power plants up to 2020. Despite Russia's substantial hydro potential, lower LCOE and relatively localised solar potential,[13] solar projects account for 25.9 percent of planned new renewable capacity, followed by 12.8 percent of small hydro projects

[9] Installed capacity is traded on the capacity market, rather than electricity. For a clear description of the capacity market, see Boute, A., 2012. Promoting renewable energy through capacity markets: An analysis of the Russian support scheme. Energy Policy 46, 68-77.

[10] Thus, in 2013 a tender had been organised for projects to be realised by the end of 2014 through 2017.

[11] The installed capacity at the end of 2014 amounts to 232451 MW according to the System Operator of the Unified Energy System, see http://so-ups.ru/index.php?id=ees [04.04.2016]

[12] Under the condition that the support scheme will be fully implemented

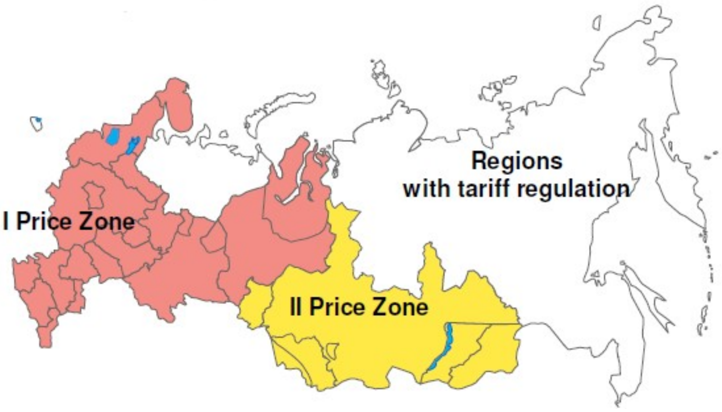
[13] Russia's technical solar potential is most promising in its southern regions

(Table 1.). The resource-economic dimension thus cannot fully explain why more expensive solar energy is chosen over small hydro power.

Second, the support scheme has been limited to the wholesale market. The scheme, which gathers financial resources from this market, is restricted to grid-connected companies that propose projects within Russia's price zones - that is European Russia and West Siberia (Fig. 2). Moreover, it excludes micro installations due to the 5 MW threshold to participate in the wholesale market (Boute, 2013: 8).[14]

This second institutional choice runs counter to the resource-economic and financial dimensions on the basis of which a focus on Russia's isolated regions is expected. Russia's coastal areas in the Northern and Far East regions are characterised by high wind speeds and solar energy has the highest potential in Southern Siberia. It also contradicts the resource-economic goal mentioned in the goal setting phase to improve reliability. Remote settlements often face electricity blackouts and would greatly benefit from locally available, off-grid micro installations to decrease dependence on fossil fuels imported from other Russian regions. From a financial perspective, the generation cost of electricity is substantially higher in isolate areas as a result of long transportation routes and higher fuel costs (imported diesel oil).

Figure 2. Russia's price zones of the wholesale electricity market



Source: Market Council, available at http://www.ceer.eu/portal/page/portal/EER_HOME/EER_INTERNATIONAL/ CEER-FTS/Workshop_on_Capacity_Markets/Mr%20Barkin%20NP%20MC.pdf

A third condition to the support scheme refers to the financial dimension. The Administrator of the Trading System (ATS) selects RES projects on the basis of the lowest capital expenditure (Boute, 2013: 11). Such highly competitive tenders that award contracts to contenders that offered to develop RES projects at the lowest cost imply that companies with strong financial backing will be in the best position to obtain contracts (Breukers and Wolsink, 2007:2741).

A fourth institutional building block relates to the localisation of renewable production facilities.[15] For each renewable energy type, a local content requirement (LCR) has been determined (Table 2.). Investors must guarantee the use of equipment that has been at least partly produced or assembled in Russia. Investors that fail to comply with this requirement incur severe financial penalties (Boute, 2013). The idea behind such an obligation is to enable

[14] To exclude large hydro projects, small hydro projects have been defined as having a maximum capacity of 25 MW.

