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**FINANCIAL MODEL IN TERMS OF CONCESSION  
AGREEMENTS**

V. Rakhaev (a)\*

\*Corresponding author

(a) Samara State University of Economics, 443090, Soviet Army Str., 141, Samara, Russia, [raxaev.valerij@mail.ru](mailto:raxaev.valerij@mail.ru)

***Abstract***

The subjects of financial relations in the field of heat supply are heat supply organizations (concessionaires), owners of heat supply facilities (concessors), regional authorities and consumers. Concessionaires operate heat supply facilities, purchase fuel and energy resources, produce and transfer heat energy to consumers. Grants own heat supply facilities and hand them over to concessionaires. Regional authorities set tariffs at which concessionaires sell thermal energy to consumers, which are the population, budget and other organizations. The interests of the subjects of financial relations in this area are often opposite. Thus, consumers are interested in lower tariffs, and concessionaires in higher tariffs, ensuring good financial condition and solvency. Regional authorities typically pursue the interests of heat consumers. Therefore, it is relevant to find a balance of interests of all participants in financial relations in this area. The aim of the study is to analyze the existing financing mechanism in the framework of concession agreements and develop a model to increase the profitability of concessionaires. As part of the study, concession agreements were evaluated in a number of regions of the Russian Federation for 2016-2019. It is concluded that the existing tariff setting mechanism does not allow to adequately compensate for the reasonable costs incurred by concessionaires in the production and transmission of thermal energy and reconstruction. A model for the formation of the necessary gross revenue and concessionaire tariffs is proposed. The conditions for lending to concessionaires in the framework of project financing have been developed.

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**Keywords:** Expenses, required gross revenue, financial result, shortfalls, financial model, financial mechanism.



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## 1. Introduction

Heat supply facilities in Russia are governed by federal law (Federal law of 21.07.2005 N 115-FZ (ed. of 27.12.2018) "On concession agreements"; Federal law of 27.07.2010 N 190-FZ (ed. of 29.07.2018) "On heat supply"; Order of the Federal tariff service of 13.06.2013 No. 760-e "on approval of Guidelines for calculating regulated prices (tariffs) in the field of heat supply" (as amended on May 27, 2015, July 4, 2016, June 30, October 4, 2017, July 18, 2018; Order of the Federal tariff service of Russia dated 07.06.2013 No. 163 "on approval of the Rules for opening cases on setting regulated prices (tariffs) and canceling the regulation of tariffs in the field of heat supply" (with subsequent changes); Resolution Of the government of the Russian Federation of 22.10.2012 N1075 (ed. from 26.04.2019) "On pricing in the field of heat supply"; Resolution Of the government of the Russian Federation of may 5, 2014 N 410 "On the procedure for approval and approval of investment programs of organizations engaged in regulated activities in the field of heat supply, as well as requirements for the composition and content of such programs (except for such programs approved in accordance with the legislation of the Russian Federation on electric power)" with amendments and additions from: March 18, 2016, January 24, November 17, 2017, may 12, October 8, 2018). The parties to the concession agreements are the concession holder (the municipality that owns the heat supply facilities), the concessionaire (carries out the reconstruction and operation of heat supply facilities). The financial obligations of the concessor are the transfer of heat supply facilities to the possession and use of the concessionaire. The grantee also agrees the investment program of the concessionaire, the terms of financing by the bank, pays compensation to the concessionaire in case of early termination of the agreement. The regional authority sets tariffs for the provision of services by the concessionaire, approves the investment program, and reimburses the concessionaire's lost income. The basis for compensation for lost income to the concessionaire is a reduction in payments by consumers - organizations subordinate to regional authorities. The obligations of the concessionaire relate to the implementation of investments, at the expense of own and borrowed funds, in the reconstruction of the object of the agreement and the payment of the concession fee. The terms of the concession agreements should take into account the interests of all participants.

