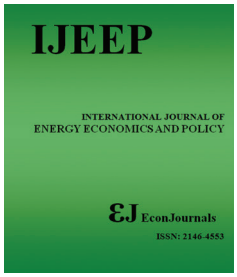

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Increase of Social Impact Due to the Development of the Renewable Energy Industry in Russia

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ABSTRACT

The article is providing highlights on the development prospects of the renewable energy industry in Russia from the point of view of increasing the social impact on jobs creation. The branch of renewable energy is considered as one of the directions reducing unemployment in the regions of Russia. The peculiarities of the industry development in Russia, related to the existing regulatory and legal framework and the structure of the national electric power market, are singled out. As a result of the study, methodological approaches in assessing the social effect from the development of the renewable energy industry in Russia are formulated. Also a forecast of the number of created jobs is made, taking into account the implementation of projects in the wholesale and retail electric power markets and isolated power systems. The compiled statistical and expert data allow to develop scenarios for commissioning capacities in the industry. The proposed approaches and scenarios make it possible to estimate the number of created jobs regionally and analyze the impact of these places on the level of unemployment in the regions of Russia. Regions have been identified where the development of the renewable energy sector will have a significant positive social effect. Quantitative assessment of the social effects of the industry development can help to work out mechanisms of state support for renewable energy, for performing technical and economic calculations for projects and regional programs in the field of renewable resources and energy sources. The results can be used to formulate criteria for regional competitive selection, to formulate schemes for the territorial development of the electric power industry.

Keywords: Renewable Energy Industry, Social Effect, Unemployment Level, Russian Regions, Jobs Creation
JEL Classifications: J21, J60, L72

1. INTRODUCTION

The development of the renewable energy industry leads to economic, social and environmental effects from its use. At the same time, it is essential to solve the unemployment problem, which is especially important for many Russian regions, considering the shortage of jobs (Republic of Dagestan, Ingushetia, Sakha (Yakutia), etc.) among social effects. Despite the fact that since 2000 the unemployment rate has been tending to decrease (10.6% in 2000, 7.3% in 2010), the crisis in the economy is evident. So, in 2014 the unemployment rate reached 5.2%, but in 2015 it rose to 5.6% and after a small fall in 2016 (to 5.4%) as of January 2017, the unemployment rate in Russia is 5.6% or 4.3 million people (according to Rosstat).

Evaluation of the role of the renewable energy development in terms of social benefits is one of the priorities in solution of the unemployment problems in Russia. On the one hand, the construction of industry facilities is economically feasible in remote and hard-to-reach areas where it is difficult to find work for the population. On the other hand, newly commissioned renewable energy facilities, especially when accompanied with the organization of equipment production, can defuse the tense situation of shortage of work in such regions as the North Caucasus Federal District.

The need for the development of renewable energy is fairly controversial for Russia. With the existing low prices for natural gas and oil, developed infrastructure of the gas industry and traditional generation, the economic viability of building renewable energy sources (RES) facilities is often questioned by many experts. Nevertheless, the beginning of the development of the renewable energy sector has already been initiated, which is one of the opportunities in solving the unemployment problem in the regions.

The effect assessment of the renewable energy on solving problems of unemployment in the Russian regions is possible due to the adoption of the regulatory framework for the support of renewable energy in the wholesale and retail markets, as well as the need to justify Incorporation of projects based on RES in regional development programs and energy supply schemes.

According to world statistics, in 2015, 8.1 million people were employed in the sector (excluding large hydro-generation), which is 5% more than in 2014, when renewable energy industry employed 7.7 million people (Renewable Energy and Jobs 2016). Despite the fact that the dynamics of growth in the number of people employed in the renewable energy sector has slowed down, the total number of jobs created in the industry is on the rise. At the same time, countries of Asia are playing an increasing role with share increased to 60%. Such countries as China, Brazil, the United States, India, Japan and Germany are the leaders in volume of employed in the renewable energy sector. The number of people employed in various sectors of the renewable energy sector according to statistics is presented in Table 1.

