Comparative analysis of renewable energy development in the Republic of Buryatia (Russia) and Mongolia

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Abstract. The constantly growing demand for electricity and relatively small energy capacities are forcing the Republic of Buryatia (to a greater extent) and Mongolia, which are limited in some types of economic activity, to look for new sources of energy. One of these restrictions is the ban on the construction of hydroelectric power plants on rivers of the Lake Baikal basin. Therefore, Buryatia and Mongolia have taken the path of building environmentally friendly power plants and have succeeded in many ways. Despite the high costs of setting up clean power plants, infrastructure investments in alternative energy are long-term and expected to be profitable. Investors (including foreign ones) placing their money in a seemingly low-profit project, having long-term expectations. Competent investors do not run after "quick money", realising that the return period of the constructed power plants will be long, as at the moment of development they have a relatively low efficiency. Despite the criticism of some researchers [1], they invest in green energy, modern infrastructure and a future without emissions (CO_2, NO_2, SO_2 and other gases) from burning coal, fuel oil and firewood. Other experts see in the development of alternative energy a great potential [2-5], refuting arguments of critics about high cost of electricity [6].

1. Introduction

The geographical proximity of Buryatia and Mongolia determines the similarity of natural conditions for energy development. Their energy capacities are approximately equal, both territories generate roughly the same amount of electricity, besides, the Buryat and Mongolian power systems are interconnected, which makes the comparison even more interesting. Mongolia has three times the population of Buryatia, so Mongolia imports some of its electricity from Russia. Gusinoozyorsk thermal power plant (TPP) in Buryatia exports electricity to the central part of Mongolia, Kharanor TPP (Zabaikalsky Krai) – to the eastern part, and Sayano-Shushenskaya hydro power plant (HPP) in Krasnoyarsk Krai – to the western part. Both territories benefit from the legacy of the Soviet past – thermal power plants that use coal and fuel oil.

In recent years, the need to develop renewable energy sources has arisen in connection with the UN Sustainable Development Goals on infrastructure for affordable and clean energy (Goal 7). One of the priority areas for the development of renewable, including alternative, energy in Buryatia and Mongolia is solar, wind, hydro- and geothermal energy.

2. Power generation's situation

2.1. Current state of Power generation in Buryatia

The territory of Buryatia is divided into two unconnected energy districts: Northern and Southern. The Republic of Buryatia has an energy industry based mainly on TPPs: three combined heat and power plants and one state district power plant (GRES), which were put into operation from 1936 to 1976 (Table 1) and are the main sources of electricity in the southern energy district of Buryatia. In the Republic, an energy industry has developed, based mainly on thermal power plants: three thermal power plants and one state district power station, which were commissioned from 1936 to 1976 (Table 1). They are the main sources of electricity for the southern energy district of Buryatia. In general, 92.5% of the electricity in Buryatia is generated by combined heat and power plants (CHPs) and diesel power plants (DPPs)

The largest power plant is the Gusinoozyorsk TPP (79.7% of the total capacity of Buryatia), which exports part of its electricity to Mongolia. The northern energy district of Buryatia is a transit one, is connected to the power system of the Irkutsk region, from where is supplied with electricity as it does not have its own power generation capacities. In addition, there are small isolated diesel power plants (DPP) in the settlements of the Severo-Baikalsky district (Table 1, Figure 1).