[15] Although such a local content requirement is by no means exceptional in comparison with practices abroad, these protectionist measures run counter to WTO rules, of which Russia became a member in 2012.

industrial growth on Russia's soil. This resource-economic enabling factor to create jobs and stimulate local investments in research and development conflicts with the financial dimension: Russian production is more expensive than already existing mass production of solar panels abroad.

Table 2. Local Content Requirement per Energy Type

Renewable energy type	*year of commissioning*	*Local Content Requirement*
Wind Energy	2014	35%
	2015	55%
	2016-2020	65%
Solar Energy	2014-2015	50%
	2016-2020	70%
Small Hydro Power	2014-2015	20%
	2016-2017	45%
	2018-2020	65%

Source: Boute (2013: 11)

4.2.2 Policy feedback: Retail Market Support Scheme

To meet financial and resource-economic concerns, by January 2015, the government established a legal framework of an additional support scheme on the retail market. It allows investors to gain financial support for smaller (< 5 MW) renewable installations and also encompasses regions with tariff regulations. Under this scheme, subjects of the Russian Federation are responsible for organising regional tenders and determining further selection criteria. The legal base, however, does not provide for sanctions coupled to the non-implementation of this regional policy. The financial dimension surfaces in the condition that RES projects should decrease the electricity price in order to receive financial support on the retail market.

The success of such regional programs lies in the discretionary power of regional administrations. The condition of a downward pressure on the electricity price runs the risk that regional authorities will use it as pretext of non-implementation. They could simply declare that, after scrutinizing the market, no such opportunities could have been identified.[16] An additional constraint of the regional support scheme from a resource-economic perspective is that the maximum possible technical capacity increase of new renewable energy installations in Russia's non-price zones is a mere 1 GW, too little a contribution to reach the 4.5 percent target (Willems, 2014).

4.3 Policy implementation

4.3.1 Dimensions of the Tender Results (2013-2014)

The ATS organised two tenders in 2013 and 2014 according to the above described rules of the game. The first tender already demonstrated that investors' interest substantially differed

[16] Interview with an international organisation promoting, financing and developing renewable energy in Russia, 16.09.2015

with regard to the renewable source type. Whereas the ATS received 58 bids for solar installations that exceeded the annual capacity limits by 289 MW, merely 105 MW out of the available 1.1 GW wind projects (2014-2017) had been selected. Prospective companies completely lacked interest in small hydropower: not a single investor made a bid (Skorlygina and Dzaguto, 2013). The second tender portrayed a comparable picture: an additional 505 MW of solar projects had been granted albeit merely one wind energy project (51 MW) had been approved. Energy giant *RusHydro* made the first three successful bids for small hydro projects for a total of 20.64 MW (Fadeeva, 2014). These tender outcomes further depart from the resource-economic dimension under which solar projects are expected to be the least promising renewable technology.

Moreover, the failure to achieve the prescribed annual capacity limit jeopardizes the objective to diversify Russia's electricity mix. According to the 2013-2014 tender rules, if the capital limit of that year has not been reached, the remaining capacity will not be transferred to the next year, which *de facto* reduces the total RES capacity target of 5.871 GW. In the case of the largest planned contributor to this capacity target, wind energy, a potential 299 MW did not find its way to an investor during the first two tenders (Table 3.). This raises the question what factors explain this bias in favour of solar energy.

Table 3. Annual Capacity Limits versus Tender Results 2013-2014 (MW)

		2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Total (2018)**
Wind	CapLim	100	250	250	500	750	750	1000	**1850**
	Tender	0	51	15	90	0	-	-	**156**
	Difference	**-100**	**-199**	-235	-410	-750	-	-	**-1694**
Solar	CapLim	120	140	200	250	270	270	270	**980**
	Tender	35.2	140	189	255	285	-	-	**904.2**
	Difference	- 84.8	0	-11	**+5**	**+15**	-	-	**-75.8**
Small Hydro	CapLim	18	26	124	124	141	159	159	**433**
	Tender	0	0	0	20.6	0	-	-	**20.6**
	Difference	-18	-26	-124	-103.4	-141	-	-	**-412.4**