According to the data in the table, the dynamics of employment in technologies based on the use of RES are different. The largest employer is the solar energy industry, where 2.8 million people were employed in 2015, and the growth tendency is 11% compared to 2014. However, there has been a significant increase in Japan and the US, stabilization in China, a decline in the European Union.

The number of jobs in wind energy reached 1.1 million people, which is more by 5% in 2014 due to the input power in China, the US and Germany (Renewable Energy and Jobs 2016).

In bioenergy, employment amounted to 1.7 million people, including 822 thousand people in biomass processing projects and 382 thousand people in biogas utilization projects. Nevertheless, compared to 2014, there was a 6% decrease in the number of employed because of the increased level of mechanization in some countries and a reduction in the production of biofuels in others.

Practical data suggest that in some renewable energy sectors more jobs are created per MW of installed capacity than in traditional energy, as during the construction phase as well as during the operation of the generating facility (Rutovitz and Harris 2012). The possible number of jobs created in the energy sector is presented in Table 2.

The development of renewable energy in the world has led to an increase in the number of studies on employment issues and the impact of the renewable energy industry on reducing the number of unemployed. Among modern foreign studies, the work of F. Ulrich, W. Lehr et al. on the impact of renewable energy on the labor market and employment in Germany (Ulrich et al., 2012) was mentioned. The number of jobs created in wind energy is estimated as a result of domestic investment and exports, and jobs for the operation and maintenance of existing wind turbines. In addition to direct employment in wind energy, the creation of jobs is estimated in related industries, and the regional influence of wind energy on employment is also considered.

The works of Cebotari and Benedek (2017) assess the influence of RES on the development of innovations in the regions. In their opinion, the realization of solar energy projects does not directly affect the "classical" indicators such as employment and local government revenue for the settlements of northwestern Romania, but it is necessary to assess their impact on innovation and technological development on the whole. It is important to emphasize that the insignificant impact of RES projects on employment refers to the local level, and not to the region as a whole. The study says that RES projects usually involve highly qualified personnel who come from regional centers and do not live directly at the site of the RES project.

The ADAS experts analyzed the opportunities for social development in the rural regions of the UK under the influence

Table 1: Volume of people employed in the renewable energy sector and related industries. thousand people

Number of employed in country technology RES Based	China	Brazil	USA	India	Japan	Bangladesh	Germany	France	Other EU countries	Total in the world
Sun energies (photovoltaic modules)	1652	4	194	103	377	127	38	21	84	2772
Liquid biofuels	71	821	277	35	3		23	35	47	1678
Wind power	507	41	88	48	5	0.1	149	20	162	1081
Energy of the Sun (thermal installations)	743	41	10	75	0.7		10	6	19	939
Solid biomass	241		152	58			49	48	214	822
Biogas	209			85		9	48	4	14	382
Energy of water	100	12	8	12		5	12	4	31	204
Energy of geothermal sources			35		2		17	31	55	160
Energy of the Sun (concentrated solar energy)			4				0.7		5	14
Total	3523	918	769	416	388	141.1	355	170	644	8079

Table 2: Number of jobs per 1 MW of installed capacity

Technology	Term of construction	Construction period	Production of equipment	Operation period
Coal	5	7.7	3.5	0.1
Gas. oil and diesel fuel	2	1.7	1.0	0.08
Nuclear power	10	14.0	1.3	0.3
Biomass	2	14.0	2.9	1.5
Small hydropower engineering	2	15	5.5	2.4
Wind power onshore	2	2.5	6.1	0.2
Wind power offshore	4	7.1	11	0.2
Solar power engineering	1	11	6.9	0.3
Geothermal power engineering	2	6.8	3.9	0.4
Solar thermal power engineering	2	8.9	4.0	0.5
Tidal energy	2	9.0	1.0	0.3

of wind energy, hydro and bioenergy projects (Renewable Energy and Its Impact on Rural Development and Sustainability in the UK, 2003). The study shows that the greatest number of jobs is created when implementing bioenergy projects (on average 29, of which 25 are created directly in the project implementation area, and 1 work place assumes part-time employment). The number of jobs created is lower in hydro- and wind-power engineering (respectively 2 and 6 workplaces with part-time employment). The work emphasizes that for rural areas where employment opportunities are extremely limited, including agriculture and forestry, even a small number of new jobs can have a significant impact on the development of the region.

