

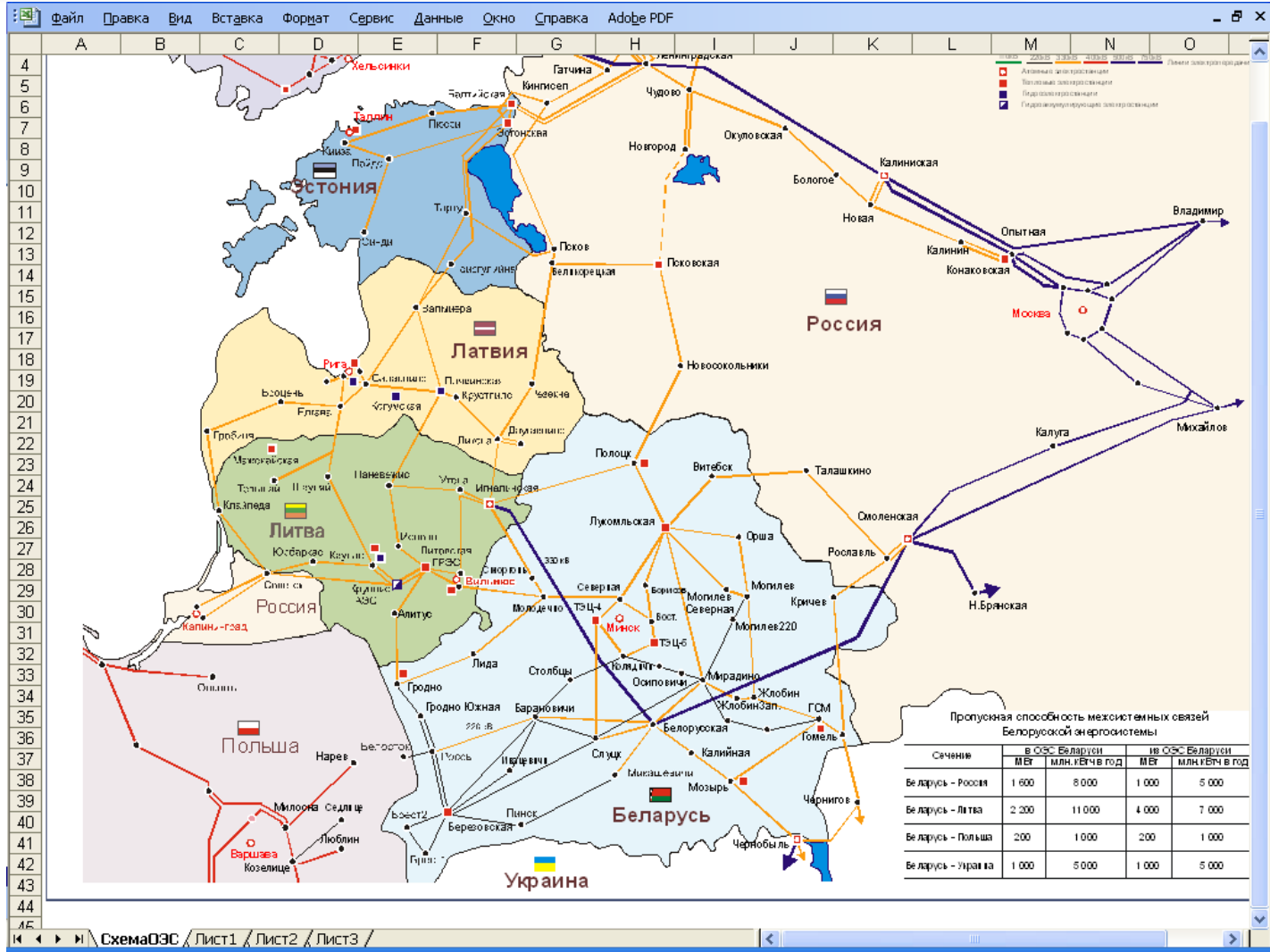
INTEGRATED ENERGY-EFFICIENT SYSTEM SOLUTIONS AND TECHNOLOGIES FOR POWER ENERGY AND INDUSTRIAL FACILITIES, AND HOUSING AND PUBLIC UTILITIES



