AGAT CONTROL SYSTEMS

INTEGRATED ENERGY-EFFICIENT SYSTEM SOLUTIONS AND TECHNOLOGIES FOR POWER ENERGY AND INDUSTRIAL FACILITIES, AND HOUSING AND PUBLIC UTILITIES

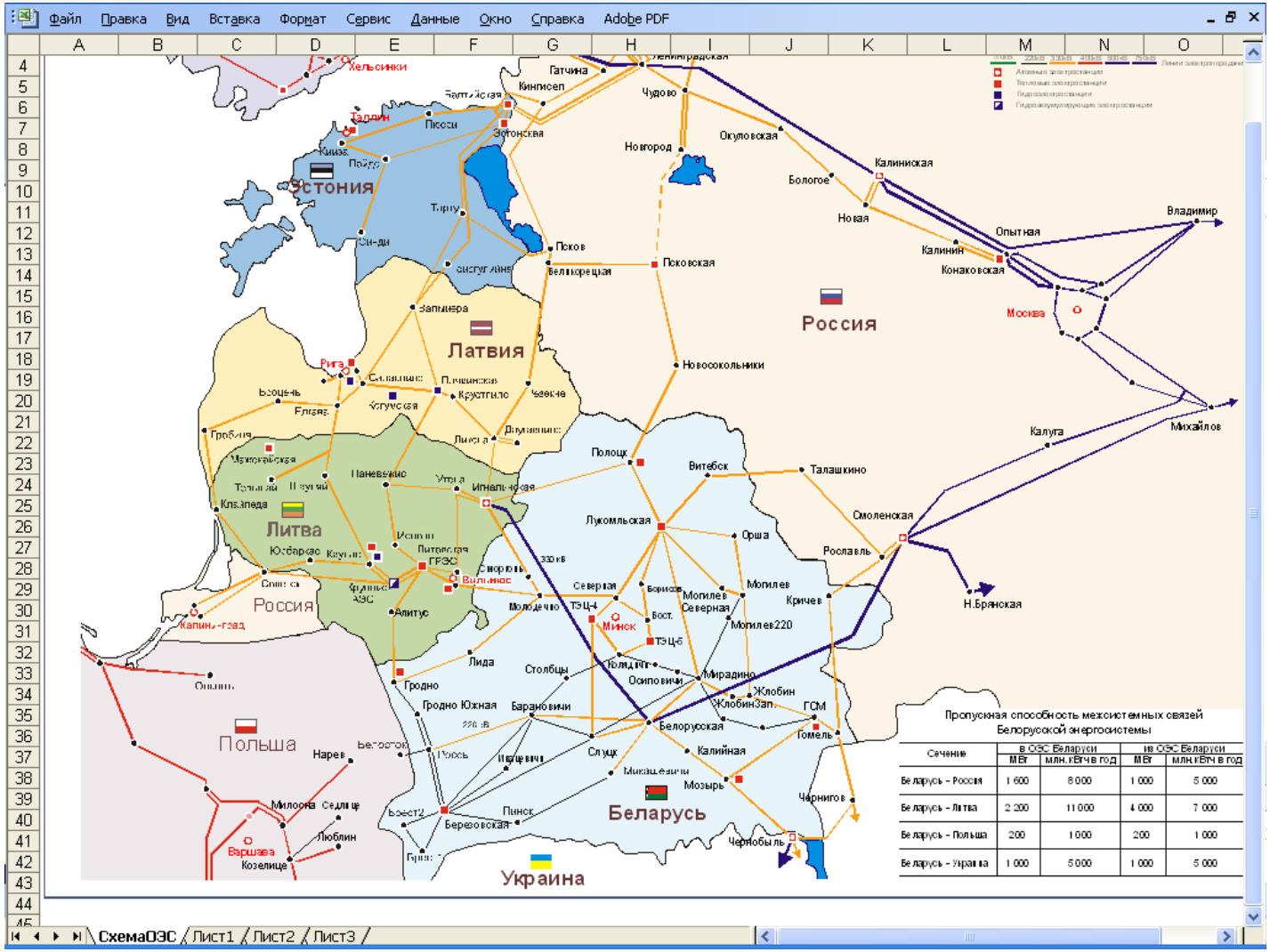
AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS) FOR INTERSTATE AND INTERSYSTEM ENERGY FLOWS AND GENERATION

