

# Development Trends and Problems of Public-Private Partnership in the Field of District Heating

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**Abstract** — The article deals with the problems of improving the efficiency of the provision of public services of heat supply on the basis of concession agreements in the framework of public-private partnership. The current status and development trends of concessions in the field of district heating supply system in Vladimir region, and in particular, Melenki district. Statistical methods of analysis of information from open sources and the method of expert assessments were used in the article. There are main problems of the use of concessions in heat supply, expressed in the transformation of public utilities with a socially significant direction into commercial services with the resulting negative consequences for the consumer. The conclusion is drawn that it is necessary to form an equitable tariff-setting system and to shift business priorities from maximizing the profit from the concession agreement to improving the quality of utility services. For this purpose it is recommended to establish specific quality targets in the interest of the population and to strengthen the permanent state and municipal control over their implementation. The article is useful for representatives of state and local authorities, heads of resource-supplying enterprises, and anyone interested in the problems of housing and communal services.

**Keywords** — *public-private partnership, concession, housing and communal services, heat supply, target quality indicators, state and municipal control.*

## I. INTRODUCTION

Public-private partnership (PPP) as a form of management in the housing and communal services has a number of undeniable advantages. They are expressed in the demonopolization of the provision of public services with the exception of the state's prerogatives on property and at the same time preventing the full privatization of public infrastructure by private businesses. The result is a balanced approach in the management of housing and communal services, manifested in a combination of management skills, technology, business resources with the regulatory activities of the public sector that protects consumer interest.

PPP in many countries has been developed not only at the federal, but also at the local level.

So, in the USA, municipalities actively involve commercial structures for solving issues of local importance (water supply, sewage, garbage collection, operation of parking lots and others). As a result, municipalities save up to 50 % of budget funds [1].

PPP projects in housing and communal services are successfully implemented in developed European countries, especially in Great Britain and France, with the financial support of the European Investment Bank. The majority of investments are aimed at supporting projects for the construction of waste-processing plants and desalination plants. Among the group of Asian countries led by China, the largest share of PPP projects is realized in the energy sector, accounting for 45.4 % of the total number [2].

Positive foreign experience was the main reason why the state strategy for the development of housing and communal services in the Russian Federation is aimed at attracting private investment in this sector by transferring communal facilities to concessions.

## II. ANALYSIS OF THE CURRENT STATUS AND DEVELOPMENT TRENDS OF CONCESSIONS IN HOUSING AND COMMUNAL SERVICES

### *A. State policy in the sphere of concessions, municipal opinions and expert assessments*

At present the attraction of private investments in housing and communal services with the conclusion of concession agreements is one of the most priority directions of the state strategy of development of housing and communal services in the Russian Federation.

Currently, 1,831 concession agreements have been concluded with respect to public infrastructure facilities with a total amount of investment obligations of more than 257 billion rubles, 95 % of which are the funds of a private investor [3]. According to estimates of the Ministry of Construction and Housing and Communal Services of the Russian Federation for modernization of worn-out infrastructure of housing and communal services it is necessary to attract not less than 0,5 billion rubles of private investments annually [4].

If the government of the Russian Federation pursues a policy of active involvement of private business in housing and communal services, many municipalities are wary of concessions due to the possible weakening of the management impact in this area, as well as the risks of opaque tariff policy and lack of incentives on the part of businesses to modernize the utility infrastructure transferred to it [5].

Many experts do not consider the concession to be a sufficiently profitable tool for private investment due to the

"political tariff" regulated by the state, and propose to allow businesses to calculate the "investment-correct" tariff for effective return on investment [6].

However, in this case social factors are ignored, which should be the priority in the provision of public services.

As noted in the strategy of socio-economic development of Vladimir region, the investment attractiveness of the region's potential in the sphere of housing and communal services significantly reduces such risks as: reducing the solvency of the population and enterprises, growth of tariffs and debts for payment of public services, reduction of budget financing, high depreciation of communal infrastructure facilities, low level of introduction of innovative technologies [7].