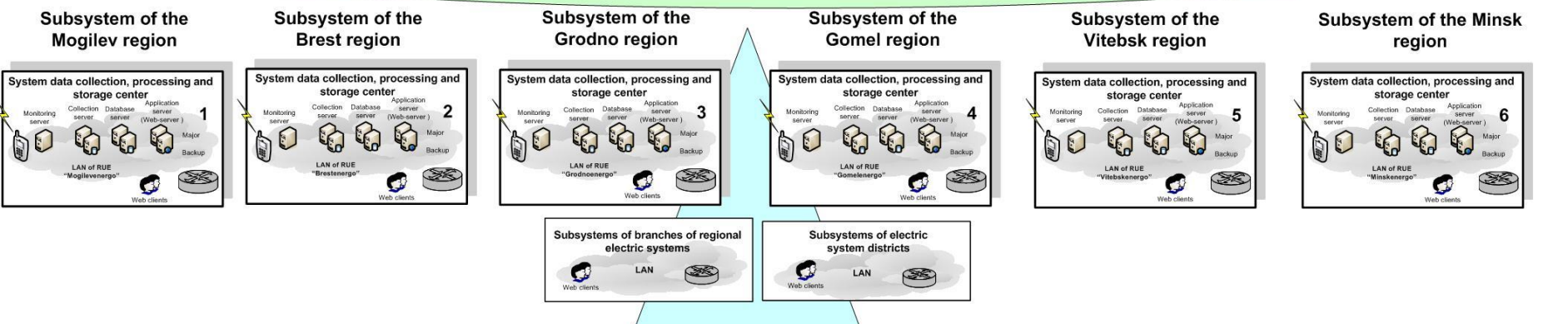
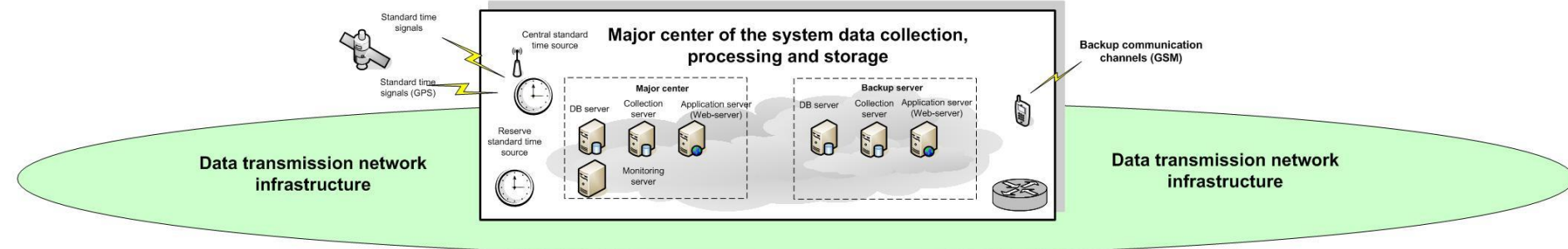
NATIONAL AUTOMATED ENERGY CONTROL AND METERING SYSTEM (AECMS) FOR INTERSTATE AND INTERSYSTEM ENERGY FLOWS AND GENERATION



