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PARTICULAR QUALITIES OF EXECUTION OF THE PROGRAM COMPONENT FOR ENERGY RESOURCES MANAGEMENT OF THE BELGOROD REGION

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Abstract. The article considers modern operating systems for increasing energy efficiency at the municipal and regional levels. Present successfully applied practices in other regions are given. The essential distinctive features of the proposed system for the Belgorod region are revealed. Described, developed methods and algorithms for managing energy conservation in the budget sector. The structure of complex interaction of the developed modules used in the created software component is offered.

The system of urban energy resources management is a set of strategic and practical measures aimed at achieving sustainable and efficient consumption of fuel and energy resources and includes both organizational and technical measures at sites located in the city management [1-3]. Currently, several regional systems are operating or being developed in Russia, the review of which is given in Table 1.

Based on the analysis of advantages and disadvantages in existing software systems and systems, as well as taking into account the needs of regional and municipal authorities, the following structure of the regional information and analytical system Energy Resources Management Systems of the Belgorod Region "EnergyRegion" (RIAS SUEP "EnergyRegion") is proposed.

The goal of the development is to make an operating system that helps manage energy saving and save on the basis of data collection, analysis, problem identification and effective control over their solution. The system should: 1) monitor the efficiency of allocating budget funds to pay for communal resources; 2) to choose the directions of investing in energy saving from the point of view of maximum savings; 3) be the basis for the development of energy service contracts and monitor their implementation.

Main functions of the system are defined:

- storage and analysis of data on energy consumption, identification of falsification of meter readings;
- monitoring the quality of the supplied resources in the building, not depending on the date of collection of energy consumption data;
- calculation of individual energy consumption standards for buildings;
- monitoring of changes in consumption of objects, forecasting of possible emergency situations;
- monitoring and setting of targets for resource savings and monetary costs (limits) for each building;
- forecasting the consumption of energy resources for a long period, setting limits on the consumption of energy resources, monitoring their implementation;
- calculation of actual specific indicators of consumption of energy resources;
- control of energy consumption indicators;
- assessment of energy saving potential for standard energy-saving measures;
- evaluation of the results of the implementation of energy-saving measures;
- formation of administrative documents and control over its execution;
- formation of reporting documentation on the actual implementation of energy service contracts.
- formation of energy efficiency rating.



Table 1. Regional and municipal energy management systems [1, 2, 4, 5]

GIS Energy Efficiency	<p>State information system in the field of energy saving and improving of energy efficiency.</p> <p>Disadvantages:</p> <ol style="list-style-type: none"> 1. These are systems of statistical observation that are being organized -as a base of materials in the field of energy saving and a catalog of branch organizations, there are no analytical tools. 2. The statistical period is the year. 3. "Manual" data collection. 4. "GIS" Energy Efficiency "- a temporary and non-systemic solution" (Igor Kozhukhovsky, deputy director of REA, http://www.energy2020.ru/news/news10237.php).
<p>Information-analytic system of the fuel and energy balances - IAS TEB (Ivanovo State Energy University)</p>	<p>Implemented:</p> <ul style="list-style-type: none"> • Orenburg region; • Ryazan Oblast; • Vladimir region; • Republic of Tatarstan; • Ivanovo region. <p>Disadvantages:</p> <ol style="list-style-type: none"> 1. Focuses on enterprises that supply energy, not consumers. 2. The analyzed period is a year. 3. Technical features of objects (number of stores, availability of insulation, etc.) are not taken into account. 4. "Manual" datacollection.
<p>City Energy Management System - SGUER (UNDP / GEF Project 00074315 "Energy Efficiency of Buildings in North-West Russia", 2010-2015)</p>	<p>It is developed on the basis of EMIS platform.</p> <p>Implemented by:</p> <ul style="list-style-type: none"> • Pskov region. • Arhangelsk region. • Vologda Region. <p>Disadvantages:</p> <ol style="list-style-type: none"> 1. It is at the stage of concept development and design decisions. 2. The analyzed period is a year. 3. Technical features of objects (number of stores, availability of insulation, etc.) are not taken into account. 4. "Manual" datacollection.
<p>Energy Management Information System - EMIS (Croatia)</p>	<p>Implemented by:</p> <ul style="list-style-type: none"> • Croatia (official energy management system). • Slovakia (official energy management system). • Pskov Region (a pilot project of 485 projects under the UNDP / GEF program). • Vologda region (pilot project of 16 objects). <p>Disadvantages:</p> <ol style="list-style-type: none"> 1. The system was created to control the payment of bills for energy. 2. Does not contain any instrumental analysis - no ranking, grouping, forecasting. 3. Data are not provided for comparable conditions. 4. The user performs the entire analysis manually, using data upload in Excel format. 5. Not adapted to the conditions of Russian office management and administrative management.
<p>Information system energy saving LLC Ansists Systems of dispatching, monitoring, AMR, ASUE, AIIIS, etc.</p>	<p>Regional GIS Segment Energy Efficiency. Under development.</p> <p>Disadvantages:</p> <p>The system, like the GIS Energy Efficiency, is designed to collect information and maintain documentation with the addition of functionality to record energy service contracts and contracts with suppliers of fuel and energy resources. Are superstructures over the technical means of instrument accounting. There are numerous number of such systems, their main drawback is only accounting and control, without analyzing and evaluating the efficiency of energy consumption.</p>