Russian researchers note the advantage of concession in the constancy of long-term tariffs. The difficulties of the concession include the impossibility of attracting large amounts of capital, the underestimation of economically justified expenses and lost revenue, the large volume of receivables and payables of the concessionaire, and high losses (Dondupova, 2016). Using international experience will help solve the problems of concessions in Russia. Thus, European Union directives determine concession conditions, risk sharing and state control measures (Nemchaninova, 2015). Foreign researchers have noted the need to use project financing for concessions (Soku & Zhaoxia, 2014). Banerji, Duygun, Noe, and Shaban (2019) believe that the state's share should not exceed half of the total financing of the concession agreement. Godlewski (2020) investigates the dependence of the amount and term of lending to concessionaires on the degree of protection of creditors' rights.

The important role of budget financing in public-private partnerships (Holland, 2019; Huang & Zhu, 2015; Otchere, Senbet, & Zhu, 2020) is noted. Companies dependent on external financing are more likely to raise funds for investment (Acharya & Xu, 2017; Dang & Xu, 2018).

The need to attract external budget and bank financing by the concessionaire is due to the lack of own funds for implementing investment programs. However, a clear algorithm for the interaction of the grantor, the concessionaire and the bank has not been developed. Concession agreements involving the bank in Russian practice are rare. This is because the financial situation of concessionaires often does not meet the requirements of the bank. The reasons are the improper fulfillment of obligations by consumers and the unreasonableness of tariffs. In this regard, further theoretical research and practical study of the financial mechanism of concession agreements are necessary.

## **2. Problem Statement**

The heat supply market is local. The income of concessionaires is generated due to the supply of thermal energy to consumers (households, budget and other consumers) at regulated tariffs. Tariffs are set by regional authorities on the basis of the accounting reports of concessionaires. The dynamics of sales is determined on the basis of the growth potential of sales in physical and value terms in the municipality. A feature of the market is seasonality. The proceeds go to the concessionaire during the heating period: from October of the current year to April of the following year. However, expenses must be incurred throughout the year.

Revenues depend on the current level and approved norms of heat energy consumption, consumer income. The current trend is the transition of some consumers to individual heating and the rejection of centralized heating. This leads to a decrease in sales of the concessionaire compared to the level established by the concession agreement. In practice, there is a discrepancy between the time of invoicing and the receipt of funds from consumers of thermal energy. This is due to settlement conditions, as well as low solvency of some consumers. The concessionaire incurs the costs of acquiring fuel and energy resources (hereinafter referred to as the fuel and energy resources) necessary for the production of thermal energy (gas, electricity, water), as well as operating and uncontrolled expenses. This cash gap is rarely the subject of bank lending. There is no operational regulation by regional authorities. The objectives of the study are the analysis of the existing mechanism for financing concessionaires and its improvement.

## **3. Research Questions**

To overcome the shortcomings in the field of concession agreements, the research questions were raised:

- What are the reasons for the poor financial situation of the concessionaires;
- What is the financing model that allows to increase the profitability of concessionaires.

## **4. Purpose of the Study**

The objectives of the study are:

- To analyze the existing financing mechanism in the framework of concession agreements;
- To propose a financial model to increase the profitability of concessionaires.

## 5. Research Methods

The author analyzes the implementation of 5 Concession Agreements concluded between municipalities (concessors) and a heat supply organization (concessionaire) in the regions of the Russian Federation: in the Samara Region - 1 agreement, in the Penza Region - 3 agreements, in the Orenburg Region - 1 agreement. Concession agreements were concluded for the period 2016 - 2024. The study was conducted for the period 2016 - 2019. As part of the concession agreements examined, 47 heat supply facilities (boiler houses) operate. Boiler houses provide heat to consumers located in rural administrative areas of these regions.

