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Saving of heat energy costs while providing residents with heat and hot water

In the article data on the amount of heat while providing consumers with heat and hot water are presented. The installation of heat meters is necessary to improve the standard of living of the population through the efficient use of heat energy. Various devices are used to take account of the consumption of heat in heat supply and hot water supply to consumers. Heat metering devices have been started to be installed in residential buildings in recent years. Questions connected to account of heat consumption and its cost is very important these days. The considered commercial heat metering station includes a heat meter, a mass meter or a heat carrier volume, pressure and temperature sensors. We only need to calculate the meter to save energy for heat energy because we only have to pay for the heat we consume. While equipping a residential house with heat metering devices, it was observed that payment for heat energy and consumed hot water was beneficial for consumers.

Key words: heat metering, heat energy, heat supply, flow meter, heat carrier.

Heating systems are an important part of the engineering of energy and industrial facilities. Special productions are created in large cities in order to organize the use of these systems. One of the key issues of operation is the organization of reliable heat supply to consumers [1].

Heating systems in heating facilities operate only during heating season from October to April, while hot water supply is provided throughout the year. Seasonal thermal loads depend on climatic conditions as they are subjected to changes in the heated period due to the external air temperature of the heat loss. Main seasonal heat loads include heat loads used for heating, venting and air conditioning of buildings. Heat loads for heating during the year are considered by the hot water supply systems, technological needs of communal and industrial enterprises of public buildings [2].

The accounting and controlling of heat energy consumed in heating of buildings is a topical issue both for housing and communal services and ordinary consumers. Large losses in heat grids are excluded as long as introduce effective methods of heat metering. At present, 20 % of heat loss is lost in the network, while 30 % of all dispatched energy is lost during transportation. Heat loads in heat exchangers are not regulated and as a result heat is consumed at home [3].

In addition, installation of thermal energy meters is essential to ensure the improvement of the living standards of the population by utilizing thermal energy effectively. We only need to calculate the meter to save energy for thermal energy because we only have to pay for the heat used. Equipping multi-storey apartment housing with computing equipment:

– pay only for the amount of heat energy consumed;

– refuse to invest in poor municipal resources;

– will give the opportunity to profitably use communal resources.

Calculation of payments to consumers without metering devices is carried out according to consumption norms. Therefore, the installation of heat energy meters will help to optimize the system of requirements for the use of thermal energy, and at the discretion of the customer allows to organize and distribute thermal energy in the building.

In connection with the above problems buildings connected to centralized heating networks must be equipped with commercial heat metering devices consumed at heating points. A commercial heat metering station includes a heat meter, a device for calculating the amount of heat based on input information about the mass, temperature and pressure of the coolant. Registration, collection, storage, processing of quantities of energy consumed, their processing and delivery, information quality, information storage, recorders, timers, registers. These elements provide a high level of reliability, accuracy, independence of measurements, fast response of the device and a wide range of measurements of the dimensions of the coolant flow. Domestic or foreign heat meters included in the State Register of Measuring Instruments and meeting the requirements of technical conditions can be used in the accounting units [4–7].

Choosing a computational tool requires careful consideration of its technical data, installation procedures, service rules. The principle of operation is to determine the amount of heat at the entrance, fix the temperature and determine the amount of heat exchanger consumed. The calculation is based on the coolant and the heat input scheme. Heaters can predict heat transfer costs. The building is equipped with a heat transfer pipe.

Thermal energy is determined by measuring the volume, temperature and pressure of the thermal media. The heat transfer medium is calculated using the computing device. Home computing tools can perform additional operations. They store and record the consumed heat information. The main differences between the heat meters are dependent on the measurement methods, installation and operation conditions, and their cost. It is advisable to automate the data collection system in the selection of heat metering devices in buildings. Automated data transmission systems are implemented by modem. Connection of the modems dependent on the type of heat meter is carried out by connecting the heat exchanger to the digital port, as well as to the interface or radio transceiver converters.

Due to the above mentioned issues the consumers were able to determine the cost of heating and hot water supply and determine its cost and reduce costs. The object of the research is a 5-storey, 80-apartment house. In the dwelling house since 2015 special tools for heating and hot water are installed.

As for the main issues of using heat energy, the VKT-7 heat meter was used to regulate heat consumption and heat conductor parameters. The VCT-7 can be connected to a printer, personal computer, battery pack, and a RS232S or RS485 interface modem. The NP-4A battery is used to extract data from calculators. The NP-4A battery is widely used when reading and indicating loss values in an electromagnetic flow sensor, reading and indicating pressure values in a heat calculator database.