The focus on the study of socio-economic effects from the development of the renewable energy industry was made in the work of Del Rio and Burguillo (2008). Among the effects, the authors singled out: The diversification of energy sources, the opportunities for regional and rural development, the creation of localized industry and jobs. The study is aimed at creating a theoretical basis for identifying the impact of the renewable energy on regional sustainability with the possibility of applying results for different territories.

Many researchers in the field of renewable energy pay special attention to the effects from its development (Kammen et al., 2004; Alvarez et al., 2009; Dai et al., 2016; Barbosea et al., 2016; Dvorak et al., 2017).

Among the Russian studies in the field of social effects from the development of renewable energy can be noted the works of Kopylov (2015), Bezrukikh and Bezrukikh (2014), *Grechukhina* et al. (2016), where they pay special attention to the already implemented projects in the field of renewable energy in various countries. These days, Russia has not gained an experience in implementing projects in this area. Therefore, this study is of a predictive nature, and its purpose is to assess the possible benefits from implementing renewable energy projects in the regions of Russia, based on existing goals and indicators for the development of RES in the wholesale and retail electricity and capacity markets, supported by existing regulatory documentation.

2. METHODOLOGY OF THE RESEARCH

Social effects from the development of renewable energy, such as the creation of jobs in the renewable energy and in related industries, should be evaluated in several stages (Nazarova et al., 2017).

At the first stage, a large-scale valuation is carried out on the basis of the existing normative legal documentation and strategic goals in the input powers industry. Also, the peculiarities of the economic model of the operation of RES facilities in Russia should be taken into account, which is fundamentally different for the wholesale and retail electricity market, for isolated power systems. Support measures such as establishing long-term tariffs for the purchase of electricity for the payback period, inclusion of RES projects in federal and regional target programs, ensuring priority loading of generating objects of RES in the operational dispatch management system are provided for isolated power systems. In retail markets, the main element of support is the obligation of grid companies to purchase electricity from qualified RES facilities at regulated tariffs in order to compensate for losses. At the same time, the federal budget compensates the costs of technological connection to electric grids for facilities with a capacity of less than 25 MW.

For qualified renewable generation facilities in the wholesale electricity and capacity market (WECM), a mechanism is provided for the sale of electricity under a purchase and sale agreement, as well as capacity sales under a capacity contract (CC), which is the generator's obligation to build, commission and to bring a new generation to the WECM in the future. The Government of the Russian Federation determined the procedure for competitive selection of construction projects for generating facilities based on RES, rules for calculating the price for the capacity of generating facilities for RES that provide return on invested capital, as well as targets for commissioning of generating facilities for RES up to 2024, target indicators of the localization degree and limit values for capital and operating costs.

Taking into account the above-mentioned peculiarities of the structure of the Russian branch of renewable energy, the number of jobs created can be assessed according to the Formula 1:

$$P = \sum_{i=1}^{n}((P_c + P_П) * ym_i) + \sum_{i=1}^{n}(P_э * (ym_i + ym_{i-1})) \quad (1)$$

Where: i – Number of the target year of the period under evaluation, i = 1, 2, 3 etc.;
n – Number of years in the period under evaluation;
Pc – Number of jobs created during the construction of a renewable energy object;
Pп – Number of jobs created in the production of equipment for the RES facility in related industries;
Pэ – Number of workplaces created when operating a renewable energy object;
yм – The value of the installed capacity of the renewable energy object, determined by the formula:

$$ym_i = \sum(ym_1; ym_2; ym_3) \quad (2)$$

Where: i – Number of the target year of the period under evaluation, i = 1, 2, 3 etc.;
ym_1 – The amount of installed capacity of renewable energy objects in the WECM;
ym_2 – Value of installed capacity of RES in the retail market;
ym_3 – Value of the installed capacity of renewable energy objects in isolated power systems.