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

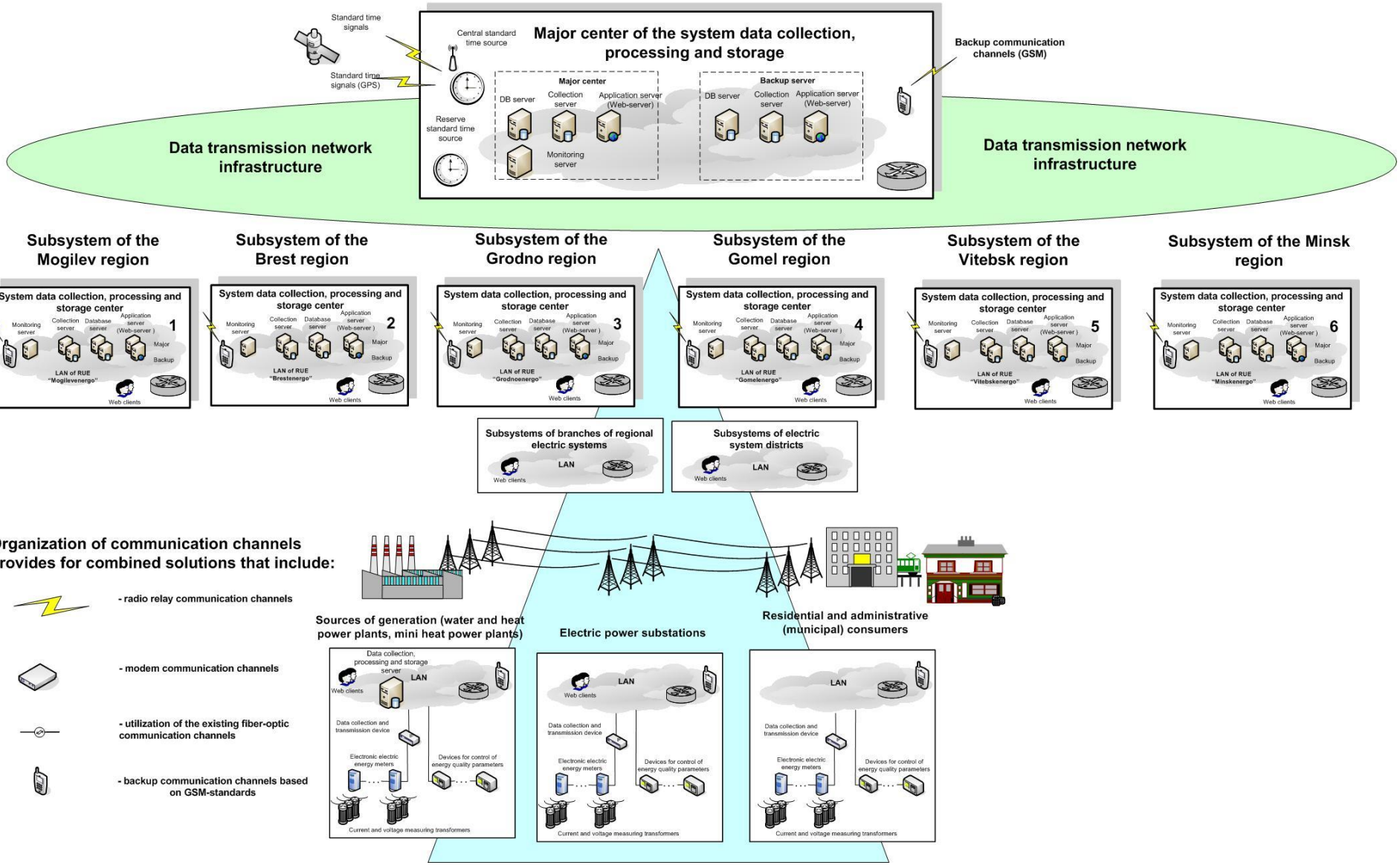
CURRENT NATIONAL AECMS SYSTEM



AGAT CONTROL SYSTEMS

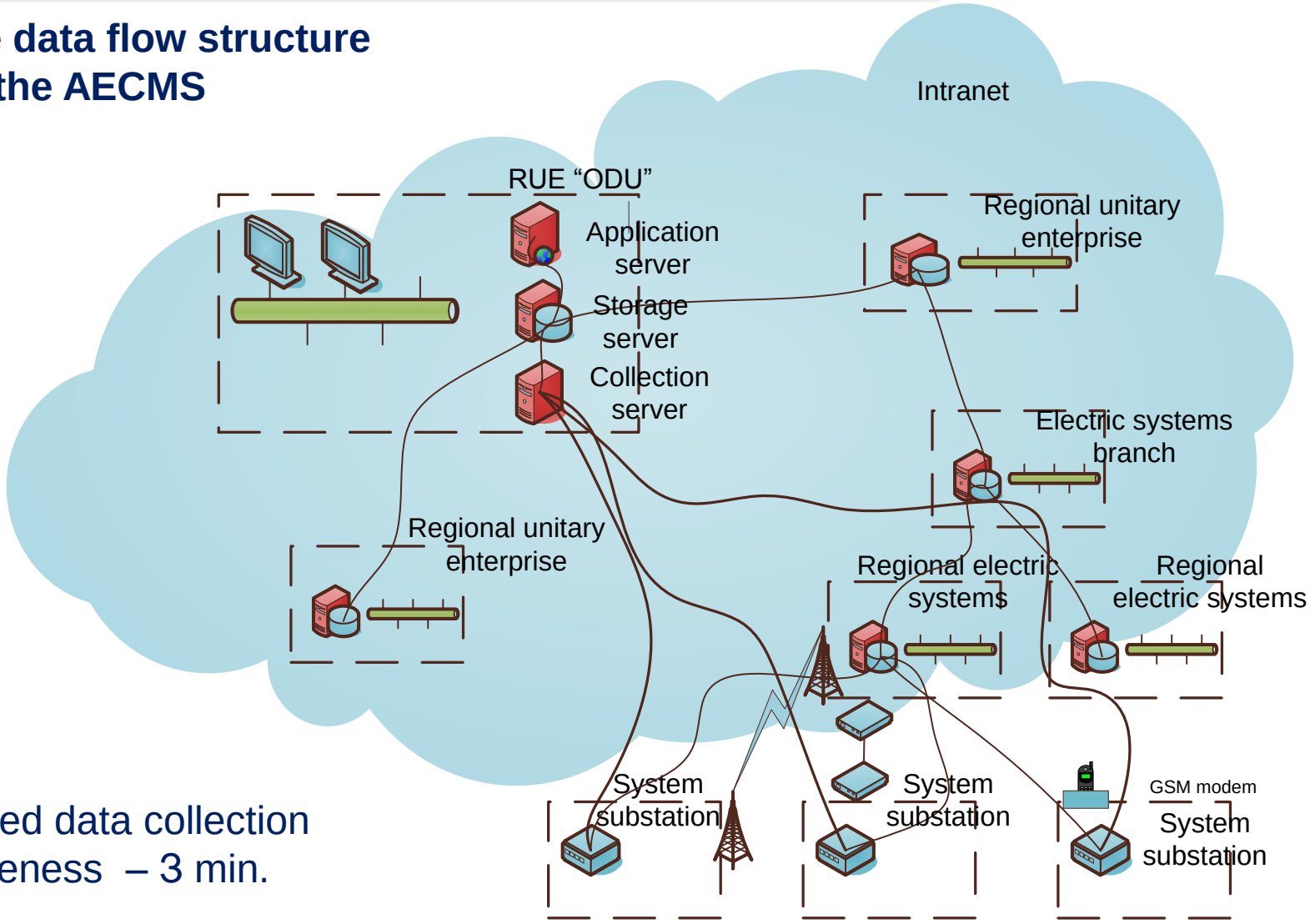
CURRENT NATIONAL AECMS SYSTEM

Structural Chart of the Automated Energy Control and Metering System of the Republic of Belarus



DATA FLOW

Unique data flow structure within the AECMS



Achieved data collection discreteness – 3 min.

MAJOR SYSTEM COMPONENTS

- Meters (capability to read out instantaneous data)
- DCTS
- EPFCD
- System SW (Windows)
- Basic SW (on basis of real time DB)
- Application SW (with public source code)
- Client SW (thick and thin clients)
- Infrastructure monitoring system
- Supporting network
- Connection “last mile”

COMPLEXITY APPROACH TO BUILD THE SYSTEM

Company has performed all work package to build AECMS:

- pre-project survey of automation objects;
- development and approval technical task;
- supply of necessary equipment and software;
- assembly work;
- start-up and set-up operations;
- Customer's personnel training;
- operational and executive documentation for AECMS;
- experimental operation of AECMS;
- AECMS industrial commissioning.

SOLVED FUNCTIONAL TASKS

- Commercial tasks – calculation tasks for supplied /consumed power energy between market subjects for billing period;
- Operational monitoring tasks of energy and power on metering points and objects;
- Balance tasks – tasks to calculate operative energy and power balances per each object and metering entity;
- Tasks of overall losses – these are tasks of actual balance losses of electric energy and power per objects and metering entities;
- Tasks of technical losses – these are calculating tasks of actual electric energy losses in power transformer and electrical transmission lines;

SOLVED FUNCTIONAL TASKS

- Limitation and adjustment tasks – these tasks provide systemic limitation of electricity energy and power consumption and control the energy load of consumers-regulators;
- Calculation and analytical tasks – they provide operative estimation (calculation) of cost (price) and prime cost of generation, transmission and energy power distribution for all metering objects, as well as specific fuel consumption to generate electric and thermal energy on all generating sources;
- Prediction tasks – tasks for short-term, medium-term and long-term forecasting of generation/energy consumption for each and group metering objects at energy power market;
- Technical control tasks – to monitor the technical state of AECMS means.

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

MAIN FUNCTIONAL SUBSYSTEMS

- data collection subsystem;
- verification subsystem;
- monitoring subsystem;
- real time request subsystem;
- visualization subsystem;
- security subsystem;
- configuration subsystem;
- external medium exchange subsystem.

ADDITIONAL SUBSYSTEMS

- dispatching module;
- calculation and analytical subsystem.

