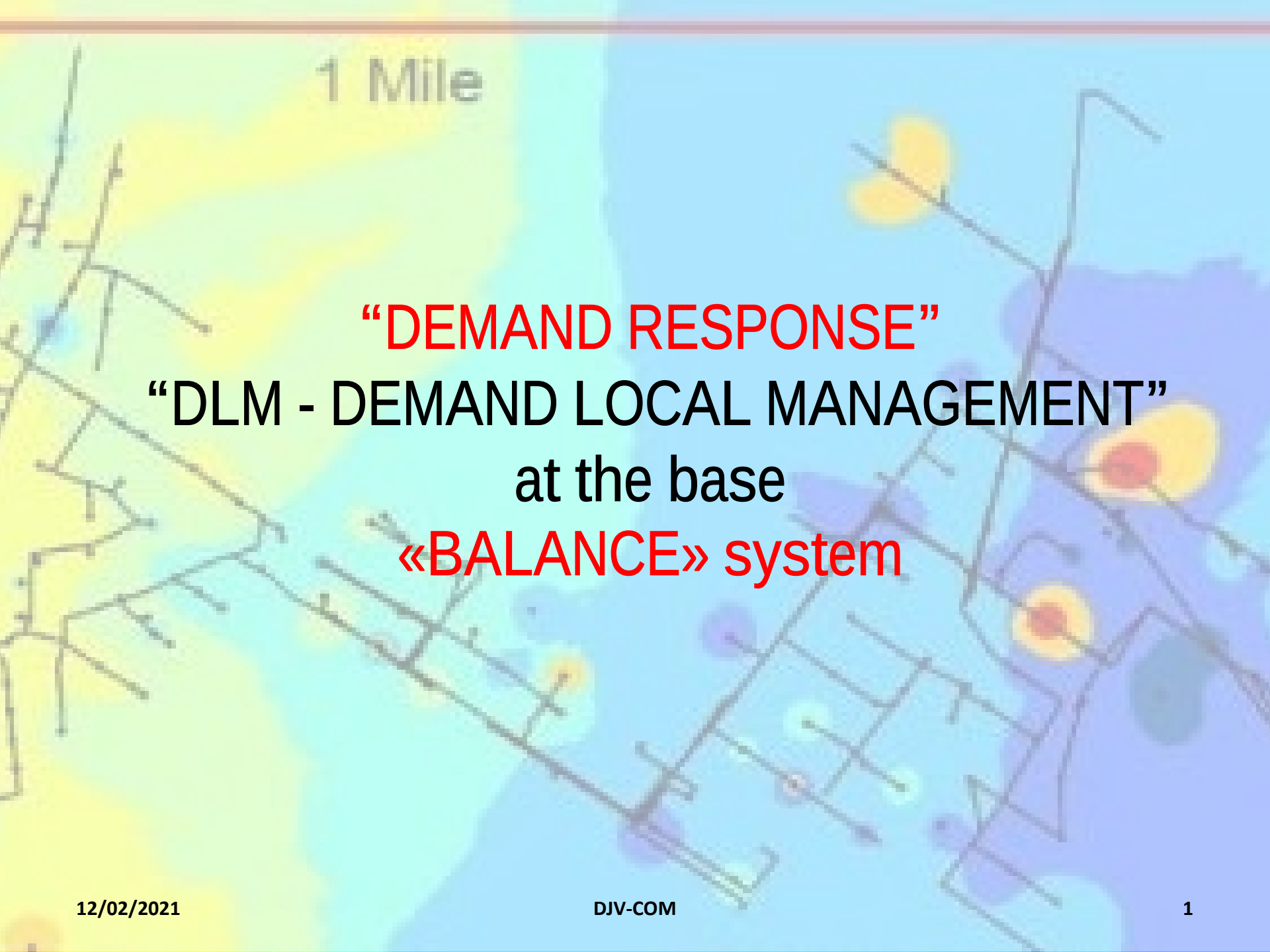


“DEMAND RESPONSE”
“DLM - DEMAND LOCAL MANAGEMENT”
at the base
«BALANCE» system

DEMAND RESPONS «DR» at «BALANCE» system

DEMAND RESPONS (DR) is the reduction in end-user electricity consumption relative to their normal load profile in response to higher electricity prices during peak hours (for incentive payments) or when the reliability of power grids and transformers is threatened by blackouts.

