Development of a set of limits for the main performance indicators of energy-generating companies

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Abstract. Restrictive conditions established on average throughout the organization, which each energy-generating company should strive to carry out, have been proposed and analyzed. In order to ensure a sustainable level of financial stability, the calculation of the use of debt coverage and debt service limits is predicated. Fulfillment of the established limits should be taken into account in the formation of investment programs, which the energy-generating company intends to implement, which should imply the corresponding energy-generating company certain preferences, for example, a reduced interest rate on loans, which in turn increases the efficiency of the investment project of the organization and leads to more economic efficiency of the tariff method RAB-regulation.

1. Introduction

Let 's look at the main models and methods of estimation in electric power systems **[1-3]**, in ensuring energy security of the state **[4]** using the example of the mechanism analysis of the method of return of invested capital. This mechanism includes the costs of determining the net gross revenue (NGR) and the tariffs of the following periods, of servicing the loans raised to finance the programmes and projects implemented by energy generating companies, assets used in their activities, to stimulate investment in energy-generating companies in general **[5]**.

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We calculate the borrowing amounts during the negotiation of the NGR amount. The current credit position of the energy-generating companies takes into account and we select the optimal level between the tariff load on customers and the debt load on the energy-generating companies in the forecast period **[6-16]**.

In the absence of limit values of parameters controlling the level of debt burden regulated by the railway infrastructure company, the regulator will inevitably face risky actions of the energy-generating company to borrow volumes to ensure tariff growth.

In the absence of a long-term economically sound tariff policy, the amount of financial debt can lead to a risk of loss of financial stability and an increase in the cost of servicing debt capital. Because of the growth of the share of borrowed capital, the share of contributions from the operating flow of the energy-generating company for debt servicing significantly increases.

To ensure the acceptable level of financial stability, we propose it to use the debt coverage limit and the debt service coverage limit.

2. Results and Discussion

The debt coverage limit is met if the ratio:

$$LC \leq 3 * EBITDA \quad (1)$$

where *LC* - borrowed capital, thousand rubles; *EBITDA* - profit before deduction of expenses on payment of interest, taxes, wear and tear and accrued depreciation, thousand rubles, taxes, wear and added depreciation, thousand rubles.

The debt service coverage limit is met if we carry the ratio out:

$$Debt\ servicing \leq EBITDA / 3 \quad (2)$$

Let ’s consider we meet whether these conditions within the framework of tariff regulation by the method of return on invested capital of Interregional Distribution Grid Company of Centre and Volga Region.

To begin with, you need to determine which values EBITDA will take. For this purpose, we use formula (1):

$$EBITDA = NGR_i - OC - UC + T \quad (3)$$

where NGR_i - required gross revenue, thousand rubles; *OC* - operational costs, thousand rubles; *UC* - uncontrollable costs, thousand rubles; *T* - income tax, thousand rubles.

Now let ’s move on to determining debt service. It will be equal to income on capital:

$$EBITDA = 17\ 626{,}05\ million\ rubles \quad (4)$$

The share of borrowed capital in 2019 amounted to 19,896.66million rubles.

The determining debt service amounted to 2273.43 million rubbles:

$$3 * EBITDA = 52878{,}15\ million\ rubles \quad (5)$$

Having made calculations, we can conclude it that the organisation in the conditions of RAB regulation meets these conditions, which positively affects financial stability and reduces servicing of borrowed capital.

We will perform a comparative analysis of tariffs (indexing method and RAB) for the next 5 years (Table 1).

Table 1. Comparative analysis of tariffs.