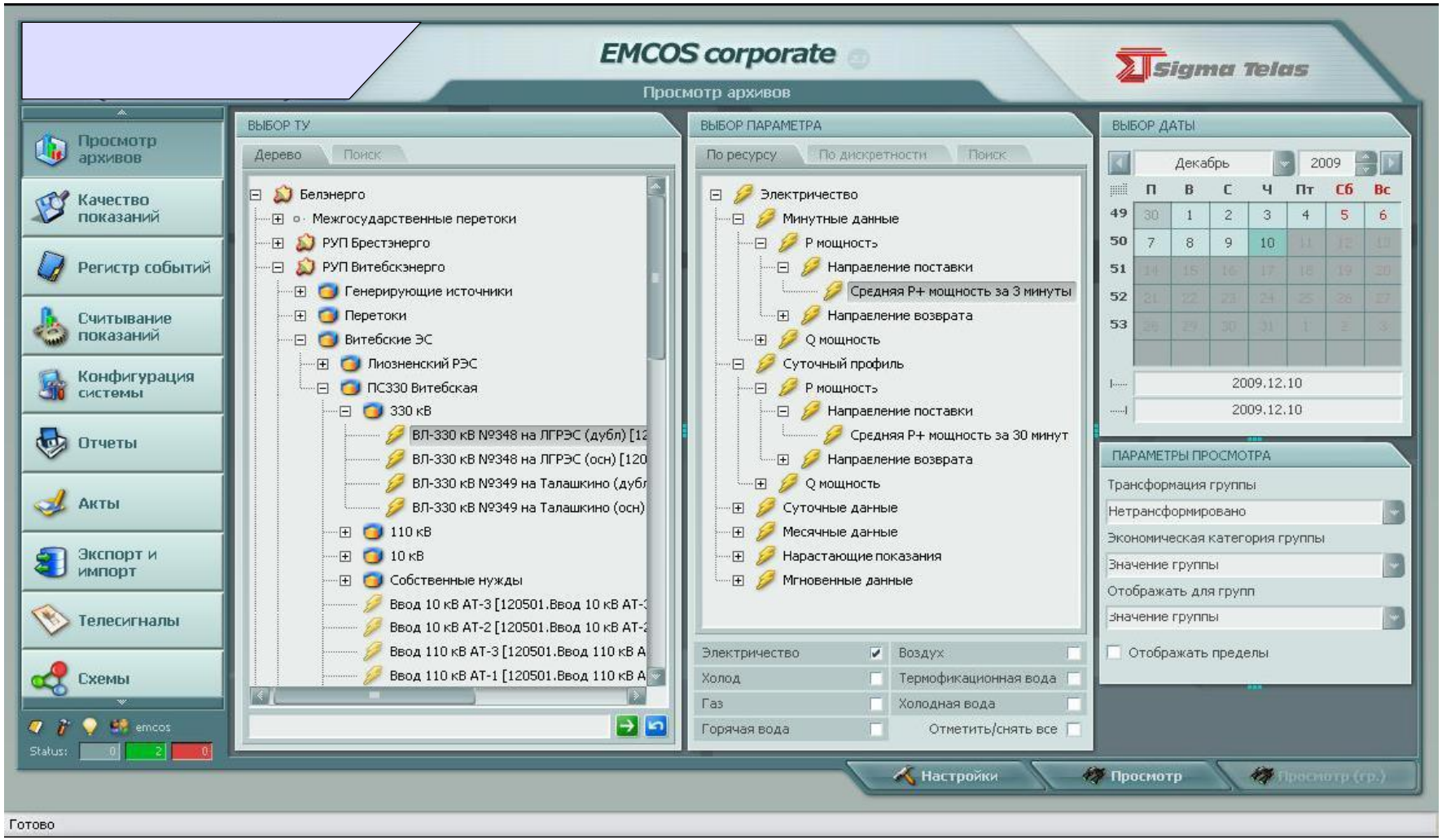
DATA COLLECTION SUBSYSTEM

- monitors diagrams of data collection, objects state, recurring requests in case of failed sessions;
- implements the algorithm to shift to the reserve communication channel, if required;
- responsible jointly with the data exchange data for data integration, derived from adjacent or hierarchically connected systems;
- provides backup using duplicated loops;
- manual data input is provided on the basis of acts (for example, correcting, supplementing, etc.).

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

DATA COLLECTION SUBSYSTEM



VERIFICATION SUBSYSTEM

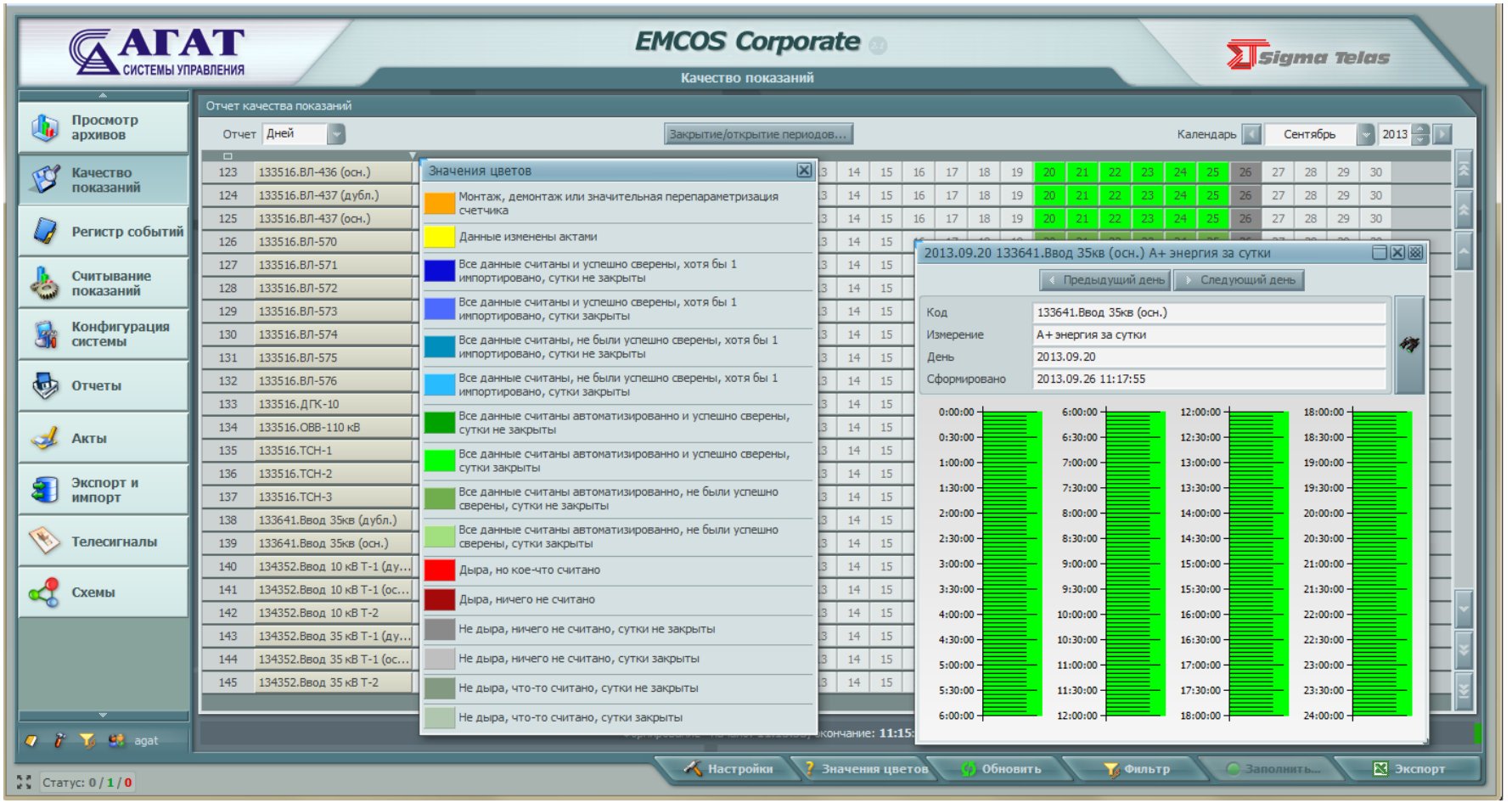
One of the basic subsystems, allowing the end-user to detect incorrect data.

- to perform constant check of received data and their cross comparison;
- allows calculating balances during data collection;
- processes function in background mode;
- allows initiating the manual collection /archiving of missing data;
- verification results are provided:
  - in the monitoring subsystem log, containing all failures of system operation and errors, detected during data check;
  - by means of graphic display of data fullness and quality, using the color data coding.

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

VERIFICATION SUBSYSTEM



MONITORING SUBSYSTEM

- records absolutely all events:
  - malfunctions;
  - incorrect data detection;
  - communication bugs;
  - full audit of users actions, etc.
- ensures sending email and SMS in real time mode, in case of “alarm” actuation;
- possess flexible system of access filtering to necessary objective subpoints.

