NEW TECHNOLOGIES IN ENERGY

ENTELS

SOLUTIONS FOR AUTOMATION OF CRITICAL ENGINEERING INFRASTRUCTURE

DEVELOPMENT OF SYSTEM SOLUTIONS AND PLATFORMS. 20 YEARS & MORE

CONTENTS

1. Development of system platforms and solutions
2. Model solutions – automation of electric networks for ROSSETI PJSC
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5. Information security
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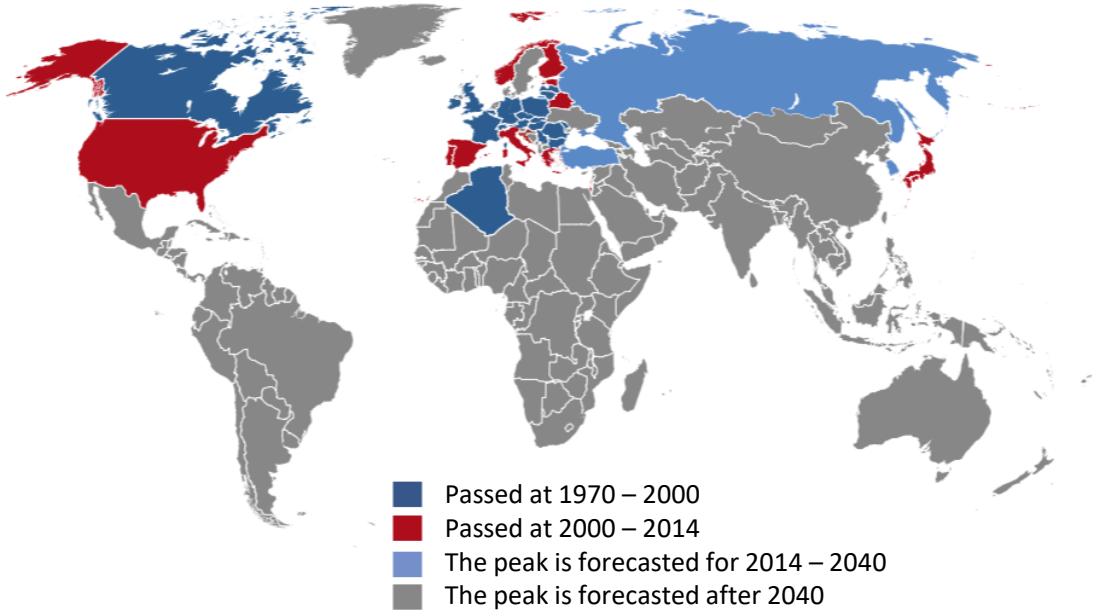
7. Automation as service of IoT operator
8. Technology business partners
9. Contact details

MACRO TRENDS FOR ENERGY MANAGEMENT BY 2040

- The planet's population will increase by 2 billion and exceed 9 billion people. To ensure the safety of such a number of energy technologies, all energy sectors will undergo a transformation and transition to new technological structures - Industry 4.0.
- Reducing the energy intensity of GDP of all countries will lead to competition in the field of energy.
- The working-age population in Europe will decrease by 8%.
- Coal will continue to be the dominant form of energy production (38% of output), but environmental concerns will lead to a rethink of wise energy use and lead to government regulations.
- After 2035, the sale of vehicles with internal combustion engines will be banned in the European Union..

Peaks of coal consumption by country at 1970-2040



Source: Energy Research Institute of the Russian Academy of Sciences

DEVELOPMENT OF SYSTEM PLATFORMS AND SOLUTIONS

ENTELS Engineering Center specializes in providing a full range of services for the development and implementation of commercial and technical energy metering systems, telemechanics, dispatch and automated process control systems in housing and communal services distribution networks and large enterprises.

KEY PRODUCTS OF ENTELS

Digital platform ENTEK

- **SOFTWARE** → SCADA-system ENTEK, SoftLogic ENLOGIC platform and additional software extension modules

  SCADA-system ENTEK
  Universal software product for creating of automated control systems, telemechanics, automated process control systems, energy metering, energy monitoring, dispatching and other tasks in the energy sector.

  SoftLogic ENLOGIC platform
  Communication solutions based on controllers of the EnLogic software platform for creating protocol converters, telemetry and SCADA systems, monitoring systems for digital relay protection systems, etc.

- **EQUIPMENT** → controllers, servers and complete cabinets for energy metering and control, various measuring sensors, metering devices, special equipment (relay protection terminals, short circuit identifier modules, etc.)

Model solutions

- Comprehensive automation of distribution network facilities
- Automation of power supply to an industrial enterprise
- Automation of transformer substations
- Integrated dispatch and automation of boiler houses
- Automation of electricity storage media and charging stations for electric vehicles, etc.

DEVELOPMENT OF SOFTWARE AND HARDWARE SYSTEMS

The system of software and hardware complexes of Entels LLC is built on the basis of smart metering devices, sensors and various actuators that provide automated online control of the distribution and consumption of resources.

Information from metering devices is transmitted to the upper level, to the data collection server. The system is built on the SCADA platform and has a hierarchical structure consisting of three levels.

Lower level (periphery)

primary meters (smart meters), sensors, actuators and peripherals

Intermediate level (data collection)

multifunctional controllers (can be virtual) that accumulate information from metering devices and transmit it to the upper level

Upper level (servers and software)

monitoring and control servers and digital workstations provide solutions to the tasks of the energy dispatcher, planning department, analyst, chief power engineer, technologist, and enterprise director

ECONOMIC GOALS OF SYSTEMS IMPLEMENTATION

1. Eliminating the human factor as a source of abnormal and emergency situations and increasing safety
2. Minimizing energy consumption by switching to more favorable tariffs and identifying leaks, malfunctioning equipment, and theft
3. Analysis of telemetric data and creation of specialist work profiles (digital assistant)
4. Reduce operating costs by automating operating cost control
5. Remote diagnostics of equipment condition
6. Improved production planning taking into account energy consumption opportunities
7. Monitoring the work of personnel and equipment in optimal schedules and modes
8. Reliable information, online, about the progress of the technological process, the condition of equipment and technological controls
9. Retrospective information for analysis, optimization and planning of equipment operation for its repair and maintenance
10. Cost reduction due to automated control of energy consumption and detection of violations of technological discipline and theft

LICENSES, DIPLOMAS AND CERTIFICATES

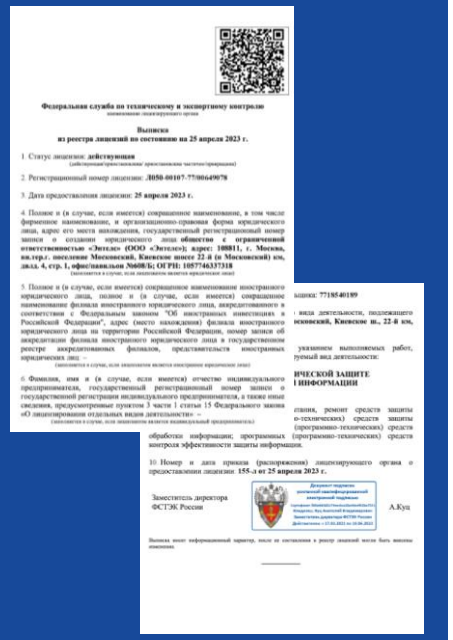
The company independently develops all software products, has licenses, certificates and other documents confirming ownership for all developments

SCADA system ENTEK
Certificate of registration of a software No. 2020615565 dated May 18, 2020

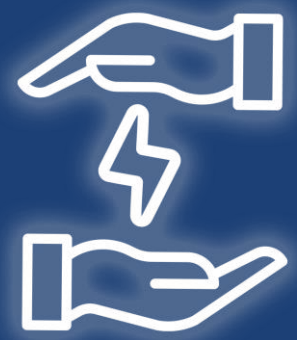
SoftLogic platform "EnLogic"
Certificate of registration of a software No. 2009614875 dated 09/08/2009

Services for the implementation of automation systems, development, production and supply of automation cabinets
Certificate of conformity to ISO 14001-2016

Services for the implementation of automation systems, development, production and supply of automation cabinets
Certificate of conformity to ISO 9001-2015



Licenses of the Federal Service for Technical and Export Control for “Activities for the development and production of means of protecting confidential information” and for “Activities for the technical protection of confidential information”



MODEL SOLUTIONS

AUTOMATION OF ELECTRIC NETWORKS FOR ROSSETI PJSC

MODEL SOLUTIONS FOR ELECTRICITY SUPPLY NETWORKS

Energy consumption accounting

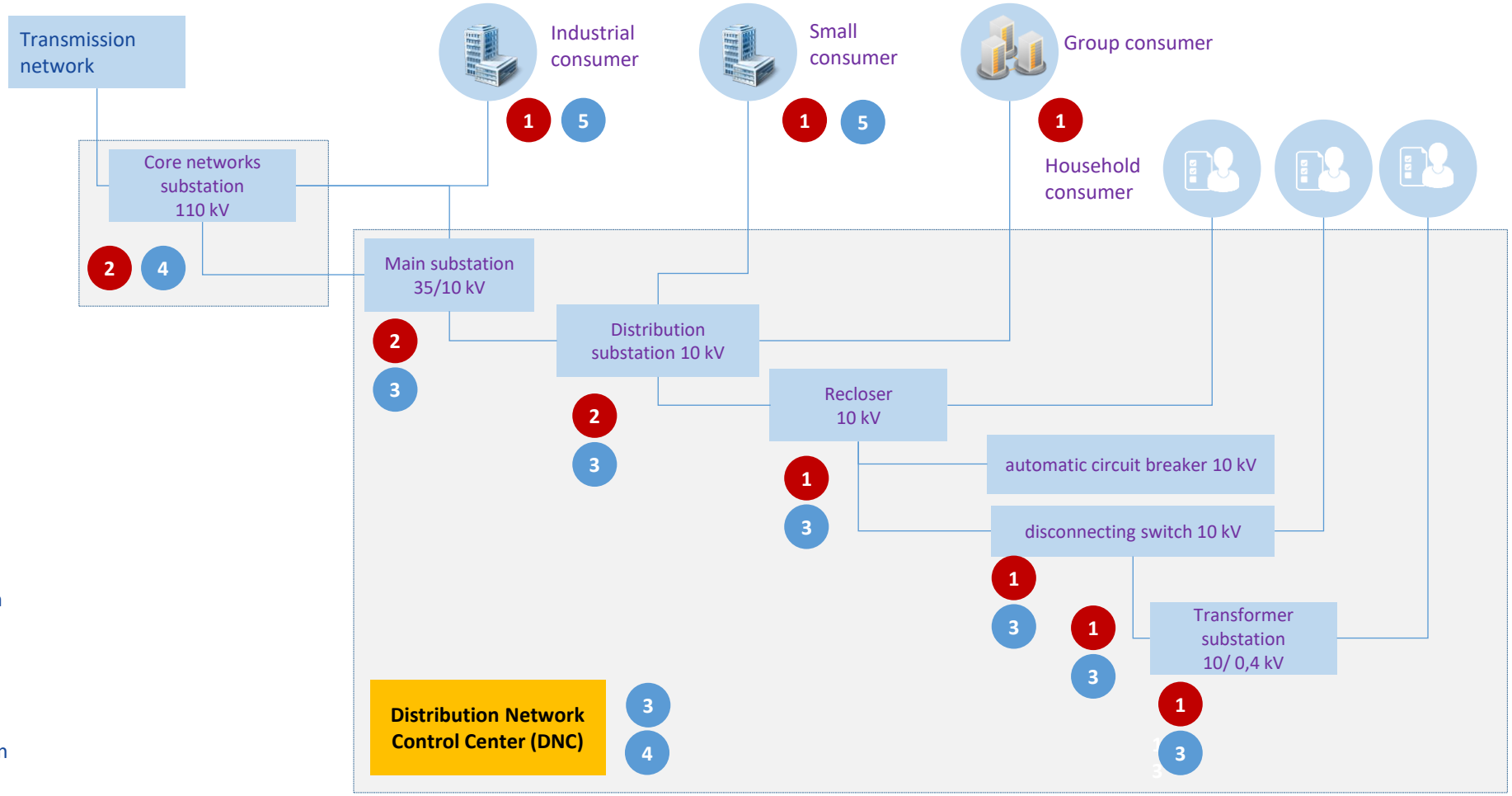
Automation of disconnectors

Automation of Automatic Charging Stations, Reclosers

Automation of transformer points 10-0,4 kV

Substation automation 10-35 kV

Substation automation 110-220 kV



1 Controller and modules for automation of transformer substation, recloser, disconnector

2 Automation Controller at Distribution Transformer Substation 10 kV & substations on 35 / 110 / 220 kV

3 Central transceiver station for collecting data from power grid objects

4 SCADA system for automated process control systems of substations

5 SCADA for enterprise automation

AUTOMATION OF OBJECTS BASED ON THE ENTEK CONTROLLER

Electricity metering

Data exchange with the upper level

IEC 104

IEC 61850

Transfer to Pyramida Network *

Water consumption metering

Heat consumption metering

Depending on the task, the use of controllers of varying power and technical characteristics

Gas sensors

Temperature sensors

Water leakage sensors

Control, access management, video recording, photo recording

Security, safety: motion sensors, etc.