At the stage of the integrated estimation for definition of the predicted value of the established capacity as an initial information can be used:
1. Existing legal and regulatory framework (for WECM);
2. Expert review (for the retail market and isolated energy systems).

To determine the specific indicators for the number of jobs created in renewable energy and related industries can be used analytical and information reports IRENA, REN21, NP "Council of market participants in RES" and others.

The second stage of the assessment can be carried out at the regional level and include the assessment of social effects from the implementation of specific RES projects. As projects planned for implementation, it is reasonable to consider objects that have passed the competitive selection at WECM or won in regional competitions. The results of competitive selection at the WECM are published annually by NP "Market Council".

At the final stage of the study, the results obtained are summarized and the conclusions formulated about the impact of RES projects on solving unemployment problems at the country and region level.

3. THE RESULTS OF RESEARCH

The installed capacity of facilities operating on the basis of renewable energy in 2015-2016 is determined on the basis of the data of the NP "Market Council" and NP "Council of market participants of renewable energy" about qualified renewable energy facilities. The installed capacity of the facilities for the period 2017-2024, corresponds to the target indicators of the regulatory documentation, and is presented in Table 3.

According to Vygon Consulting, the potential for developing renewable energy projects in the retail market is estimated at around 3,000 MW with an aggregate investment of $ 8 billion.

The development potential for RES until 2020 in isolated power systems is up to 1,000 MW (mainly solar and wind power projects) according to the estimation of the Ministry of Energy.

The number of jobs created was estimated on the basis of specific indicators per 1 MW for different sectors according to the IRENA study (for European countries, USA and South Africa).

It was done during the construction period, including the production of equipment and installation and start-up work:
- Jobs in wind energy - 12.5 people/MW;
- Jobs in solar energy - 33.2 people/MW;
- Jobs in small hydropower - 20.4 people/MW;
- Jobs in bioenergy - 7.7 people/MW;
- The average for the four renewable energy sectors is 20.3 people/MW

For the period of operation of renewable energy facilities:
- Jobs in wind power engineering - 0.4 people/MW;
- Jobs in solar energy - 0.5 people/MW;
- Jobs in small hydropower - 1,2 people/MW;
- Jobs in bioenergy - 5.5 people/MW;
- The average for four renewable energy sectors - 1 person/MW.

Considering the available basic data for the WECM, the number of jobs created up to 2024 will be about 100,000 and by RES sectors is shown in Table 4.

Assuming that 3000 MW of installed capacity will be introduced in the retail market, the number of jobs allocated to the four RES (WPP, SPP, SHPP and bioenergy) sectors can reach 60,950.

For isolated power systems, this amount can be 21,700 when 1000 MW of solar and wind power are put into operation.

By 2024, about 6,000 jobs can be created for the operation of renewable energy facilities (Table 5), including:
- In WECM 2521;
- In the retail market 2950;
- In isolated power systems 428.

Starting in 2013, a number of renewable energy facilities were built in Russia in regions with high unemployment:
- Small hydroelectric power plant "Kokadoy" (Chechen Republic, 135 thousand unemployed);
- Buribaevskaya and Bugulchanskaya solar power plants (Republic of Bashkortostan, more than 100 thousand unemployed);

Table 3: The installed capacity of renewable energy at the WECM for the period up to 2024. MW