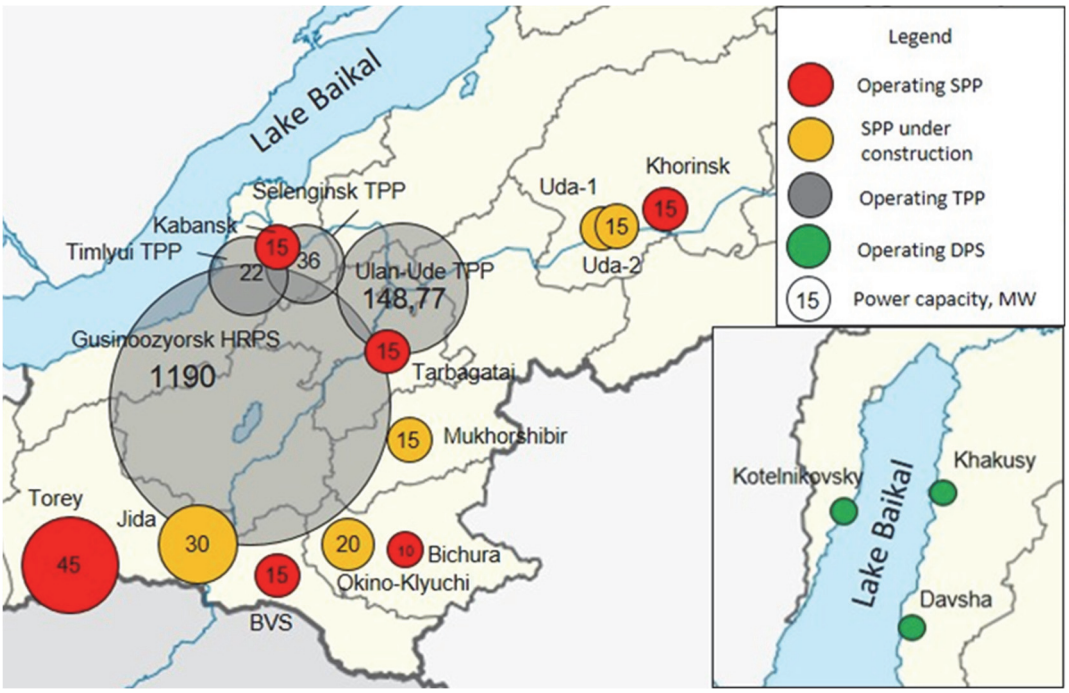

Figure 1. Buryatia's power facilities (compiled by author).

The republic would have enough electricity if Ulan-Ude's TPP-2 were completed. CHP-2, commissioned in 1991, operates as a large boiler house, although according to the project it should have an electricity capacity of 840 MW and a heat capacity of 1,840 Gcal. In March 2019, the project for the reconstruction of CHP-2 in Ulan-Ude was included in the Development Strategy of Buryatia until 2035. It is planned to commission two power units with the plant reaching an electric capacity of 230 MW and a thermal capacity of 360 Gcal/hour [16]. Recently, Buryatia has been experiencing a shortage of electricity.

Table 1. Operating power generation facilities in the Republic of Buryatia (as of 2021).

Company	Generating facility	Installed capacity, MW	Share of total capacity, %	Location	Launch year (date)
Conventional sources of electricity					
Thermal power plants (TPPs)					
JSC "TGK-14"	Ulan-Ude TPP-1 [7]	148.77	9.72	Ulan-Ude	1936
	Timlyui TPP [8]	22	1.44	Kabansky District, Kamensk	1953
OJSC "Selenginsk pulp and cardboard mill"	TPP at OJSC "Selenginsk pulp and cardboard mill"	36	2.35	Kabansky District, Selenginsk	1971
JSC "Inter RAO – Electrogeneratsia"	Gusinoozyorsk TPP [9]	1,190	77.76	Selenginsky District, Gusinoozyorsk	1976
PJSC "MRSK of Siberia" – "Buryatenergo"	DPP [7]	18.62	1.22	Severo-Baikalsky district: Davsha, Khakusy and Kotelnikovsky [10]	–
Total of conventional sources of electricity:		**1,415.39**	**92.49**		
Renewable sources of electricity					
Solar power plants (SPPs)					
LLC "Avelar Solar Technology"	Bichura SPP [11]	10	0.65	Bichura District, Bichura	13.11.17
LLC "Complex Industry"	Kabansk SPP [12]	15	0.98	Kabansk District, Kabansk	29.10.19
	Tarbatatai SPP [12]	15	0.98	Tarbagatai District, Tarbagatai	29.10.19
	"BVS" SPP [12]	15	0.98	Kyakhta District, Kyakhta city	29.10.19
LLC "Avelar Solar Technology"	Khorinsk SPP [13]	15	0.98	Khorinsk district, Khorinsk	08.12.19
	Torey SPP[a] [14, 15]	45	2.94	Dzida District, Nizhny Torey	21.12.20
Total of renewable sources of electricity:		**115**	7.51		
Total:		**1,530.39**	100.00		

[a] Biggest solar power plant in Buryatia.

Given the environmental constraints in the Baikal natural area, the republic is experiencing difficulties with the development of the economy and infrastructure, including power generation. According to the reported data for 2019, the generation of electricity by the power plants of the operational zone of the Buryat Regional Dispatching Office amounted to 5,263.53 million kWh, electricity consumption – 5,549.72 million kWh [17]. The deficit of electricity for the year was 286.19 million kWh.

Most of Buryatia's power generation facilities are located and constructed in the central and southern parts of the republic, except for three autonomous diesel power plants in the Severo-Baikalsky District.

2.2. Current state of Power generation in Mongolia

The Mongolian power system is divided into 4 regional power systems (in addition, the country has many isolated small power systems):

- Central Power System (CPS);
- Altai-Uliastai Power System (AUPS);
- Eastern Power System (EPS);
- Western Power System (WPS).

More than 82% of Mongolia's electricity is generated by CHPs, and DPPs, which were commissioned from 1961 to 2017. The largest of them is Ulaanbaatar TPP-4 (789 MW) [18] (Table 2; Figure 2). In 2019, electricity production in Mongolia reached 6,900.4 million kWh, electricity consumption – 6,846.4 million kWh [19]. The balance for the year amounted to +54 million kWh. However, the country still imports another 1,722.7 million kWh.

