

## **Measures to minimize the consumption of public utilities for the maintenance of common property in multiple dwelling units**

*Medidas para minimizar el consumo de servicios públicos para el mantenimiento de la propiedad común en unidades de vivienda múltiple*

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## Abstract

The objective of this research was to develop measures to minimize the consumption of public utilities for the maintenance of common property (CPUCP) in multiple dwelling units. The current housing [1, 6, 8] and civil [2] legislation provides for that consumers of public utilities in multiple dwelling units pay for the consumed resources according to the actual volumes of consumption (if there are individual metering devices) or, if none apply, according to the standards for the consumption of public utilities. Consumers pay for the consumed electricity, cold and hot water, as well as for water disposal to the managing organization, both for individual consumption according to individual metering devices or according to individual consumption standards, and for consumption of CPUCP, which volume is determined according to the standards for the consumption of public utilities for the maintenance of common property in multiple dwelling units. These standards are established by the state authorities of the constituent entities of the Russian Federation and are mandatory for both consumers and management organizations. Thus, payment of CPUCP by consumers to the managing organization is carried out not according to the actual volumes of consumption but according to relative indicators, which are determined in accordance with the Rules for the establishment and determination of standards for the consumption of utilities and standards for the consumption of utilities for the maintenance of common property in an multiple dwelling units [5, 9]. The managing organization, in turn, makes settlements with utility companies for the actual volumes of acquired resources, including CPUCP [7]. This circumstance leads to unprofitable activities of managing organizations, as they get undistributed volumes of CPUCP, which therefore will stay unpaid by these consumers. Mechanisms for compensation of losses incurred by the managing organization in connection with the undistributed volumes of CPUCP are not provided for by law. Therefore, first of all, the managing organizations have a financial interest in minimizing the volume of consumption of CPUCP. This work is relevant for all organizations that manage multiple dwelling units, as well as for utility companies with direct contractual relations with consumers of public utilities and public authorities of the constituent entities of the Russian Federation. The research used the following methods:

identification of sources of increased costs of CPUCP;

collection and analysis of meter readings;

monitoring of the consumption of public utilities;

detailed analysis of consumption volumes of public utilities in multiple dwelling units.

The article provides a list of organizational measures to minimize the increased consumption of CPUCP.

The developed recommendations are of applied nature. The use of these Measures will help to prevent losses of managing organizations resulting from the provision of CPUCP to consumers.

**Keywords:** Public Utilities for the Maintenance of Common Property in Multiple Dwelling Units; Consumption Standards; General House Needs; Management of Multiple Dwelling Units; Managing Organization; Metering Devices in Multiple Dwelling Units.

## Resumen

El objetivo de esta investigación fue desarrollar medidas para minimizar el consumo de servicios públicos para el mantenimiento de la propiedad común (CPUCP) en unidades de vivienda múltiple. La legislación vigente en materia de vivienda [1, 6, 8] y civil [2] prevé que los consumidores de servicios públicos en unidades de vivienda múltiple paguen por los recursos consumidos de acuerdo con los volúmenes reales de consumo (si hay dispositivos de medición individuales) o, si ninguno aplica, de acuerdo con las normas para el consumo de servicios públicos. Los consumidores pagan por la electricidad consumida, agua fría y caliente, así como por la disposición del agua a la organización gestora, tanto para consumo individual según dispositivos de medición individuales o según estándares de consumo individual, como por consumo de CPUCP, cuyo volumen se determina según a las normas de consumo de servicios públicos para el mantenimiento de propiedad común en unidades de vivienda múltiple. Estos estándares son establecidos por las autoridades estatales de las entidades constitutivas de la Federación de Rusia y son obligatorios tanto para los consumidores como para las organizaciones de gestión. Por lo tanto, el pago de CPUCP por parte de los consumidores a la organización gestora no se realiza de acuerdo con los volúmenes reales de consumo, sino de acuerdo con indicadores relativos, que se determinan de acuerdo con las Reglas para el establecimiento y determinación de estándares para el consumo de servicios públicos y estándares. para el consumo de servicios públicos para el mantenimiento de la propiedad común en unidades de vivienda múltiple [5, 9]. La organización gestora, a su vez, realiza acuerdos con empresas de servicios públicos por los volúmenes reales de recursos adquiridos, incluida la CPUCP [7]. Esta circunstancia conduce a actividades no rentables de las organizaciones gestoras, ya que obtienen volúmenes de CPUCP no distribuidos, que por lo tanto no serán pagados por estos consumidores. Los mecanismos de