As part of this project (RIAS SUER“EnergyRegion”) provides for the establishment of monitoring and analysis of energy efficiency of budget consumers of energy resources that are connected to the unified automated information-measuring system of energy accounting (AIS), created in the framework of the regional project number 10081730 "Creation of a regional automated unified automated information - measuring system of energy resources accounting AIS ".

The structural diagram of the system is shown in Fig. 1.

The input data is divided into three groups:

- monitoring of energy consumption: actual and planned consumption of energy resources and water;
- technical data: technical and functional characteristics of facilities, their equipping with accounting devices;
- energy saving indicators: energy efficiency programs for institutions, data on energy service contracts and the results of their implementation.

After the final development of the RIASSUER“EnergyRegion” will contain data on all municipal budget institutions and Resident sector in the Belgorod region.

All collected information will be stored in a single data warehouse with the necessary redundancy and ensuring a work rate sufficient for the functioning of the system.

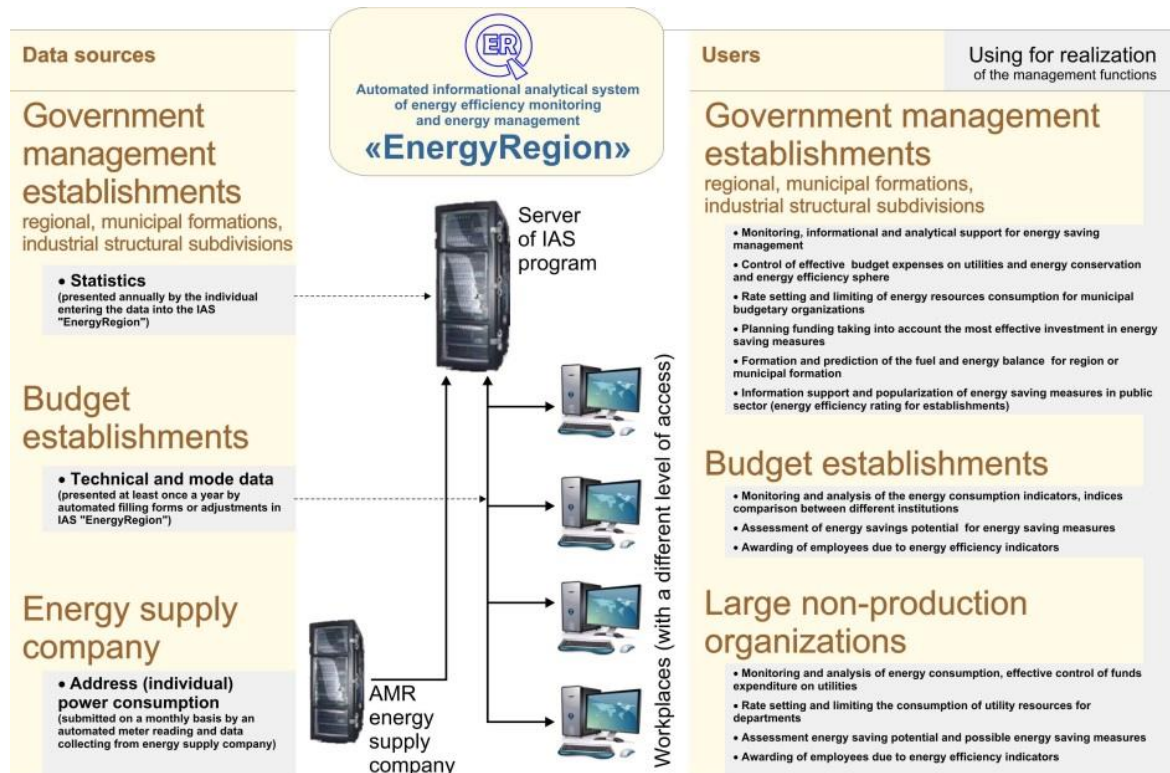


Figure1. Schematic representation of the structure of the pilot project of RIASSUER“EnergyRegion”

To create a system, it is necessary to develop new methods and management tools:

- development of calculation and analytical methods for determining the cost of heating;
- development of a methodology for determining individual energy consumption standards;
- development of a methodology for forecasting energy consumption for a long period;
- development of a methodology for calculating actual specific energy consumption indicators, monitoring energy consumption indicators based on their comparison with norms.