Power stations based on renewable energy sources	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Wind power plants (WPP)	3.3	0	200	400	500	500	500	500	500	150.2	3253.4
Solar power plants (SPP)	55.5	70.3	250	270	270	270	162.6	162.6	0	0	1510.9
Small hydroelectric power plants (SHPPs)	8.3	10.8	124	0	49.8	109.2	35.6	35.6	35.6	35.6	444.6
Total	66.9	81.1	574	670	819.8	879.2	698.2	698.2	535.6	185.8	5208.9

Source: Order of the Government of the Russian Federation dated February 28. 2017 No. 354-s

Table 4: Creation of jobs at the WECM for the period up to 2024 people

Power stations based on renewable energy sources	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
WPP	40	-	2500	5000	6250	6250	6250	6250	6250	1878	40668
SPP	1841	2334	8300	8964	8964	8964	5398	5398	-	-	50163
SHPPs	170	221	2530	-	1016	2228	726	726	726	726	9069
Total	2051	2555	13330	13964	16230	17442	12375	12375	6976	2604	99900

Table 5: Creation of jobs in the renewable energy sector for the operation of power generation facilities

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Creation of workplaces for operation of renewable energy sources at the WECM										
WPP	1	1	78	232	424	616	808	1000	1192	1249
SPP	27	61	181	312	442	572	651	729	729	729
SHPPs	10	23	175	175	235	369	412	455	499	542
Total in WEPM	38	85	434	718	1101	1556	1870	2184	2420	2521
Creation of workplaces for the operation of RES facilities in the retail market										
			369	738	1106	1475	1844	2213	2581	2950
Creation of workplaces for the operation of renewable energy sources in isolated power systems										
			53	107	160	214	267	321	374	428
Total for three sectors	38	85	856	1562	2368	3245	3981	4717	5375	5898

- Perevolotskaya solar power station and Sakmarsk solar photovoltaic power plant. A.A. Vlazneva (Orenburg region, more than 46 thousand unemployed);
- Small hydropower stations "Lyaskel" and "Kalliokoski" (Republic of Karelia, more than 26 thousand unemployed).

The results of competitive selection held in 2013-2016, give an idea of the regions that are interesting from the point of view of the development of RES. In addition, in August 2016, the Territorial Planning Scheme of the Russian Federation in the energy sector was adopted, where the commissioning of capacity in wind energy by regions of Russia is forecasted for the period up to 2030 (Table 6).

The information presented in Table 6 gives the possibility to assess the impact of projects in renewable energy on the problem of creating jobs in the regions.

Given the ambiguity of the presented projecting data, two scenarios were formed:

Scenario 1 "Realistic" - implementation of RES projects takes place, according to the selection on a competition basis. Regions of project implementation are defined. When assessing the input capacities and, respectively, the created workplaces, information is used based on the competitive selection results, held in 2013-2016. Thus, the renewable energy resources introduced for the period up to 2020 are taken into account.

Scenario 2 "Optimistic" - the implementation of RES projects takes place according to the results of competitive selection, but the forecast for the construction of wind power plant (WPP) is taken into account in accordance with the RF Territorial Planning Scheme in the energy sector for the period until 2030. Regions of project implementation are defined. When assessing the input capacity and, accordingly, the created workplaces, information is used based on the results of the competitive selection held in 2013-2016, and the forecast up to 2030 for the WPP. Thus, the RES capacities commissioned for the period up to 2020 by SES and mini-HPPs are taken into account, and by 2030 - by WES.

Table 7 provides an assessment of the created jobs in renewable energy for the construction period of the facility, taking into account the production of equipment and commissioning, as well as the period of operation.

4. DISCUSSION

The unemployment rate in the regions under consideration, according to the State Statistics Service, as of 2016, is presented in Table 8. Taking into account the forecast of created jobs in the regions where RES projects are implemented (Table 7), an assessment of the reduction in the unemployment rate in the regions of Russia under consideration is made (Table 8).