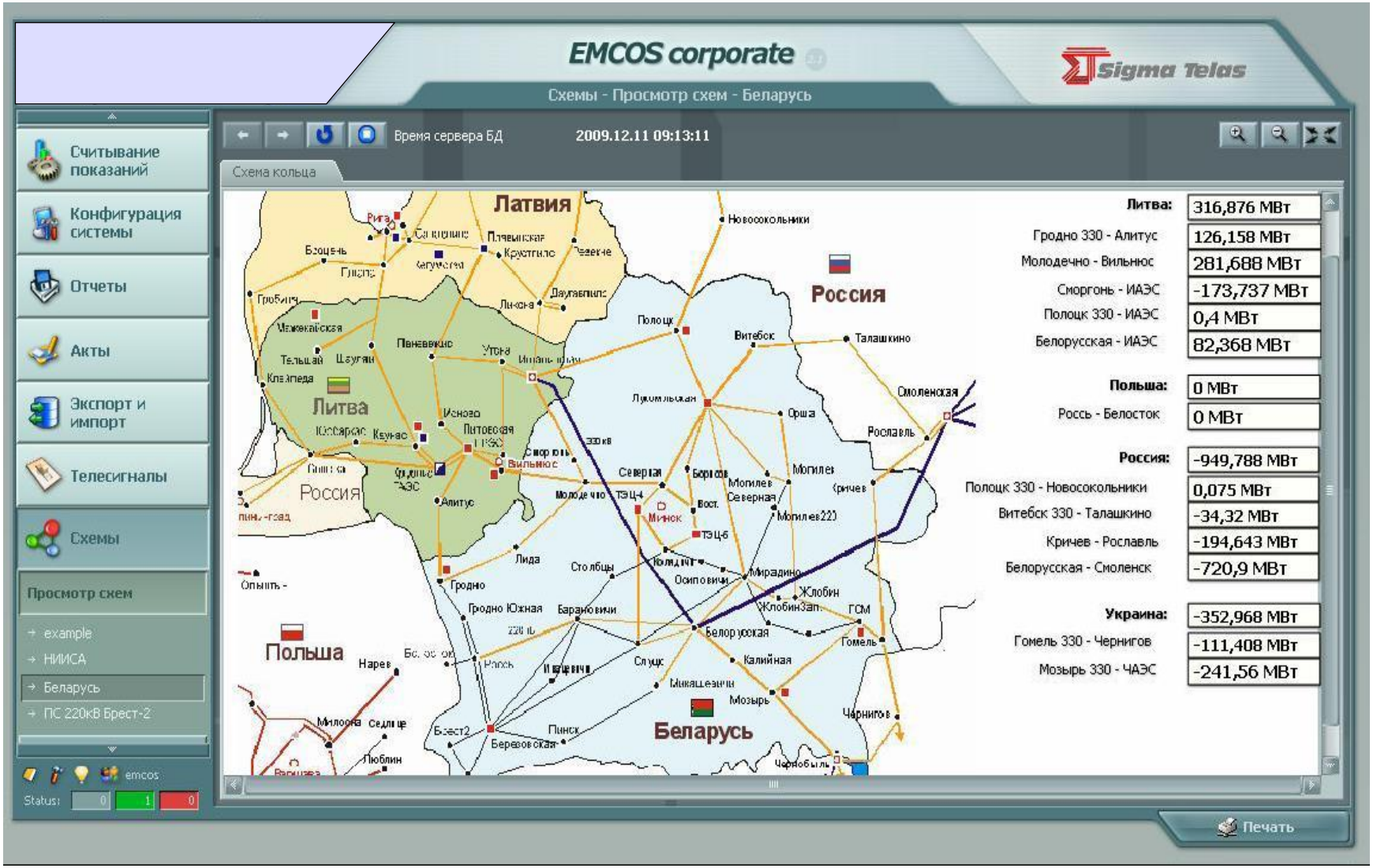
VISUALIZATION SUBSYSTEM

- gives access to results of all subsystem operations;
- provides possibility to work with archives, group construction and data review on groups;
- provides possibility to view data as symbolic circuits;
- ensures capability to construct the desired reports.

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

VISUALIZATION SUBSYSTEM



SUBSYSTEM OF EXTERNAL SYSTEMS EXCHANGE

- automatic data dispatch about metering results, means and metering objects conditions;
- XML and AFCS formats are realized;
- data import from external systems using the same formats;
- connection on different protocols with dispatcher systems;
- connection with ERP enterprise systems.

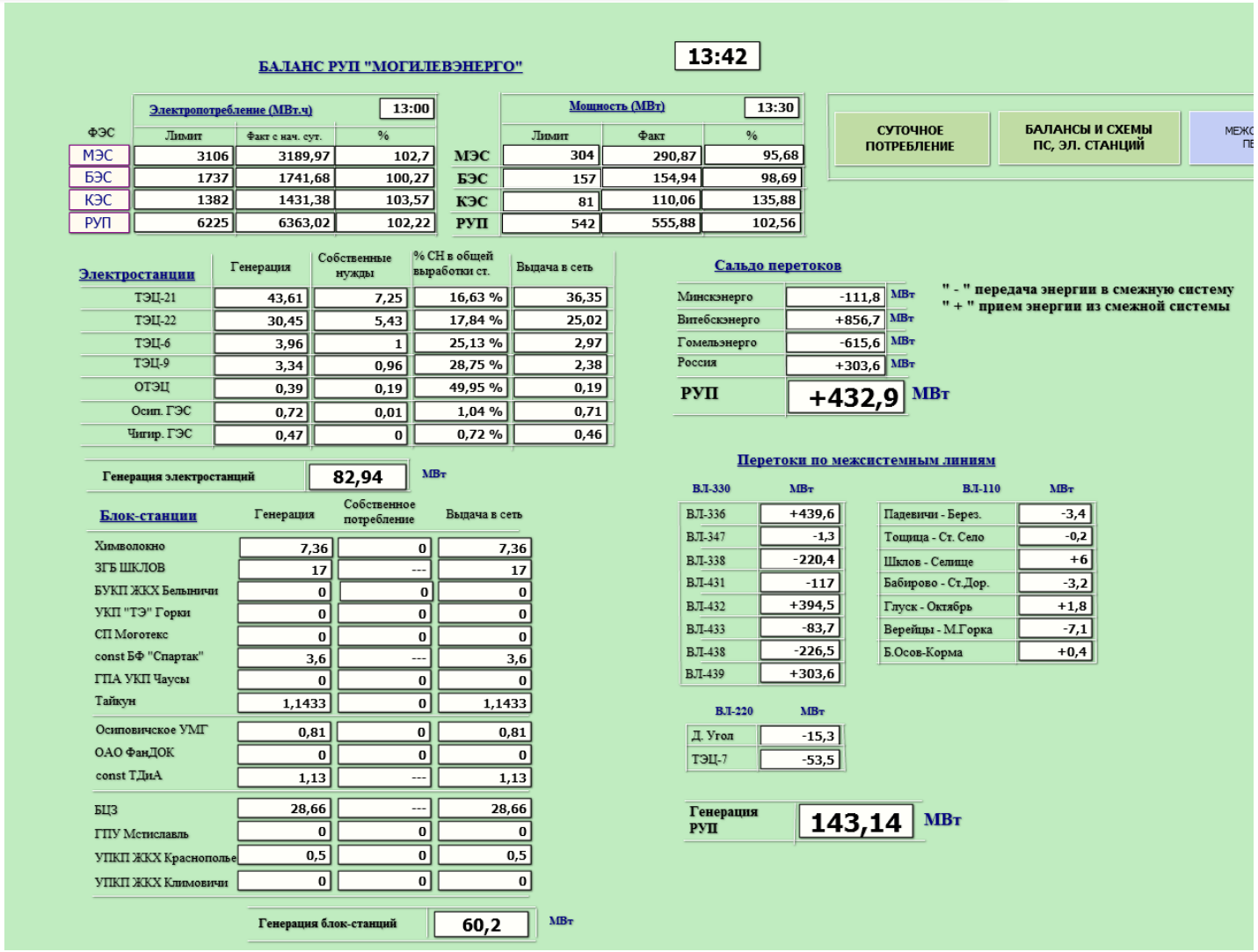
CALCULATION AND ANALYTICAL SUBSYSTEM

- support of alternative communication channels and reading points;
- alternative archiving lists depending on current communication channel;
- new self-adjusted data analysis algorithms, their replacement;
- dynamic creation of consumption samples and limiting settings;
- estimation if thermal equipment economy;
- operative calculation of specific fuel consumption;
- prediction of specific fuel consumption;
- analysis of system operation;
- data fusion from different systems.