* Innovative Russian software for organizing electricity metering, developed for the needs and in accordance with the requirements and specifics of power grid companies of the Russian Federation based on the Pyramid 2.0 software.

AUTOMATION FOR NETWORK COMPANIES

Solutions based on multifunction controller ENTEK

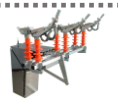
Electric Automatic Filling Station

Storage media

Environment object

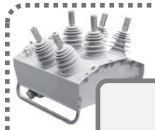
TM+ AEMS [1]

Substation 10-35 kV



TM+ AEMS [1]

Disconnector



TM+ AEMS [1]

RS-485

RPAD [2]

Recloser

IEC-5-104
IEC-61850

Communication network 3G/LTE/NBiOT radio

IEC-5-104
IEC-61850

IEC-5-104
IEC-61850

Transfer to Automatic system for commercial accounting of power consumption

TM+ AEMS [1]

cabinet unit opening

Substation door opening

RS-485

RS-485

gateway

voltage availability

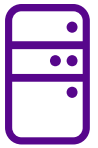
Transformer substation

Transfer of telemetry and readings from subscriber metering devices via LPWAN, PLC, ZigBee channels

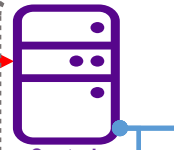
Consumers of information in the digital power grid

Automatic system for accounting of power consumption

Dispatcher



Exploitation



Central transceiver station

Relay Protection and Automation Device Workstation

Communication workstation

Supervisory control system workstation

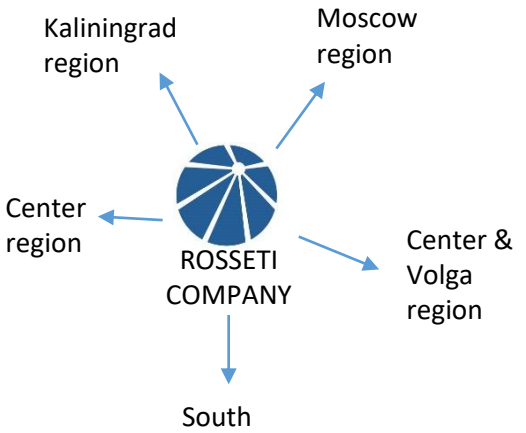
Exploitation workstation

Model cabinet of high availability

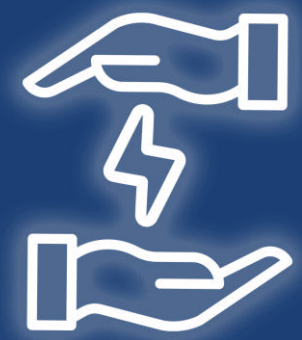
- ✓ readiness for implementation
- ✓ fast delivery time
- ✓ ready to use

SOLUTIONS HAVE BEEN IMPLEMENTED AT MORE THAN 50 000 AUTOMATION FACILITIES OF ROSSETI COMPANY

- Supply of power quality controllers and monitoring of measuring instruments
- Implementation of a unified distribution network management system for 20 branches
- Supply of a unified network distributor management system
- Implementation of a unified network distributor management system



[1] Telemechanics+ Automated Electricity Metering System = TM AEMS
[2] Relay Protection and Automation Devices = RPAD



MODEL SOLUTIONS

AUTOMATION OF PUBLIC ENERGY INFRASTRUCTURE AND URBAN ENVIRONMENT

IMPLEMENTATION EXAMPLE – AUTOMATION OF A GYMNASIUM

Transfer of information about power supply modes and emergencies to resource companies

Electricity distribution network

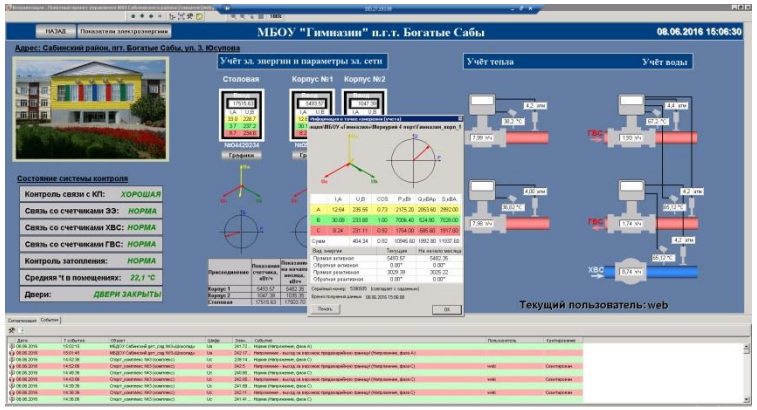
- ✓ control of unauthorized opening of the electricity meter
- ✓ electricity consumption
- ✓ no voltage

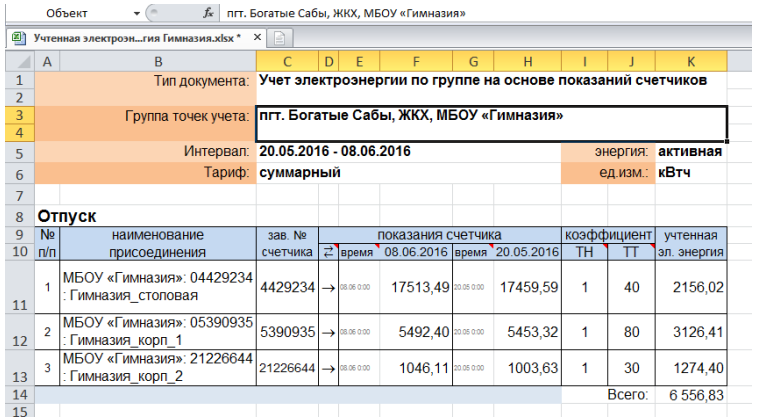
Heat distribution network

- ✓ flowing pressure
- ✓ temperature deviation
- ✓ heat consumption

Water and wastewater treatment plant

- ✓ pressure
- ✓ water consumption





Объект: пгт. Богатые Сабы, ЖКХ, МБОУ «Гимназия»

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3		Группа точек учета:	пгт. Богатые Сабы, ЖКХ, МБОУ «Гимназия»								
4											
5		Интервал:	20.05.2016 - 08.06.2016						энергия:	активная	
6		Тариф:	суммарный						ед.изм.:	кВтч	
7											
8	Отпуск										
9	№	наименование	зав. №		показания счетчика				коэффициент		учтенная
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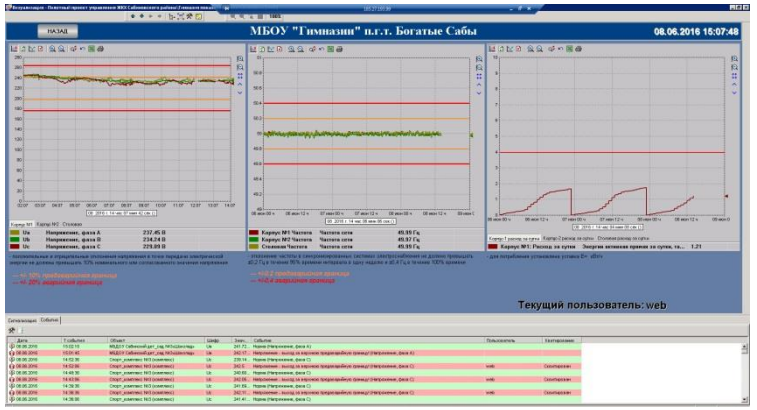
15											

Sending SMS in cases:

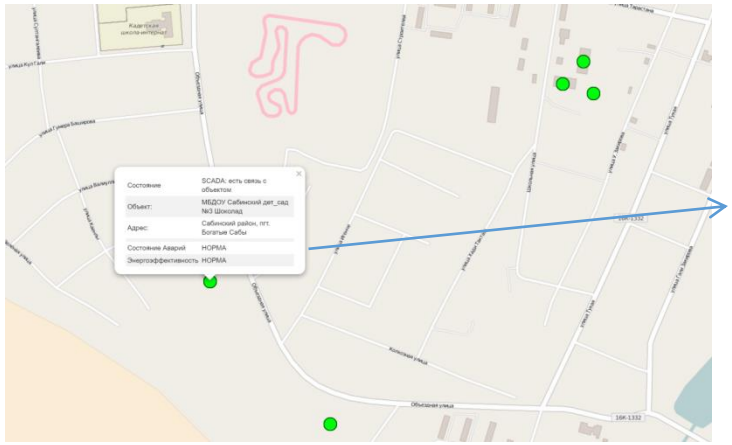
- occurrence of accidents
- deviations of energy consumption from planned

Notifying the dispatcher in cases:

- fire, flooding, deviation from normal conditions
- access to equipment and metering devices



IMPLEMENTATION EXAMPLE – KINDERGARTEN AUTOMATION



Displaying the state of the object on GIS, online. Monitoring communications, accidents and energy efficiency of the kindergarten

Transfer of information about energy supply modes and accidents to resource supply companies according to the protocol IEC-104

Electricity distribution network

- ✓ control of unauthorized opening of the electricity meter
- ✓ electricity consumption
- ✓ no voltage

Heat distribution network

- ✓ flowing pressure
- ✓ temperature deviation
- ✓ heat consumption

Water and wastewater treatment plant

- ✓ pressure
- ✓ water consumption

SMS

Sending SMS in cases:

- occurrence of accidents
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Notifying the dispatcher in cases:

- fire, flooding, deviation from normal conditions
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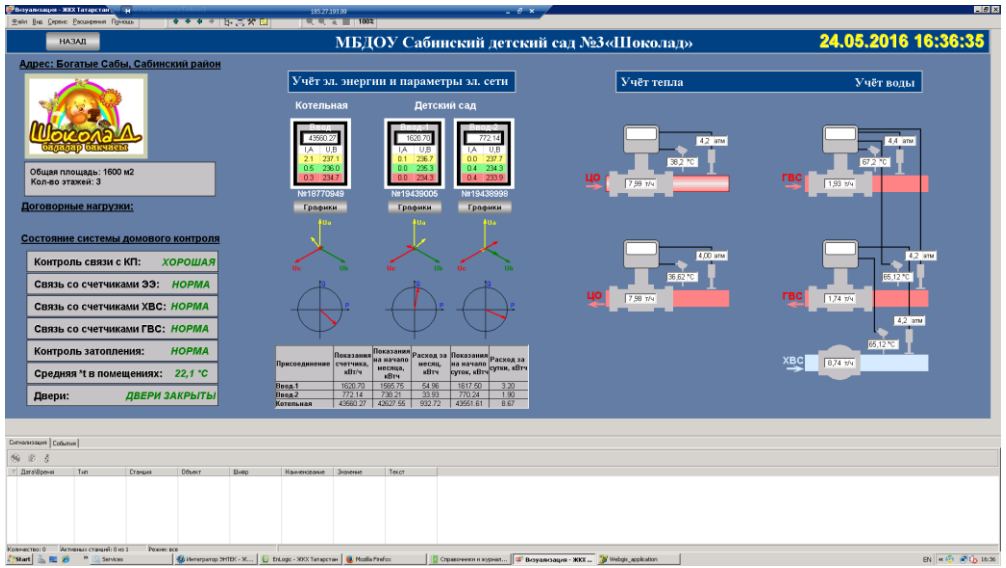