CURRENT NATIONAL AECMS SYSTEM

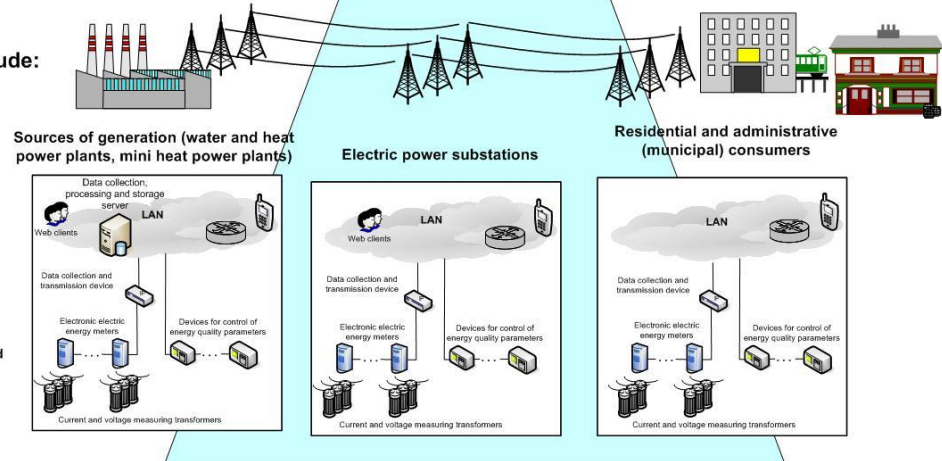


Structural Chart of the Automated Energy Control and Metering System of the Republic of Belarus



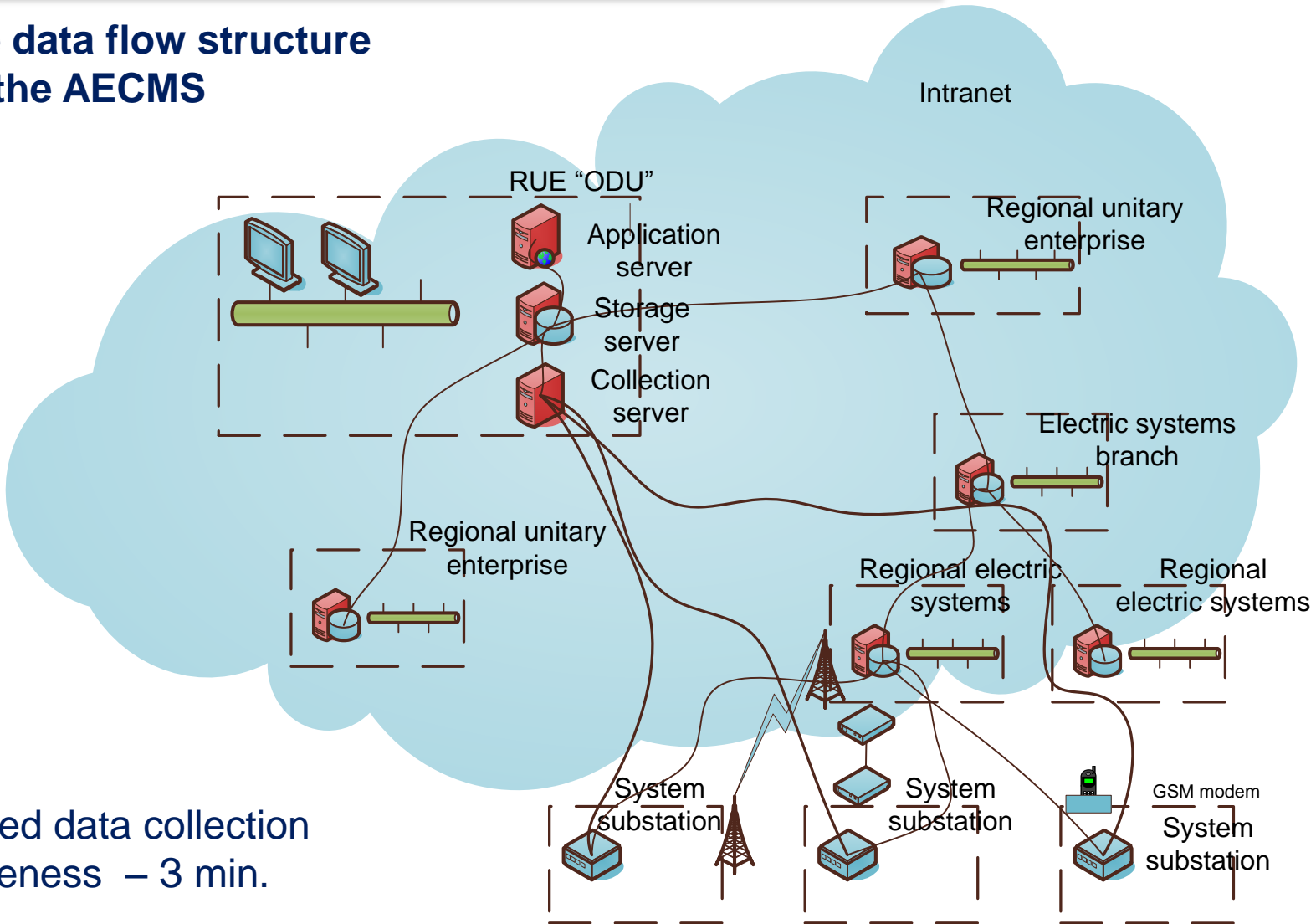
Organization of communication channels provides for combined solutions that include:

- radio relay communication channels
- modem communication channels
- utilization of the existing fiber-optic communication channels
- backup communication channels based on GSM-standards



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.



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.).



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.



VERIFICATION SUBSYSTEM

The screenshot displays the AGAT EMCOS Corporate interface. At the top, it features the AGAT logo, the text "EMCOS Corporate", and the "Sigma Telas" logo. The main area is titled "Отчет качества показаний" (Quality of readings report) and includes a navigation sidebar on the left with options like "Просмотр архивов", "Качество показаний", "Регистр событий", etc.

The central table lists various metering points with their IDs and names. A color-coded legend is overlaid on the table, explaining the status of each entry:

- Orange:** Монтаж, демонтаж или значительная перепараметризация счетчика
- Yellow:** Данные изменены актами
- Blue:** Все данные считаны и успешно сверены, хотя бы 1 импортировано, сутки не закрыты
- Light Blue:** Все данные считаны и успешно сверены, хотя бы 1 импортировано, сутки закрыты
- Dark Blue:** Все данные считаны, не были успешно сверены, хотя бы 1 импортировано, сутки не закрыты
- Light Blue (darker):** Все данные считаны, не были успешно сверены, хотя бы 1 импортировано, сутки закрыты
- Green:** Все данные считаны автоматизированно и успешно сверены, сутки не закрыты
- Light Green:** Все данные считаны автоматизированно, не были успешно сверены, сутки закрыты
- Red:** Дыра, но кое-что считано
- Dark Red:** Дыра, ничего не считано
- Grey:** Не дыра, ничего не считано, сутки не закрыты
- Light Grey:** Не дыра, ничего не считано, сутки закрыты
- Dark Green:** Не дыра, что-то считано, сутки не закрыты
- Light Green (darker):** Не дыра, что-то считано, сутки закрыты

On the right, a calendar shows the month of September 2013. A data visualization window is open, titled "2013.09.20 133641.Ввод 35кв (осн.) A+ энергия за сутки". It displays a 24-hour energy consumption chart with green bars. The chart shows energy usage starting at 0:00:00 and ending at 6:00:00. The status bar at the bottom indicates "Статус: 0 / 1 / 0" and includes buttons for "Настройки", "Значения цветов", "Обновить", "Фильтр", "Заполнить...", and "Экспорт".

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.



VISUALIZATION SUBSYSTEM

EMCOS corporate

Схемы - Просмотр схем - Беларусь

Время сервера БД: 2009.12.11 09:13:11

Схема кольца

- Считывание показаний
- Конфигурация системы
- Отчеты
- Акты
- Экспорт и импорт
- Телесигналы
- Схемы
- Просмотр схем
 - + example
 - + НИИСА
 - + Беларусь
 - + ПС 220кВ Брест-2

Status: 0 1 0

Литва:	316,876 MBT
Гродно 330 - Алитус	126,158 MBT
Молодечно - Вильнюс	281,688 MBT
Сморгонь - ИАЭС	-173,737 MBT
Полоцк 330 - ИАЭС	0,4 MBT
Белорусская - ИАЭС	82,368 MBT
Польша:	0 MBT
Россь - Белосток	0 MBT
Россия:	-949,788 MBT
Полоцк 330 - Новосokolники	0,075 MBT
Витебск 330 - Талашкино	-34,32 MBT
Кричев - Рославль	-194,643 MBT
Белорусская - Смоленск	-720,9 MBT
Украина:	-352,968 MBT
Гомель 330 - Чернигов	-111,408 MBT
Мозырь 330 - ЧАЭС	-241,56 MBT

Печать

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 of thermal equipment economy;
- operative calculation of specific fuel consumption;
- prediction of specific fuel consumption;
- analysis of system operation;
- data fusion from different systems.