AGAT CONTROL SYSTEMS

NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS)

EXAMPLE OF CALCULATION AND ANALYTIC SUBSYSTEM



БАЛАНС РУП "МОГИЛЕВЭНЕРГО" 13:42

Электропотребление (МВт.ч) 13:00

ФЭС	Лимит	Факт с нач. сут.	%
МЭС	3106	3189,97	102,7
БЭС	1737	1741,68	100,27
КЭС	1382	1431,38	103,57
РУП	6225	6363,02	102,22

Мощность (МВт) 13:30

	Лимит	Факт	%
МЭС	304	290,87	95,68
БЭС	157	154,94	98,69
КЭС	81	110,06	135,88
РУП	542	555,88	102,56

СУТОЧНОЕ ПОТРЕБЛЕНИЕ | БАЛАНСЫ И СХЕМЫ ПС, ЭЛ. СТАНЦИЙ | МЕЖС ПЕ

Электростанции

	Генерация	Собственные нужды	% СН в общей выработки ст.	Выдача в сеть
ТЭЦ-21	43,61	7,25	16,63 %	36,35
ТЭЦ-22	30,45	5,43	17,84 %	25,02
ТЭЦ-6	3,96	1	25,13 %	2,97
ТЭЦ-9	3,34	0,96	28,75 %	2,38
ОТЭЦ	0,39	0,19	49,95 %	0,19
Осип. ГЭС	0,72	0,01	1,04 %	0,71
Чигир. ГЭС	0,47	0	0,72 %	0,46

Генерация электростанций 82,94 МВт

Сальдо перетоков

Минскэнерго	-111,8	МВт
Витебскэнерго	+856,7	МВт
Гомельэнерго	-615,6	МВт
Россия	+303,6	МВт
РУП	+432,9	МВт

" - " передача энергии в смежную систему
" + " прием энергии из смежной системы

Блок-станции

	Генерация	Собственное потребление	Выдача в сеть
Химволокно	7,36	0	7,36
ЗГБ ШКЛОВ	17	---	17
БУКП ЖКХ Бельничи	0	0	0
УКП "ТЭ" Горки	0	0	0
СП Моготекс	0	0	0
const БФ "Спартак"	3,6	---	3,6
ГПА УКП Чаусы	0	0	0
Тайкун	1,1433	0	1,1433
Осиповичское УМГ	0,81	0	0,81
ОАО ФанДОК	0	0	0
const ТДиА	1,13	---	1,13
БЦЗ	28,66	---	28,66
ГПУ Мстиславль	0	0	0
УПКП ЖКХ Краснополье	0,5	0	0,5
УПКП ЖКХ Климовичи	0	0	0

Генерация блок-станций 60,2 МВт

Перетоки по межсистемным линиям

ВЛ-330	МВт
ВЛ-336	+439,6
ВЛ-347	-1,3
ВЛ-338	-220,4
ВЛ-431	-117
ВЛ-432	+394,5
ВЛ-433	-83,7
ВЛ-438	-226,5
ВЛ-439	+303,6

ВЛ-110	МВт
Падевичи - Берез.	-3,4
Тощица - Ст. Село	-0,2
Шклов - Селище	+6
Бабирово - Ст.Дор.	-3,2
Глуск - Октябрь	+1,8
Верейцы - М.Горка	-7,1
Б.Осов-Корма	+0,4

ВЛ-220	МВт
Д. Угол	-15,3
ТЭЦ-7	-53,5

Генерация РУП 143,14 МВт

PROFITABLE DIFFERENCE OF WORKS PERFORMED BY JSC «AGAT – CONTROL SYSTEMS»

- ✓ Possibility to use as the user interface the PC program complex and fully constructed visualization subsystem under WEB technologies.
- ✓ Possibility to record not only electric power, but other energy sources.
- ✓ Integration of large quantity of different devices (nowadays the number of supporting devices exceeds more than 100, among them ABB, Elgama Electronika (Lithuania), Power Measurement (not the subunit of Schneider Electric) and many others).
- ✓ Support of international standard DLMS.
- ✓ Adaptation of the software to different languages.
- ✓ When ordering the complex project there is the possibility to provide the software with the open source texts, and with the obtained analysis unit with operation description – the capability to obtain the whole technology, not only the product.
- ✓ System is used in country's scale.

PROFITABLE DIFFERENCE OF WORKS PERFORMED BY JSC «AGAT – CONTROL SYSTEMS»

1

Constantly functioning the ASCME complex – simulating center, used for training of all accepted project solutions, the system is simulated, Customer's personnel training is conducted and emergency situations are trained, emerging during maintenance.

PROFITABLE DIFFERENCE OF WORKS PERFORMED BY JSC «AGAT – CONTROL SYSTEMS»

2

JSC «AGAT – Control Systems» on the one hand may perform integration of the main AECMS equipment, supplied by the Customer, and on the other hand if necessary may propose manufacture and delivery of equipment to construct AECMS system.

PROFITABLE DIFFERENCE OF WORKS PERFORMED BY JSC «AGAT – CONTROL SYSTEMS»

3

Offered program solutions are used in AECMS systems of whole states (Belarus, Lithuania). The software actively is implemented in Russian Federation, Kazakhstan, Uzbekistan and at present is considered by specialists in Turkey and Egypt.

PROFITABLE DIFFERENCE OF WORKS PERFORMED BY JSC «AGAT – CONTROL SYSTEMS»

4

Within the frames of performed work not only the automated system of data collection, processing, storage and visualization is offered, but the whole range of calculation and analytical tasks, allowing the constructed system to be used more effectively!

AGAT CONTROL SYSTEMS

AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS) FOR INDUSTRIAL ENTERPRISES

APPLICATION

The automated energy control and metering system is a combination of a hardware-software complex and end information transducers that performs the following tasks:

- commercial energy metering;
- technological (technical) energy metering at an enterprise's subdivisions for energy loss detection.

COMPONENTS

The system is based on both the hardware and software by OJSC “AGAT – Control Systems” as well as commercially available computer and communication equipment and LAN facilities by various manufacturers.

The system integrates:

- measuring current and voltage transformers;
- end devices (energy meters of various types by different manufacturers);
- data collection and transmission devices;
- DB server, users’ automated workstations (WS);
- Advanced data collection and delivery facilities.

DIGITAL MULTIFUNCTIONAL METERS

The Ministry of Energy determined Gran-Electro SS-301 electricity meters produced by PSDTU company (affiliate of RUE “Grodnoenergo”) to be used as the major electricity meter of the AECMS for interstate and intersystem energy flows and generation.

DATA COLLECTION AND TRANSMISSION DEVICE

As the data collection and transmission device we use ECOM 3000 by ProSoft Systems (Russia, Ekaterinburg).

The system implemented at RUE “Grodnoenergo” integrates the existing data collection and transmission devices produced by PSDTU company (affiliate of RUE “Grodnoenergo”).