E22

Проекты 23.05.2016.xls * | Данные по 6... (2).xlsx * | УСПД стат...ми1.xlsx *

Тип документа:	Статистика опрошенных точек учета УСПД с показаниями счетчиков
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всего точек учета:	3
подключено:	3
с идентификатором:	0
без идентификатора:	3

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				тариф №1	тариф №2	тариф №3	суммарный
кол-во:	3	3	0	3	0	0	3
	от подключенных:		0,0%	100,0%	0,0%	0,0%	100,0%
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3	Ввод-2	19438998		686,92			770,24

IMPLEMENTATION EXAMPLE – SPORTS COMPLEX AUTOMATION

Transfer of information about power supply modes and emergencies to resource companies

Electricity distribution network

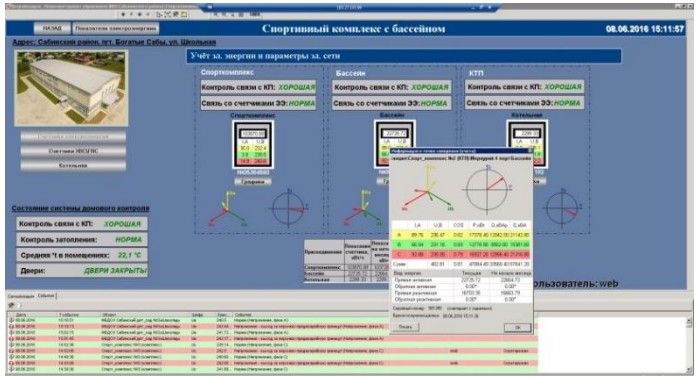
- ✓ control of unauthorized opening of the electricity meter
- ✓ electricity consumption
- ✓ no voltage

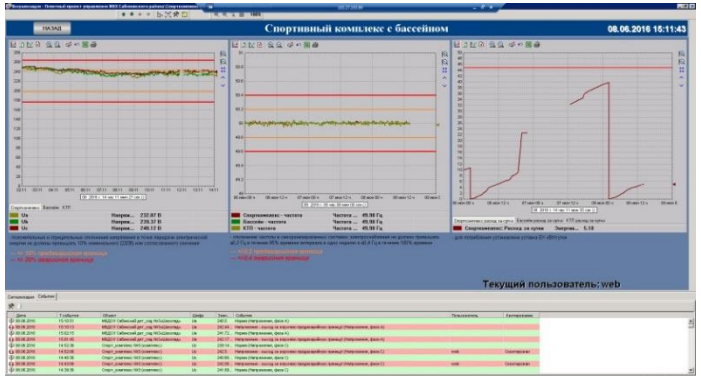
Heat distribution network

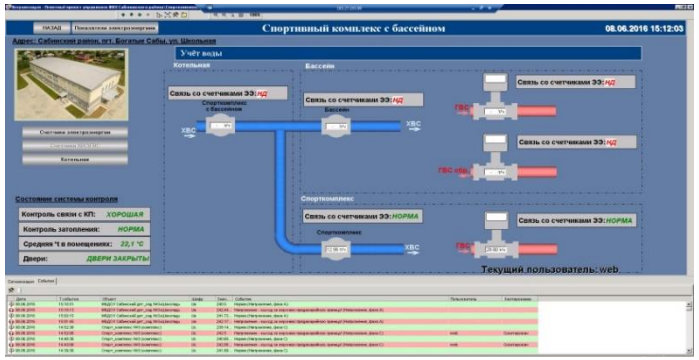
- ✓ flowing pressure
- ✓ temperature deviation
- ✓ heat consumption

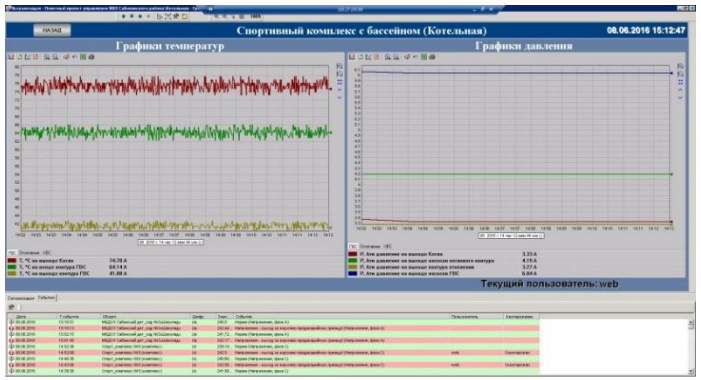
Water and wastewater treatment plant

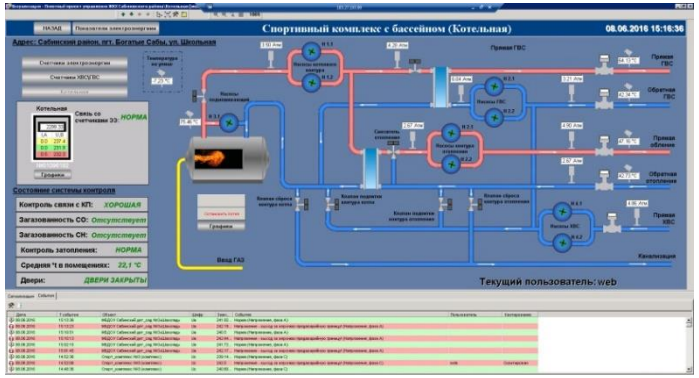
- ✓ pressure
- ✓ water consumption











Sending SMS in cases:

- occurrence of accidents
- deviations of energy consumption from planned

Notifying the dispatcher in cases:

- fire, flooding, deviation from normal conditions
- access to equipment and metering devices

Учетная электроэн...порткомплекс.xlsx *

	A	B	C	D	E	F	G	H	I	J	K
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3		Группа точек учета:	ЖКХ, Спорткомплекс, Спорт_комплекс №3 (комплекс)								
4											
5		Интервал:	20.05.2016 - 08.06.2016						энергия:	активная	
6		Тариф:	суммарный						ед.изм.:	кВтч	
7											
8	Отпуск										
9	№ п/п	наименование присоединения	зав. № счетчика		показания счетчика				коэффициент		учтенная эл. энергия
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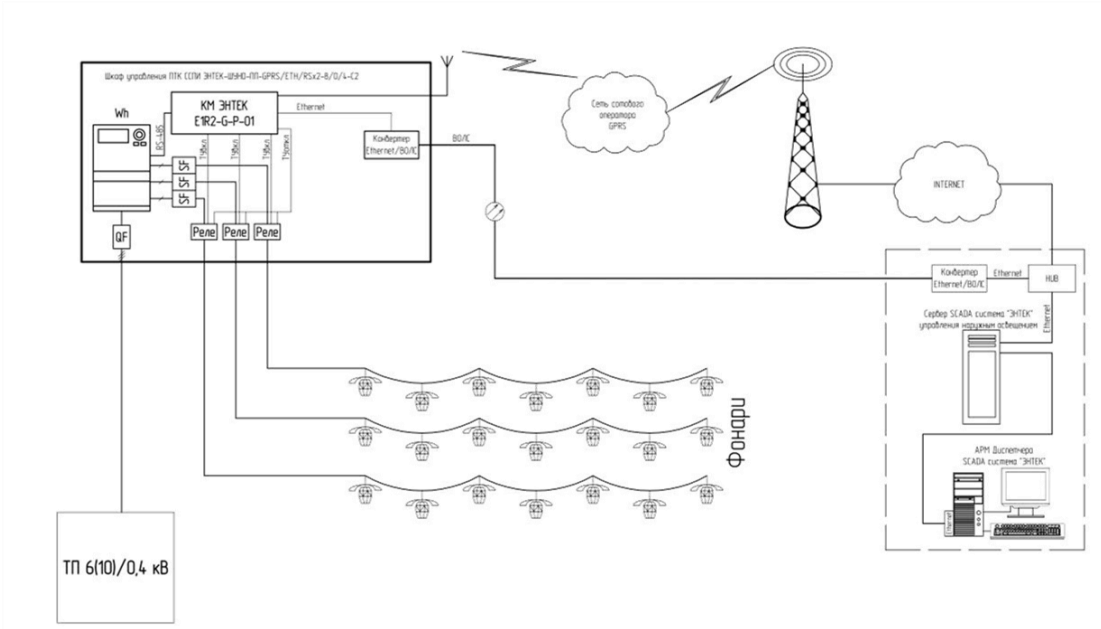
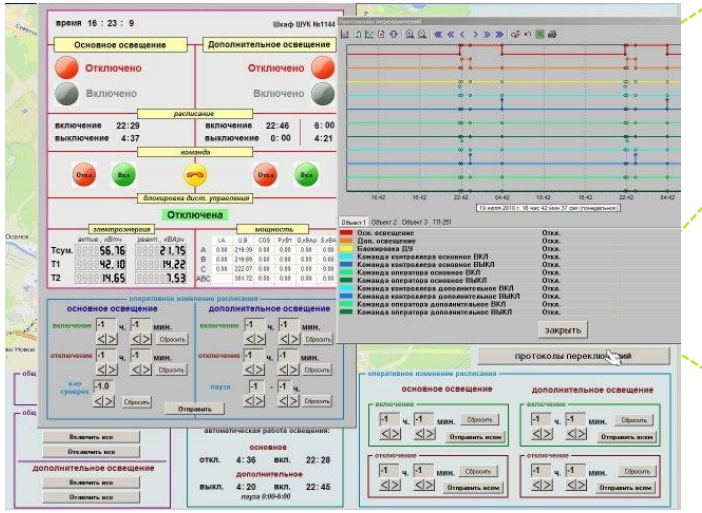
14											

LIGHTING WITH DIMMING AND ZONE SCENARIOS

Lighting for urban infrastructure of parks, gas stations, industrial areas, railway platforms. Ability to work with LED lamps - work with plans and schedules, built-in additional features and functions.





Monitoring the energy efficiency of equipment operation

Объект	Направление	Текущий режим работы	Текущее состояние	Ручное управление	Автоматическое управление текущая команда		Автоматическое управление следующая команда		Текущая мощность	Расчетная уставка по мощн. текущая	Расчетная уставка по мощн. полная	Ua, В	Ub, В	Uc, В	Контроль ламп
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	Линия №2		Включена		К2 Откл		К2 Вкл		6.3 кВт	7.0 кВт	7.0 кВт	220	216	216	Отчет
ТП-1	Линия №1	Ручной	Включена		К1 Откл	17.09.2014 6:27:00	К1 Вкл	17.09.2014 20:28:00	18.3* кВт	18.5 кВт	18.5 кВт	-	-	-	Отчет
	Линия №2		Отключена		К2 Откл		К2 Вкл		6.8* кВт	7.0 кВт	7.0 кВт	-	-	-	Отчет
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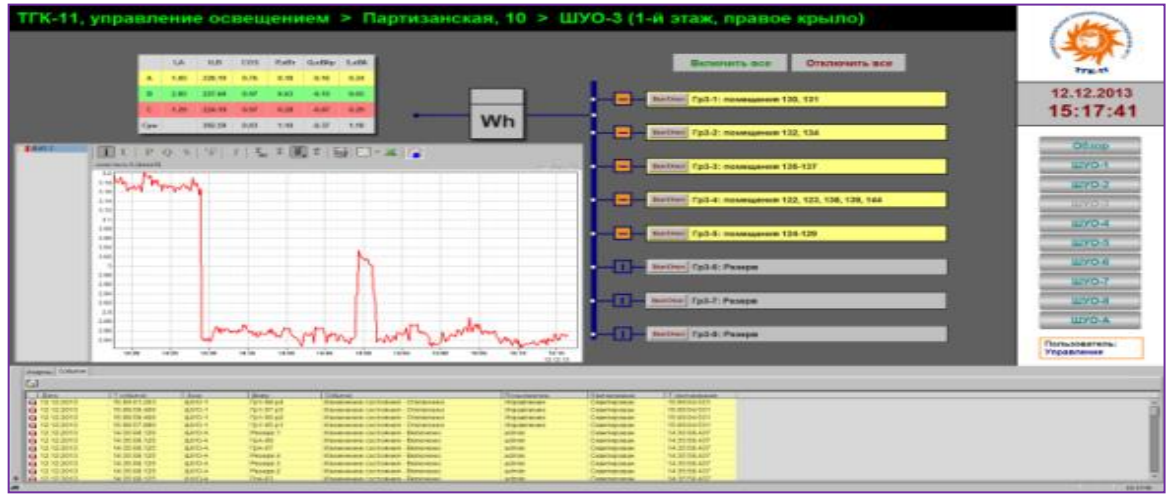
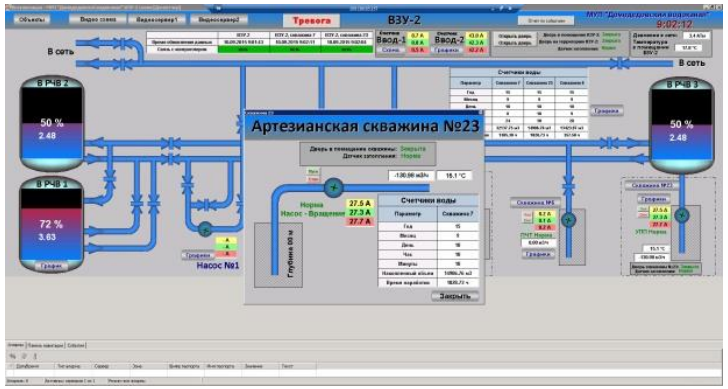
	Линия №1		Отключена		К2 Откл		К2 Вкл		6.8* кВт	7.0 кВт	7.0 кВт	-	-	-	Отчет