Information on thermal energy in heat and hot water supply during heating season are presented in Figures 1 and 2.

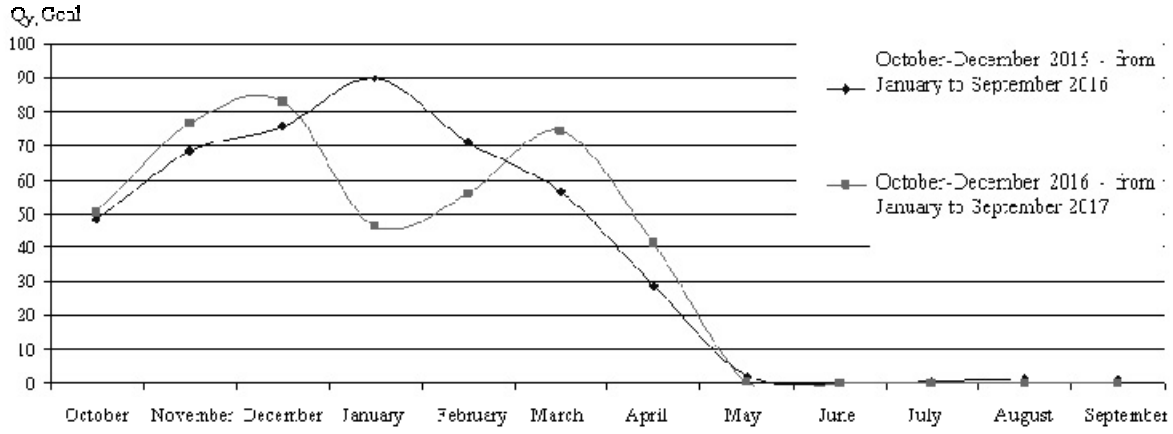


Figure 1. Heating energy in heating season

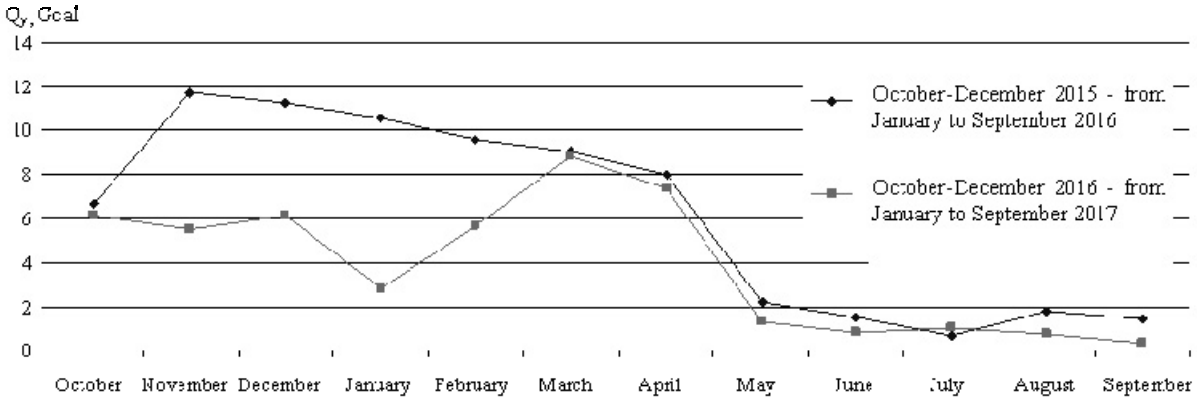
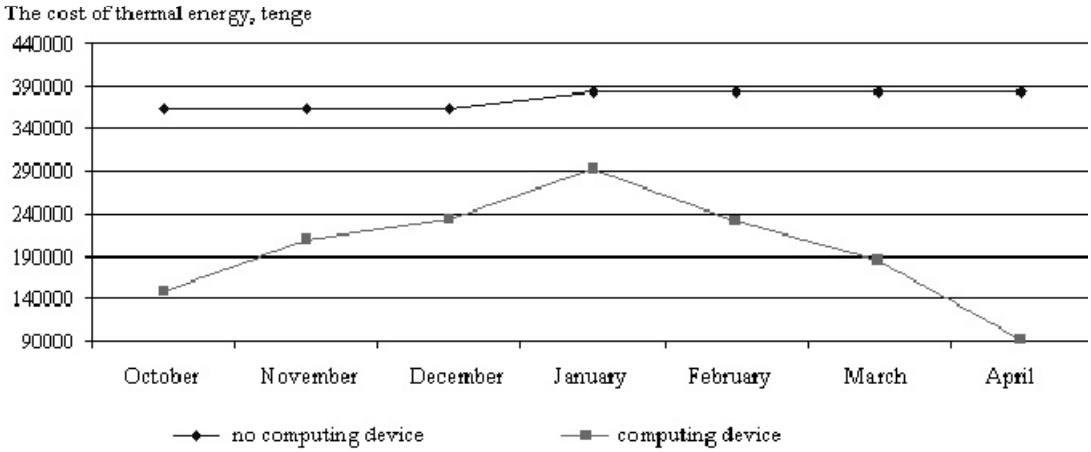