Source: author's own computations on the basis of data, provided by the ATS

A first set of explanations lies encapsulated in the design itself. One interviewee, closely involved in the policy making process directly linked the design phase with the implementation phase: "*we sometimes have the impression that the support scheme has been tailored to the benefit of the solar sector, facilitated by some major government related oligarchs.*"

One of the institutional conditions to meeting the capacity limits is the available production capacity within the Russian Federation, which allows solar companies to comply with the strict LCR (Table 2.). In March 2015, *Hevel* launched the first full-cycle solar photovoltaic (PV) module manufacturing facility in Novocheboksarsk. The production facility is projected to produce one million solar modules per year with an annual manufacturing output of 130 MW.[17] Moreover, *Rusnano*'s board of directors approved *Hevel*'s strategy to modernise the quality of the solar panels to an efficiency level of 20%, thereby augmenting the annual output up to 160 MW (Barsukov and Skorlygina, 2015).[18] *Hevel* alone could, at current production capacity (130 MW), provide for 65 percent of the capacity limit for solar projects (200 MW in 2016). Foreign investors that won the tender are obliged to set up their own production/assembly facilities in Russia,[19] or to buy them at the only alternative supplier, *Hevel*. Given these production facilities, the LRC of 70 percent from 2016 onwards actually helps protect the development of solar production facilities on Russian soil against imported less expensive panels originating from foreign competitors.

Contrary to the solar industry, the LRC (Table 2.) forms a major institutional constraining factor in the wind industry. The wind sector requested the government (Skorlygina and Fomicheva, 2014) to lower the LCR as currently, not a single factory is present in Russia to develop and assemble wind generator components. Since large production facilities located in the Russian Federation are non-existent, not only does it scare off potential investors in risking financial penalties because of non-fulfilment of the LCR, it also pushes the time horizon for commissioning wind farms further back. According to the Global Wind Energy Council, the construction time of a 50 MW wind farm, similar of size as the Kalmykia project[20] would take up to six months (EWEA, 2016). Yet, when wind investors have to first engage other entrepreneurs to set up an assembly line, this would overdue the theoretical delivery date of in Russia produced components to build that wind farm by at least two years.[21]

In the case of small hydro, the LCR is not so much an issue of available domestic components, as it is financial. Since Russian equipment is more expensive than imported components, it drives up the capital cost which in turn increases pressure on the capital expenditure (capex) limits.[22]

Apart from the LRC, Decree No. 449 also subjects RES projects to capex limits, expressed in roubles per kW. Only projects below this limit will be eligible in the tender. The capital expenditure includes the installation investment costs and the costs related to connection to the grid (Boute, 2013: 10). Solar projects enjoyed more attractive capex limits (116451 RUB/kW in 2014 to 103157 RUB/kW in 2020) than wind projects (65762 RUB/kW in 2014 to 65368 RUB/kW in 2020) (Fadeeva, 2014). This is in line with the expectations formulated under the financial dimension since capital costs of solar power plants are roughly twice as expensive as onshore wind farms. The depreciation of the rouble, however, further constrained the attractiveness of the capex limits. Already in August 2014, wind sector representatives called for capex limits to be adapted to the current exchange rate.[23] Given Russia's weak banking

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[17] Information publicly available at the company's website: http://en.rusnano.com/portfolio/companies/hevel

[18] In addition, Telecom STV Company Limited has a production site of silicon wafers and PV modules in Zelenograd.

[19] The Chinese company Solar Systems also intends to set up its own production facility of solar panels in Tatarstan, available at: http://www.akm.ru/rus/news/2014/october/01/ns_4965041.htm

[20] *Alten* obtained a 51MW project in Kalmykia in the second tender.

[21] Interview with wind developing company, 11.08.2014

[22] Small hydro projects should stay within a generous 146000 RUB/kW capex limit.

[23] 48 RUB/EUR at that time.

sector with highly volatile interest rates, RES investors should preferably possess sufficient equity capital to finance capital intensive projects out of their own funds.