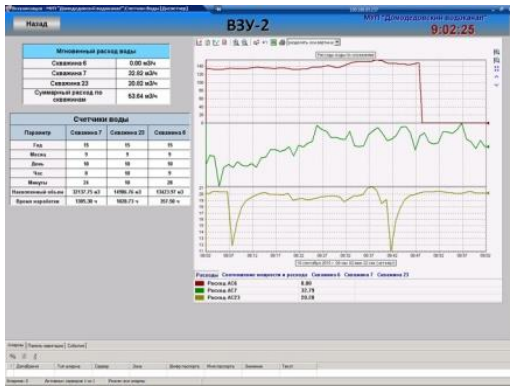


Automated lighting control system of city of Omsk stations -TSK11

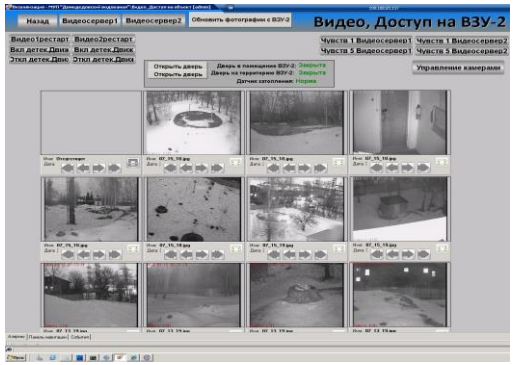
Tasks

- ✓ continuous monitoring of parameters and condition of lighting line equipment, prompt detection of damage
- ✓ remote and automatic, scheduled, control of lighting modes
- ✓ automated multi-tariff metering of consumed electricity
- ✓ identification of losses and ineffective operating modes

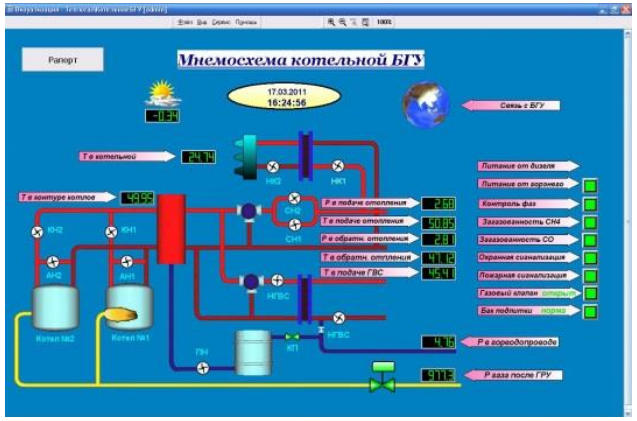


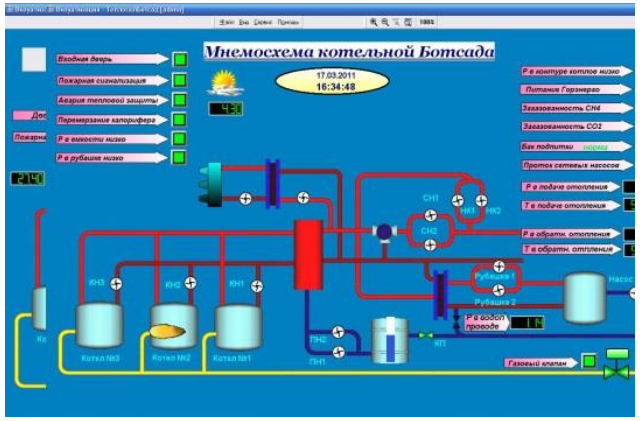


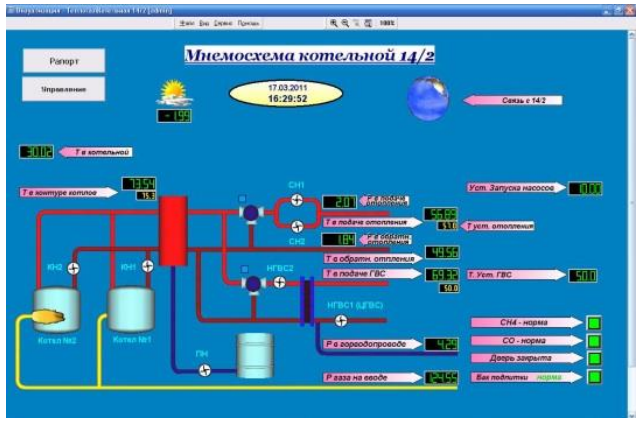
Domodedovo water utility

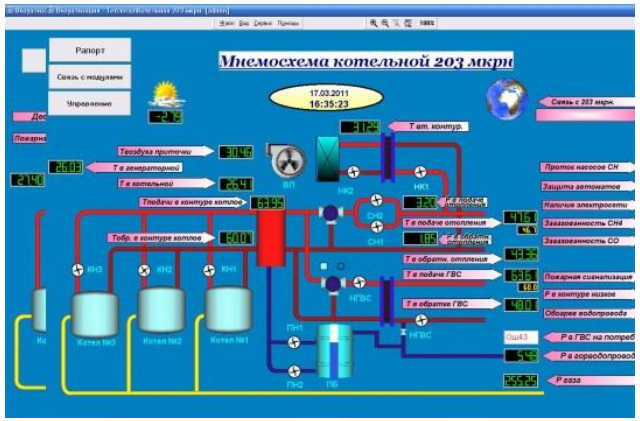


- ✓ Continuous monitoring of equipment parameters and condition, prompt detection of damage
- ✓ Remote and automatic mode control
- ✓ Automated multi-tariff metering of electricity and water
- ✓ Access control and video recording
- ✓ Identification of losses and ineffective operating modes





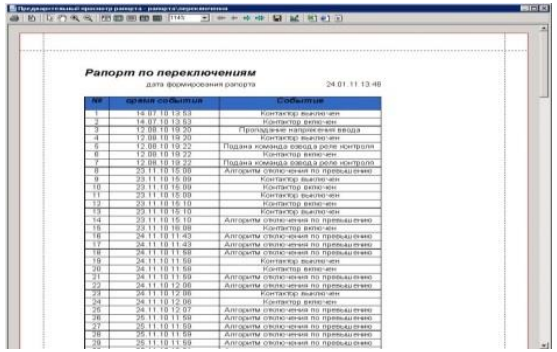


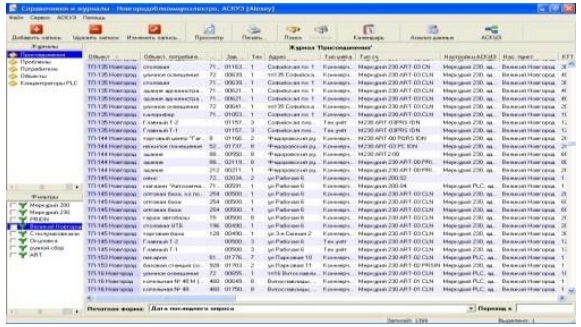


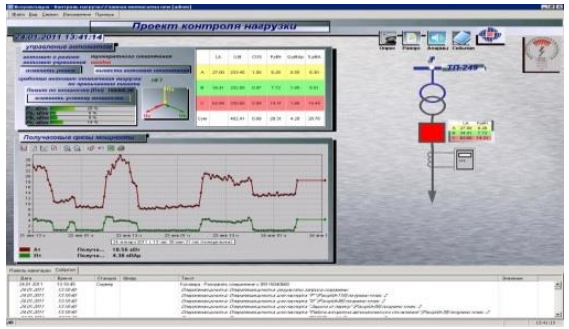
Heat supply of city of Yakutsk

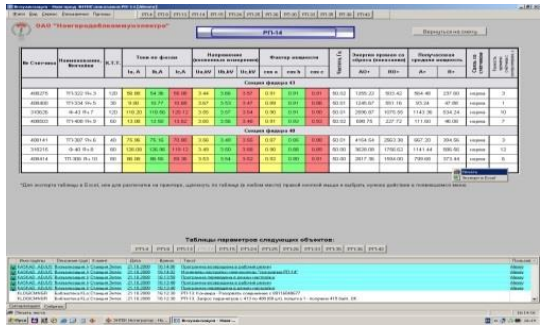
- ✓ Continuous monitoring of equipment parameters and condition, prompt detection of damage
- ✓ Remote and automatic mode control
- ✓ Automated multi-tariff metering of electricity and water
- ✓ Access control and video recording
- ✓ Identification of losses and ineffective operating modes

COMPREHENSIVE NETWORK MANAGEMENT BY LOCAL GRID COMPANY









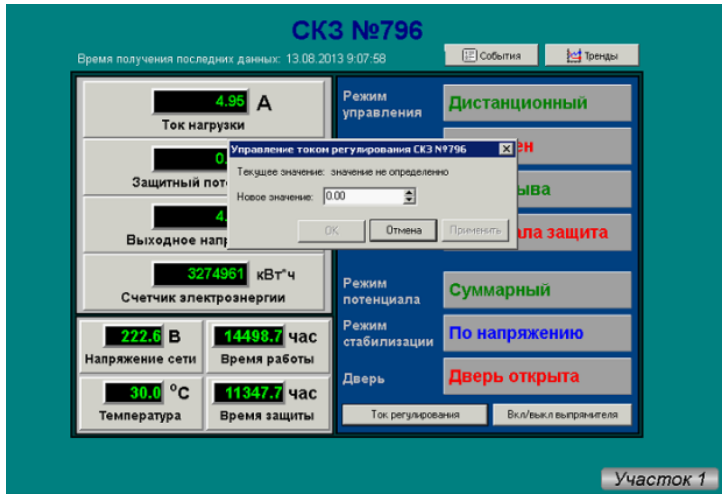
Municipal power grids of city of Veliky Novgorod

A unified distribution network management system, including city and regional branches. Implemented using client-server architecture.
More than 400 city substations
More than 30,000 electricity meters

Tasks

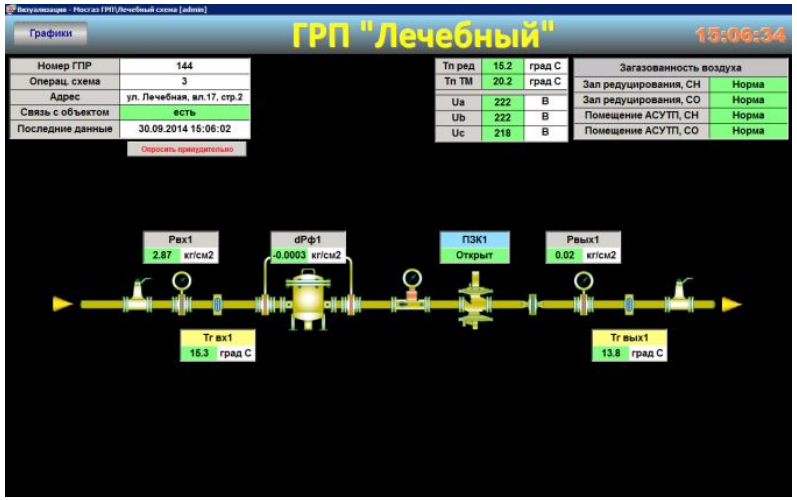
- ✓ Dispatcher control of the electrical network
- ✓ Electric power control for consumers with limitation modes
- ✓ Technical and commercial electricity metering

ELECTROCHEMICAL PROTECTION MANAGEMENT



Electrochemical protection control system «MOSGAZ»

- ✓ There are more than 5000 objects in the system;
- ✓ The system provides continuous monitoring of equipment parameters and condition, prompt detection of damage;
- ✓ Remote and automatic mode control;
- ✓ Emergency control;
- ✓ Identification of losses and ineffective operating modes.