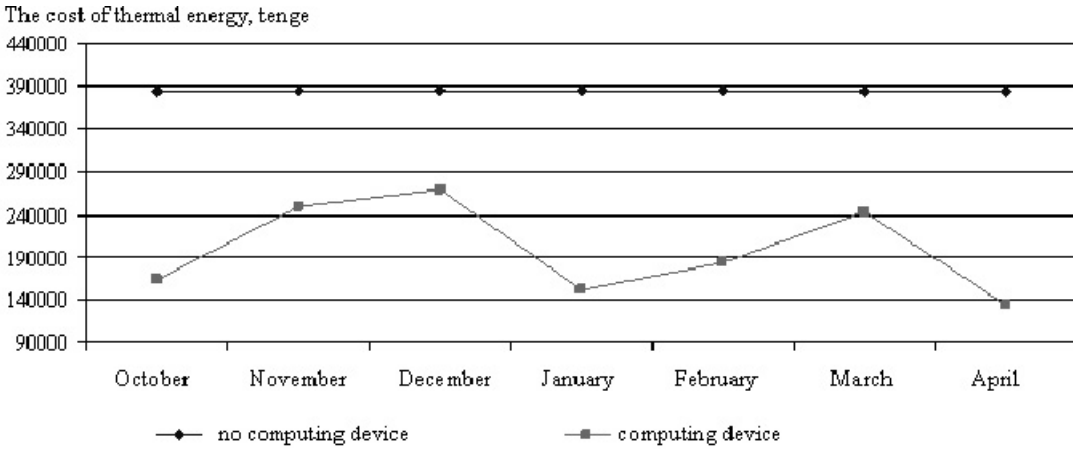
Figure 2. Heat energy relative to hot water

During the heating season, the reduction in the population's heat energy data is associated with a decrease in heat supply and hot water supply from heat energy in May-September, stopping the supply of hot water during the end of the heating season and preparation for the heating season.

The results of the research were compared before and after commercial heat metering installation. Data on thermal energy cost at hot water supply in November-December 2016 and January-September 2017 are shown in Figures 3 and 4.