EXAMPLE OF CALCULATION AND ANALYTIC SUBSYSTEM

13:42

БАЛАНС РУП "МОГИЛЕВЭНЕРГО"

ФЭС	Электропотребление (МВт.ч)		
	Льдинг	Факт с нам. 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

МЭС	Мощность (МВт)		
	Льдинг	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

Электростанция	Генерация	Собственные нужды	% СН в общей выработке 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
--------------------------	-------	-----

Блок-станции	Генерация	Собственное потребление	Выдача в сеть
Химволокно	7,36	0	7,36
ЗГБ ШКЛОВ	17	---	17
БУКП ЖКХ Бельнич	0	0	0
УКП "ТЭ" Горки	0	0	0
СП Морготекс	0	0	0
const БФ "Спартак"	3,6	---	3,6
ГПА УКП Чаусы	0	0	0
Тайхун	1,1433	0	1,1433
Осиповичское УМГ	0,81	0	0,81
ОАО ФандОК	0	0	0
const Т.ДиА	1,13	---	1,13
БЦЗ	28,66	---	28,66
ГПУ Мстиславль	0	0	0
УПКП ЖКХ Краснополье	0,5	0	0,5
УПКП ЖКХ Клымовичи	0	0	0

Генерация блок-станций	60,2	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

Перетоки по межсистемным линиям

ВЛ-330	МВт	ВЛ-110	МВт
ВЛ-336	+439,6	Падевичи - Берез.	-3,4
ВЛ-347	-1,3	Тошница - Ст. Село	-0,2
ВЛ-338	-220,4	Шклов - Семше	+6
ВЛ-431	-117	Бабирово - Ст.Дор.	-3,2
ВЛ-432	+394,5	Глуск - Октябрь	+1,8
ВЛ-433	-83,7	Верейцы - М.Горка	-7,1
ВЛ-438	-226,5	Б.Осов-Корма	+0,4
ВЛ-439	+303,6		

ВЛ-220	МВт
Д. Угол	-15,3
ТЭЦ-7	-53,5

Генерация РУП	143,14	МВт
---------------	---------------	------------

- ✓ 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.



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.



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.



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.



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!



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.