#### *B. Current status and development trends of concession agreements in the region*

Let's consider the current practice of stimulating business to implement investment projects in the housing sector, trends and problems of public-private partnership on the example of modernization of heat supply facilities in Vladimir region, and in particular, Melenki district as one of the promising areas for the placement of solid fuel boilers. Statistical methods of analysis of information from open sources and the method of expert assessments were used to process the primary information.

According to representatives of the Ministry of Construction and Housing and Communal Services of the Russian Federation, Vladimir region belongs to the regions that effectively use the mechanism of concession agreements. Currently, 26 concession agreements with investments in the amount of 12.6 billion rubles and with an average validity of 25 years have been signed in Vladimir region. In 2018, it is planned to conclude 10 concession agreements with a total investment of 526.8 million rubles [8].

Several large regional PPP projects are aimed at the construction and modernization of boiler houses on peat fuels. These boilers are fully automated, have a lower staff costs, maintenance of fuel oil facilities and electricity consumption. Cost savings for production of thermal energy through the use of peat fuel is more than 50 % compared to solid and liquid fuels. One of these joint projects is an investment agreement between "BIOENERGO" OJSC, "Teplo ludyam Melenki" Ltd and the administration of Vladimir region.

According to the PPP project, a solid biofuel was built and put into operation in the village of Turgenevo, Melenki district. Its cost is 11.5 million rubles including 1.0 million rubles for the design, 10.5 million rubles for the purchase of equipment, construction and installation works, heating mains. The introduction of a new solid biofuel boiler into operation caused the increase in the efficiency of boilers from 55 to 85%. At the same time, fuel consumption decreased from 10033 to 620 tons of fuel equivalent, fuel costs were halved and the necessary number of negotiators fell from 6 to 1 person / day [9].

In addition, there has been an increase in energy security by reducing dependence on imported fuel and the use of local

renewable resources. Attraction of investments in the amount of 487 million rubles contributed to the increase of the revenue part of the regional budget by 20 million rubles per year. The rate of growth of the tariff for heat supply is 3.3 % per year, which does not exceed the target inflation. At the same time, the state guarantees the compliance with long-term tariffs for the return on investment (on average for 7-9 years) and receipt of planned profit. The investor, having achieved efficiency increase, as a result gets an opportunity to save for himself expenses saving concerning the level considered in tariffs and will be able to plan investment and operating activity for the long-term prospect.

The analysis of tariffs for heat supply services in the period 2016-2017 showed that the reduction in tariffs occurred in the heat supply company "Teplo ludyam. Melenki" Ltd by 1.99 %, while in other organizations there is an increase of 4 to 9 %, which exceeds the planned growth of tariffs (table I). Reduction of tariffs became possible due to implementation of the program of public-private partnership.

TABLE I. Tariffs for services in the field of district heating supply system of Melenki district in 2016-2017\*

Name of the organization	Unit	Tariff in rubles for 2016	Tariff in rubles for 2017	Percent growth in Dec. 2017 to Dec. 2016	Decisions of the Regional Administration
"Vladteploresurs" Ltd	Giga-calorie	2202,47	2350,84	106,74	from 27.02.2017 № 4/3
<b>"Teplo ludyam. Melenki" Ltd</b>	<b>Giga-calorie</b>	<b>4423,21</b>	<b>4335,38</b>	<b>98,01</b>	<b>from 06.12.2016 № 42/33</b>
Agricultural production cooperative "Dmitrievy Gory"	Giga-calorie	1404,49	1463,03	104,17	from 06.12.2016 № 42/26
"Glavnoye upravleniye zhilishchno-kommunalnogo khozyaystva" JSC	Giga-calorie	1251,08	1368,25	109,37	from 19.12.2016 № 46/4

\* Compiled by the authors. Data source: [10].