Table 2. Operating power generation facilities in Mongolia (as of 2021).

Company	Generating facility	Installed capacity, MW	Location	Launch year
Conventional sources of electricity				
Thermal power plants [20]				
Thermal Power Plant-2 SSH Co	Ulaanbaatar TPP-2	24	Ulaanbaatar city	1961
Engie, POSCO Energy, Sojitz Corp., Newcom Group [21]	Ulaanbaatar TPP-3	198	Ulaanbaatar city	1968
Thermal Power Plant-4 SSH Co. [18]	Ulaanbaatar TPP-4	789	Ulaanbaatar city	1983
JSC "Darkhan TPP", Mongolian Central Energy System [22]	Darkhan TPP	83	Darkhan-Uul aimag, Darkhan town	1966
JSC "Dornod busiin erchim khuchnii system"	Choibalsan (Dornod) TPP	36	Dornod aimag, Choibalsan town	1982
Hunan Ind. Equipment Instal-lation, MMRE of Mongolia [23]	Erdenet TPP	50	Orkhon aimag, Erdenet town	1987
Dalandzadgad Heat & Power Station SSH Co	Dalanzadgad TPP	6	Umnugovi aimag, Dalanzadgad town	2000
LLC "MCS International"	Ukhaa Khudag TPP	18	Umnugovi aimag, Tsogttsetsii sum	2011
"Mining and processing plant Erdenet"	TPP at Erdenet GOK	48	Orkhon aimag, Erdenet town	2017
Diesel power stations		43		
Total of conventional sources of electricity:		**1,295**		
Renewable sources of electricity				
Solar power plants (SPP) (Table 4)				
Total SPP:		93.033		
Wind power plants (WPP) (Table 5)				
Total WPP:		154.86		
Hydro power plants (HPP) and Small hydro power plants (HPP) (Table 6)				
Total HPP and SHPP:		27.19		
Hybrid solar and wind plants (HSWP) [24]				
Total HSWP:		1.475		
Total of renewable sources of electricity:		**276.558**		
Total:		**1,571.558**		

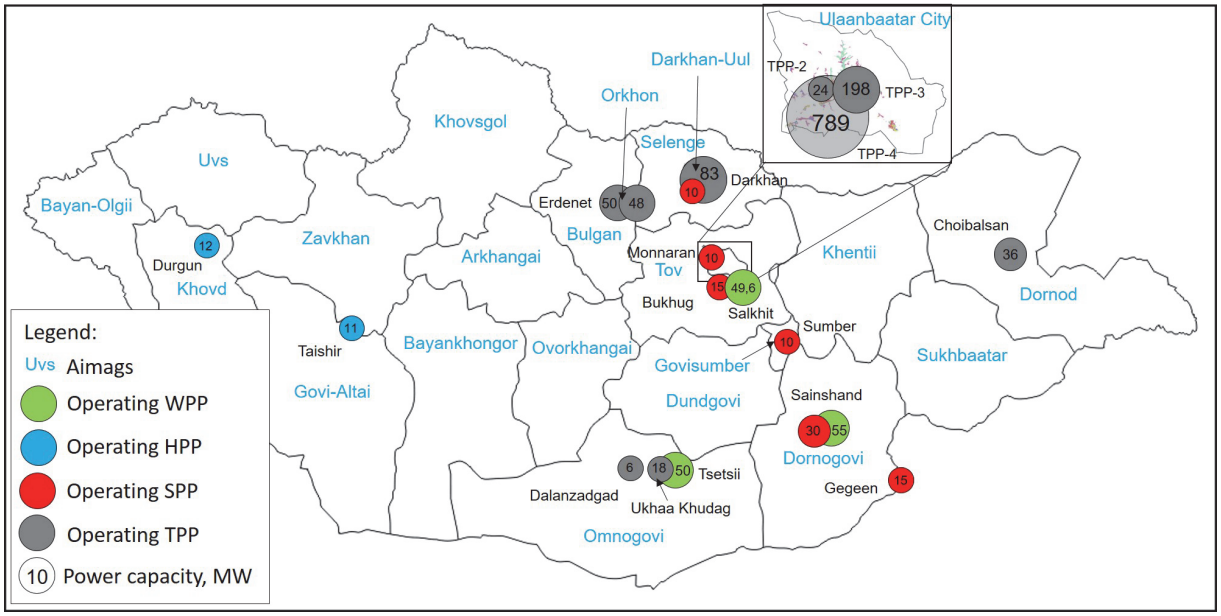

Figure 2. Mongolia's power facilities (with power capacity over 5 MW) (compiled by author).