compensación de las pérdidas sufridas por la organización gestora en relación con los volúmenes no distribuidos de CPUCP no están previstos por ley. Por lo tanto, en primer lugar, las organizaciones gestoras tienen un interés financiero en minimizar el volumen de consumo de CPUCP. Este trabajo es relevante para todas las organizaciones que administran unidades de vivienda múltiple, así como para las empresas de servicios públicos con relaciones contractuales directas con los consumidores de servicios públicos y las autoridades públicas de las entidades constituyentes de la Federación de Rusia. La investigación utilizó los siguientes métodos:

identificación de fuentes de aumento de costos de CPUCP;

recopilación y análisis de lecturas de contadores;

seguimiento del consumo de servicios públicos;

análisis detallado de los volúmenes de consumo de los servicios públicos en unidades de vivienda múltiple.

El artículo proporciona una lista de medidas organizativas para minimizar el aumento del consumo de CPUCP.

Las recomendaciones desarrolladas son de naturaleza aplicada. El uso de estas Medidas ayudará a prevenir pérdidas de las organizaciones gestoras como resultado de la provisión de CPUCP a los consumidores.

**Palabras clave:** Servicios públicos para el mantenimiento de propiedad común en unidades de vivienda múltiple; Normas de consumo; Necesidades generales de la casa; Gestión de Unidades de Vivienda Múltiple; Organización Gestora; Dispositivos de medición en unidades de vivienda múltiple.



## Introduction

The provision of public utilities (services) to their end consumers over the past 15 years has undergone a number of significant changes. However, these changes have not created a balanced system of relations between consumers of public utilities and managing organizations, as well as between managing and utility companies. The inclusion of public utilities in the housing service for the maintenance of the common property in multiple dwelling units has created another problem for the organizations that manage the multiple dwelling units. In fact, a misconception occurred. Previously, the costs of public utilities for the maintenance of common property were considered in the structure of their consumption standards and were used for general household needs (lighting a house, an entrance, an apartment hall, operation of pumps, elevators and other equipment, sanitary, wet cleaning of entrances and staircases, watering green spaces and etc.). At present, the calculations of the CPUCP consumption standards neither provide for the actual volumes of resource consumption nor contain the relevant calculated indicators.

The managing organizations settle accounts with consumers based on consumption standards, while with a utility company based on actual consumption volumes. In these relations, the volume of consumption of CPUCP is determined as the difference between the total readings of the volumes of consumption by individual consumption devices and the volume of consumed utility by the whole multiple dwelling unit according to the following formula:

$$V_{cpucp} = V_{cm} - V_{cons/r} - V_{cons/nr}$$

where:

$V_{cm}$  - the volume of the public utility according to the readings of the communal meter for the billing period (billing month).

$V_{cons/r}$  - the volume of utilities consumed during the billing period in residential premises according to the readings of individual (flat) metering devices.

$V_{cons/nr}$  - the volume of utilities consumed during the billing period in non-residential premises according to the readings of individual metering devices.

If the consumer does not have individual metering devices, the volume of the public utility consumed during the billing period in residential premises is determined according to the CPUCP consumption standard.

In accordance with the Rules, binding upon the conclusion of agreements between a managing organization or a homeowners' association or a housing cooperative or other specialized consumer cooperative and utility companies [Decree of the Government of the Russian Federation N 124 of

14.02.2012], the owners of non-residential premises are obliged to independently conclude contracts with utility companies for their provision with utilities and install metering devices. This makes it possible to determine the actual volumes of consumption of public utilities by the owners of non-residential premises and objectively consider them in CPUCP calculations.

Calculation of the volume of consumption of CPUCP in accordance with the above formula leads to a significant increase in the readings of these volumes for the following reasons:

1. The CPUCP consumption standards are not commensurate with the actual volumes of consumption for general household needs. The situation is similar with the norms for the consumption of public utilities, which are applied in the absence of an individual metering device in the consumer.
2. Consumers do not report the readings of an individual metering device on time, but consume the public utility. Then, in accordance with the calculation formula, CPUCP will increase by the value of unreported readings.
3. The readings of metering devices are reported with a delay.
4. There is a possibility to change readings when taking them from meters (both general and individual), leaving the seal unremoved.
5. A gap in the dates of taking readings of general and individual meters.
6. Errors of metering devices (general and individual).
7. Unaccounted consumption of public utilities by consumers themselves, as well as by third parties.
8. Interference with the metering device.
9. Use of a faulty meter.
10. Deliberate damage to the metering device.
11. Reporting of readings from the metering devices with expired inspection time.
12. Rounding off the readings by consumers.
13. Charging of CPUCP "on average". These charges are made when the readings of individual metering devices are not reported by the consumer. The amount of consumed resource will be calculated based on the average monthly consumption for the last three months.