The implementation of the PPP program allowed to increase the investment attractiveness of the housing and communal complex, which led to the conclusion of a concession agreement between the administration of Melenki district and "Vladteploresurs" Ltd on January 24, 2017. The term of the agreement is 24 years. The object of the concession agreement is the property complex intended for the implementation in the field of district heating [11].

The concession provides for the reconstruction of 15 boiler houses and heat supply networks. The result of the reconstruction of the boilers should be the increasing of reliability and reducing accidents, saving energy resources and reducing heat loss during the reconstruction of the heating mains, which ultimately should help to improve the quality of services and reducing their cost. In the process of implementation of the concession agreement, the specific fuel consumption per unit of thermal energy should decrease from

159.56 to 157.86 kilograms of fuel equivalent / Gigacalorie, and technological losses during the transfer of thermal energy should be reduced by 12.65 % (from 8162.09 to 7129.60 Gigacalories). The investment volume under the agreement will amount to 77.6 million rubles. Regulatory level of income of the concessionaire will be in different periods from 0.5 to 6.4 % [11].

Generally, the PPP investment project in the heat supply sector allows bringing the heat supply sector to a qualitatively new level, solving the problem of replacing obsolete equipment, poor quality of services, stopping the growth of tariffs.

### III. DETECTION OF MAJOR CONCESSION PROBLEMS IN HEAT SUPPLY

#### *A. The emergence of commercial priority in public services*

With all the advantages of concession agreements mentioned above, it is necessary to take into account the fact that with the transfer of communal infrastructure objects to concession, the public heat supply service with a socially significant orientation essentially becomes commercial, with a predominantly economic interest of the service provider. Private business tends to extract the greatest profit, which, under conditions of a predominantly centralized heat supply system, may result in manipulation and abuse of the monopoly position on the part of the concessionaire, with understatement of the quality and overestimation of tariffs.

Thus, in the concession agreement concluded for 25 years between the administration of the city of Dzerzhinsk in Nizhny Novgorod region and "Dzerzhinsky Vodokanal" JSC, there is no information on the full list of property transferred to the concession, and there is also no feasibility study for financial investments. In such conditions, the concessionaire did not fulfill the plans for the reconstruction of housing and communal services and repair projects, and refused to service the unprofitable water-distribution networks of more than ten villages that are part of the urban district.

In 2016, the administration of Dzerzhinsk attempted to terminate the concession agreement through an arbitration court, but the concessionaire managed to prove that, in accordance with the concluded agreement, the concession terms were not violated [12]. The concessionaire agreed to include burdensome property in the investment program only after an additional increase in the investment component and, accordingly, the tariff for public services [13].

In the legislation itself, many significant issues concerning the regulation and clear definition of the concessionaire's activities are left unaddressed. Thus, in the law "On concession agreements" the subject of concession agreements in housing and communal services are the objects themselves (for example, pipeline), while not taking into account the activities carried out during the operation of the property (for example, heat supply service) [14].

#### *B. Concession tariff setting and consumer interests*

The long-term tariff setting system RAB (Regulatory Asset Base), provided for in PPP projects, with annual indexation,

contains an investment component that guarantees the concessionaire a return on investment and profit. At the same time, this component is intended to be paid by the consumer, who in fact is not recognized as either an investor or an owner of municipal facilities and has no economic interest, which is a serious disadvantage of the current system of long-term tariff formation. As a result, the use of the term "investment component" is consistent with the interests of business in the provision of commercial services for profit in the future and is deprived of economic meaning for the population who need not profit from investments, but a quality and affordable utility service. All this blurs the concessionaire's responsibility for complying with the consumer's interest, which is manifested in practice.

So, in 2015 the implementation of the concessionaire, "Teplo ludyam. Melenki" Ltd modernization of the boiler house in the village of Turgenevo, Melenki district was the reduction in fuel consumption 1.67 times that have reduced the cost of its purchase of 2.17 times. At the same time, tariffs for heat supply services, on the contrary, increased by 1.21 % (table II). In 2016, the growth of tariffs continued (table I), and only in 2017 there was a slight decrease of less than 2 % compared to 2016.