The shortage of electricity has forced Mongolia to plan various projects, including the construction of HPP on the Selenga River and its tributaries. In recent years, there have been ongoing discussions between the Russian authorities and their Mongolian counterparts about their big hydropower plans. Despite Mongolia's promises not to harm the Baikal ecosystem, Russian scientists and the public, on the contrary, are seriously concerned. They consider the environmental risks that will arise after the construction of the HPP on the Selenga River and its tributaries to be unacceptably high. The Russian authorities have proposed various ways out to the neighbouring country: building the Mokskaya HPP (1,200 MW) on the Vitim River and exporting electricity to Mongolia; constructing the Russia-Mongolia-China gas pipeline ('Power of Siberia 2'), and helping with alternatives such as construction of TPP or nuclear power plant [25].

Figure 2 shows the power plants in Mongolia with a capacity of more than 5 MW. Most of them are located along the Mongolian Railway. The rest are located in Erdenet (two CHPs), in Choibalsan (in the east of the country) and in the Umnugovi coal mining aimag in the south of the country. There are two HPPs in the comparatively more water-secured west of the country.

3. Renewable energy development

3.1. Development of renewable energy in Buryatia

On 08 January 2009 the Government of the Russian Federation issued Order No. 1-R "On the main directions of state policy in the sphere of increasing energy efficiency of electric power industry based on the use of renewable energy sources (RES)". In order to implement this Order, the Ministry of Transport, Energy and Road Sector Development of Buryatia is working on the involvement of renewable energy sources in the republic's energy sector [26].

Despite the large hydropower, wind and geothermal potential, only solar energy has been developed in Buryatia so far. This is facilitated by climatic characteristics – there are up to 300 sunny days per year in Buryatia, and the duration of sunshine is more than 2,000 hours per year (Fig. 3). The amount of solar radiation in Buryatia is 4-5 kWh per m^2/day.

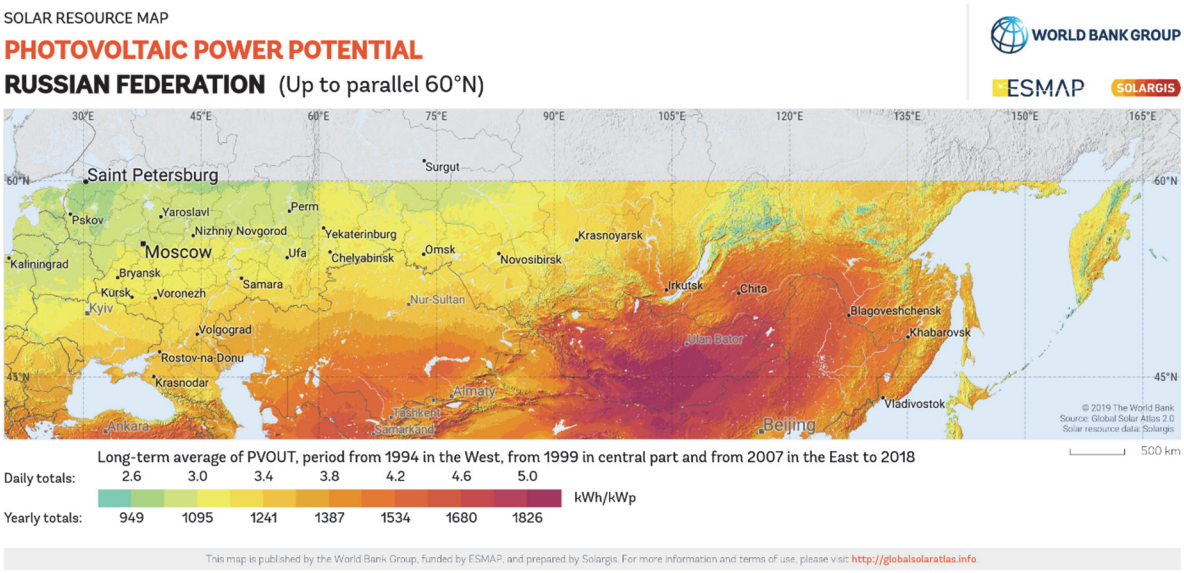

Figure 3. Photovoltaic power potential in Russia [27].

In Buryatia, the first solar power plant (SPP) appeared in 2017, but over 3 years the production of solar energy in the republic has taken a large share, thus contributing to the reduction of greenhouse gas emissions. Three investment companies are currently operating in Buryatia: 'Avelar Solar Technology' LLC, 'Complex Industry' LLC, and 'Green Energy Rus' LLC (Table 3), which in the period 2017-2020 have already built 6 SPPs with a total capacity of 115 MW and a total cost of 12.7 billion roubles. To date, the share of SPP of in the total capacity of Buryatia is 7.51%. At the end of 2020, the Torey SPP with a capacity of 45 MW was commissioned. At the time of commissioning, the Torey SPP is one of the ten most powerful solar power plants in Russia and is the most powerful in the Asian part of Russia. All SPP capacities are being introduced into the general power system of the southern energy district of Buryatia, and will not be isolated energy systems.