Table 6: Planned volumes of installed capacity of renewable energy sources at the WECM of the Russian Federation according to the results of competitive selection in 2013-2016. MW

The subject of the Russian Federation	WPP	WPP*	SPP	SHPP
Altai region	-	-	20	-
Astrakhan region	30	100	90	-
Belgorod region	-	-	15	-
Volgograd region	-	-	100	-
Transbaikal region	-	-	40	-
Irkutsk region	-	-	15	-
Kaliningrad region	-	200		
Karachay-Cherkess Republic	-	300		5.6
Krasnodar region	460	1000		
Leningrad region	-	300		
Lipetsk region	-		45	
Murmansk region	-	400		
Nizhny Novgorod Region	-	350		
Omsk region	-	110	40	-
Orenburg region	30	150	290	-
Republic of Adygea	150	441	-	-
Altai Republic	-	-	20	-
Republic of Bashkortostan	-	-	64	-
The Republic of Buryatia	-	-	70	-
The Republic of Dagestan	-	-	10	-
Republic of Kalmykia	51	150	70	-
The Republic of Karelia	-			49.8
he Republic of Khakassia			5.198	
Samara Region	-		75	-
Saratov region	-	1000	40	-
Stavropol region	-		115	15.04
Ulyanovsk region	80		-	-
Chelyabinsk region	-		60	-
Total	801	4501	1184.2	70.4

*According to the territorial planning scheme of the Russian Federation in the energy sector until 2030. adopted by the Russian Federation Government Decree No. 1634-r dated August. 2016

The general decrease in unemployment in the group of regions under consideration will be from 3% to 5.76%.

Under Scenario 1, the least impact (up to 1%) on the unemployment problem from implementation of renewable energy projects is in the Altai Territory, the Irkutsk Region, the Karachay-Cherkess Republic, the Republic of Dagestan. The biggest impact (from 5% to 20%) is the implementation of renewable energy projects to reduce unemployment in such regions as: Astrakhan Region, Lipetsk Region, Orenburg Region, Republic of Adygea, Republic of Altai, Republic of Buryatia, Republic of Kalmykia, Stavropol Territory.

Under Scenario 2, the least impact (up to 1%) on the unemployment problem from implementation of renewable energy projects is in the Altai Territory, the Irkutsk Region, and the Republic of Dagestan. The biggest impact (from 5% to 30%) is the implementation of renewable energy projects to reduce unemployment in such regions as: Astrakhan Region, Kaliningrad Region, Karachay-Cherkess Republic, Krasnodar Territory, Leningrad Region, Lipetsk Region, Murmansk Region, Nizhny Novgorod Region, Orenburg Region, Republic of Adygea, Republic of Altai, Republic of Buryatia, Republic of Kalmykia, Stavropol Territory.

5. CONCLUSIONS

The following results were obtained as a result of the study:

- A methodology for assessing the social effect, expressed in creating jobs and reducing the level of unemployment in Russia from the implementation of projects based on renewable energy is proposed;
- A forecast of the number of jobs created in the renewable energy sector of Russia, taking into account the implementation of projects at the WECM, the retail market and isolated power systems is made;
- Scenarios for the introduction of capacities based on RES by regions of Russia are formulated;
- The impact of RES projects on the level of unemployment in the regions of Russia is assessed taking into account the scenarios for capacity development.

The proposed methodology was used to assess the social effect of the development of the renewable energy industry in Russia with the parameters determined by the existing regulatory and legal documentation and competitive selection of RES projects that took place in 2013-2016, which made it possible to assess the prospects for implementing RES projects as one of the directions solving the problems of unemployment in Russia at the regional level.

According to our estimates, in the RES industry will be created for the period until 2024: 9,900 jobs in the implementation of projects at the WECM; 60,950 jobs when implementing projects in the retail market; 21,700 jobs when implementing projects in isolated power systems. In addition, 6000 permanent jobs will be created for the operation of the constructed RES facilities.

At the same time, it should be noted that the number of jobs is estimated not only for the period of construction of new RES facilities taking into account the creation of localized production of equipment, but includes the period of operation of the constructed generating capacities, which creates additional permanent jobs for the lifetime of the RES facility, which can reach 20-25 years.