One of the important tasks of the system is the formation and control of limits. The established norms of consumption (limits) are the legislative basis for regional control over budget institutions. Limitations are proposed to be made on the basis of a set of three methods (Fig. 2): a) statistical, according to consumption for the past time for similar objectives, b) analytical and analytical on the basis of technical data objects and modes of operation, c) Acting Building Norms and Rules and codes of regulations.

Thus, the system is aimed at constant monitoring, control of each of the city administration's facilities for the consumption of fuel and energy resources on a systematic basis, taking into account the individual characteristics of each facility. At the same time, the system makes it possible to react quickly to various changes in energy consumption and to evaluate it depending on the time of day, season and weather conditions. New methods and tools for managing energy saving in the budget sector, which will be implemented in the information system will ensure compliance with the requirements of existing regulatory and legal acts in the field of energy saving, timely preparation of up-to-date information on energy saving and consumption of fuel and energy resources and water, as well as its presentation for decision-making by the executive authorities and local self-government of the region.

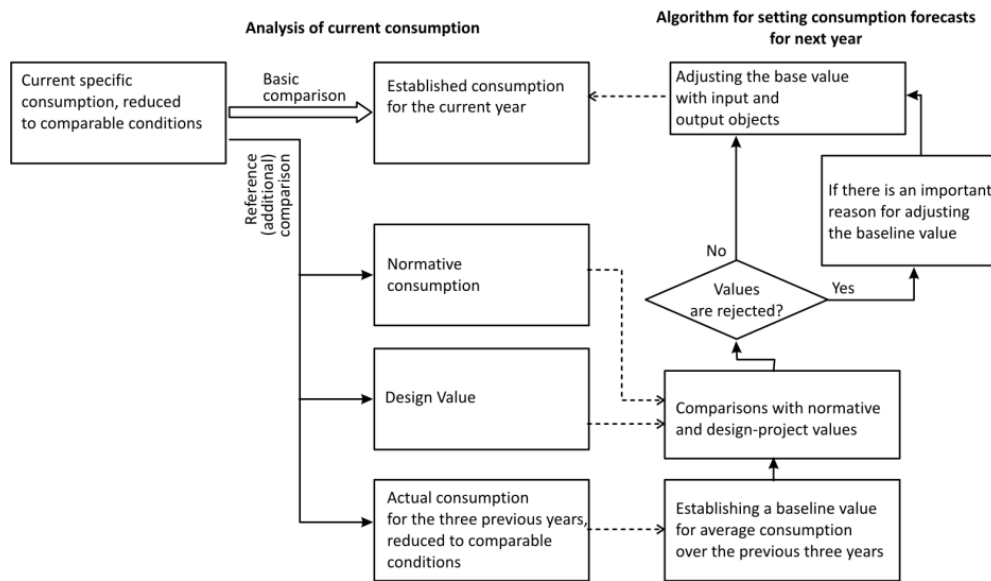


Figure 2. Interaction of blocks of analysis and formation of limits

Distinctive features of the proposed system are:

- the possibility of implementing the system in any institution (commercial, state), taking into account the type of activity of the facility;
- integration with existing workflow systems and an operational monthly analysis for management adjustments;
- obtaining the necessary information at a minimum bureaucratic load;
- compilation of a single energy balance of the whole municipal education and evaluation of the most investment-attracting events.

The key advantage of the system is the basing on successful principles of the analysis of energy management systems, where the main task is the analysis of dynamics and rational use of thermal and electric energy in urban facilities. Thus, the complex analytical processing of information within the framework of the RIAS SUER“EnergyRegion” allows us to identify the potential for reducing fuel consumption in municipalities that ensures rational and efficient use of resources, as well as provide support for making informed decisions on the development of the region as a whole.

In conclusion, it should be noted that such technical implementation provided for in the executable software module RIAS SUER“EnergyRegion” enables not only to perform effective operational analysis to respond to various changes in energy consumption and consumption regulation, but also to forecast the most effective measures in further.

Acknowledgments

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