This is an incomplete but the most significant list of the reasons for the growth in the consumption of CPUCP.

It should be noted that the managing organization must pay for the increased volumes of CPUCP to the utility company at its own expense [Decree of the Government of the Russian Federation N 354 of 06.05.2011] with no right of set-off.



*To minimize the consumption of CPUCP, it is necessary to eliminate all of the above reasons for their growth.*

### CPUCP minimization measures

The development of measures to reduce the volume of CPUCP (hereinafter referred to as the Measures) was carried out based on the results of an energy survey of apartment buildings located in the city of Kemerovo conducted by City Center for Energy Saving Municipal Budgetary Institution.

The obtained results of the energy survey made it possible to determine the main directions of minimizing the increased volumes of consumption of CPUCP.

Currently, there are two conditional approaches in organizing work to reduce the consumption of CPUCP:

calculation-based; and  
metering-based.

In the calculation-based approach, the CPUCP minimization measures begin to be implemented after establishing the fact of exceeded consumption of CPUCP in comparison with the standard volumes of consumption of CPUCP. The main indicators in this case are:

the volume of utilities consumed in a multiple dwelling unit according to the readings of individual metering devices;

the volume of utilities consumed in residential and non-residential premises according to the indications of individual metering devices;

CPUCP standard consumption volumes.

An example of such electrical power indicators is shown in Table 1.

Type of utility	Unit of measurement	The volume of utilities consumed according to the readings of individual metering devices	The volume of utilities consumed by citizens	Total individual consumption volume	Total volume according to consumption standards	Volume of the public utility accounted for by general house needs	CPUCP standard volume	Excess volume
1	2	3	4	5	6	7	8	9
Electric power	kW	69,573,043	61,478,529	54,183,424	7,295,105	8,094,514	7,932,623	161,891

**Figure 1:** Indicators of electric power consumption in multiple dwelling units.

The table shows that the estimated volume of consumed CPUCP exceeds the standard volume of CPUCP by 20%. Consumers of utilities will not pay 161,891 kW of electricity, which will amount to a loss of the managing organization in the amount of 809,455 rubles (at a tariff of 5 rubles/kW.). These figures are not constant. They can vary from 0 to 30%.

Most of the managing organizations start taking measures to reduce the consumption of CPUCP only when their values go up. As the owners and tenants of premises who have not installed individual metering devices, if it is technically possible to install them, they pay for utilities according to consumption standards with a coefficient of 1.5. Funds for such payments can partially cover the losses of the managing organization associated with increased consumption of CPUCP.

The indicators in Table 1 are generalized (include all multiple dwelling units managed by the managing organization). In order to determine the

specific excess volumes of the CPUCP it is necessary to carry out calculations for each multiple dwelling unit.

The computational approach is successfully implemented if the management organization has a well-organized work on the removal, storage, and generalization of meter readings and if special software is installed.

The metering-based approach to reducing the consumption of CPUCP determines the volume of consumption of CPUCP according to the readings of the CPUCP metering devices. The legislation does not provide for the installation of such metering devices and settlements on them between the managing and utility companies are not carried out. The installation of such metering devices is necessary to determine the volumes actually used for general household needs. According to the readings of the CPUCP metering devices and the readings of the general house metering device, one can immediately establish the fact of increased costs of utilities.

After identifying the multiple dwelling unit with an increased consumption of CPUCP, it is necessary to:



1. Check the technical condition of the internal engineering systems of the multiple dwelling unit.
2. Check unauthorized consumption of public utilities from common areas.
3. Analyze the volumes of individual consumption for each room in the multiple dwelling unit for discrepancies between the readings and the previous indicators and identify such rooms.
4. Organize a door-to-door round of the premises, which have discrepancies in their readings. During this door-to-door check the following:

availability of individual metering devices, their operability, integrity and correctness of connection, as well as their sealing;

the date of the next check of metering devices;

current readings of such devices;

date of taking and reporting meter readings by the consumer;