With regard to small hydro energy, the firm-level institutional capacity played an important role. *RusHydro*, Russia's leading state owned hydropower company,[24] possesses the capacity and funds to realise small hydro projects tough seems to lack the know-how and economic interest in small hydro installations.[25] "*RusHydro is capable of constructing large hydro power plants, however building a 100 kW hydro plant on a small river is something completely different.*[26]" *RusHydro*'s investment program includes only some renewable pilot projects, yet won the first three small hydro projects in the tender of 2014.

Nord Hydro, a company specialized in the construction and renovation of small hydro power plants, does possess the know-how but decided not to take part in the first two tenders on financial grounds. The main concerns are related to the tender's institutional architecture (Vinogradov, 2013). First, the efficiency rate of hydro installations above 38 percent is judged to be too strict and the guaranteed 14 percent return on investments has been evaluated as insufficient to incentivize small hydro investments.[27]

Apart from these financial constraining factors, the time horizon forms an additional institutional constraint to small hydro projects. The tender's time horizon, during which a project should be commissioned, is four years. According to *Nord Hydro*'s calculations, in the best case scenario, it takes at least four years to build a small hydro plant (minimum construction time of a 25 MW hydro plant) and an additional half a year to deal with attestations and qualification requirements. Thus, "*if we wish to take part in the tender, we incur half a year of penalties at the least* (Vinogradov, 2013)."

4.3.2 Project Selection: the neopatrimonial factor

A second set of explanations why the solar industry has taken a leading position centres on project selection. What catches the eye is the limited number of actors that obtain projects under the support scheme. The persistence of neopatrimonial networks both enable and constrain actors in participation in, and their chances of winning the tender.

In the case of small hydropower, Russia's state company *RusHydro*[28] was the single contender, winning three projects. With regard to wind projects, two actors were present: "*KompleksIndustriya*" (7 projects totalling 105 MW) in the 2013 tender,[29] and Czech based company *Alten* (one project of 51 MW) to be operational by the end of 2015.

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[24] 60.4 percent of the shares are in the hands of the Russian state
[25] Interview with an international organisation promoting, financing and developing renewable energy in Russia, 16.09.2015
[26] Ibidem
[27] The capacity remuneration is reduced if the facility fails to produce a certain minimum amount of electricity per year, expressed as a capacity factor (38% in the case of hydropower)
[28] As of 1 January 2015, the Russian Federation owned 66.8370% of RusHydro's shares.
[29] To be commissioned by 2016-2017.

Table 4. Actors taking part in the 2013-2014 tender for solar projects

Company with successful solar bid (MW)	Tender 2013	Tender 2014	Total projected capacity (percentage in total capacity)	Ownership structure	Russian oligarch(s)
Kompleksindustriya + *MRC energoholding*	270	165	435 (48,1%)	Solar Energy Holding 100%	M. Abyzov
Hevel solar	99	155	254 (28,1%)	Rusnano 51 % Renova 49 %	A. Chubais & V. Vekselberg
Solar systems	-	175	175 (19,4%)	Amur Sirius Power Equipment co., ltd 100%	/
Orenburg heat generating company (Orenburg HGC)	25	-	25 (2.8%)	T-Plyus 100%; Renova 65%	V. Vekselberg M. Abyzov
MEK engineering	-	10	10 (1.1%)	Corporation Integral Electric Power Complex 100 %	A. D'yakov
Eurosibenergo	5.198	-	5.198 (0.6%)	EN+ Group 100%	O. Deripaska
Total capacity won	399.198	505	904.198		

On the solar market, actors at first glance seem to be more diverse, however behind this plurality lurk neopatrimonial networks (Table 4.).[30] Immediately after the first tender, two companies that have been set up with the single goal to compete in the tender, *KompleksIndustriya* and *MRC Energoholding*, joined forces under yet another company *Solar Energy Holding*. All at once, this obscure holding became the contender with the largest renewable portfolio under the support scheme (435MW solar and 105MW wind). The ownership structure has not been made public. Different sources mention that the company - via a chain of intermediary companies and offshore structures (Krichevskiy, 2015)- belongs to politician-entrepreneur, Mikhail Abyzov, Minister for Open Government Affairs (Skorlygina and Dzaguto, 2013).