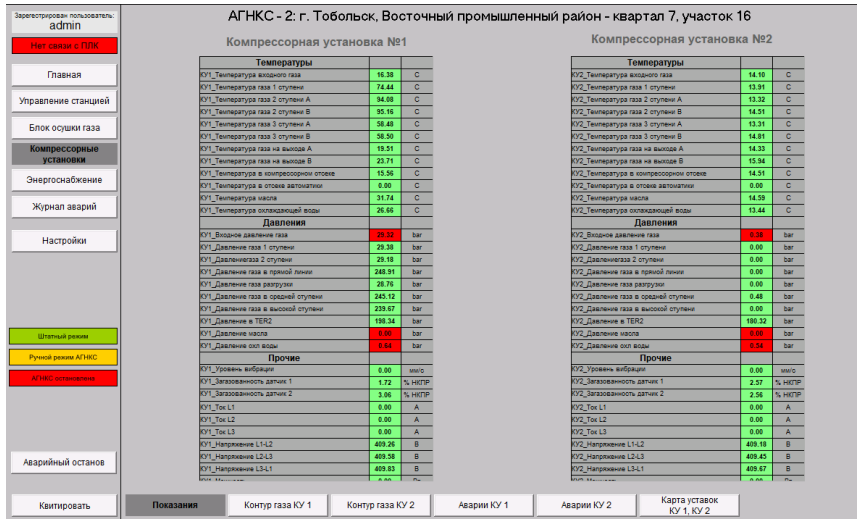


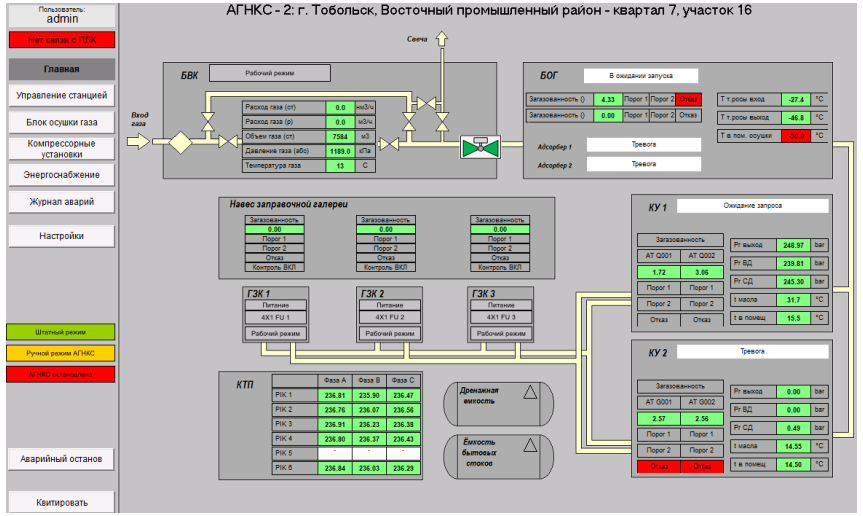
КОНЦЕРН ЭНЕРГОМЕРА

Joint products for automation of electrochemical protection of pipelines with ENERGOMERA corporate group

КРЭТ
СТАВРОПОЛЬСКИЙ РАДИОЗАВОД СИГНАЛ

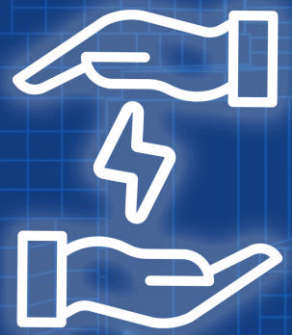
Integration with electrochemical protection equipment of the SIGNAL plant





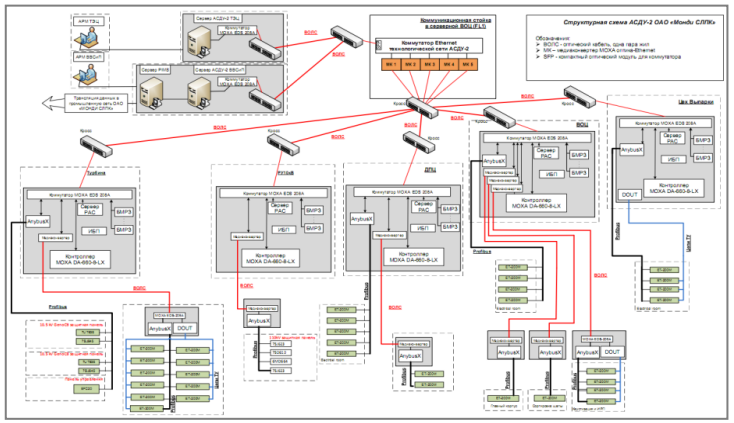
COMPLEX "ATLANT"

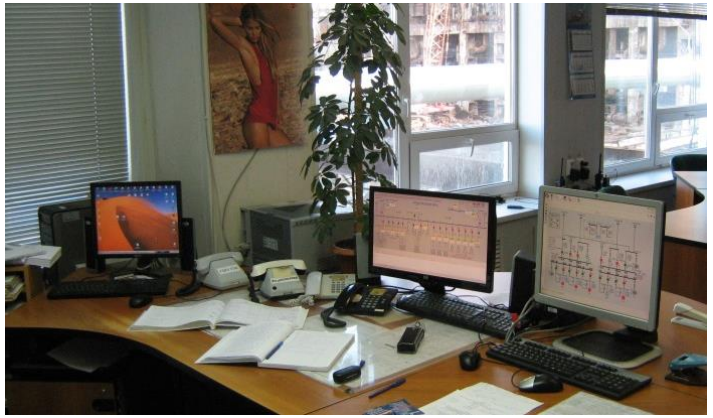
Application in automobile gas filling compressor stations of “Natural-gas-based motor fuel of Gazprom" for station automation

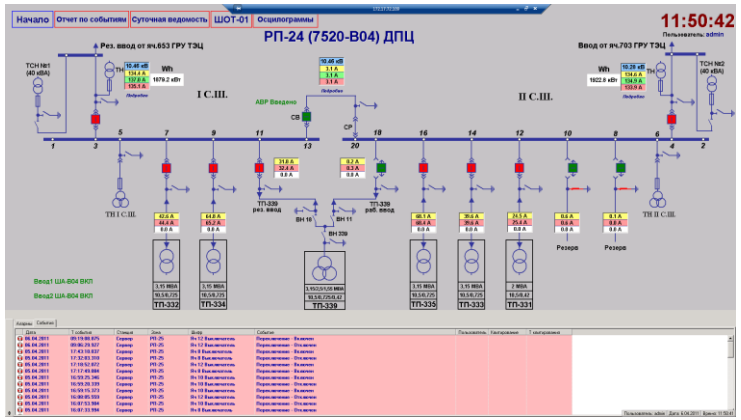


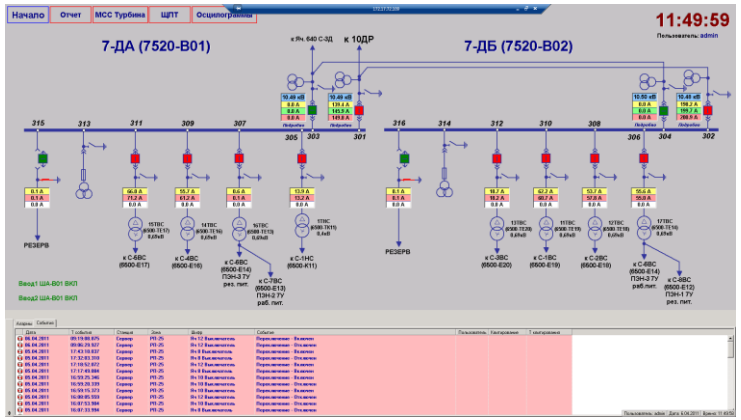
MODEL SOLUTIONS

AUTOMATION OF INDUSTRIAL ENTERPRISES AND PRODUCTION SITES







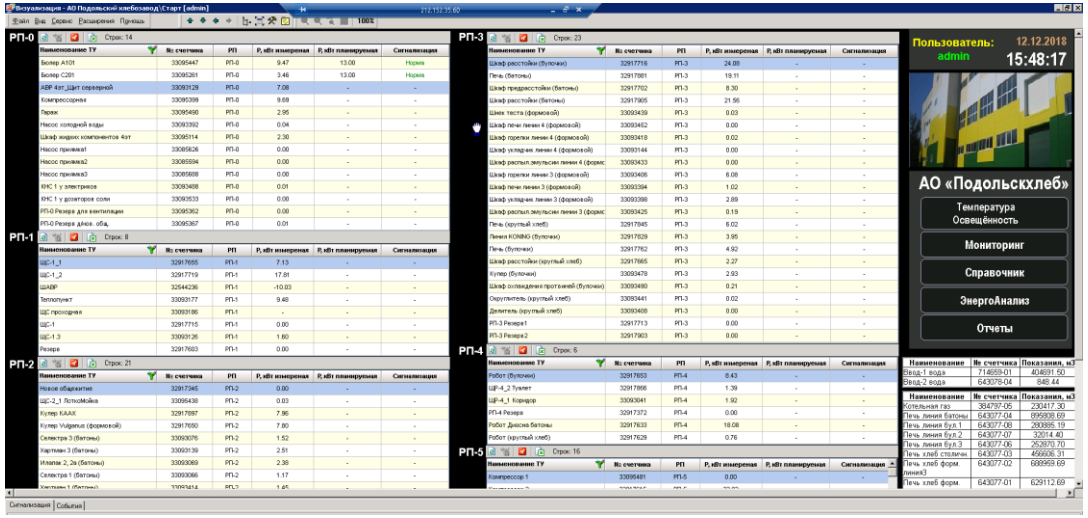


Management of the Syktyvkar timber industry complex "MONDI"

- ✓ continuous monitoring of equipment parameters and condition, prompt detection of damage
- ✓ remote and automatic control of operating modes
- ✓ monitoring of emergency modes, subtraction of oscillograms of the digital relay protection system
- ✓ identification of losses and ineffective operating modes

Tasks solved by the system

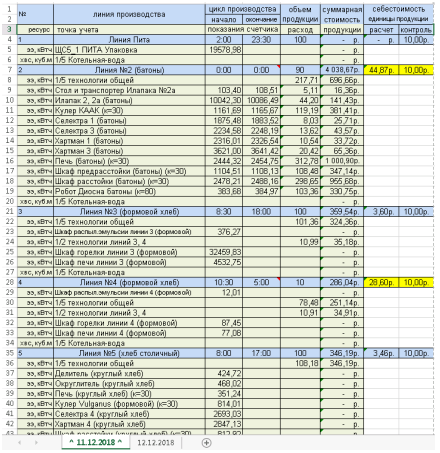
- ✓ Online operational control of resource consumption (electricity, water, gas);
- ✓ Supervisory control of the state of energy supply to an enterprise with adaptive consumption control;
- ✓ Comparison of planned resource consumption with actual consumption across production lines with warning signals in case of deviation from the reference consumption of a resource;
- ✓ Commercial and technical accounting of resources and reporting to a resource-supplying organization;
- ✓ Dispatch control with establishing a single dispatch panel to manage energy supply to an enterprise.