DR market for electricity in the EU by 2025 will grow to $ 3.5 billion compared to 2017 at $ 900 million (Frost & Si).

DR shutdown can be in three versions

-for the period of the peak tariff

-for the period of network (transformer) overloads

- combined option

DR control can be in three versions

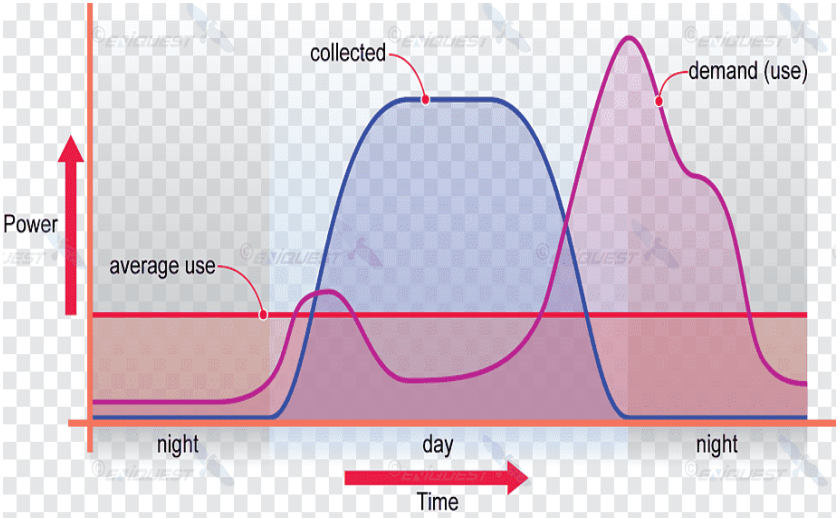
- distribution network operator

- locally, upon reaching the critical load

- combined option

DR load - maybe - boilers, water heating, refrigerators, heaters and air conditioners, additional lighting, transfer of the charging station to EcoPower mode.

Safe and economical consumption



Optimize consumption based on your local resources, including home appliances, electric vehicles, solar power, wind power, and batteries. Even without smart meters.

Any imbalances have devastating consequences for customers, higher operating costs, higher capital costs, and the potential for overinvestment to ensure reliability.

DR BALANCE equalizes demand without significantly altering energy consumption.

DR BALANCE manages system utilization cost-effectively through scheduling, with demand-management algorithms responsive to changes in the grid.

In most cases, it is much more efficient to regulate demand than to invest in expensive storage or generation, which will only be used by 60-70% without a DR mechanism.

DR provider and DLM consumer management

The purpose of the energy supplier management DR

• Prevention of power grid overload, avoidance of accidents (blackout)

• Shifting the load on the network - from the peak hours to the non-peak zone (uniform load of the network creates a reserve of power)

• Reduced energy costs during peak hours (spot prices, temporary tariffs).

• Emphasis on providing added value to the service, not just a product

Flaws

• Centralized DR management is less optimal than local DLM

• The energy supplier is of little interest in the accident on the local networks of users, he most likely will not notice this

Conclusion

Combined version of centralized DR and local DLM is optimal

Purpose of DLM Energy Consumer Management

• Prevention of power grid overload, avoidance of accidents (blackout)

• Shifting the load on the network - from the peak hours to the non-peak zone (uniform load of the network creates a reserve of power)

• Reduced energy costs during peak hours (savings on temporary tariff bills).