DEVICE FOR CONTROL OF ENERGY QUALITY PARAMETERS

- The device is used at power supply objects for collecting, processing and storing data about energy quality parameters in accordance with GOST 13109-97;
- The device generates and transfers reports to the upper level of the AECMS

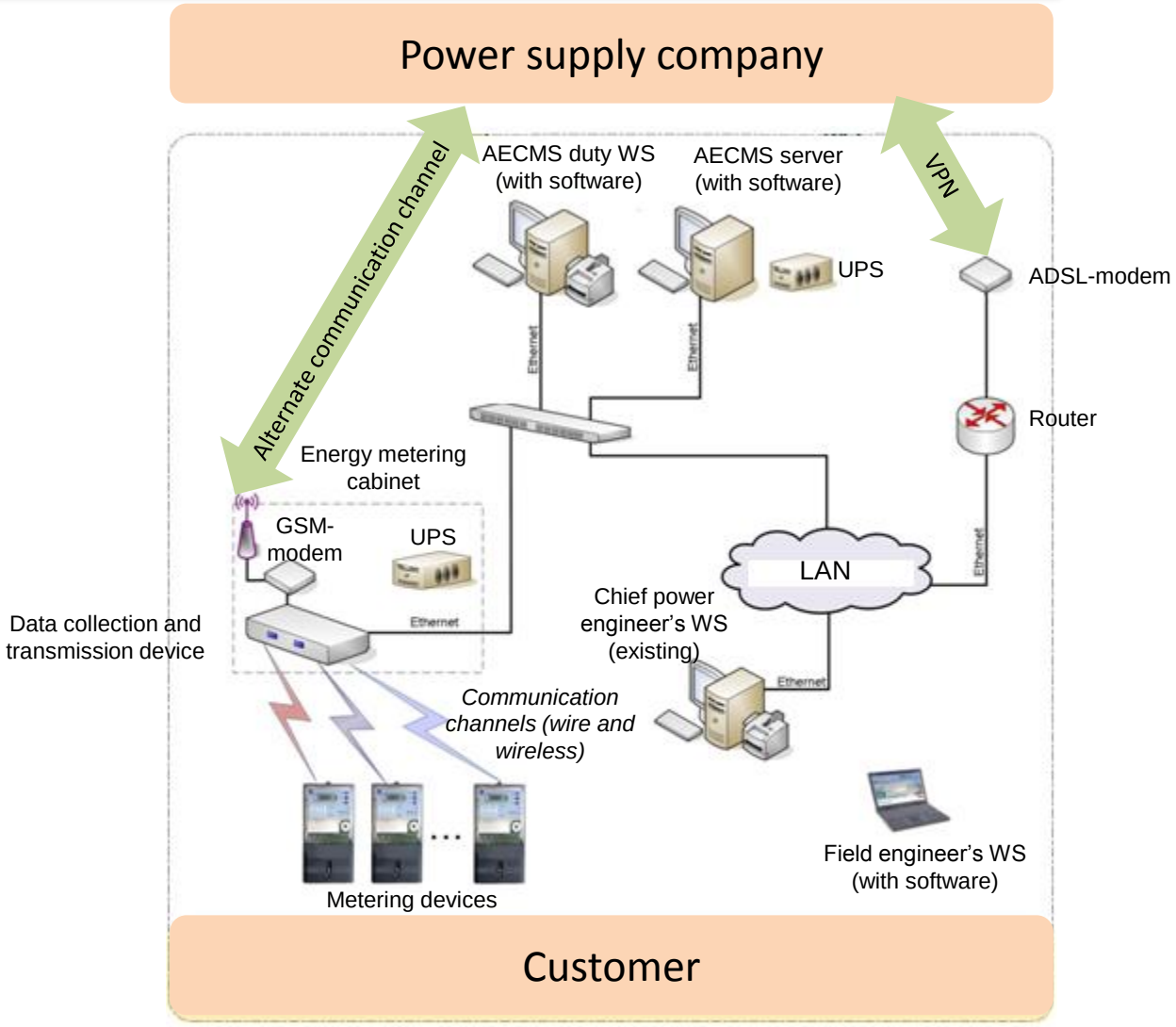
FUNCTIONS

- energy metering;
- combination of control, metering and management functions;
- building of local and distribution hierarchical systems;
- adaptation to any energy saving objects and charts;
- integration into automated systems of an enterprise with data transmission to information systems;
- Windows operating system;
- database based on Microsoft SQL Server.

ADVANTAGES

- multirate settlements with electric energy suppliers and consumers based on precise, reliable, legitimate and current metering data;
- increased energy consumption and saving efficiency thanks to remote energy metering automation on a real-time basis;
- on-line detection of electric energy balance and voltage at an enterprise and its subdivisions with loss detection;
- reduction of time necessary for data processing by economic departments of an enterprise due to rapid reception of valid on-line information about power consumption.

TEMPLATE SOLUTION



REQUIREMENTS TO THE UPPER LEVEL SOFTWARE

Specialized upper-level software is one of the key elements of the smart metering system that should perform the following tasks:

- Accumulation, processing and analysis of data received from all metering devices;
- Technical and/or commercial metering of electricity and other resources (gas, heat, water) of industrial and domestic consumers;
- Round-the-clock access about energy consumption of the object, data integrity and technical state of metering devices;
- Minimal costs of the software maintenance.

TP ACS “AGAT-2000” SOFTWARE

TP ACS “AGAT-2000” software provides fullest usage of electricity conversion and distribution capabilities, enhanced security of consumers’ supply, more adequate, secure and efficient use of the major equipment installed at power facilities. The software performs the functions of data management, collection, processing, transmission, storage, and display.

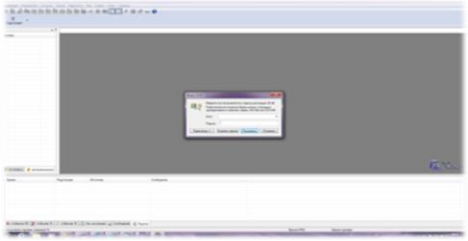
TP ACS “AGAT-2000” SOFTWARE IS THE COMBINATION OF THE FOLLOWING PROGRAMS:

“SERVER” program designed for 24/7/365 operation;

“AWS” program provides the user with the required information in an easy-to-use form;

“Chart Editor” program is designed for creation and editing of charts;

“Configuration Manager” program is designed for set up of the system hardware configuration.



CERTIFICATE OF REGISTRATION OF TP ACS “AGAT-2000” SOFTWARE

РЕСПУБЛИКА БЕЛАРУСЬ

СВИДЕТЕЛЬСТВО

О РЕГИСТРАЦИИ КОМПЬЮТЕРНОЙ ПРОГРАММЫ

№ 432

Наименование компьютерной программы:

Автоматизированная система управления технологическими процессами объектов энергетики и промышленных предприятий «АГАТ-2000» («АСУ ТП «АГАТ-2000»)

Правообладатель компьютерной программы:

Открытое акционерное общество «АГАТ-системы управления» – управляющая компания холдинга «Геоинформационные системы управления»

Год создания компьютерной программы:
2012

Автор (авторы) компьютерной программы:

Горячко Дмитрий Генрихович
Бурлюк Владимир Васильевич
Шипуль Роберт Александрович
Горбунова Ирина Борисовна
Иванюто Людмила Александровна
Портянко Людмила Яковлевна

Заявка № **C20120044** Дата подачи: **04.06.2012**

Дата внесения записи в Реестр зарегистрированных компьютерных программ: **27.06.2012**

Генеральный директор Национального центра интеллектуальной собственности Л.И.Воронецкий

Настоящее свидетельство выдано на основании сведений и материалов, представленных в заявке на регистрацию компьютерной программы

НАЦИОНАЛЬНЫЙ ЦЕНТР ИНТЕЛЛЕКТУАЛЬНОЙ СОБСТВЕННОСТИ

AECMS IMPLEMENTATION STAGES

Implementing the AECMS OJSC “AGAT – Control Systems” performs complete scope of works that includes:

- pre-project inspection
- development, agreement and approval of technical specification, development of design estimate documentation;
- delivery of equipment;
- construction and installation works;
- commissioning operations;
- start-up operations, personnel training, metrological certification of the system.