The second major successful contender in the solar tender is *Hevel Solar*, a joint venture of state controlled *Rusnano* and *Renova* group. Both companies not only have formal ownership ties with the state but are also headed by two Kremlin-related businessmen, Anatoliy Chubais and Viktor Vekselberg.

[30] The number of actors continues to decline. In September 2015, *MEK Engineering* announced that it would like to refrain from its obligation to build the solar power plants as a consequence of the depreciation of the rouble that makes the project unprofitable Fomicheva, A., 2015. Investory prosyat razresheniya uyti s solntsa [Investors request permission to leave the sun], Kommersant, Moscow.

The seemingly regional *Orenburg Heat Generating Company* that committed itself to construct a 25 MW solar farm in Orsk (Orenburg) is a subsidiary in full ownership of energy holding *T-Plyus*.[31] The latter holding owns 59 electric and cogeneration power plants and is one of the successor companies that appeared after the privatisation of the state electricity monopoly *RAO UES*. The very same *Renova* group is the majority shareholder, owing a 65 percent stake in *T-Plyus* and delivered the president of the board of directors.[32] Michail Abyzov has a minority package in *T-Plyus* (Derbilova et al., 2016).

MEK Engineering, a company that obtained two solar projects of 5 MW each, is linked to former RSFSR Minister of Fuel and the Energy Sector, Anatolii D'yakov (Skorlygina and Dzaguto, 2013). *EuroSibEnergo* is one of Russia's main electricity (and heat) producers[33] and is part of another energy major, the *En+ Group*, controlled by yet another oligarch belonging to the Kremlin's inner circle, Oleg Deripaska.

The neopatrimonial factor operationalized as the close relationship between major energy holdings (*Solar Energy Holding, Hevel Solar, Orenburg HGC, MEK Engineering, EuroSibEnergo*) and Russia's political and economic elite, seems to be an important enabling factor in attracting funds and investor guarantees. Two companies, *Solar Energy Holding* and *Hevel Solar* together control more than 75 percent of all solar projects. The former company also won 105MW out of the 156 MW assigned wind projects over the two tenders. In the case of small hydropower, Russia's state company *RusHydro* obtained all projects.

4.3.4 Dimensions of the timely commissioning of RES projects

Shifting from the tender results towards the commissioning of renewable energy projects, neopatrimonial, financial and institutional factors play important roles. During the first two tenders, 51 MW of wind and 175.198 MW of solar should have been operational by the end of 2015 (Table 3.). In practice, no wind projects came online and a mere 34.4 percent of the planned solar projects have been commissioned by December 2015 (Table 5.).

The neopatrimonial factor surfaced at the ceremonies of the inauguration of new plants. A year later than planned, *EuroSibEnergo* commissioned the Abakanskaya solar plant (5.198 MW). The head of the Khakass republic, Viktor Zimin, personally thanked Oleg Deripaska for his investments in the region (Medvedev, 2015). *Hevel* in contrast launched its 5 MW Kosh-Agach solar power plant, due by 2015, almost a year ahead of schedule (Ria Novosti, 2014). The leading role of *Hevel* in launching the 'largest' (5 MW) solar power plant[34] has been underlined by president Vladimir Putin taking part in the opening ceremony (TASS, 2014). On October 29th, Minister of Energy A. Novak and *Rusnano*'s head A. Chubais opened the first 10 MW solar power plant in Bashkortostan. The power plant surpassed the 2015 LCR with 20 percent, already meeting the 70 percent barrier required by 2016 (TASS, 2015). *Renova's* other subsidiary, *Orenburg HGC*, also managed to timely commission the 'largest' Orskaya Solar Power Plant (25 MW) in the presence of Prime Minister Medvedev and V. Vekselberg.

[31] Formerly known as Volzhskaya TGK

[32] Renova, *Company structure*, http://www.renova.ru/structure/company/detail/139/ [27.12.2015],

[33] The company produces about 9% of Russia's electricity, of which 75 percent comes from large hydro plants. More information is available at the company's website: http://www.eurosib.ru/ru/activity/businesses/

[34] However, if Russia's elite state that the Crimea forms an integral part of the Russian Federation, they forgot to mention the 407 MW solar power plants installed on the Ukrainian peninsula.