From an investor's point of view, locating SES in relatively densely populated areas in the south and centre of Buryatia, is more profitable, providing a higher return on investment (Figure 1). Private investment is good, but at the same time, we consider it is necessary to develop energy in the remote areas of the north, west and east of Buryatia. The state should help to ensure that the population of sparsely populated areas is provided with uninterrupted and high-quality power supply through construction of various types of power plants. The development of clean energy is especially necessary in the Central Ecological Zone of the Baikal Natural Territory (CEZ BNT), which still lacks relatively large or medium-sized power generation facilities, and with the development of tourism the load on the power networks has been increasing every year [10].

3.2. Development of renewable energy in Mongolia

Unlike Buryatia, Mongolia for more than 15 years has been actively building renewable energy mini power plants that are autonomous and isolated from the country's national energy system. Mongolia's first large HPP appeared in 2008, the first large wind power plant (WPP) – in 2013, and the first large SPP – in 2016. Today, in some aimags, renewable energy is used to generate 80% of the energy in the aimag and supply it to the central energy system.

In Mongolia, 270-300 days (2,250-3,300 hours) per year are solar, the specific power of solar energy is 1,200-1,600 kW/m2 (Figure 4) [20]. In Mongolia there are currently six large (built in 2016-2019) and 13 mini and micro SPPs (Table 4) with a total capacity of 93.03 MW.

Foreign investment companies, as well as the World Bank, the European Bank for Reconstruction and Development, the Asian Development Bank, the UN Green Climate Fund and others are active in constructing SPP in Mongolia, along with Mongolian companies.

Table 3. Operating and planned solar power plants of the Republic of Buryatia (as of 2021).

Organisation managing the investment project	Generating facility	Volume of investments in the project, million RUB	Installed capacity, MW	Location	Launch year (date)
Operating power plants					
LLC "Avelar Solar Technology"	Bichura [11]	1,200	10	Bichura District, Bichura	13.11.17
LLC "Complex Industry"	Kabansk [12]	2,000	15	Kabansk District, Kabansk	29.10.19
	Tarbagatai [12]	2,000	15	Tarbagatai District, Tarbagatai	29.10.19
	BVS [12]	2,000	15	Kyakhta District, Kyakhta town	29.10.19
LLC "Avelar Solar Technology"	Khorinsk [13]	1,500	15	Khorinsk District, Khorinsk	08.12.19
	Torey [14, 15]	4,000	45	Dzhida District, Nizhny Torey	21.12.20
Total of operating plants:		**12,700**	**115**		
Planned and under construction					
LLC "Complex Industry"	Mukhorshibir		15	Mukhorshibir District, Mukhorshibir	2021
LLC "Green Energy Rus"	Okino-Klyuchi		20	Bichura District, Okino-Klyuchi	2021
	Uda-1		15	Khorinsk District	2021
	Uda-2		15	Khorinsk District	2021
LLC "Avelar Solar Technology"	Dzida		30	Dzhidinsky District, Dyrestui	2022
Total of planned and being constructed:			**95**		
Total:		**12,700**	**210**		

Mongolia, in contrast to Buryatia, has succeeded in developing WPP (Table 5). In 2004-2008, further 3 micro-WPP with a total capacity of 0.26 MW were commissioned. From 2013 to 2018, 3 WPPs with a total capacity of 154.6 MW have been jointly built: Salkhit, Tsetsii and Sainshand, and the total capacity of the Mongolian WPPs was 154.86 MW.

There is a network of mini-HPPS in the north and west of Mongolia, the largest of which are Durgun (2008) and Taishir (2010), with 12 MW and 11 MW capacity, respectively (Table 6). Together with another 7 mini-HPPs, the country's hydropower capacity is 27.19 MW. In addition, Mongolia has another eight hybrid (solar-wind and solar-diesel) small power plants with a small total capacity of 1.475 MW (Table 2).

4. Prospects for renewable energy development in Buryatia and Mongolia

4.1. Buryatia

A balanced development of generating and network capacities is essential for the sustainable development of the Buryatia's economy. Therefore, it is only possible to solve the problem of power shortages without a heavy burden on the environment by developing alternative energy (renewable

energy sources). In 2010, a project was developed in Buryatia to build 7 small HPPs on the Barguzin River and its tributaries in the Kurumkansky and Barguzinsky districts. A potential investor, CJSC TDF Ecotech, was found, but the project remained on paper [31]. Along with the development of small HPPs, it is potentially possible to develop damless HPPs, WPPs, and, especially, geothermal power plants (GPPs), which can be built in the Baikal rift zone rich in geothermal sources – from the Tunkinsky to the Bauntovsky districts. Plans for the Mokskaya HPP (1,200 MW) are unclear and require significant funds for the project.