• Emphasis on providing added value to the service, not just a product

• Local DLM allows the consumer to customize the network "according to their needs" for their comfort and convenience

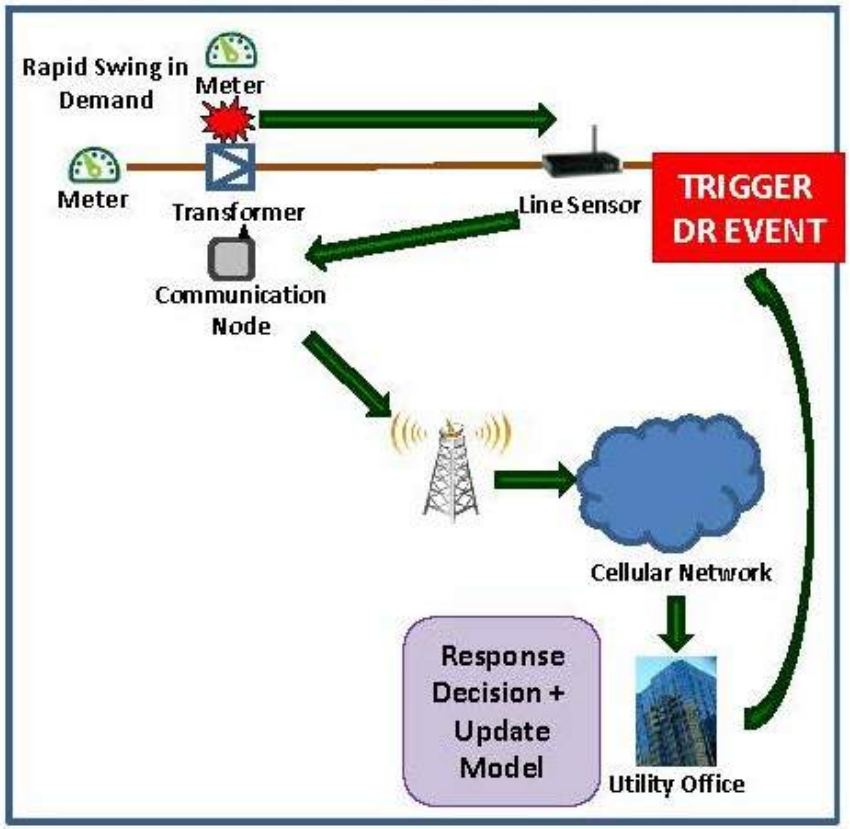
• Local DLM allows you not to bring the situation to the DR management of the supplier, implementing "soft regulation“

Flaws

Local DLM does not allow to prevent overloading of the central power grid, avoid accidents (blackout)

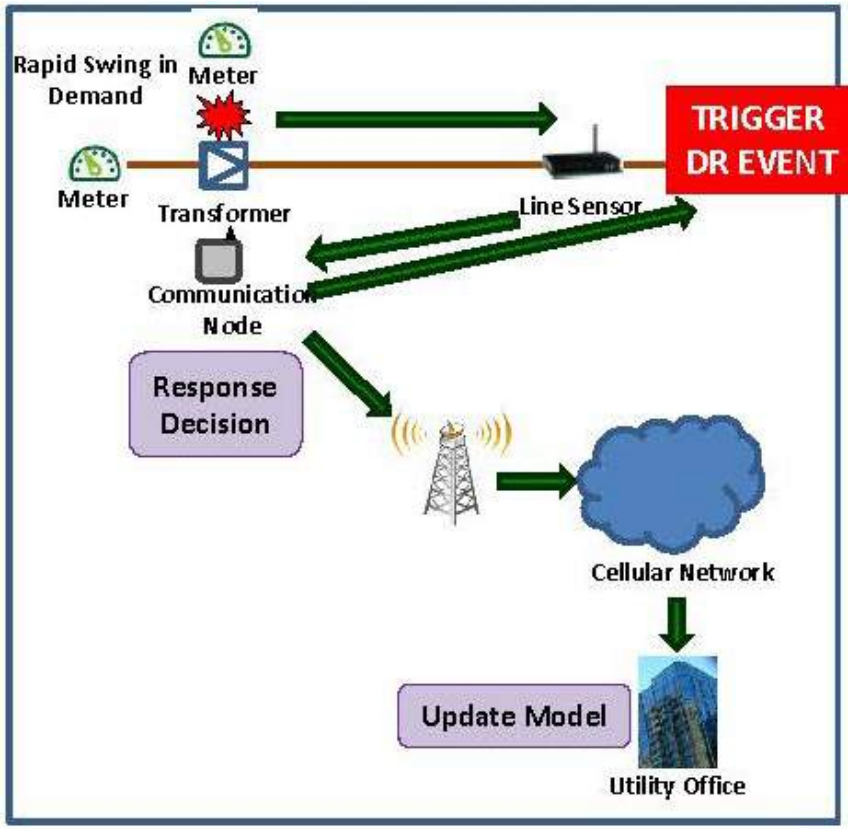
DR - centralized management and DLM - local