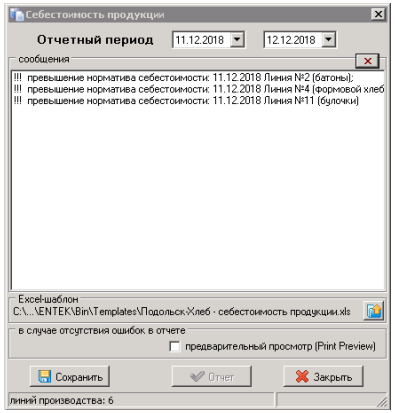
Mnemonic diagram of production load dynamics, provides information online

Results

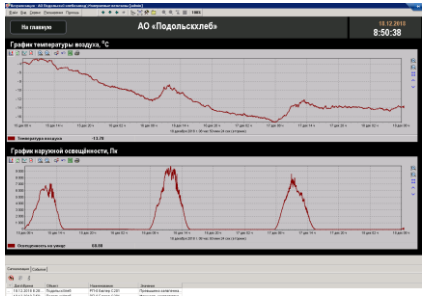
- ✓ Reducing energy costs, as part of production costs, by up to 5% - depending on the consumption plan;
- ✓ Planning resource costs depending on production load plans;
- ✓ Reducing accident rates and equipment downtime is achieved through operational monitoring of the equipment condition and modes of its use;
- ✓ Possibility to increase production volumes by planning and creating a reference equipment load;
- ✓ Creating reference planning for resource consumption depending on the production plan;
- ✓ Operational control of deviations from reference consumption;
- ✓ Identification of non-productive energy costs.



Report on the cost of production



Alarm in case of deviation from the norm



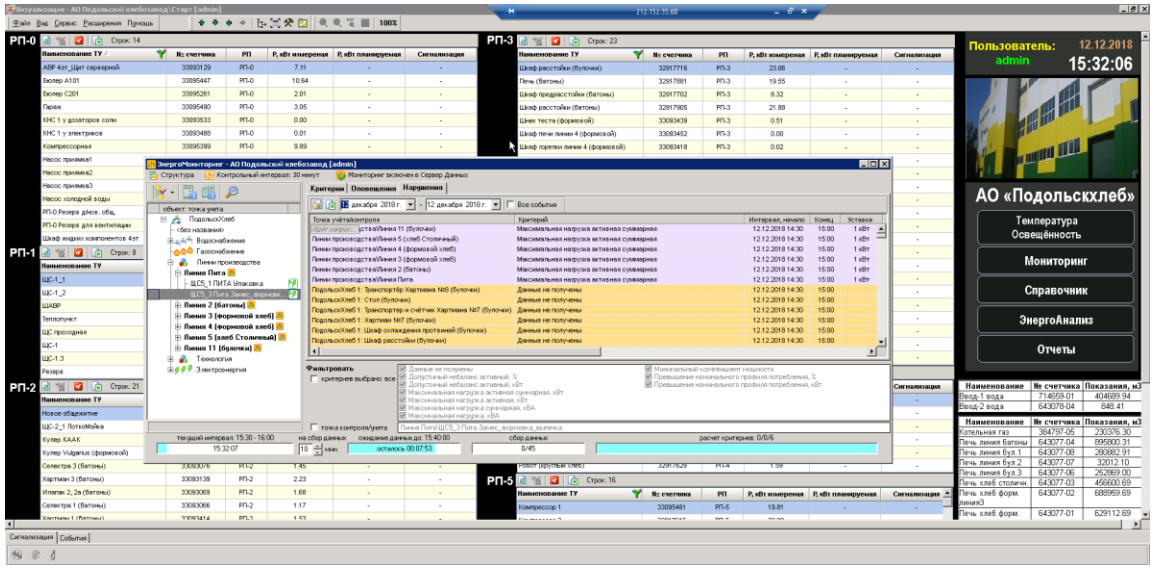
Temperature and light monitoring, used to calculate energy consumption costs

WINDOW OF OPPORTUNITIES

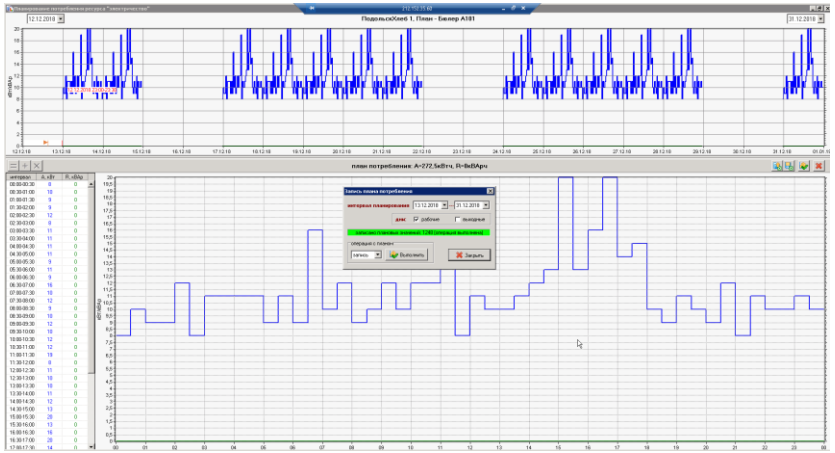
Creating reference consumption → Operation of the energy monitoring system → Detection of deviations from reference energy consumption → SMS

Notification to the energy engineer in the following cases:
- occurrence of accidents
- deviations of energy consumption from the planned (reference)

- ✓ Planning the energy consumption of an industrial enterprise based on production plans will help identify and eliminate sources of resource loss
- ✓ Special tools make it possible to identify deviations from normal energy supply. These tools are built into the SCADA-system ENTEK to implement operational management tasks and control the consumption of resources.
- ✓ The user can receive information via SMS, Email or an alarm signal on the control panel mnemonic diagram.



Monitoring of energy consumption with assessment of the main factors of deviation from the normal mode of energy supply

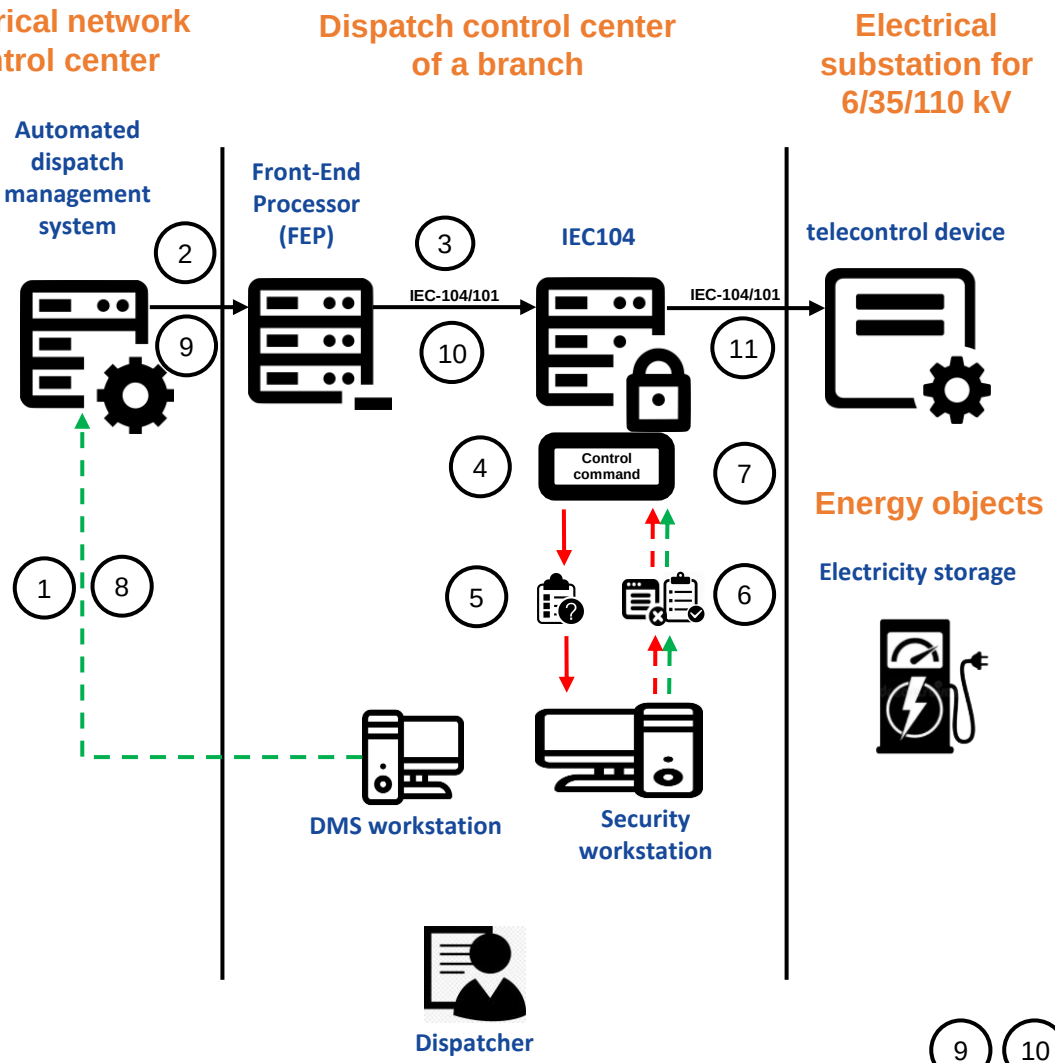


Forming of a reference consumption plan to control the balance of electricity

INFORMATION SECURITY

Ensuring information protection for information control systems

INFORMATION SECURITY



1. Receipt of a control command from the dispatcher of automated dispatch management system
2. Transferring a control command from the server of automated dispatch management system to the Front-End Processor (FEP) of a branch
3. Transfer of control commands from FEP of a branch telecontrol device via IEC-104 protocol
4. IEC-104 identifies the control command
5. IEC-104, using the protocol for interaction with the security workstation, sends a request to the dispatcher to confirm the command
6. The dispatcher confirms or does not confirm the legitimacy of the received control command and the safety workstation forwards this information to IEC-104
7. If the legitimacy of the control command is confirmed, IEC-104 adds an enabling rule for a certain period of time
8. The dispatcher resends the control command via the automated dispatch management system
9. 10. 11. The control command without encumbrance is sent to the telecontrol device at the substation

The implementation is carried out jointly with the companies "AVATEK" and "Infotex" at "ROSSETI MR“ PJSC

AVATEC

Joint developments in the field of information security in energy networks and facilities

infotecs®

Joint developments in the field of information security

РОССЕТИ МОСКОВСКИЙ РЕГИОН

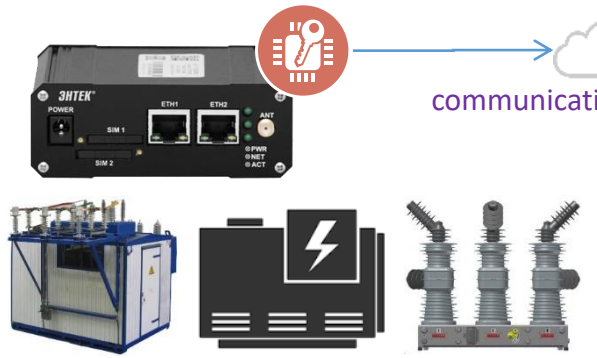
Joint developments in the field of automation of power networks, which are to be implemented in branches of ROSSETI MR

* Protocol IEC101/104. Where IEC101 is acronym for IEC 60870-5-101, which is a standard for power system monitoring, control & associated communications for telecontrol, teleprotection, and associated telecommunications for electric power systems. And IEC104 is acronym for IEC 60870-5-104 protocol, which is an analogy to IEC 60870-5-101 protocol with the changes in transport, network, link & physical layer services to suit the complete network access: TCP/IP.

BUILT-IN INFORMATION SECURITY

Data Acquisition and Transmission Device "ENTEK" with overlaid encryption means - a joint development of "ENTELS" LLC and "InfoTeKS" OJSC intended for building secure local and distributed systems for automatic control and management of technological processes of small automation objects via public communication channels to protect them from computer attacks and unauthorized access to information.