AGAT CONTROL SYSTEMS

ENERGY RESOURCES MANAGEMENT FOR HOUSING AND PUBLIC UTILITIES

ENERGY SUPPLY MANAGEMENT OF HOUSING AND PUBLIC UTILITIES

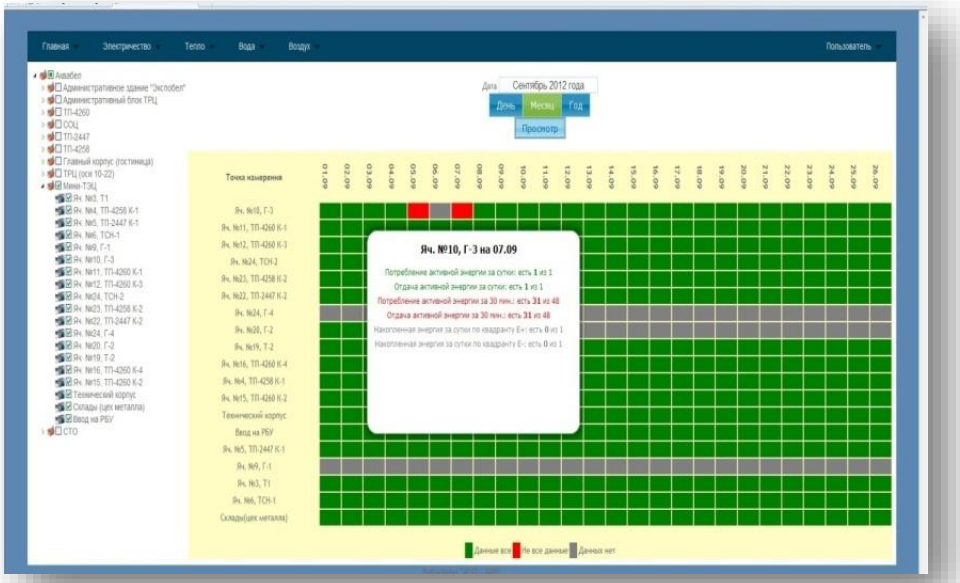
The project for development of the automated energy control and metering system for housing and public utilities includes the following directions:

- Automated readout of energy consumption indices of the selected items (regions) and the installed equipment;
- Automated calculation of electric bills for consumers and integration with the billing system;
- Improved accuracy of planning, metering and control of the power grid energy resources and assets (property).

ENERGY SUPPLY MANAGEMENT OF HOUSING AND PUBLIC UTILITIES

The project for development of the automated energy control and metering system for housing and public utilities includes four information systems:

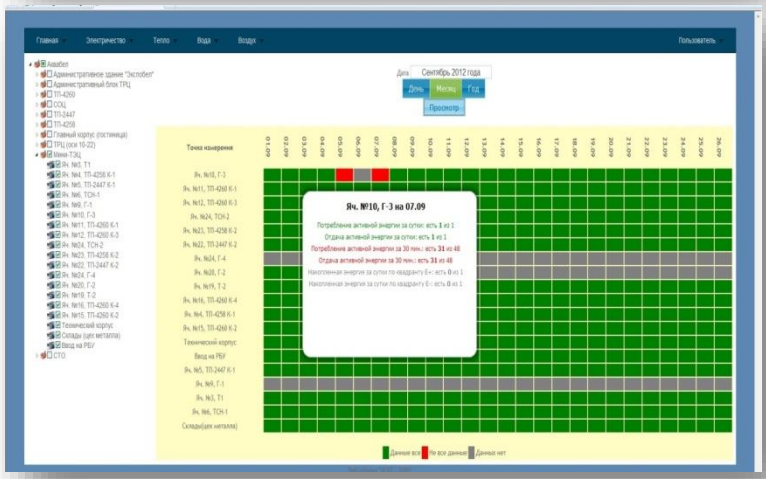
- User portal;
- Billing system;
- System for collection and inter-system data exchange;
- Design tasks server.



AGAT CONTROL SYSTEMS

ENERGY RESOURCES MANAGEMENT FOR HOUSING AND PUBLIC UTILITIES

ENERGY SUPPLY MANAGEMENT OF HOUSING AND PUBLIC UTILITIES



Currently the works for implementation of the User Portal are performed:

- personal user account depending on its status in the system;
- cross-platform system access;
- round-the-clock access to the system data for the parties involved;
- consumption monitoring option;
- planning and monitoring of task execution;
- system configuration option;
- management of reports generation.

AGAT CONTROL SYSTEMS

ENERGY RESOURCES MANAGEMENT FOR HOUSING AND PUBLIC UTILITIES

USER PORTAL

Главная | Электричество | Тепло | Техническое состояние | Пользователь

Личный кабинет пользователя

Здравствуйте, emo!

Изменение пароля

Выйти

Сводная таблица потребления на 23.05.2013 13:50

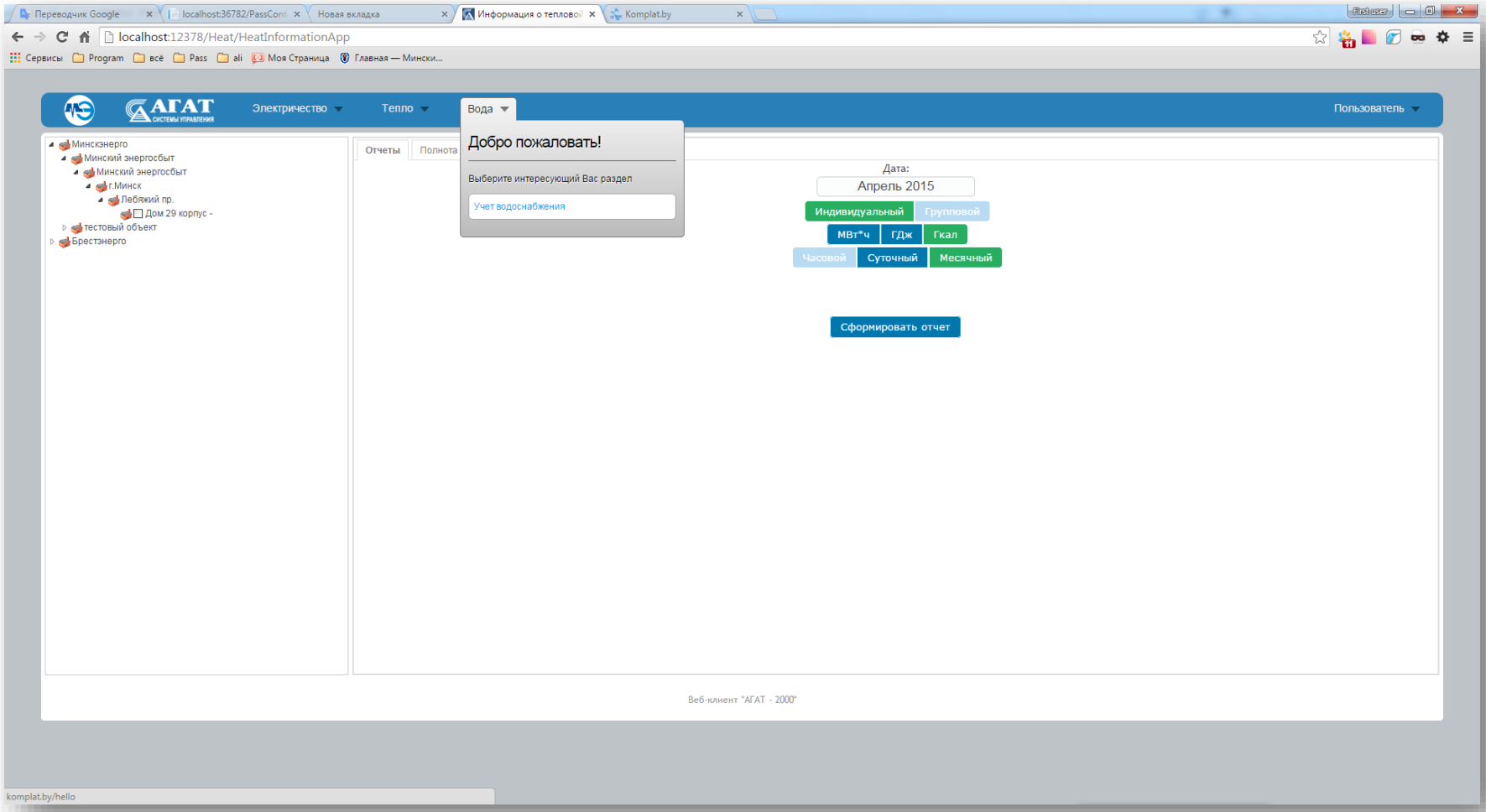
	Название	Потребление за предыдущий день		Потребление за последние 30 мин.	
		A+, кВт*ч	A-, кВт*ч	A+, кВт*ч	A-, кВт*ч
1	Суммарное потребление	15078.8	0	448.8	0
2	По показаниям РП-128	15078.8	0	448.8	0
3	РП-128, Ф2-118 Ввод 2	11702	0	309.2	0
4	РП-128, Ф2-220 Ввод 1	3376.8	0	139.6	0
5	РП-128-РП-138	0	0	0	0
6	Общежитие	0	0	0	0
10	Поляна	0	0	0	0
14	Потребление по другим группам	53.435	0	169.585	0
15	Водонагреватели	53.435	0	2.522	0
25	Субабоненты	0	0	167.063	0
	Сальдо	15025.365	0	279.215	0