Not all companies linked to Russia's political elite have been equally successful, implying that the neopatrimonial dimension can only partly explain the level of implementation. *MEK Engineering* as well as *RusHydro* officially requested the *Market Council* (the regulator of the wholesale market) to renounce the Agreement for the Supply of RES Capacity without penalty (Fomicheva, 2015). *Solar Energy Holding*, the company that won 105 MW of wind energy projects to be commissioned by the years 2016-2018, is still looking for Russian partners to achieve the required localisation (Fadeeva, 2014).[35] Czech based *Alten* that won a 51 MW wind farm project in Kalmykia to be completed by the end of 2015 also failed to commission in time.[36]

The financial and institutional dimensions provide two additional enabling factors of implementation: access to funds and production capacity. *Hevel* and *Orenburg HGC* (*T-plyus*) are the only companies that have the capacity to be able to deliver in time (Table 5.). Interestingly, both companies not only share a major shareholder, *Renova*, but also contracted the same construction company, *Avelar Solar Technology*, a subsidiary of *Hevel*, to deliver solar panels for the 25 MW Orsk power plant (Interfax, 2015). *Hevel*, through its production facility in Novocheboksarsk currently has a monopoly on the delivery of solar panels that meet the required localisation of production.

Table 5. Solar Projects commissioned by December 2015 (MW)

Company successfully applying for a solar project in 2014-2015 (MW)	2014	2015	Total Planned Capacity	Commissioned solar power plants by December 2015	Supplier of solar panels
Solar energy holding	30	75	105	0	Astana Solar
Hevel solar (renova & rusnano)	-	30	30	30	Hevel
Orenburg heat generating company (t-plyus/renova)	-	25	25	25	Avelar (100% subsidiary of Hevel)
Mek engineering	-	10	10	0*	
Eurosibenergo	5.198	-	5.198	5.198**	EuroSibEnergo
Total capacity	35.198	140	175.198	60.198	

* MEK Engineering requested to renounce the CDA ** commissioned with a one year delay

35 Widening the focus from the support scheme to projects that have been de facto commissioned and contribute to Russia's renewable capacity, the annexation of the Crimea played a more substantial role. While Russia's installed wind capacity in 2013 amounted to a mere 16.8 MW, this capacity increased almost fivefold, to 83.65 MW, after the incorporation of the Crimea. Thus, Russia indirectly profited from Ukraine's more developed renewable energy policy.

36 Interview with wind developing company, 11.08.2014

4.4 Feedback loops of the capacity-based support scheme

The macro-economic situation deteriorated dramatically in the course of 2014, increasingly constraining the support scheme financially. The Market Council[37] recognized that the weakening of the rouble in 2014-2015 resulted in a significant increase in capital expenditure, leading to a fall in the guaranteed return on investments to less than 10 percent. In parallel, the sharp increase in bank rates made it impossible to receive affordable loans (Barkin, 2015).

To hedge for further exchange rate fluctuations, Government Decree No 1210 guarantees Russian investors the promised 14 percent return on investment through pegging the capital expenditure limits to a Euro-Dollar basket. Decree No 1210 also grants participants of the first two tenders a 12 month postponement of penalties for delays in the actual commissioning. At the same time, a severe penalty has been attached in the case of non-compliance after this transition period ends.[38] These measures build in some flexibility with the purpose to stimulate the implementation of already selected projects.

These significant financial measures have been accompanied by a set of stimulation measures specifically targeted at the wind industry. Instead of relying on the resource-economic dimension that wind energy would only contribute to the existing oversupply on the wholesale electricity market, Government Resolution No 1472 seeks to close the implementation gap by changing the institutional rules of the game (Government of the Russian Federation, 2015).