TABLE II. Operational characteristics of solid fuel bio boiler house in Turgenevo, Melenki district\*

Indicator	Before the modernization of boiler house	After the modernization of boiler house
Fuel consumption, tons of fuel equivalent/season	1033	620
Fuel costs, million rubles/season	11 300 000	5 200 000
The tariff for heat supply, rubles/Gigacalorie	4195,45	4246,20

\* *Compiled by the authors.* Data source: [10, 15].

In the future, the planned increase in tariffs will be continued within the planned value at the regional level in order to provide the necessary profit to the concessionaire and to compensate for business risks.

As a result, the entire economic effect of modernizing the communal infrastructure is received by private businesses, the growth of tariffs does not stop, and the consumer pays for it.

#### *C. Unguaranteed quality of utilities by the concessionaire*

As for the need to provide quality public services to the population, in conditions of insufficient control by the local administration, the quality indicators determined by the resource-supplying enterprise itself may differ from the normative targets. In practice, this problem can be identified for a long time, and is resolved by judicial settlement.

An example of such a situation is a judicial decision to impose a fine on the municipal unitary enterprise "Teplovyye seti" of the city of Murom in Vladimir region due to a violation of the required temperature regime of hot water supply, which for a long period was 51 °C at a standard of 60 to 75 °C in tap water cranes [16].

Violation of the same targets, not resulting to complaints from consumers (for example, exceeding the temperature regime of heating in a residential area due to the impossibility of its regulation) is even more difficult to detect. As a result, there are large losses of energy resources, which are paid by consumers.

In the context of concession agreements, there are higher risks of hiding information about the qualitative characteristics of the provided public services in the interests of private business.

These facts contradict the consumer's interest, but they are not followed by an adequate reaction from the state authorities and local governments to change the terms of the concession agreement and the tariff policy in the heat supply.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

In order to improve the efficiency of management of communal infrastructure objects by the concessionaire, *concession agreements should fully and clearly reflect the targets of quality and competitiveness of public services in the interests of consumers*. Depending on the reached level of indicators the size of the tariff for utilities has to be established and changed. Such indicators, for example, in the field of heat supply there should be included:

- required pressure level in the internal heating system;
- the required level of air temperature in the living room;
- failure rate of heating networks;
- emergency heat loss to consumers;
- the number of complaints of consumers of heat on violation of quality of heat supply;
- other indicators in accordance with the quality requirements of utilities, established by the Federal law [17], the decree of the Government of the Russian Federation [18] and by the order of Ministry of Regional Development of the Russian Federation [19].

These figures reflect not only a reduction in losses, as follows from the concession agreement analyzed, but primarily an improvement in the quality of services provided. The local governments are obliged to exercise permanent control over the implementation of the targets by the concessionaire, as the quality indicators identified by the supplier company, may differ from regulatory targets.

Under concession agreements, the risks of concealing information about the qualitative characteristics of public services rendered in the interests of private business are increasing.

Thus, *the process of implementation of public-private partnership projects in the housing sector should be accompanied by increased state responsibility and increased control over the activities of private concessionaires and municipalities responsible for life support systems*.

In the context of business striving to consolidate concession agreements, the sphere of influence of

municipalities in the housing and communal services, for which they are responsible to the population, is beginning to weaken more and more, which is expressed in resolving issues through arbitration courts.

It should be noted that in some regions (Nizhny Novgorod, Lipetsk, Rostov, Kursk and Leningrad regions, Stavropol and Kamchatka Territories), an alternative strategy is being implemented to create and develop regional companies – potential concessionaires with state funding, which are called to consolidate district networks and take control over the management of communal assets.

In such projects, the main criteria should not be the investor's profit and budget savings, but the improvement of state control over the quality and availability of public services. Then the expansion of forms of public-private partnership in the sphere of housing and communal services will allow modernizing the objects of communal infrastructure and fulfill the obligations to provide public services in the interest of the population.

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