Indicator	2019	2020	2021	2022	2023
NGR, Indexation thousand rubles*	55 353 084	57 487 723	59 782 136	61 174 279	63 429 173
NGR, RAB, thousand rubles	59 911 894	63 250 205	67 071 490	70 949 228	74 982 729
Useful release, million rubles, MW•h**	47 721	47 923	48 125	48 322	48 543
The average rate, Indexation, RUB/kW•h	1.169	1.212	1.260	1.288	1.334
The average rate, RAB RUB/kW•h**	1.255	1.320	1.394	1.468	1.545

Note: * Exchange rate of dollar to ruble of the Central Bank of the Russian Federation (19.02.2020): 1 dollar = 63.7698 rubles; Exchange rate of ruble to tenge of National Bank of Kazakhstan (19.02.2020): 1 ruble = 5,91 tenge. **Losses of electrical energy in networks.

Besides the debt coverage limit and the debt service coverage limit, the author proposes to introduce a limit on the following positions.

We calculate the limit on the number of conventional units of serviced electrical grid equipment [17**]** according to the formula:

$$EBITDA / c.u. \quad (6)$$

where *c.u.* - the conventional unit.

We calculate the limit on the volume of the useful release of electric energy from the network according to the following formula:

$$EBITDA / UO \quad (7)$$

where *UO* is the volume of useful electric power release from the grid, MW•h.

We calculate the return limit on invested capital according to the following formula:

$$EBITDA / RC \quad (8)$$

where ***RC*** - return on invested capital, thousand rubles.

We calculate the return limit on invested capital on useful electricity release according to the following formula:

$$RC / UO \quad (9)$$

Introduction of these limits will allow the network energy-generating company to ensure communication of all main indicators of the energy-generating company, provide long-term tariff policy, the guarantee of profitability, solution of problems of unjustified commissioning, growth of useful release.

We calculate the limit on the number of conventional units of the served electric grid equipment according to formula (6), the limit on the volume of electric energy release from the network according to formula (7), the return limit on invested capital is calculated according to the following formula (8), the limit on return on invested capital according to useful electricity release according to formula (9). According to calculations, we will draw

up Table 1, which will show a retrospective analysis of the activities of branches under the introduced limits.

Having calculated all indicators of limitation by branches (Table 2), we will calculate these indicators throughout the public stock company IDGC of Centre and Volga Region and analyses the results).

Table 2. Factors contributing to the application of RAB - regulation.

Branch	**Method**	**The limit on the number of conventional units**			**The limit on the volume of electric energy release from the network**			**Return limit on invested capital**			**The limit on return according to useful electricity release**		
		2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
Vladimirenergo	RAB	23.87	17.12	26.65	0.36	0.26	0.41	6.42	8.90	2.11	0.06	0.029	0.195
Ivenergo	Index	5.23	7.72	3.70	0.13	0.17	0.08	(2,93)	Index	Index	(0,04)	Index	Index
Kalugaenergo	RAB	20.90	18.19	18.27	0.57	0.48	0.51	2.99	2.61	3.01	0.19	0.184	0.169
Kirovenergo	RAB	13.62	13.98	10.34	0.34	0.33	0.25	7.04	1.80	1.83	0.05	0.181	0.138
Marienergo	Index	10.75	8.31	6.69	0.25	0.21	0.19	0.83	Index	Index	0.31	Index	Index
Nizhnovenergo	RAB	9.06	34.16	23.78	0.17	0.65	0.50	(0,77)	1.98	(11,76)	(0,22)	0.329	(0,043)
Ryazanyenergo	RAB	15.73	13.73	18.21	0.37	0.27	0.42	2.83	3.23	3.41	0.13	0.084	0.124
Tulenergo	RAB	26.55	24.78	27.14	0.58	0.54	0.59	1.56	3.20	2.90	0.37	0.167	0.203
Udmurtenergo	Index	10.57	8.17	4.37	0.14	0.10	0.06	12.48	3.21	Index	0.01	0.033	Index

Calculations for compliance with the limit showed that each branch has its features, but the majority corresponds to each limit. Considering that in 2018 Ivenergo, Marienergo and Udmurtenergo switched to the method of indexing the gross revenues, only the branch of Kirovenergo this year does not fulfil most values. Most likely, the reason for this is the targeted rearmament of fixed assets. Special attention should be paid to the limit on return on invested capital, as we cannot set it from the average value throughout the organisation. This

limit will be met if it is greater than or equal to 1.5. Also, the Nizhnovenergy branch shows volatile values on limiting return according to useful electricity release.

