

GENERATION

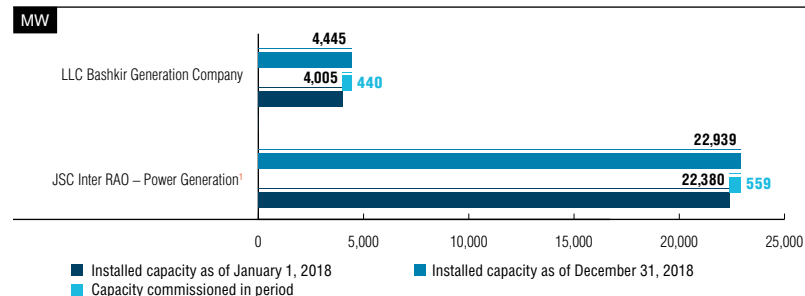
Main objectives for the development of the Generation segment within the context of strategic priorities:

- ensuring the reliability, safety, and technological development of existing production assets
- enhancing the operating, energy, and environmental efficiency of generating assets and maintaining leading positions in the Russian electric power industry
- further growth in the thermal power generation segment
- drafting and promoting proposals for the development of the regulatory framework in the industry

INSTALLED CAPACITY AT THE GROUP AS OF DECEMBER 31, 2018, MW

Primary energy sources	Capacity regulation mechanisms				
	CDA	CCA	Forced mode	Other	Total
Total for the Group					33,714
Gas generation	4,787	5,432	271	17,833	28,323
Russian Federation	4,787	5,432	271	14,835	25,325
Foreign assets	0	0	0	2,998	2,998
Coal generation	895	2,022	0	1,123	4,040
Russian Federation	895	2,022	0	123	3,040
Foreign assets	0	0	0	1,000	1,000
Mixed generation (power plants which used both gas and coal in the reporting period)	50	508	164	158	880
Russian Federation	50	508	164	158	880
Foreign assets	0	0	0	0	0
Other capacity (renewable energy sources)	0	211	0	260	471
Russian Federation	0	211	0	2	214
Foreign assets	0	0	0	257	257

CHANGES IN THE INSTALLED ELECTRIC POWER CAPACITY OF THE GROUP'S COMPANIES



¹ Including JSC Nizhnevartovskaya TPP

ELECTRIC AND THERMAL POWER GENERATION BY THE GROUP

Primary energy sources	Electric power generation, thousand MWh			Thermal power output from collectors, thousand Gcal		
	2016	2017	2018	2016	2017	2018
Gas generation	100,713	102,475	107,184	30,861	30,532	31,999
Russian Federation	92,775	95,815	102,434	30,722	30,400	31,890
Foreign assets	7,938	6,660	4,751	139	131	109
Coal generation	19,915	20,190	19,276	4,180	3,956	4,164
Russian Federation	14,939	14,695	13,839	4,109	3,890	4,085
Foreign assets ¹	4,976	5,495	5,437	71	67	79
Mixed generation (power plants which used both gas and coal in the reporting period)	11,422	10,638	4,725	5,491	5,508	5,576
Russian Federation	11,422	10,638	4,725	5,491	5,508	5,576
Foreign assets	0	0	0	0	0	0
Other capacity (renewable energy sources)	1,807	1,497	1,324	0	0	0
Russian Federation	870	940	768	0	0	0
Foreign assets	937	558	556	0	0	0

Integrated management systems

LLC Inter RAO - Engineering – ISO 9001:2015, ISO 14001:2015, and OHSAS 18001:2007

In 2018, LLC Inter RAO – Engineering confirmed the validity of three management system certificates for compliance with the international standards ISO 9001:2015, ISO 14001:2015, and OHSAS 18001:2007 (certificates of conformity were issued until 2021).

JSC TGC-11 and JSC Omsk RTS – ISO 9001, ISO 14001, and ISO 50001

JSC TGC-11 and JSC Omsk RTS have introduced an integrated management system that includes a quality management system, an environmental management

system, and an energy management system. This not only makes it possible to manage the production process itself, but to also reduce environmental pollution, enhance energy efficiency, cut costs, and constantly improve the quality of thermal and electric power (products).

The compliance of the integrated management system with the international standards ISO 9001, ISO 14001, and ISO 50001 is regularly confirmed through annual external audits conducted by international management system certification bodies as part of inspection control as well as internal audits that enable management to monitor the situation at the Company, manage it, and make informed decisions.

¹ Including the indicators of JSC Ekibastuzskaya TPP-2

COMMISSIONING OF NEW AND MODERNIZATION OF EXISTING CAPACITY IN 2018

**ZATONSKAYA
CHP**

**440
MW**
Certified power

**48.3%
EFFICIENCY**

- Two power units of combined-cycle gas turbine units PGU 220 (T) comprised of: a gas turbine unit
- GTU-160 SGT5-2000E Siemens + steam turbine T-60/73 of JSC Power Machines

**MAYAKOVSKAYA
TPP**

**157
MW**
Certified power

**35.5%
EFFICIENCY**

- GTU-2: 6FA Russian Gas Turbines

**TALAKHOVSKAYA
TPP**

**159
MW**
Certified power

**35.5%
EFFICIENCY**

- GTU-2: 6FA Russian Gas Turbines

**PREGOLSKAYA
TPP**

**227
MW**
Certified power

**51.9 %
EFFICIENCY**

- Two power units PGU-110 comprised of:
- GTU 6FA Russian Gas Turbines + steam turbine K-38-8.0 of JSC Power Machines

**IRIKLINSKAYA
TPP**

**16
MW**
Certified power

- K-300-240 LMZ turbine unit was modernized with the replacement of the maintenance components with new ones and relabeled as K-330-240-6MR
- Boiler unit PK-41-1, Plant No. 2 was modernized with the replacement of heating surfaces
- TVV-320-2 turbine generation was modernized with an increase in total power up to 350 MVA