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EFFICIENCY IN THE CHOICE OF POWER SERVICE CONTRACT AS WAY OF FINANCING POWER SERVICE ACTIVITIES

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ABSTRACT

The basic principles of energy service contracts for the external illumination sector are considered. An assessment of conditions of contract profitability for both parties is given.

Keywords: energy service contract, energy service actions (measures)

Calculations show that potential beneficiaries of energy service contracts (ESC) are public sector customers who need to cut costs due to their financial circumstances, for example as a result of state and municipal cuts.

1C From December 2009, Federal law #261- ФЗ "On energy saving and increasing energy efficiency, as well as on the introduction of amendments into separate enactments of the Russian Federation" came into force, according to which Federal law #94- ФЗ "On placing orders for the supply of goods, works and services for state and municipal needs" was added with a new separate section regulating the order of placing budgetary commissions for energy services.

The purpose of energy service contracts is to create conditions for energy saving and to improve the efficiency of energy resource use, including electricity.

To achieve this, the contractor shall finance energy service measures. Subsequently the customer compensates the contractor from the savings made as a result of decreased energy consumption. Therefore, establishing an ESC allows introducing energy saving measures without spending budgetary funds directly when introducing energy services. Budgetary allocation for power consumption is recorded at the end point of the ESC for the period necessary to compensate the costs to the contractor from the efficiency savings.

After repaying the contractor, the budgetary costs continue to reduce directly as a result of the introduction of the energy saving measures.

The ESC beneficiary as the state (municipal) customer is the party responsible for procuring energy resources, and the contractor is the party who implements and finances the energy service measures at their own cost and expense.

According to P. 3. of Article 72 of the Budgetary code of the Russian Federation, an ESC can be let for any period, without being limited by a validity period of the approved limits of budgetary obligations.

The question arises; what can an ESC achieve in the sphere of external illumination sphere? There are several opportunities: introduction of measures which lead to energy savings; direct replacement of in situ light devices and sources with more energy efficient models; measures, which enable usage schemes of partial switching off at night; installation of individual or group illumination adjustment systems etc..

It follows from the general characteristics of the ESC that its benefit is the risk transfer of an inefficient solution to the investor and the fact that no direct budgetary financing for efficiency is needed at the introduction stage.

At the same time, if we presume that state (municipal) authorities are able to estimate efficiency of the applied energy saving technologies and to determine independently what energy saving measures lead to resource savings, then the only benefit of the ESC is the specific character of its financing. And here it is important to understand exactly how beneficial an ESC can be for the budget.

In the event of accomplishing current budgetary costs, and if energy saving measures are financed directly from the budget, an ESC will be not profitable for the budget because the investor must discount the profit and the investment or availability of credit by the energy service measure cost.

WORKED EXAMPLE

Let's consider one of the simplest cases of the energy service measures for energy saving in external illumination: the replacement of light device A with an 125 W arc lamp with a more efficient light device B with an 70 W HPSL.

As it can be seen from the Table, the annual electric power saving as a result of this is equal **to 1134 roubles** (2520 rub – 1386 rub) per device.

Let's calculate the investor's expenses without accounting for incremental costs i.e. the costs of the light device itself within an average price interval. For example, the Orion ЖКУ20–70–001 luminaire (with glass and ballast *IP44* protection degree) produced by GALAD SPA has a wholesale price of 3730 rub with VAT.

With a profitability rate of 20 % or 746 rub, the cost of the luminaire is 4476 rub (3730 rub + 746 rub).

Thus with direct financing, the state (municipal) customer could commission the introduction of the new equipment at a cost of 4476 rub for this energy saving measure, and the investor would regain the cost with a the profit of 746 rub.

When financing the project at the investor's expense and compensating the investor's costs by means of monetary trenches using sums equal to the electric power saving, the investor would recalculate the project cost with income discounting.

There is a need to evaluate costs over time as the cost of monetary resources changes with time. In other words, the goods which we can buy for 100 roubles today will cost 110 roubles in a year's time, in two years – 120 roubles, and so on, i.e. purchasing cost of money decreased under inflation conditions.