The construction of the HPP is considered as a source of power supply to the northern settlements of Buryatia and Zabaikalsky Krai, as well as for the development of large mineral deposits and electrification of BAM. In August 2021, the project to build a 15 MW Gusinoozyorsk SPS was discontinued. The project of LLC Matraevskaya Solar Power Plant was estimated at over 1 billion roubles [32].

By 2022, it is planned to commission 5 more SPS with a total capacity of 95 MW, thus increasing the total capacity to 210 MW (Table 3) and the share in the total energy system of Buryatia from 7.5% to 13%.

4.2. Mongolia

Mongolia has plans with foreign partners to build 22 HPPs of varying capacity, 17 of which (the largest) are planned in the Selenga basin (Table 6). But the development of the hydropower system in the Selenga basin will also depend on the influence of the Russian side, as investors are not planning to give money for projects that are not settled with Russia. Therefore, for the time being, Mongolia has to solve the electricity capacity shortage by building alternative energy sources. In the coming years, Mongolia plans to build 11 more hydropower plants with a total capacity of about 132.8 MW (Table 4), and a project to build seven wind power plants with a total capacity of about 565.4 MW (Table 5). In addition, the World Bank and the Government of Mongolia are launching a national programme “100,000 Solar Yurts” and a project “Access to Renewable Energy and Rural Electricity” [33].

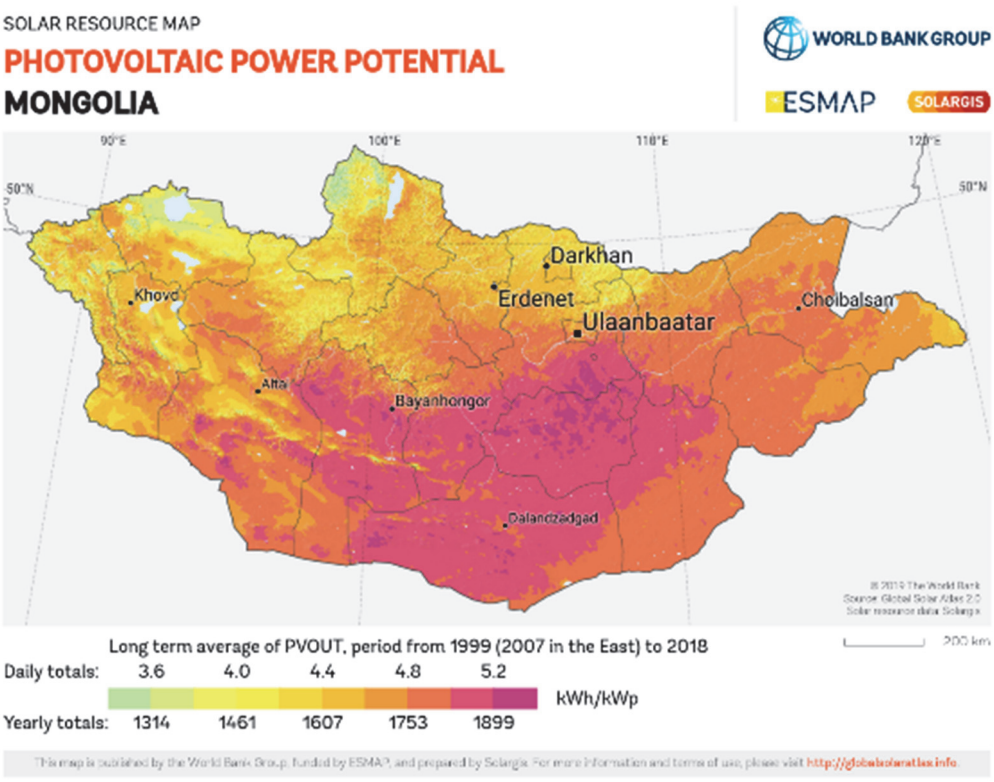

Figure 4. Photovoltaic power generation potential in Mongolia [28].

Table 4. Operating and planned solar power plants of Mongolia (as of 2021).