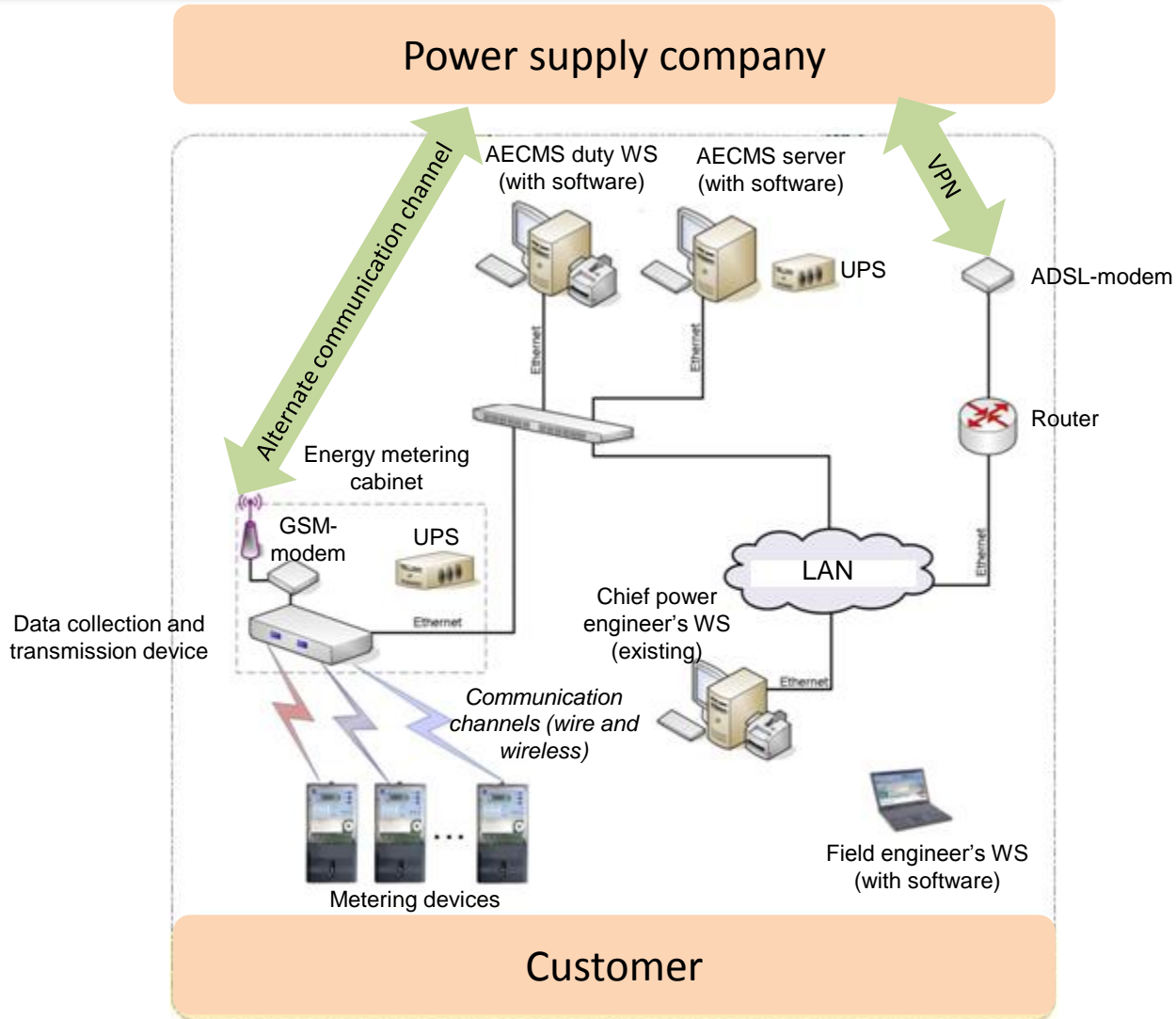


ADVANTAGES

- ❑ 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.



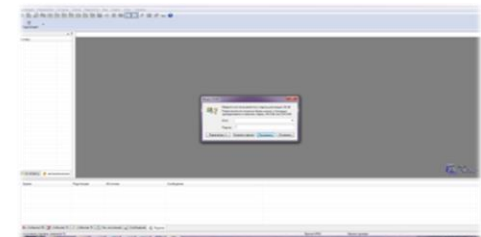
TP ACS “AGAT-2000” SOFTWARE IS THE COMBINATION OF THE FOLLOWING PROGRAMS:

“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:
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Заявка № С20120044 Дата подачи: 04.06.2012

Дата внесения записи в
Реестр зарегистрированных
компьютерных программ: 27.06.2012

Генеральный директор
Национального центра
интеллектуальной собственности



Л.И.Воронетский

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.



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).



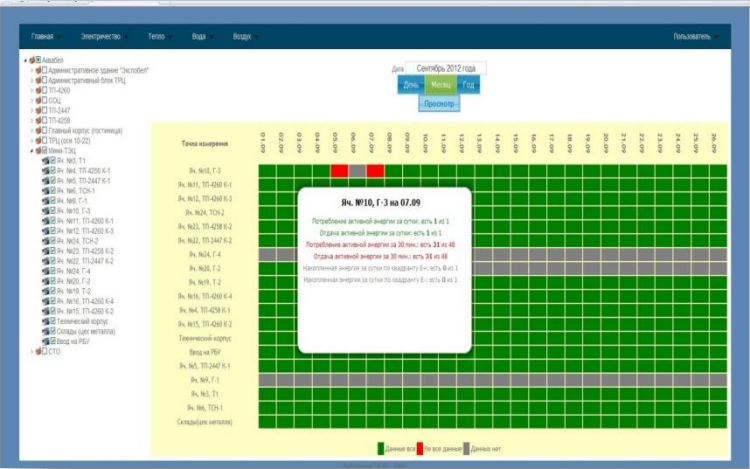
ENERGY SUPPLY MANAGEMENT OF HOUSING AND PUBLIC UTILITIES

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.