Based on the available data on the calculation of NGR by the method of return on invested capital (Table 3), we will set limits for the five years of regulation 2019-2023 years throughout the public stock company IDGC of Centre and Volga Region (Table 4).

Table 3. Factors contributing to the application of RAB - regulation.

Indicator	2019	2020	2021	2022	2023
NGR in total, thousand rubles	59911894,7	63250205,3	67071490,3	70949228,1	74982729,9
Controlled expenses, thousand rubles	19947482,0	20705486,3	21533705,7	22395053,9	23290856,1
Uncontrollable expenses, thousand rubles	23949476,6	24859556,7	25853939,0	26888096,5	27963620,4
Return of the capital, thousand rubles	6818656,0	7249038,0	7762286,9	8282816,0	8859164,6
Capital gain, thousand rubles	7585162,9	8597780,0	9798426,8	10973832,9	12307258,2
Return and capital gain, thousand rubles	14403818,9	15846818,0	17560713,7	19256648,9	21166422,8
The parameters for calculation of the return of capital:					
The full value of the invested capital, thousand rubles	238652960,0	253716330,0	271680040,0	289898560,0	310070760,0
Investments in the capital base - IP (Investment program); (without technical connection), thousand rubles	15063370,0	17963710,0	18218520,0	20172200,0	20610350,0
Calculation of return capital, including, thousand rubles	35.0	35.0	35.0	35.0	35.0
Return of the "old" capital, thousand rubles	6818656,0	7249038,0	7762286,9	8282816,0	8859164,6
Return of "new" investments (according to IP), thousand rubles	6818656,0	6818656,0	6818656,0	6818656,0	6818656,0
2020, thousand rubles		430,382.0	943,630.9	1 464 160,0	2 040 508,6
2021, thousand rubles		430,382.0	430,382.0	430,382.0	430,382.0
2022, thousand rubles			513,248.9	513,248.9	513,248.9
2023, thousand rubles				520,529.1	520,529.1
Parameters for calculating return on capital:					

Indicator	2019	2020	2021	2022	2023
The residual value of invested capital, thousand rubles	66322209,0	74566923,0	85281595,0	95737828,1	107627212,1
Rate of return, %	11	11	11	11	11
The calculation of the return on capital, thousand rubles, including:	7585162,9	8597780,0	9798426,8	10973832,9	12307258,2
Income on "old" capital, thousand rubles	7295443,0	6545390,8	5795338,7	5 045 286,5	4295234,4
Income on "new" capital (IP) and working capital, thousand rubles	289,719.9	2052389,2	4003088,1	5928546,4	8012023,9

Table 4. Factors contributing to the application of RAB - regulation.

Indicator	2019	2020	2021	2022	2023
The limit on the number of conventional units	17.901	19.803	22.090	24.357	26.562
The limit on the volume of useful release	0.369	0.407	0.453	0.498	0.542
The return limit on invested capital	2.324	2.271	2.226	2.194	2.136
The limit on losses*	0.159	0.179	0.204	0.227	0.254

Note: *Losses of electrical energy in networks, MW•h.

Thus, each branch of the public stock company IDGC of Center and Volga Region analyze the results.

3. Conclusion

Energy-generating companies should strive to comply with the conditions of limitation established on average throughout the organization and applied to each branch. Fulfilment of the specified limits should be taken into account when forming the investment program. With full implementation, organizations should provide some preferences, such as reducing the interest rate on credit, which in turn increases the efficiency of the organization ‘s investment programs and projects, to stimulate investment in these programs and projects and energy-generating companies in general and leads to the greater economic efficiency of the RAB-regulation tariff method.

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