Generating facility	Installed capacity, MW	Location	Launch year
		Operating	
Darkhan	10	Darkhan-Uul aimag, Khongor sum	2016
Monnaran	10	Ulaanbaatar city, Songinokhairkhan District	2017
Gegeen (Naran teeg)	15	Dornogovi aimag, Zamyn-Uud sum	2018
Bukhug (Sergelen)	16.4	Tov aimag, Sergelen sum	2019
Sainshand[a]	30	Dornogovi aimag, Sainshand town	2019
Sumber	10	Govi-Sumber aimag, Sumber sum	2019
		Including operating mini-SPPs [24]	
Tsetseg	0.1	Khovd aimag, Tsetseg sum	2008
Bayantsagaan	0.06	Bayankhongor aimag, Bayantsagaan sum	2008
Bugat	0.14	Govi-Altai aimag, Bugat sum	2009
Altai	0.01	Bayan-Olgii aimag, Altai sum	2010
Altai	0.3	Govi-Altai aimag, Altai sum	2010
Bayantooroi (Tsogt)	0.1	Govi-Altai aimag, Tsogt sum	2010
Buyant	0.01	Bayan-Olgii aimag, Buyant sum	2010
Dorvoljin	0.15	Zavkhan aimag, Dorvoljin sum	2010
Urgamal	0.15	Zavkhan aimag, Urgamal sum	2010
Tsengel	0.01	Bayan-Olgii aimag, Tsetseg sum	2010
Chinggis Khaan	0.44	Ulaanbaatar city, Chinggis Khaan International Airport	2010
Khiliin tsereg 0214	0.1	Govi-Altai aimag, Border troops, military unit 0214	2014
Takhiin tal	0.06	Govi-Altai aimag, Bugat sum	2015
Total of operating plants:	**93.033**		
		Planned [29]	
Khurmen	30	Umnugovi aimag, Khurmen sum	–
Airag	20	Dornogovi aimag, Airag sum	–
Dalanzadgad	10-20	Umnugovi aimag, Dalanzadgad town	–
Khovd	10	Khovd aimag, Myangad sum	–
Durgun	10	Khovd aimag, Durgun sum	–
Muren	10	Khocsgol aimag, Muren town	–
Taishir	7.8-10	Govi-Altai aimag, Taishir sum	–
Altai	10	Govi-Altai aimag, Altai sum	–
Bayanteeg	7.8	Ovorkhangai aimag, Nariinteel sum	–
Uliastai	5	Zavkhan aimag, Uliastai sum	–
Bayan-Undur	no data	Orkhon aimag, Undur sum	–
Total of planned plants:	**120.6-132.8**		

[a] Biggest solar power plant in Mongolia

Table 5. Operating and planned wind power plants of Mongolia (as of 2021).

Generating facility	Installed capacity, MW	Location	Launch year
Operating			
Salkhit	49.6	Tov aimag, Sergelen sum	2013
Tsetsii	50	Umnugovi aimag, Tsogttsetsii sum	2017
Sainshand[a]	55	Dornogovi aimag, Sainshand town	2018
Including operating mini-WPPs			
Erdenetsagaan	0.1	Sukhbaatar aimag, Erdenetsagaan sum	2004
Bogd	0.08	Ovorkhangai aimag, Bogd sum	2008
Sevrei	0.08	Umnugovi aimag, Sevrei sum	2008
Total of operating plants:	**154.86**		
Planned [29]			
Oyu-Tolgoi	102-250	Umnugovi aimag, Khanbogd sum	-
AB Solar Wind	100	Govisumber aimag, Choir town	-
Bulgan	100	Umnugovi aimag, Bulgan sum	-
Choir	50.4	Govisumber aimag, Choir town	-
Argalant	50	Tov aimag, Argalant sum	-
Taishir	10	Govi-Altai aimag, Taishir sum	-
Telmen	5	Zavkhan aimag, Telmen sum	-
Total of planned plants:	**417.4-565.4**		