Веб-клиент "АГАТ - 2000"

AGAT CONTROL SYSTEMS

ENERGY RESOURCES MANAGEMENT FOR HOUSING AND PUBLIC UTILITIES

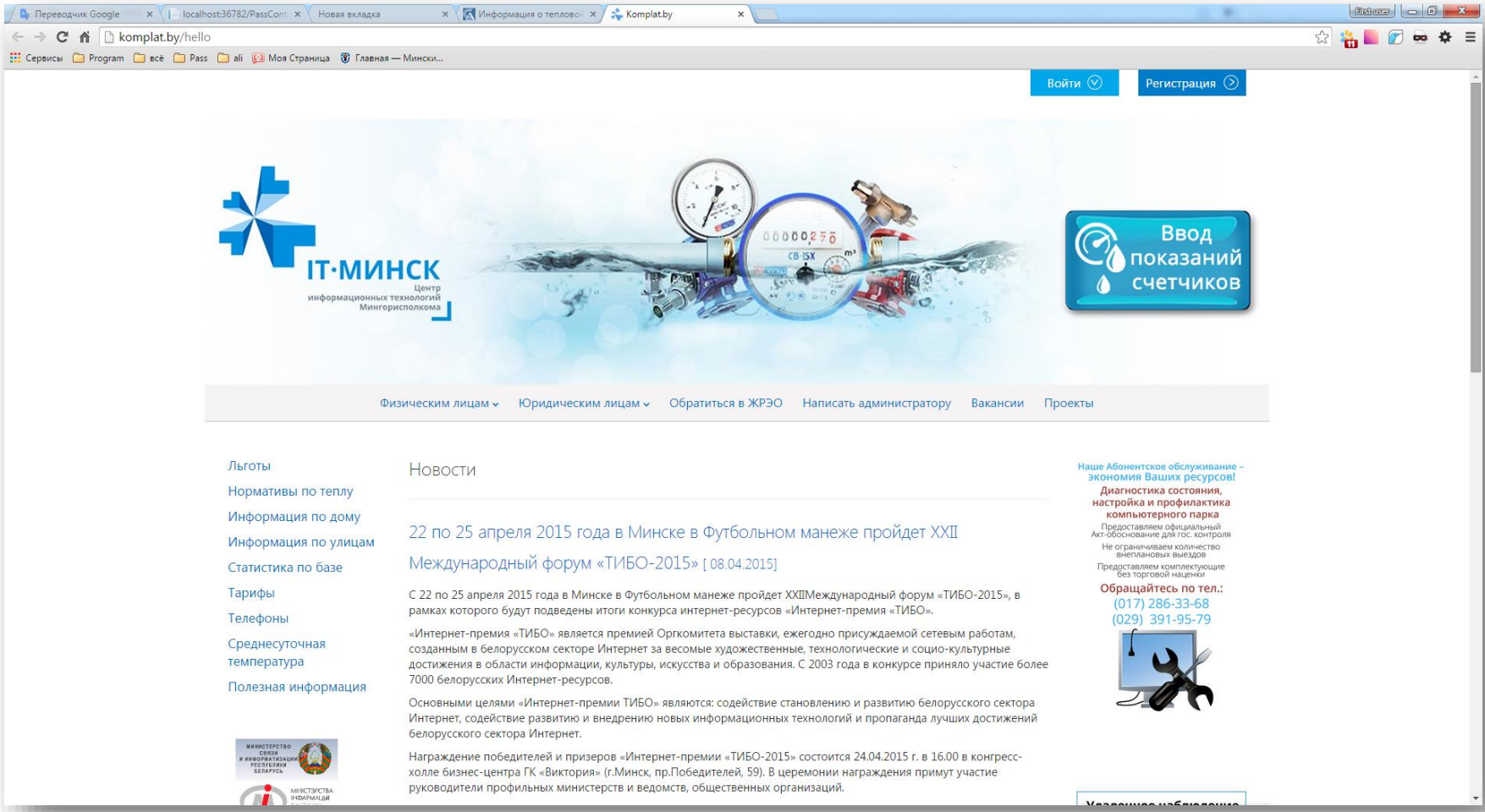
JOINT PROJECT OF OJSC “AGAT – CONTROL SYSTEMS” AND INFORMATION TECHNOLOGIES CENTER OF MINSK EXECUTIVE COMMITTEE



АГАТ
СИСТЕМЫ УПРАВЛЕНИЯ

ENERGY RESOURCES MANAGEMENT FOR HOUSING AND PUBLIC UTILITIES

JOINT PROJECT OF OJSC “AGAT – CONTROL SYSTEMS” AND INFORMATION TECHNOLOGIES CENTER OF MINSK EXECUTIVE COMMITTEE

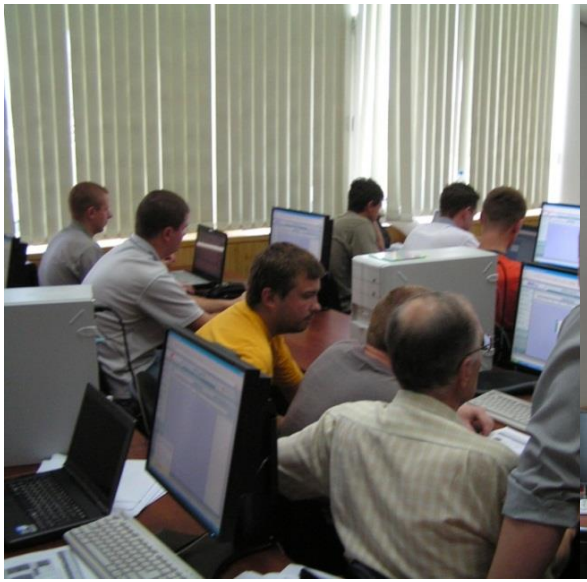


COMPLEX SIMULATION CENTER

Before implementation of the system at the Customer's facilities all hardware and software is tested in the system complex simulation center on the basis of operating equipment of OJSC "AGAT – Control Systems.




PERSONNEL TRAINING



ARRANGING OF WORKSHOPS AND CONFERENCES

IMPLEMENTED PROJECTS

Automated Energy Control and Metering System of the Power Industry:

OJSC “AGAT – Control Systems” is the General Designer and General Contractor for the project “Automated Energy Control and Metering System of Interstate and Intersystem Energy Flows and Generation of the Republic of Belarus». The system includes about 30 power stations and over 200 substations.

Automated systems for control and commercial metering of industrial enterprises:

OJSC «AGAT – Control Systems”, Mogilev Rayon Factory, BelFA, Baranovichi Automated Lines Plant, Skidel Sugar Refinery, Minsk Motor Plant, Bereza Feed-Milling Plant, Bereza Water Power Plant, Belarusian Railways, Transnational Corporation – BP West, 558 Aircraft Repair Plant, BelAZ Branch in Mogilev, Mogilev Motor Plant, Neman Bus Plant in Lida, OJSC “Agat – Electromechanical Plant”.

AECMS of mobile operators:

Mobile Digital Networks, BeST, Velcom.

AECMS of shopping malls:

AquaBel Exhibition Center.