Telemechanics system for dispatch control and resource record



communication channel

Server of operative-information complex

- Telemechanics workstation
- Accounting service workstation
- Workstation of the relay protection and automation service
- Communication service workstation
- Operation workstation

Recording and management system for distributed objects

Transformer point, recloser, water intake unit, heating unit, generator, telecom operator infrastructure facility, electric charging station, electricity storage device, etc.

Conclusion on the compatibility of the E2R2 (G) controllers with VipNet information security software systems

ЭНТЕЛС

infotecs

ЗАКЛЮЧЕНИЕ О СОВМЕСТИМОСТИ

СКЗИ ПК/ПАК ViPNet – Контроллеры ЭНТЕК E2R2G

Настоящее Заключение подготовлено производителем сертифицированных средств криптографической защиты информации ОАО «ИнфоТеКС» и компанией ООО «ЭНТЕЛС».

Компании заявляют о корректности совместной работы Контроллеров ЭНТЕК E2R2G с программными комплексами средств защиты информации (ПК) ViPNet производства компании ОАО «ИнфоТеКС».

ПК ViPNet рекомендованы к использованию в качестве средств криптографической защиты информации для создания сетевой инфраструктуры в защищенном исполнении на базе Контроллеров ЭНТЕК E2R2G.

Настоящее заключение составлено на основании стендовых испытаний.

Таблица совместимости и сценарии совместного использования Контроллера ЭНТЕК E2R2G с ПК ViPNet приведены в Приложении 1.

25.12.18 2019г.

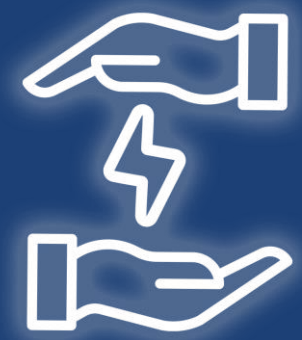
ООО «ЭНТЕЛС»:
Технический директор
/ Севостьянов А.В./
Главный конструктор
/ Бурмистров А.В./

ОАО «ИнфоТеКС»:
Заместитель генерального директора
/ Гусев Д.М./
Руководитель направления
/ Василенков А.С./

"Энтелс"

Possibilities

For objects of the Substation type, a standard software and hardware complex based on ready-made equipment is used. This allows to create a single information-protected network for all types of objects with minimal costs



NEW SOLUTIONS

Automation of electric energy storage

ELECTRICITY STORAGE MEDIAS MANAGEMENT

Secure technological data transmission network based on public networks of mobile telecom operators using commercial metering protocols DLMS/COSEM and telemechanics IEC-5-104, IEC-61850

Storage media Manufacturer 1

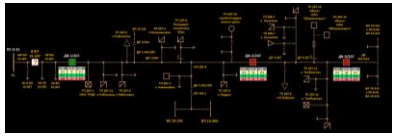
Storage media Manufacturer 2

Storage media Manufacturer N

IEC-5-104
IEC-61850
DLMS/COSEM

Communication network
3G/LTE/NBiOT
radiocommunication

Unified automated process control system - Unified electrical network control center



Network manager

Service desk

Unified regulations

Branch of an electric grid enterprise

Base Transceiver Station

power-system protection workstation

communication

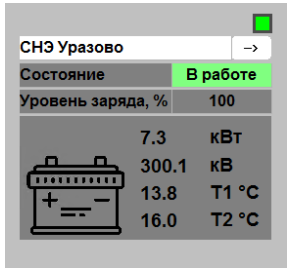
supervisory control system

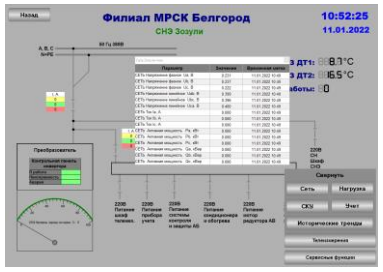
exploitation

safety

Engineering workplaces for electric grid enterprise specialists

Electronic storage devices - workplace of competence center for development of storage media at Management Company "RUSNANO"





Messenger for managing the operation of storage devices

Server and workstations for monitoring the operation of storage media – generation of analytical data on operability, efficiency, accident rate

Data Gateway

A single gateway for the transmission of telemetry information, statistics, information for operation management, ensures the collection of data from all branches, the transfer of information on equipment performance statistics, the transfer of information to external systems, consumers

Contractors

* Protocol IEC101/104. Where IEC101 is acronym for IEC 60870-5-101, which is a standard for power system monitoring, control & associated communications for telecontrol, teleprotection, and associated telecommunications for electric power systems. And IEC104 is acronym for IEC 60870-5-104 protocol, which is an analogy to IEC 60870-5-101 protocol with the changes in transport, network, link & physical layer services to suit the complete network access: TCP/IP.

ELECTRICITY STORAGE MEDIAS MANAGEMENT

CENTRALIZED CONTROL OF STORAGE MEDIA WORK

The inclusion of storage medias into centralized monitoring ensures the inclusion and monitoring of all storage medias as part of a single automated dispatch management system network based on a unified set of telemetry data.

CONTROL OF THE STATE OF STORAGE MEDIA AS PART OF THE POWER NETWORK

A centralized collection of information has been organized to monitor and analyze the status and operation of storage media with output of information to the development center of storage media to evaluate the effectiveness of their use and the generation of “big data” analytical data on the operation of storage media from different manufacturers and technologies.

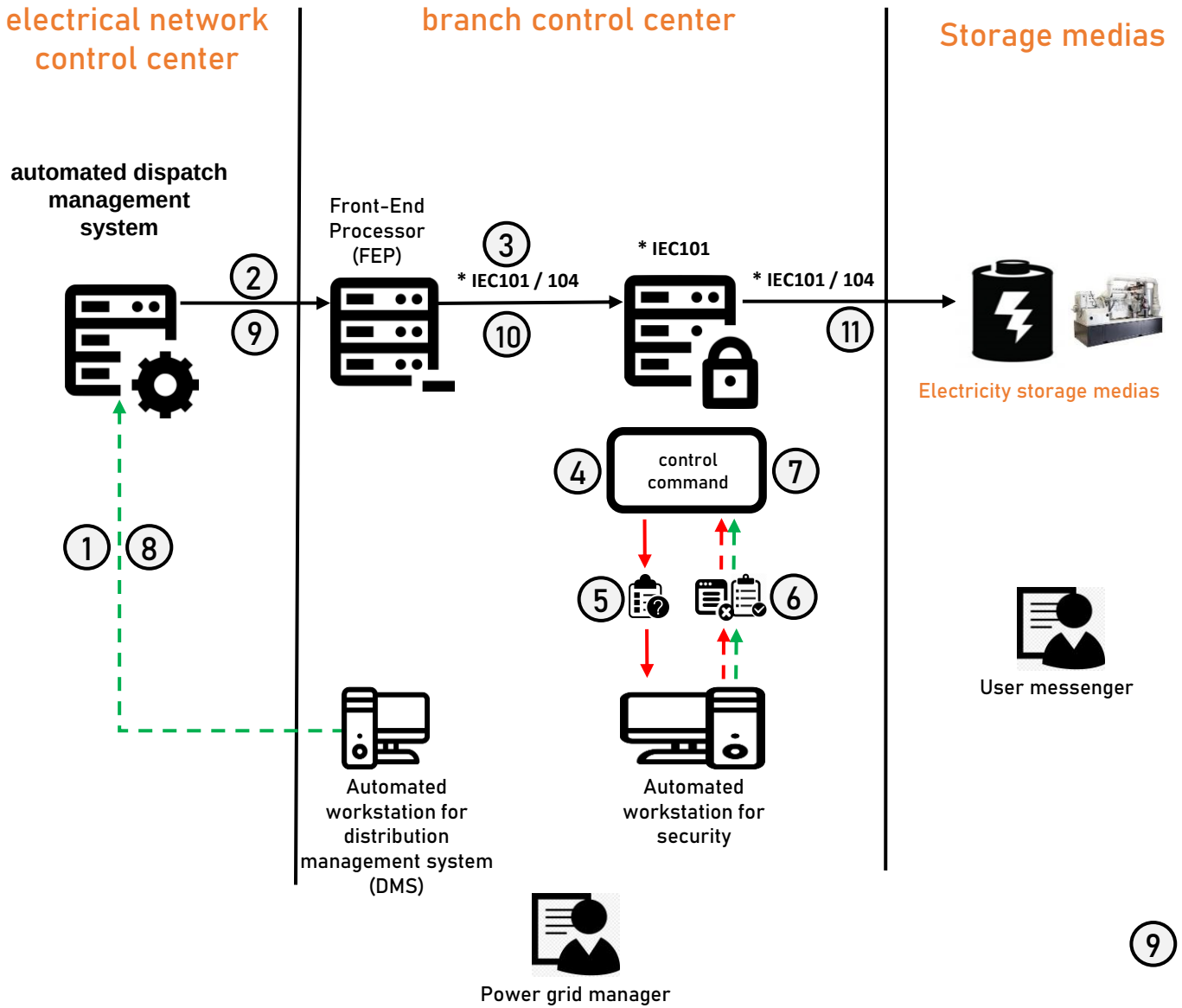
CONDITION MANAGEMENT OF STORAGE MEDIA THROUGH THE ENTIRE LIFE CYCLE

Remote maintenance, setting up monitoring scenarios and monitoring the operation of storage media throughout the entire life cycle of storage media operation from a single center of competence.

INCREASING INFORMATION SECURITY

The use of the solution allows to implement data protection when using public communication networks and blocking unauthorized control commands, which ensures information protection of the control system for electrical grid infrastructure facilities

ELECTRICITY STORAGE MEDIAS MANAGEMENT

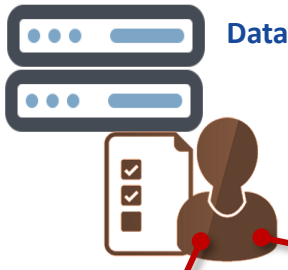


1. Arrival of a control command from the dispatcher of the Automated Dispatch Control System
2. Transferring a control command from the Automated Dispatch Control System server to the Front-End Processor (FEP) of a company branch
3. Transfer of a control command from the FEP of a company branch to the telemechanics device via the IEC-104 protocol
4. IEC-104 protocol identifies control command
5. IEC-104, using the protocol for interaction with the security workstation, sends a request to the dispatcher to confirm the command
6. The dispatcher confirms or does not confirm the legitimacy of the received control command and the security workstation forwards this information to the IEC-104 protocol
7. If the legitimacy of the control command is confirmed, the IEC-104 protocol adds an permitting rule for a certain period of time
8. The dispatcher resends the control command via the Automated Dispatch Control System
9. 10. 11. The control command is directly transmitted to automated dispatch management system

* Protocol IEC101/104. Where IEC101 is acronym for IEC 60870-5-101, which is a standard for power system monitoring, control & associated communications for telecontrol, teleprotection, and associated telecommunications for electric power systems. And IEC104 is acronym for IEC 60870-5-104 protocol, which is an analogy to IEC 60870-5-101 protocol with the changes in transport, network, link & physical layer services to suit the complete network access: TCP/IP.

MESSENGER FOR WORK CONTROL

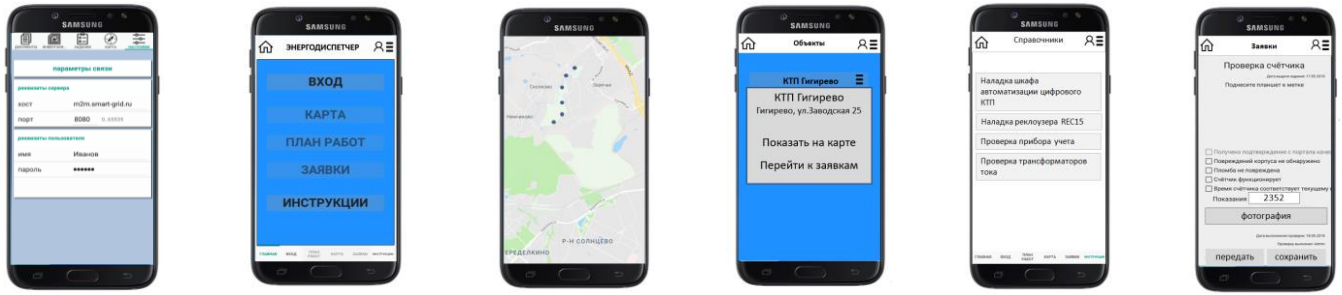
- A mobile application of the "Field Service Management Software (FSM)" class is a part of and one of the modules of the Central Receiver/Transmitter “ENTEK” software. It provides interaction on all issues of storage media operation.
- Users install the software on a tablet or smartphone. When performing work and exploitation, they receive the necessary information and register the work. The software includes automatic identification of equipment by QR codes, RFID and NFC tags.
- The messenger simplifies the monitoring and exploitation of storage media . The software works in off-line mode. The mode allows to use the software without a communication channel at the site.
- The software is built into the Central Receiver/Transmitter “ENTEK”. It allows to create a unified business process for managing electrical distribution network facilities.