Under ESC conditions, compensation to the investor is made through annual payments equal to the money saved for electric energy (an annual payment in our example is equal to 1134 roubles), these cash flows should be reduced to the current cost.

Hence, we will carry out the following calculations. Investments of the investor in our example are equal to 4476 roubles (this is the cost of the luminaire with a profitability rate of 20 %, which satisfies the investor). Compensation of the investments is made by means of annual payments of 1134 roubles (the cost of the saved electric energy). For discounting, we need to determine a barrier rate or discount rate. Economics tells us that this value should be equal to a minimum permissible income rate since the investor could invest available funds into some other project, or place them to a bank deposit etc.. The most effective method of determining the discount rate is according to Fischer's [1] formula, which considers both profitability with and inflation losses. If inflation rate I is equal to 6 % per annum according to a moderately positive forecast, and an acceptable profitability level R is equal to the bank deposit rate of 7 % per annum, then the discount rate E using Fischer's formula

$E = (1+I/100) \times (1+R/100) - 1$ is equal to
$(1+ 0.06) \cdot (1+ 0.07) - 1 = 0.1342$ (i.e. 13.42 %).

Now we will recalculate cash flows into the current costs:

The first year: 1134/1.1342 = 999.82 rub.

The second year: 1134/(1.1342·1.1342) = 881.52 rub.

The third year: 1134/(1.1342·1.1342×1.1342) =777.22 rub.

The fourth year: 1134/(1.1342·1.1342×1.1342·1.1342) = 685.26 rub.

The fifth year: 1134/(1.1342·1.1342×1.1342·1.1342·1.1342) = 604.18 rub.

The sixth year: 1134 / (1.1342·1.1342·1.1342×1.1342·1.1342·1.1342) =532.68 rub.

The sum of the discounted cash flows for six years is equal to 4480.68 rub (999.82 + 881.52 + 777.22 + 685.26 + 604.18 + 532.68).

The difference between actual investments and discounted total cash flows is a factor of net present value *NPV*. *NPV* is calculated using predicted cash

Table. An example of an evaluation of energy service measure cost efficiency

Light device	Lamp power, W	Loss factor in the ballast	Annual power consumption at an average 4000/year lighting hours, kW·h	Cost of annual power consumption at an electricity price of 4.5 rub/kW·h, roubles.
A	125	1.12	125·4000·1,12/1000 = **560**	560·4,5 = **2520**
B	70	1.1	70·4000·1,1/1000 = **308**	308·4,5 = **1386**

flows connected with the planned investments according to formula [2]

$$NPV = \sum_{i=1}^{N} \frac{NCF_i}{(1+r)^i} - Inv,$$

where NCF_i is net cash flow for period *i*; *Inv* is initial investments; *r* is the discount rate (cost of the capital needed for the investment project). In case of a positive *NPV*, the capital investment is considered effective. In our example *NPV* = 4480.68 rub – 4476 rub = 4.68 rub.

Accordingly, the investor reaches a positive *NPV* in six years with an ESC cost of 6804 rub (1134 rub × 6 years).

As a consequence, from the point of view of budgetary expenditure evaluation, financing energy service measures by means of an ESC, is 52 % more expensive for the budget than direct financing (6804 rub / 4476 rub = 1.52).

Discounting is even more complex if an investor uses borrowed funds (credit resources) for financing energy service measures. The investor as a borrower in this case has an opportunity to repay debt with money of a reduced purchasing power and will only discount their own profit. However, when crediting an investor according to the bank rate, which exceeds their own barrier rate, the project repayment period for the investor increases, and consequently the ESC cost to the budget will also increase.

According to the above analysis, before financing energy saving measures through an ESC, a public sector customer should calculate and compare the financial flows of their expenditure.

In our opinion, it is more advantageous for a budgetary customer to achieve energy savings by placing a traditional state order for services, except for in cases when energy service measure cost corresponds to no more than 1–2-year energy saving obtained as a result of the introduction of energy service measures.

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