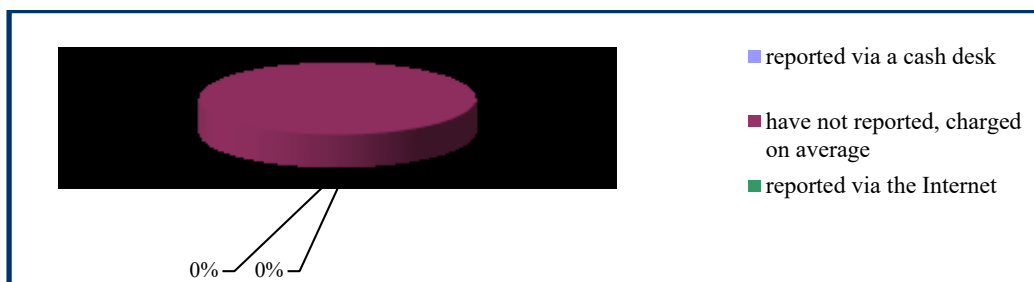
the number of actually living people (in the absence of metering devices);

technical condition of plumbing equipment in apartments not equipped with individual metering devices.

These types of activities can be included in scheduled inspections of premises and are preventive measures to increase the consumption of CPUCP. The inspections must be conducted two times a year. A survey of the heads of managing organizations showed that most organizations do not conduct inspections of premises, and increased volumes of CPUCP are distributed among the consumers of public utilities with their consent. In most cases, the owners do not give their consent.

5. Analyze the untimely reporting of readings of consumed public utilities and their reliability. This indicator depends on the method of reporting such readings.

The influence of the method of reporting on the formation of CPUCP is shown in Figure 1.



**Figure 1:** Distribution of deviations of readings of individual metering devices by their reporting methods

The minimum deviations in readings occurred in cases of reporting via the Internet - 2%, as this method allows immediately taking and reporting the readings of metering devices and simultaneously paying for the public utilities consumed in a timely manner.

The maximum deviations occur when reporting through the company's cash desks - 58%. This is most often due to the delay in taking and reporting meter readings by consumers.

6. Organize explanatory work with consumers about the need to: report readings of individual metering devices at a specified time; install individual metering devices.

Individual metering devices significantly save consumer's money, and exclude the managing company's losses of inconsistency between the actual volumes of consumption of public utilities and the standard ones.

Indicators of savings of consumers' money from the installed individual metering devices are shown in Tables 2 and 3.

No.	Address	Cash saving, rub.	In percentage, %
1.	V.Voloshina Str., 4	27,390.13	62%
2.	V.Voloshina Str., 6	38,283.43	65%
3.	Lenina Ave., 128	62,851.55	12%
4.	Oktyabrsky Ave., 67	69,335.70	65%
5.	Markovtseva Str., 22	7,186.62	68%
6.	Markovtseva Str., 22A	13,824.63	49%
7.	Nogradskaya Str., 20	21,817.97	68%
8.	Krasnoarmeyskaya Str., 101	14,636.41	64%
9.	50 let Oktyabrya Str., 26A	53,136.45	58%



10.	Dvuzhilnogo Str., 32B	5,500.29	59%
<b>TOTAL:</b>		<b>313,963.18 rub.</b>	

**Table 2:** Indicators of savings of consumers' money from the installed individual cold-water meters for one calendar year.

No.	Address	Cash saving, rub.	In percentage, %
1.	V.Voloshina Str., 4	9,977	27%
2.	V.Voloshina Str., 6	18,334	45%
3.	Lenina Ave., 128	88,219	56%
4.	Oktyabrsky Ave., 67	48,967	58%
5.	Markovtseva Str., 22	3,463	56%
6.	Markovtseva Str., 22A	8,280	38%
7.	Nogradskaya Str., 20	4,114	27%
8.	Krasnoarmeyskaya Str., 101	4,080	26%
9.	50 let Oktyabrya Str., 26A	17,915	32%
10.	Dvuzhilnogo Str., 32B	3,840	53%
<b>TOTAL:</b>		<b>207,188.91 rub.</b>	

**Table 3:** Indicators of savings of consumers' money from the installed individual hot water meters for one calendar year

- Identify apartments with the owners not registered and not reporting readings of individual metering devices.

**Activities:**

identify the number of people actually living in the apartment, draw up a certificate;  
 find out whether the apartments are equipped with individual metering devices and whether these devices have been put into operation;  
 In the case of the available metering device, control readings are taken and utilities are charged according to the readings of metering devices.  
 In the absence of metering devices, charges are made according to the standard, considering the number of actually living people.

- Identify apartments with the significant (or underestimated) consumption of public utilities.