According to the terms of the agreements, the annual volume of useful supply of thermal energy to consumers should be 43,791 gigacalories (hereinafter - Gcal). The actual useful supply was by year: 2016 - 35 124 Gcal, 2017 - 28 966 Gcal, 2018 - 30,070 Gcal, 2019 - 26 961 Gcal. The reason for the decrease in productive supply was the transition of some consumers to individual heating and the rejection of centralized heating. The decrease in productive leave has led to a deterioration in the financial results of the concessionaire. Tables 01 - 04 show the calculation of the financial result of the Concessionaire for the period 2016-2019 in accordance with the tariff and upon.

**Table 01.** Calculation of the concessionaire's financial result for 2016

Name	According to the tariff, thousand rubles	In fact, thousand rubles	Deviation, thousand rubles
Useful release of heat energy, Gcal	43 791	35 124	- 8 667
Tarif without VAT, rubles / Gcal	1361,15	1361,15	-
Revenue	61 675	47 809	- 13 866
Total expenses,	61 674	50 861	- 10 813
including:			
Operating expenses	12 274	8 532	- 3 742
Uncontrolled expenses	5 200	1 519	- 3 681
Expenditures on fuel and energy resources	44 200	40 810	-3 390
Profit / Loss	1	-3 052	- 3 053

Source: author.

The drop-out income amounted to 3,052 thousand rubles. To reach the break-even point, the revenue must be equal to 50,861 thousand rubles, and the tariff is 1448,04 rubles / Gcal without VAT (50,861 thousand rubles / 35,124 Gcal).

**Table 02.** Calculation of the concessionaire's financial result for 2017

Name	According to the tariff, thousand rubles	In fact, thousand rubles	Deviation, thousand rubles
Useful release of heat energy, Gcal	37 628	28 966	-8662
Tarif without VAT, rubles / Gcal	1 483,97	1483,97	0
Revenue	55 839	42 985	-12854
Total expenses,	53 714	47 321	-6 393
including:			

Operating expenses	12 719	6022	-6 697
Uncontrolled expenses	3813	3159	-654
Expenditures on fuel and energy resources	37 182	38 140	958
Profit / Loss	2 125	-4 336	-6 461

Source: author.

The drop-out income amounted to 6, 461 thousand rubles. To reach the break-even point, the revenue must be equal to 47,321 thousand rubles, and the tariff is 1,633. 67 rubles / Gcal without VAT (47,321 thousand rubles / 28,966 Gcal).

**Table 03.** Calculation of the concessionaire's financial result for 2018

Name	According to the tariff, thousand rubles	In fact, thousand rubles	Deviation, thousand rubles
Useful release of heat energy, Gcal	35 124	30 070	-5 054
Tarif without VAT, rubles / Gcal	1515,74	1515,74	
Revenue	53 239	45 587	- 7 652
Total expenses,	51 473	51 087	-386
including:			
Operating expenses	12 333	11 761	-572
Uncontrolled expenses	2 940	2 226	-714
Expenditures on fuel and energy resources	36 200	37 160	960
Profit / Loss	1 766	-5 500	- 7 266

Source: author.

The drop-out income amounted to 7,266 thousand rubles. To reach the break-even point, the revenue must be equal to 51,087 thousand rubles, and the tariff is 1,698. 94 rubles / Gcal without VAT (51,087 thousand rubles / 30,070 Gcal).

**Table 04.** Calculation of the concessionaire's financial result for 2019

Name	According to the tariff, thousand rubles	In fact, thousand rubles	Deviation, thousand rubles
Useful release of heat energy, Gcal	32 255	26 961	-5 294
Tarif without VAT, rubles / Gcal	1597,87	1597,87	
Revenue	51 540	43 080	-8 460
Total expenses,	50 460	44 461	-5 999
including:			
Operating expenses	13 521	9 862	-3 659
Uncontrolled expenses	2 500	2 240	-260
Expenditures on fuel and energy resources	34 439	32 359	-2 080
Profit / Loss	1 080	-1 381	-2 462

Source: author.