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.

USER PORTAL

[Главная](#) ▾
 [Электричество](#) ▾
 [Тепло](#) ▾
 [Техническое состояние](#) ▾

Пользователь ▾



Личный кабинет пользователя

Здравствуйте, ето!

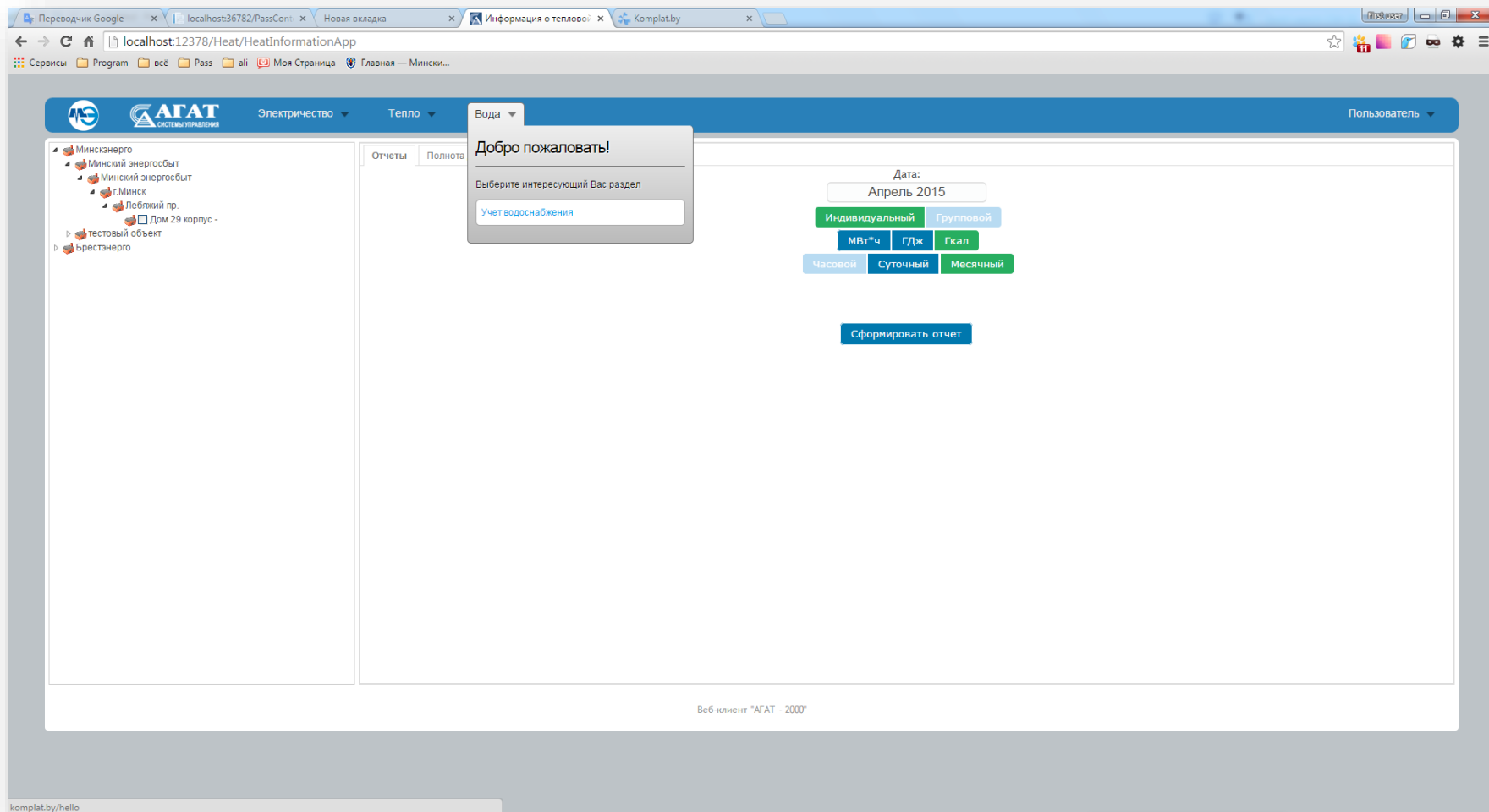
[Изменение пароля](#)