[a] Biggest wind power plant in Mongolia

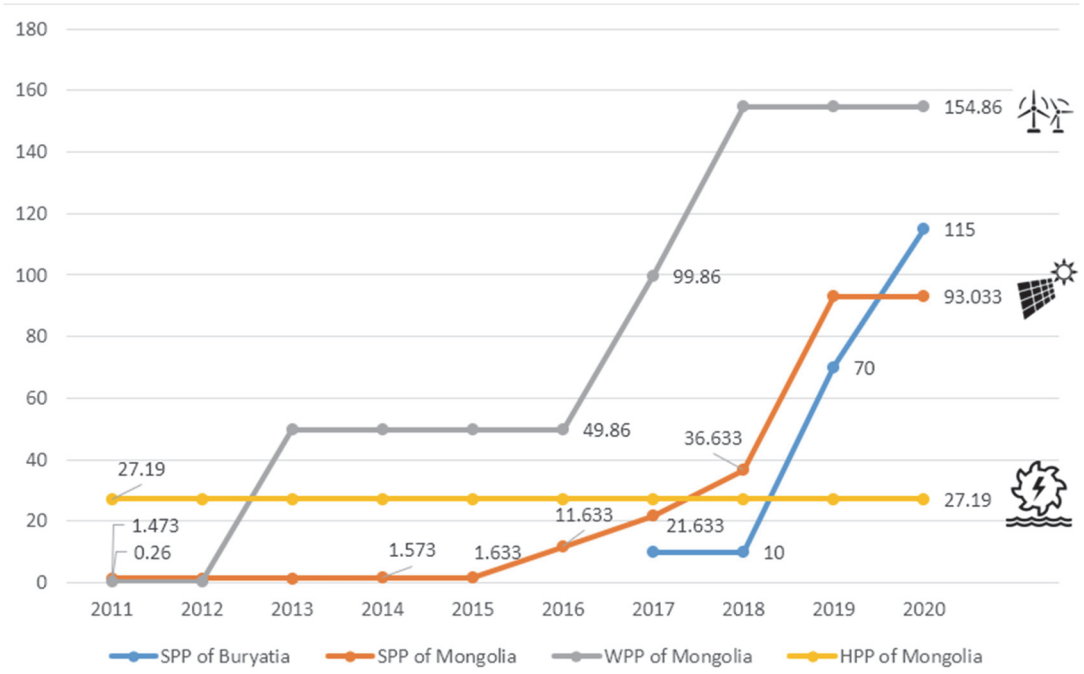

Figure 5. Dynamics of total capacity by types of renewable energy sources in the Republic of Buryatia and Mongolia (2011-2020), MW.

Table 6. Operating, inoperative and planned hydro power plants of Mongolia (as of 2021).

Generating facility	Installed capacity, MW	Location	Launch year
		Operating	
Durgun	12	Khovd aimag, Durgun sum (Chono-Kharaikh r.)	2008
Taishir	11	Govi-Altai aimag, Taishir sum (Zavkan r.)	2010
		Including operating mini-power plants [24]	
Bogdyn gol	2	Zavkhan aimag, Uliastai sum (Bogd r.)	1997
Guulin	0.4	Govi-Altai aimag, Delger sum (Zavkan r.)	1999
Ider	0.38	Zavkhan aimag, Tosontsengel sum (Ider r.)	2006
Uench	0.96	Khovd aimag, Uench sum (Uench r.)	2006
Erdenebulgan	0.15	Khovsgol aimag, Erdenebulag sum (Uure r.)	2006
Galuut (Tsetsen-Uul)	0.15	Zavkhan aimag, Tsetsen-Uul (Galuut r.)	2008
Khunguin gol (Zavkhanmandal)	0.15	Zavkhan aimag, Zavkhanmandal sum (Khunguin-Gol r.)	2010
Total of operating plants:	**27.19**		
		Inoperative	
Kharkhorin	0.528	Ovorkhangai aimag, Kharkhorin sum	1959
Ondorkhangai (Jigjiin gol)	0.2	Uvs aimag, Ondorkhangai sum	1989
Mankhan	0.15	Khovd aimag, Mankhan sum	1998
Monkhkhairkhan	0.15	Khovd aimag, Monkhkhairkhan sum	2003
Total of inoperative plants:	**1.028**		
		Planned [29, 30]	
Eg gol	200-315	Bulgan aimag, Khutag-Ondor sum (Egiin Gol r.)	-
Shuren	245-300	Selenge aimag, Tsagaan-nuur and Zuunburen sums	
Buren	161	Selenge r.	-
Artsat	118	Selenge aimag (Artsat r.)	-
Orkhon	100-110	Orkhon aimag, Orkhontuul sum (Orkhon r.)	-
Erdenet	100	Orkhon aimag, Erdenet town (Orkhon r.)	-
Tuul	50-100	Tuul r.	-
Tavaltai	93	Khovd r.	-
Terelj	90	Terelj r.	-
Erdeneburen	60-90	Khovd aimag, Erdeneburen and Bayan-Ulgii sums	-
Bayannuur	58	Bulgan aimag, Bayannuur sum (Tuul r.)	
Tsambyn khiid	50	Egiin Gol r.	-
Khantai	40	Egiin Gol r.	-
Elstei	40	Egiin Gol r.	-
Orkhon-Govi	33	Orkhon-Gobi canal	-
Chargait	23-25	Delger-Muren r.	-
Tosontsengel	24	Khovsgol aimag, Tosontsengel sum (Delger-Muren r.)	-
Maikhan Tolgoi	12-21	Khovd r.	-
Kherlen-Govi	20	Kherlen r.	-
Khurst aral	15	No data	-
Khenkhert	5	Egiin Gol r.	-
Khatgal	3	Egiin Gol r.	-
Total of planned plants:	**1598–1811**		

[a] Biggest hydro power plant in Mongolia

5. Conclusion

In this article we have shown the current state of affairs in the energy system of Buryatia and Mongolia and identified problems and prospects for development. On a large scale, both Buryatia and Mongolia began to develop alternative energy relatively recently. The surge began 5 years ago (Figure 3). Buryatia is 2.4 times behind Mongolia in terms of renewable energy sources, and judging by the big plans of the Mongolian authorities and business, this gap will widen. One thing is certain: the share of renewable energy capacity in both Buryatia and Mongolia will grow every year.

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