The drop-out income amounted to 2,462 thousand rubles. To reach the break-even point, the revenue must be equal to 44,461 thousand rubles, and the tariff is 1649.09 rubles / Gcal without VAT (44,461

thousand rubles / 26,961 Gcal). As you can see, the annual activity of the concessionaire is unprofitable. The loss income for 2016-2019 amounted to 14,833 thousand rubles. The reason for the losses is that when the useful vacation is reduced, the cost of fuel and energy resources is reduced to a lesser extent than the income. As a result, the cost of fuel and energy resources for the useful release of heat energy (by 1 Gcal) increases. At the same time, the cost of thermal energy for thermal energy production (by 1 Gcal) did not increase. The loss was caused by a low tariff and a decrease in useful vacation time. Expenses and the tariff for the next year are determined by the method of indexing the established tariffs. This method does not take into account the decrease in useful leave.

The concession agreements concluded do not imply compensation for the loss of income to the concessionaire. Therefore, during the analyzed period, no compensation was made for the loss of income to the concessionaire by the concedents or regional authorities. According to the terms of the concession agreements under consideration, the concessionaire was also obliged to implement an investment program (to reconstruct boiler houses and heat networks). As a result of the investment program, heat losses are reduced, production, useful vacation, gross revenue and profit increase. The additional profit of the concessionaire allows to compensate for the decrease in income due to the transition of some consumers to individual heating. However, the established tariff does not allow the investment program to be carried out at the expense of the concessionaire's own funds. The concessionaire's unprofitable activity makes it impossible to attract borrowed funds to Finance investments. This example is given for 5 concession agreements, but it illustrates the General situation in the implementation of heat supply agreements in the Russian Federation. To ensure proper financing of the concessionaire, a financial model based on the method of economically justified expenses is proposed.

## 6. Findings

The proposed financial model includes input data, assumptions, and calculation results. The source data has the following composition:

- Forecast of useful output, losses and heat generation;
- Norms of consumption of fuel and energy resources for heat energy production;
- Forecast of prices for fuel and energy resources;
- Forecast of tariffs for thermal energy;
- Investment forecast;
- Forecast financing structure, terms of borrowing (interest rates, schedule of debt collection and servicing);
- Terms of settlements with contractors;
- Tax conditions.

Assumptions:

- The method of economically justified expenses is used to calculate long-term parameters of regulation;
- The project lifetime is equal to the concession period;
- The duration of the forecast period is not less than the loan repayment period;
- Forecast step: for the investment stage - one quarter, for the operating stage-one year.

When forecasting, it is necessary to take into account the actual expected useful leave according to the concessionaire's data.

Determine the generation of heat energy taking into account the useful output and losses in the networks. Operating expenses are determined based on the experience of previous years, non-controlling expenses in fact. The calculation results include a profit and loss forecast and a cash flow forecast. When making a profit and loss forecast, expenses are first determined by their types. Expenses for fuel and energy (conditionally – variables) are determined on the basis of the planned annual output of thermal energy, norms of fuel and energy resources consumption for production of 1 Gcal of heat energy and prices of energy resources according to the formula 1:

$$R_{\text{ter}} = V_{\text{yr}} * N_{\text{ter}} * C_{\text{ter}}, \quad (1)$$

where:  $R_{\text{ter}}$  – the cost of fuel and energy resources per year, thousand RUB.;  $V_{\text{yr}}$  – annual production of heat energy, Gcal;

$N_{\text{ter}}$  – norms of fuel and energy consumption for the production of 1 Gcal (m<sup>3</sup> of gas, kWh of electricity, m<sup>3</sup> of water);

$C_{\text{ter}}$  – prices for TER (RUB / m<sup>3</sup> of gas, RUB / kWh of electricity, RUB / m<sup>3</sup> of water).