[Выйти](#)

Сводная таблица потребления на

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

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



The screenshot shows a web browser window displaying the AGAT web application. The browser tabs include "Переводчик Google", "localhost:36782/PassCont...", "Новая вкладка", "Информация о теплов...", and "Komplat.by". The address bar shows "localhost:12378/Heat/HeatInformationApp".

The application interface features a blue header with the AGAT logo, navigation tabs for "Электричество", "Тепло", and "Вода", and a user profile dropdown labeled "Пользователь". A left sidebar contains a tree view of energy objects, including "Минскэнерго", "Минский энергосбыт", "г. Минск", "Лебяжий пр.", "тестовый объект", and "Брестэнерго".

A central panel displays a "Добро пожаловать!" (Welcome!) message with a "Выберите интересующий Вас раздел" (Select the section you are interested in) prompt and a "Учет водоснабжения" (Water supply accounting) link. Below this, there are filters for "Дата:" (Date) set to "Апрель 2015", and buttons for "Индивидуальный" (Individual) and "Групповой" (Group) views. Further filters include "МВт*ч", "ГДж", "Гкал", "Часовой" (Hourly), "Суточный" (Daily), and "Месячный" (Monthly) views. A "Сформировать отчет" (Generate report) button is located at the bottom.

The footer of the application displays "Веб-клиент 'AGAT - 2000'".

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



Переводчик Google x localhost36782/PassCont: x Новая вкладка x Информация о тепловом x Komplat.by x

komplat.by/hello

Сервисы Program всё Pass ali Моя Страница Главная — Минск...

Войти Регистрация

ИТ-МИНСК
 Центр информационных технологий Мингорисполкома

Ввод показаний счетчиков

Физическим лицам Юридическим лицам Обратиться в ЖРЭО Написать администратору Вакансии Проекты

Льготы
 Нормативы по теплу
 Информация по дому
 Информация по улицам
 Статистика по базе
 Тарифы
 Телефоны
 Среднесуточная температура
 Полезная информация

Министерство связи и информатизации Республики Беларусь

Министерства информатизации

Новости

22 по 25 апреля 2015 года в Минске в Футбольном манеже пройдет XXII Международный форум «ТИБО-2015» [08.04.2015]

С 22 по 25 апреля 2015 года в Минске в Футбольном манеже пройдет XXII Международный форум «ТИБО-2015», в рамках которого будут подведены итоги конкурса интернет-ресурсов «Интернет-премия «ТИБО»».

«Интернет-премия «ТИБО» является премией Оргкомитета выставки, ежегодно присуждаемой сетевым работам, созданным в белорусском секторе Интернет за весомые художественные, технологические и социо-культурные достижения в области информации, культуры, искусства и образования. С 2003 года в конкурсе приняло участие более 7000 белорусских Интернет-ресурсов.

Основными целями «Интернет-премии ТИБО» являются: содействие становлению и развитию белорусского сектора Интернет, содействие развитию и внедрению новых информационных технологий и пропаганда лучших достижений белорусского сектора Интернет.

Награждение победителей и призеров «Интернет-премии «ТИБО-2015» состоится 24.04.2015 г. в 16.00 в конгресс-холле бизнес-центра ГК «Виктория» (г.Минск, пр.Победителей, 59). В церемонии награждения примут участие руководители профильных министерств и ведомств, общественных организаций.

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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.

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