**Activities:**

door-to-door;  
 identify an unauthorized connection to intra-building engineering systems. The electrical supply to the apartment is turned off and the presence of electrical energy in sockets and in lighting devices is determined;  
 install equipment that prevents unauthorized consumption of public utilities from common areas;  
 install a duplicate metering device;  
 establish the fact of interference with the metering device;  
 draw up a door-to-door certificate.

Interesting that the Internet is full with suggestions and recommendations on how to change the

readings of metering devices and deceive the managing organization.

- Introduce an automated system for remote reading of individual metering devices and calculating the amount of payment.
- Organize control over the consumption of electricity by consumers additionally connected to the multiple dwelling units (garages, trade pavilions, central heating point, etc.), reporting of meter readings to the managing organization and the correctness of calculations.

Federal public authorities do not provide recommendations to managing organizations on how to avoid unprofitable results of the provision of CPUCP [Letter of the Ministry of Construction of Russia N 12368-ACh/04 of 11.04.2017, Letter of the Ministry of Construction of Russia N 47256-OL/06 of 10.12.2019, Letter of the Ministry of Construction of Russia N 42868-OD/04 of 29.12.2015].

**Material and Methods**

The measures to minimize the consumption of public utilities for the maintenance of common property in multiple dwelling units are based on the results of generalization and analysis of the experience of the managing organizations of the Kemerovo, Rostov, Novosibirsk, Tyumen, Omsk, and Irkutsk regions. Currently, no serious scientific research or economic calculations have been carried out on this topic. The results of such activities have neither been generalized nor systematized.

The measures consist of a variable part by type of approach (calculation-based and metering-based) in determining the increased volumes of consumption





of CPUCP and a general part, which lists the reasons for the increased volumes of CPUCP and practical recommendations for their elimination or minimization.

A significant part of the reasons can be eliminated or minimized without additional costs by combining individual activities into one technological process associated with the need of citizens for access to the premises. This process may be an inspection of premises in the multiple dwelling units [Decree of the Gosstroy of Russia N 170 of September 27, 2003].

### Results

During the development of Measures, we analyzed the real mechanisms for identifying increased volumes of CPUCP and ways of their elimination or minimization.

In case the owners of premises in the multiple dwelling units enter into direct contractual relations, these Measures become more complicated because the consumers report the readings of individual metering devices to the utility companies and the managing organization no longer has the ability to control the volumes of individual consumption and the bills issued by the utility company.

The developed Measures are already used by many managing organizations and are constantly being improved subject to the emergence of new ways to minimize the increased volumes of CPUCP and changes in housing legislation.

The Measures consider all the mandatory requirements of the current legislation, have a practical focus and can become the basis for the development of an organization's standard by managing organizations.

### Discussion

The article does not provide an estimate of the additional costs associated with the implementation of these Measures but they are significant. Monthly control over the reading of individual metering devices and the number of actually living people requires a special service at the enterprise. Some of the costs can be reduced through the use of automated commercial accounting systems, but this requires additional funding.

The current regulatory control of the consumption volumes of CPUCP purchased from utility companies is currently conflicting and ineffective. The economic interests of the organizations managing the multiple dwelling units are violated. The procedure for determining the consumption standards of CPUCP by the calculation method avoids unambiguous indicators of the consumed

volumes of public utilities used in the maintenance of common property in multiple dwelling units. This drawback can be eliminated by using the analog method for determining the standards of the CPUCP but the legislator has refused this method [Decree of the Government of the Russian Federation N 306 of 23.05.2006].

There is an expert opinion that the mandatory introduction of intelligent accounting systems [Federal Law No. 261-FZ of 23.11.2009, Federal Law No. 522-FZ of 27.12.2018] will level out the situation.

### Summary

The set of the developed Measures is not aimed at improving the efficiency of multiple dwelling unit management, but rather as a forced measure of protection against bankruptcy.

The mechanisms for determining the volumes of consumption of CPUCP are legally established as different for persons exercising management of multiple dwelling units, based on the method of such management. With the direct method of management, CPUCP are not included in the structure of payment for residential premises, but are included in the tariff for utilities, which creates unequal conditions for the activities of economic entities.

The provision of CPUCP to consumers is carried out regardless of the method of multiple dwelling unit management chosen by the owners.

Performing such type of obligation is unprofitable when a multiple dwelling unit is managed by a managing organization and a homeowners' association.

The Measures can be implemented without increasing the number of employees of the managing organization.

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