First, new annual capacity targets have been set to institutionally enable the implementation of wind projects (Table 6.). The extension of the implementation horizon for wind energy allows investors to achieve the same 3.6 GW goal spread out over four additional years. The new targets also take the lack of production facilities into account by gradually increasing the maximum capacity and never exceeding 500 MW of newly commissioned capacity. The changes in the maximum annual capacity also take into account the already obtained 51 MW wind projects, thus allowing the 2015 tender to start with a clean sheet.[39]

Table 6. Changes in the Maximum Annual Capacity that could be financed under the support scheme

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
WindX	100	250	250	500	750	750	1000					**3600**
WindY	-	51	50	200	400	500	500	500	500	500	500	**3600**
Solar	120	140	200	250	270	270	270	-	-	-	-	**1520**
Small Hydro	18	26	124	124	141	159	159	-	-	-	-	**751**
Total	**238**	**416**	**574**	**874**	**1161**	**1179**	**1429**	**500**	**500**	**500**	**500**	**5871**

Source: WindX: Maximum Annual Capacity according to Government resolution No 861-r of 28 May 2013
WindY: Maximum Annual Capacity according to Government resolution No 1472-r of 28 July 2015

[37] A non-profit self-regulatory organization, consisting of representatives of all parties of the Russian electricity market. The Council performs tasks of legislative implementation and develops the overall market functioning.

[38] 5 percent of the capex limit for 1 kWh.

[39] Table 5. also shows that currently, no new solar and small hydro plants are planned between 2021-2024. The solar sector already has plans to export the oversupply in these years to projects in Saudi-Arabia and Iran. http://ru.euronews.com/newswires/3106992-newswire/

Second, LCRs have been decreased substantially (Table 7.), thereby loosening the institutional constraint to allow for new wind component factories to be planned and constructed on Russian soil. The previous LCR of 65 percent from 2016 onwards only has to be met by 2019. It will at least take another three years between setting up a local factory in Russia that could deliver wind generator components and the actual use of these parts in a wind farm.[40] Thus, if such a decision is made by the end of 2015, Russian companies might be able to implement the annual target given the 65 percent localisation constraint.

Table 7. Local content requirement reductions for wind energy

Renewable energy type	commissioning year	Local Content Requirement
Wind Energy (Resolution No. 861-r of 28 May 2013)	2014	35%
	2015	55%
	2016-2020	65%
Wind Energy (Resolution No. 1472-r of 28 July 2015)	2015-2016	25%
	2017	40%
	2018	55%
	2019-2024	65%

Third, the government also loosened the reins vis-à-vis the financial constraint. To guarantee the 14 percent return on investment, the government could either chose to lower the annual capacity targets or to raise capex limits. Initially, the Ministry of Energy argued in favour of the former option as to minimize pressure on electricity prices (Pogosyan, 2015). However, this financial constraint had been overcome and the final decision was made to increase capex limits with 67 percent in order to preserve the 5.871 GW target (Table 8.).

Table 8. Limits to the Capex of Renewable Energy Investment Projects (roubles per kW)

Type of RES	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WindX	65762	65696	65630	65565	65499	65434	65368				
WindY	65762	110000	109890	19780	109670	109561	109451	109342	109232	109123	109014
Solar	116451	114122	111839	109602	107410	105262	103157				
Small Hydro	146000	146000	146000	146000	146000	146000	146000				

Source: WindX: Maximum Annual Capacity according to Government resolution No 861-r of 28 May 2013
WindY: Maximum Annual Capacity according to Government resolution No 1472-r of 28 July 2015

5. Conclusion: Factors enabling and constraining Russia's renewable energy policy

Table 9. summarizes the results of each of the enabling and constraining factors within each policy phase. The analysis shows that claims of ecologic improvement and increased reliability of electricity supply in the goal-setting phase make room for financial and institutional factors

[40] Interview with wind developing company, 11.08.2014

further down the implementation chain. Instead of the expected decentralised support scheme in Russia's isolated regions, Russia's policy makers have opted for a top-down approach. The solar industry, contrary to resource-economic expectations, has been privileged, receiving generous capital expenditure limits and a protective LRC. Neopatrimonial ties between Russia's emerging green energy companies and major business groups with access to oligarchs have facilitated access to participation in the annual tender for renewable energy projects and guaranteed funds and production facilities that further enabled timely commissioning of the projects. To revitalise the wind industry, significant legal efforts have been made albeit it remains to be seen in how far these legal adaptations will translate into implementation.