Operating expenses include expenses for staff salaries, repairs, maintenance and operation of fixed assets, depreciation, shop and General business expenses (conditional and permanent). Operating expenses are projected based on the installed capacity of heat and power equipment (Gcal/hour) and consumption rates per 1 capacity. Concessionaires should strive to reduce these costs. Noncontrolling expenses (conditionally fixed) do not depend on the activity of the concessionaire and are accounted for in full. They include insurance premiums, expenses for renting heat supply facilities, and income tax. The concessionaire's required gross revenue for the year is calculated as the sum of TER expenses, operating expenses (OR), noncontrolling expenses (NPR), and the concessionaire's profit (PR) using formula 2:

$$N_{\text{v}} = \text{expenses for TER} + \text{OR} + \text{NPR} + \text{PR}, \quad (2)$$

The tariff for thermal energy is equal to the ratio of the required gross revenue to the value of the useful output. In the case of reducing the effective supply of the required payments shortfall in income to the concessionaire. Investment costs are limited to the maximum amount of reconstruction costs set out in the concession agreement (repair and purchase of boiler equipment, repair of heating networks, etc.). The source of repayment of the loan and interest is depreciation and profit of the concessionaire. In case of early termination of the agreement, it is necessary to provide compensation for the concessionaire's investment costs from the regional authorities. Compensation allows you to make settlements with the Bank under the loan agreement. There are two possible compensation options: - not less than the amount of the principal debt and interest not paid on the date of termination of the concession agreement ("on liabilities").

When compensating for "liabilities", the regional authority directly compensates the Bank for the amount of principal and interest not returned by the concessionaire; - no more than the concessionaire's expenses for reconstruction, net of reimbursed expenses ("on assets"). The Bank's credit conditions depend

on the choice of the project compensation calculation option ("on liabilities" or "on assets"). Compensation "for assets" is calculated using the formula (3):

$$K = (RC-SK) + VD \quad (3)$$

where: K-compensation for early termination;

RC – expenses actually incurred by the concessionaire that are subject to compensation;

SK – the concessionaire's equity raised for investment purposes;

VD – the concessionaire's lost revenue that was not reimbursed on the date of termination of the agreement.

Lending by the Bank for reconstruction of the agreement objects is possible on the terms of project financing. Based on the results of the analysis of concession agreements, the following credit conditions are seen (Table 05).

**Table 05.** Credit conditions under concession agreements

Indicator	Characteristic
Loan term	Up to 10 years
Loan amount	Up to 70% of total investment costs
Interest rate	in accordance with the financial indicators of the project and the participation of regional authorities in the payment of compensation
Security	Pledge of the concessionaire's rights under the agreement Pledge of shares/shares of the concessionaire Deposit of funds in the reserve account to ensure payment of interest for 3 months.
Collection of consumer payments	At least 95 % of the concessionaire's accruals

Source: author.

The term of financing should not exceed the term of the concession agreement. The regulatory parameters (fuel and energy costs, operating expenses, non-controlled expenses, profit, required gross revenue, and tariff) are approved for the duration of the loan agreement. Collateral for the loan can be a pledge of the rights of claims under the concession agreement, as well as other types of security, depending on the individual characteristics of the project. It is possible to provide a delay in the payment of the principal debt until the implementation of investment costs. Due to the seasonality of the business, payment of the principal debt is made on an individual schedule, taking into account the uneven receipt of revenue by the concessionaire. Interest is paid monthly. Monitoring of the intended use of credit funds allocated for project financing is carried out using Bank support.

## 7. Conclusion

The purpose of the study was to analyze the existing financing mechanism within the framework of concession agreements and develop a model that allows increasing the profitability of concessionaires. Existing regulatory documents in this area do not allow to ensure the profitability of concessionaires and the implementation of investment programs. The main problems are unreasonable tariffs, the lack of a



mechanism for compensating lost revenue, and incomplete collection of payments. This is confirmed by the analysis of concession agreements in a number of regions of the Russian Federation. A financial model is proposed that allows taking into account the economically justified expenses of the concessionaire when forming the necessary gross revenue and tariffs. According to the author, the optimal conditions for crediting the concessionaire are determined. The results of the study can be used by banks in determining the parameters of lending concessions. The recommendations may also be useful for consideration by regional authorities of the considered regions of the Russian Federation. It is planned to expand research on concession agreements in other sectors of the economy.

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