Data Gateway for central receiver/transmitter “ENTEK”

Setting tasks, analyzing the operation of storage media, creating tasks for performing work, monitoring, planning and recording results to assess the condition.

SPECIALIST SERVICING THE STORAGE MEDIA



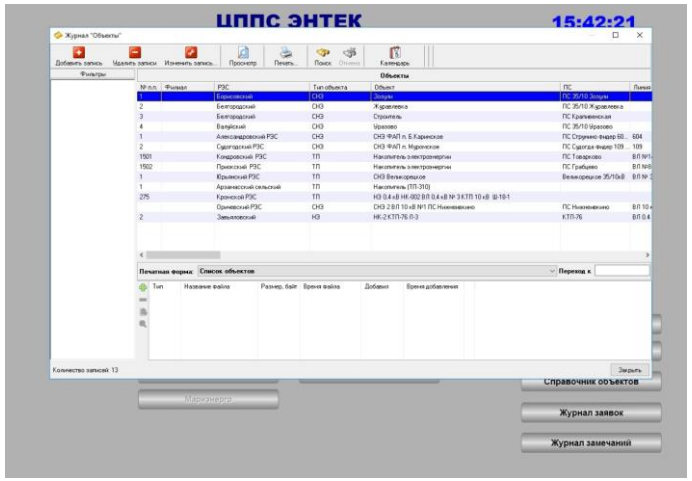
INPLEMENTATION FOR NETWORK CONTROL CENTERS

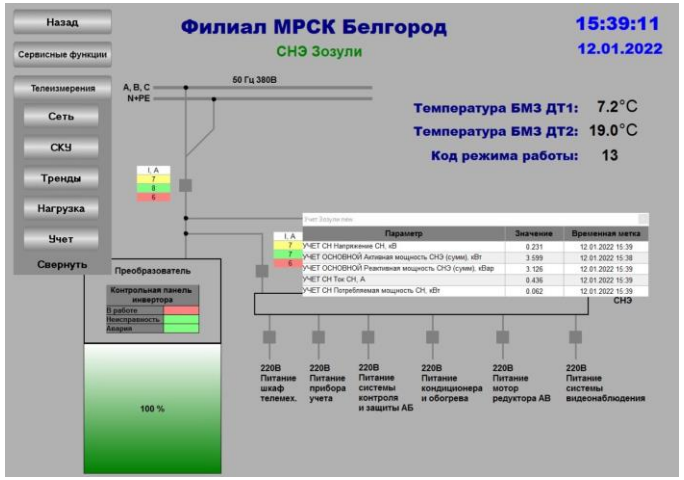
A standard solution (Hardware-Software Complex) has been developed for storage media automation, ensuring the collection of technological data on a single server from 20 regions.

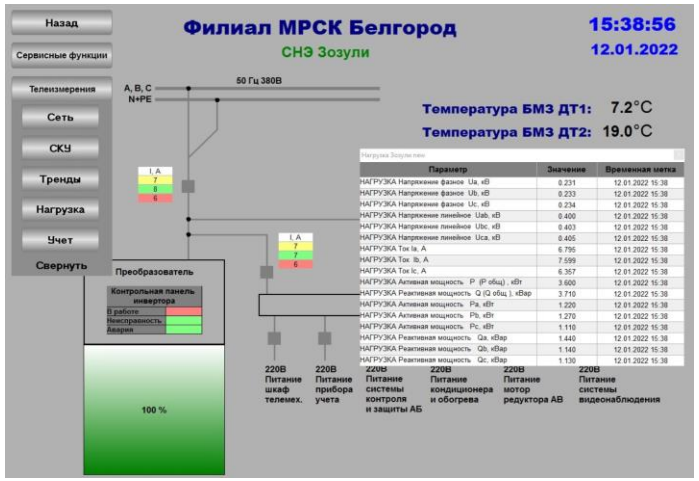
The solution was implemented as a unified control and management system in 20 branches of ROSSETI Center PJSC , ROSSETI Center and Volga Region as part of the Unified Network Management Center.

A local server has been developed for Group of Companies RUSNANO for centralized monitoring of storage media from all manufacturers in real time with automatic generation of statistics and efficiency diagnostics.

Reports for managers on the current state of equipment, deviations in the operation of storage devices, as well as operating parameters and parameters of electricity, supplied to the network, are generated automatically.







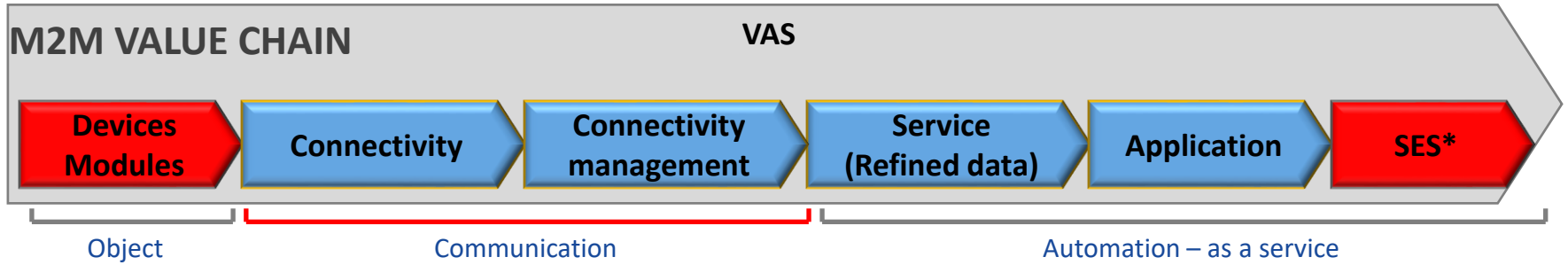
NEW SOLUTIONS
Automation as service of IoT operator

WINDOW OF OPPORTUNITIES

The potential demand is at the domestic energy and infrastructure markets.
Such objects include infrastructure facilities.

- Territorial electric distribution companies;
- Water and wastewater treatment plants, heating suppliers, lighting;
- Social infrastructure - educational institutions, hospitals, administrative buildings;
- Energy facilities of industrial enterprises.

Software and hardware system allow to implement telecontrol systems, metering systems, Computer-Aided Process Control System for facilities of the electric grid company and utility infrastructure. Using of normal and cyber-protected mode allows to apply solutions for critically important objects: power grids, water utilities, infrastructure facilities, etc.



The role of the integrator

- installation of equipment at facilities in accordance with standard technical solutions;
- use of ready-made standard technical solutions;
- equipment maintenance;
- setting up solutions for private technical tasks (improving solutions)

This approach allows the customer to:

- receive automation in conformity with the planned result;
- get guaranteed technical support;
- shorten the implementation period;
- simplify exploitation and further development;
- minimize investments in infrastructure and personnel;
- have the opportunity for continuous development.

Advantages

- You can work with the systems from anywhere in the world.
- Outstanding reliability.
- Possibility to combine remote offices and branches in one place.
- There is no need to purchase expensive licensed software.
- There is no need for outsourcing of information technology and programmers.
- There is no degradation and obsolescence of the equipment, it is supplied as part of the service.
- It is possible to transfer all data from your server in office, to a remote server or backward.
- 24/7 technical support.
- Development and updating of software at all stages of the life cycle.
- The performer is responsible for the final result of the work.

* Service Enablement Services (IT politics management, service activation/deactivation)

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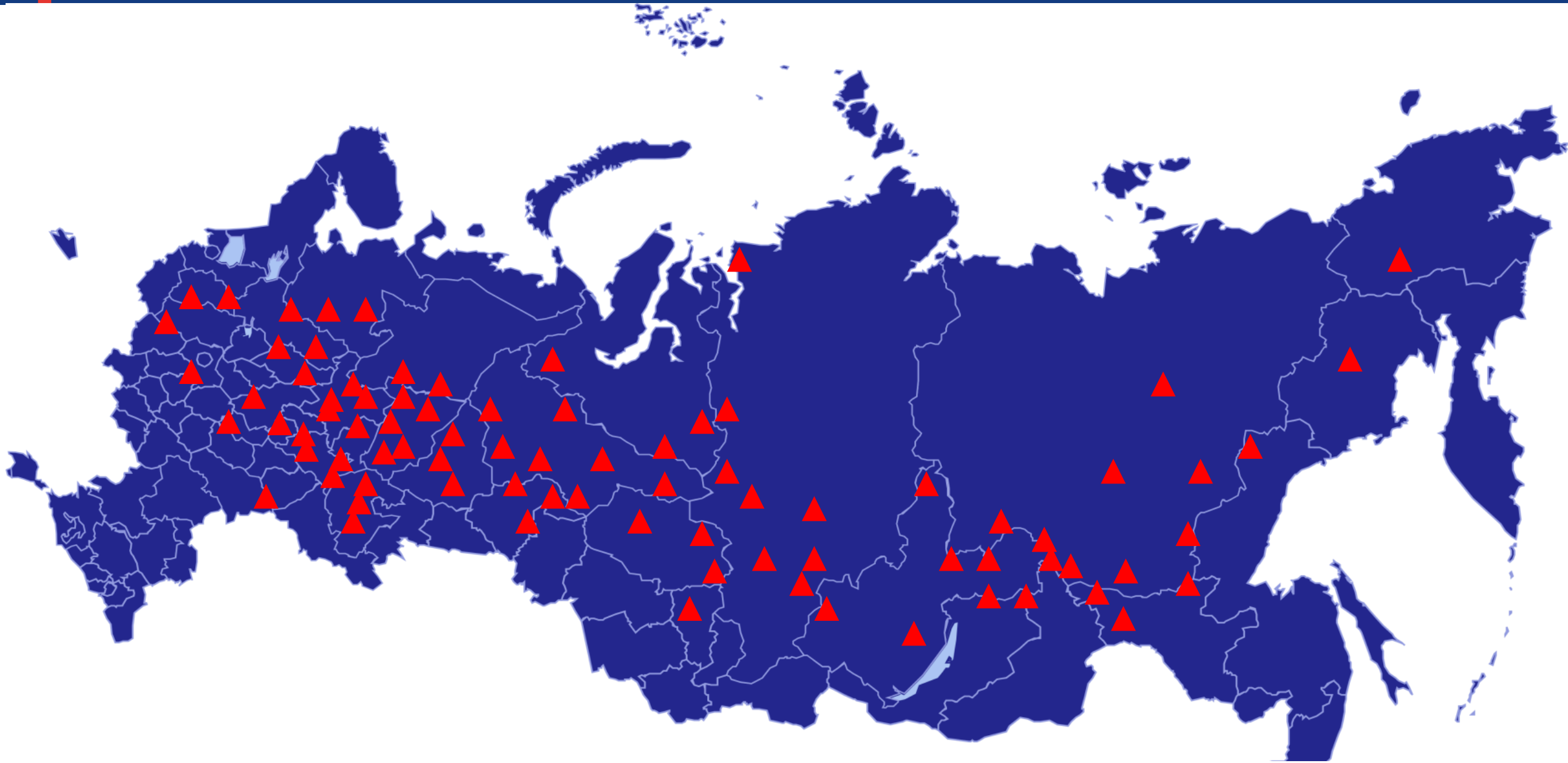

CONTACT DETAILS

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7 (499) 110-31-79

sales@entels.ru

108811, Moscow, Rumyantsevo subway station,
Business Park “Rumyantsevo",
building B, 5th entrance, 6th floor, office 608

Technical support service https://support.entels.ru/

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