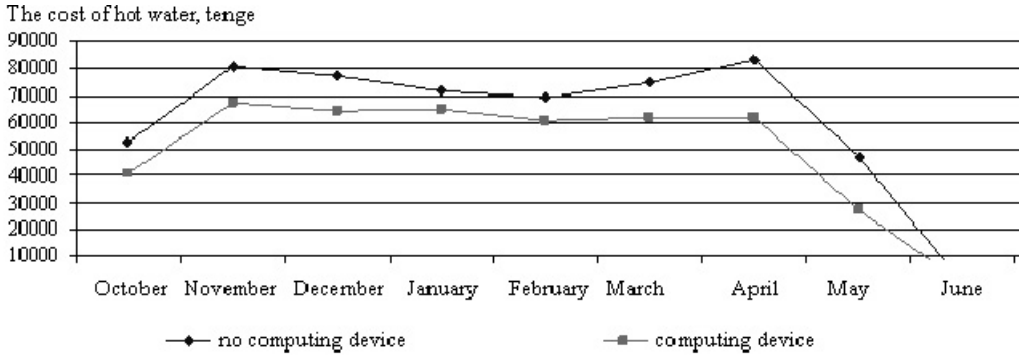


a) Period from November-December, 2015 to January-September, 2016

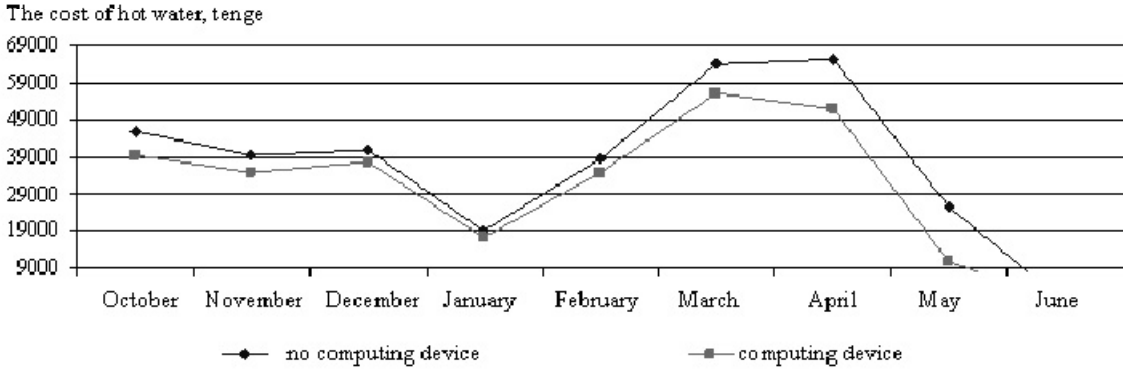


b) Period from November-December, 2016 to January-September, 2017

Figure 3. The value of thermal energy in the heat supply of consumers



a) Period from November-December, 2015 to January-September, 2016



b) Period from November-December, 2016 to January-September, 2017

Figure 4. The cost of consumed hot water

In the absence of computing equipment data for consumers during the heat supply period, we see that in January, the cost of heat energy increased. This is due to the increase in heating costs per 1 m^2: 93,3 tenge/m^2, 2015 — 104.7 3 tenge/m^2, 2016 — 110.98 tenge/m^2. The dependence on the device data showed that a sharp decline in the cost of heat energy in April was due to the end of the heating season.

The following conclusions are drawn from the dependence of the thermal energy cost during heat supply:

– about 2,623,000 tenge were spent for the total thermal energy in the absence of computing tools, while during the period from November-December of 2015 to January-September of 2016 the installation of the counting device amounted to 1,393,700 tenge;

– about 2,688,200 tenge were spent in the absence of computing tools during the period from November-December of 2016 to January-September of 2017, when 1393000 tenge were spent on the installation of heat metering devices.

It is proved that consumers are provided with heat energy and hot water for the consumers when using housing computing devices.

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Тұрғындарды жылумен және ыстық сумен жабдықтауда жылу энергиясының шығындарын үнемдеу

Мақалада тұтынушыларды жылумен және ыстық сумен қамтамасыз ету кезіндегі жылу мөлшері туралы деректер келтірілді. Жылу энергиясын есептегіштерді орнату жылу энергиясын тиімді пайдалану есебінен халықтың өмір сүру деңгейін арттыру үшін қажет. Тұтынушыларды жылумен және ыстық сумен жабдықтау кезінде жылу шығынын есептеуде әртүрлі аспаптар пайдаланылады. Тұрғын үйлерде жылу энергиясын есептеу құралдарын соңғы жылдары орната бастады. Жылу шығынын және оның құнын есепке алу мақсатына байланысты мәселелер қазіргі уақытта өте маңызды. Қарастырылып отырған коммерциялық жылу есептеу торабы жылу есептегішпен, масса немесе жылу тасымалдағыштың көлемі есептегішімен, қысым және температура датчиктерімен қамтылған. Жылу энергиясы үшін энергияны үнемдеуде біз тек есептеуіштің көрсеткіші бойынша есептеу жүргізуіміз керек, себебі тек пайдаланылған жылу үшін төлеуіміз қажет. Тұрғын үйді жылу есептеу құралдарымен жабдықтау кезінде жылу энергиясы мен пайдаланылған ыстық судың төлем ақысы тұтынушылар үшін тиімді болғаны анықталды.

Кілт сөздер: жылуды есепке алу, жылу энергиясы, жылумен жабдықтау, шығын есептеуіші, жылутасымалдаушы.

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Экономия расходов энергии тепла при обеспечении жильцов теплом и горячим водоснабжением

В статье приведены данные о количестве тепла при обеспечении потребителей теплом и горячей водой. Установка счетчиков тепловой энергии необходима для повышения уровня жизни населения за счет эффективного использования тепловой энергии. Для учета расхода тепла при теплоснабжении и горячем водоснабжении потребителей используются различные приборы. В жилых домах приборы учета тепловой энергии начали устанавливать в последние годы. Вопросы, связанные с целью учета расхода тепла и его стоимости, в настоящее время очень важны. Рассматриваемый коммерческий узел учета тепла включает в себя: теплосчетчик, счетчик массы или объема теплоносителя, датчики давления и температуры. Чтобы сэкономить энергию для тепловой энергии, нам нужно только рассчитать счетчик, потому что мы должны платить только за использованное тепло. При оснащении жилого дома приборами учета тепла наблюдалось, что оплата за тепловую энергию и использованную горячую воду для потребителей была выгодной.

Ключевые слова: учет тепла, тепловая энергия, теплоснабжение, счетчик расхода, теплоноситель.

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