Although the feedback loops have improved the policy design significantly, regional administrations should be given an incentive structure to stimulate RES. Encapsulating investments in renewables as a performance indicator for Russia's regions in conjunction with penalties for non-implementation would strengthen the support scheme on the retail market. The capacity-based scheme on the wholesale market could benefit from allowing grassroots renewable energy companies to participate in the tender and to organise cheaper eco-loans to invest in renewable energy. Increasing domestic electricity prices, although sensitive, would also improve the competitiveness of RES. This would ensure a continuation of renewable development after subsidies have ended.

Table 9. Enabling and constraining factors of Russia's REP

PHASE	ENABLING FACTORS	CONSTRAINING FACTORS
GOAL-SETTING	• large wind, solar and hydro resources (R) • improve reliability of energy supply, especially in isolated areas (R) • catch up with Western renewable energy technologies (R) • diversify Russia's energy mix away from natural gas (R) • save fossil fuel for future generations (R) • minimize transmission costs (F) • reduce greenhouse gas emissions (E)	• inconsistent renewable energy target: de facto reduction from 4.5 to 2.5 percent (I) • diversification by means of new coal and nuclear power plants (E)
POLICY DESIGN	• the capacity-based scheme allows control over quantity and price of RES projects (F) • localisation enables job creation and R&D investments (R) • fixed annual installed capacity limits by renewable technology (F)	• cheap substitution goods (gas & nuclear energy) (F) • fear of upward pressure on electricity price (F) • regulatory uncertainty: policy change from a premium to a capacity-based support scheme (I)

	• competitive selection on the basis of lowest capital expenditure (F) • guaranteed 14% return on investment over 15 years (F)	• limited to solar, wind and small-hydro technologies (R) • focus on price-zones of wholesale market (I) • Micro installations excluded (R)
POLICY IMPLEMENTATION	• neopatrimonial networks (I) • access to major business groups (F) • availability of production capacity (I) • local content requirement offers solar industry protection from international competition (I) • know-how and expertise in the construction of renewable power plants (I)	• strong depreciation of the rouble exchange rate (F) • weak banking sector with volatile and high loan interest rates (F) • lack of Russian-based wind production facilities to meet the local content requirement (I) • four year time horizon deemed too short for small hydro projects (I)
FEEDBACK	**Retail market** • open to alternative energy technologies other than solar, wind and hydro (R) • open to installations with less than 5 MW installed capacity (R) • use of locally available sources with low transmission costs (F) and increased reliability in case of a black-out (R) • higher electricity price in non-price zones (F)	• retail market at the scrutiny of the regional administration (I) • No penalties provided for non-implementation (I) • Low population density in isolated regions: potential contribution of the retail market support scheme limited to 1 GW (R) • Condition that RES investments have to reduce electricity prices (F)
	Wholesale market • capex limits pegged to euro/dollar basket (F) • annual wind targets rearranged & time horizon extended (I) • decreased local content requirement for wind energy (I) • increased wind capex limits (F)	• upward pressure on electricity price due to increased capex limits (F)

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Business analyst gas sector, MOEK, Moscow, 06.07.2014; 03.08.2014.
Business analyst gas sector, Gazprom, Moscow, 27.07.2014
Business analyst, Administrator of the Trading System (ATS), Moscow, 10.08.2014
Renewable energy entrepreneur, Association for Wind Energy, Moscow, 11.08.2014
Environmentalist, Green Peace Russia, Moscow, 04.08.2014
Policy advisor, Gazprom Export, Moscow, 17.03.2015
Business analyst, Gazprom Energy Holding, Moscow, 10.04.2015
Political scientist focussing on energy policy, Institute of Energy and Finance, Moscow, 10.04.2015
International business analyst involved in the promotion of renewable energy in Russia, IFC (World Bank Group), Moscow, 16.09.2015

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