A quantitative assessment of the social effects of renewable energy development can serve as a reference point for developing mechanisms for state support for renewable energy, for carrying out technical and economic calculations for projects and regional programs in the field of renewable resources and energy sources. The results can be used to formulate criteria for regional competitive selection, to formulate schemes for the territorial development of the electric power industry and to take decisions on the implementation of projects based on RES.

6. ACKNOWLEDGEMENT

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Table 7: Estimation of the number of jobs created in the regions of Russia as a result of the implementation of renewable energy projects. people

The subject of the Russian Federation	WPP	WPP*	SPP	SHPP	Scenario 1	Scenario 2
Altai region			674		674	674
Astrakhan region	387	1288	3031		3418	4320
Belgorod region			505		505	505
Volgograd region			3368		3368	3368
Transbaikal region			1347		1347	1347
Irkutsk region			505		505	505
Kaliningrad region		2577				2577
Karachay-Cherkess Republic		3865		121	121	3986
Krasnodar region	5927	12884			5927	12884
Leningrad region		3865				3865
Lipetsk region			1516		1516	1516
Myrmansk region		5154				5154
Nizhny Novgorod Regio		4509				4509
Omsk region		1417	1347		1347	2765
Orenburg region	387	1933	9768		10154	11701
Republic of Adygea	1933	5682			1933	5682
Altai republic			674		674	674
Republic of Bashkortosta			2156		2156	2156
The Republic of Buryatia			2358		2358	2358
The Republic of Dagestan			337		337	337
Republic of Kalmykia	657	1933	2358		3015	4290
The Republic of Karelia				1077	1077	1077
The Republic of Khakassia			175		175	175
Samara Region			2526		2526	2526
Saratov region		12884	1347		1347	14231
Stavropol region			3873	325	4199	4199
Ulyanovsk region	1031				1031	
Chelyabinsk region			2021		2021	2021
Total	10320	57991	39887	1523	51730	99401

*According to the territorial planning scheme of the Russian Federation in the energy sector until 2030. adopted by the RF Government Decree No. 1634-s dated August 1. 2016

Table 8: Possibilities to reduce unemployment as a result of implementation of RES projects in the regions of Russia

The subject of the Russian Federation	Unemployment rate, people	Reduction of unemployment (Scenario 1), %	Reduction of unemployment (Scenario 2), %
Altai region	99,645	0.68	0.68
Astrakhan region	39,968	8.55	10.81
Belgorod region	32,537	1.55	1.55
Volgograd region	87,987	3.83	3.83
Transbaikal region	57,592	2.34	2.34
Irkutsk region	110,160	0.46	0.46
Kaliningrad region	31,468		8.19
Karachay-Cherkess Republic	30,937	0.39	12.89
Krasnodar region	159,480	3.72	8.08
Leningrad region	44,297		8.73
Lipetsk region	23,621	6.42	6.42
Murmansk region	34,334		15.01
Nizhny Novgorod Region	76,281		5.91
Omsk Region	75,652	1.78	3.65
Orenburg region	50,005	20.31	23.40
Republic of Adygea	18,231	10.60	31.17
Altai Republic	11,880	5.67	5.67
Republic of Bashkortostan	115,975	1.86	1.86
The Republic of Buryatia	43,504	5.42	5.42
The Republic of Dagestan	146,163	0.23	0.23
Republic of Kalmykia	15,347	19.64	27.96
The Republic of Karelia	30,183	3.57	3.57
The Republic of Khakassia	16,309	1.07	1.07
Samara Region	71,865	3.52	3.52
Saratov region	63,657	2.12	22.36
Stavropol region	78,336	5.36	5.36
Ulyanovsk region	29,721	3.47	
Chelyabinsk region	130,464	1.55	1.55
Total	1,725,599	3.00	5.76

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