Centralized decision making



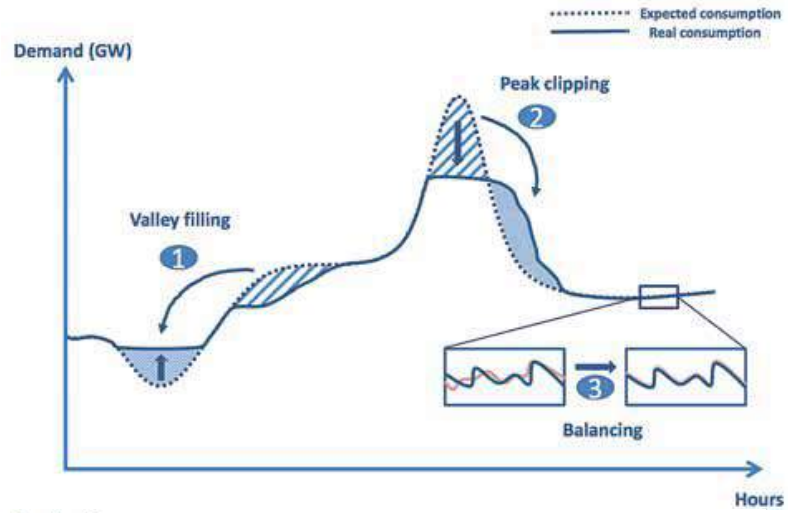
This approach is more stringent and is used in emergency situations in distribution networks.

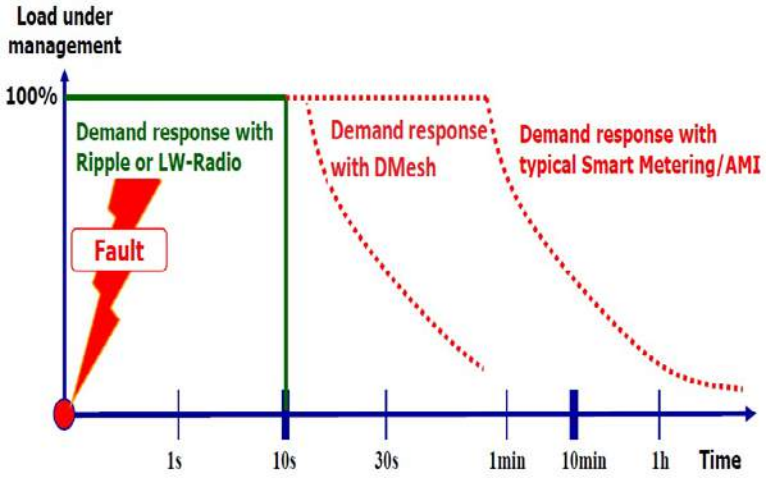
Local decision making



Significantly improved response times, security, and the ability to offer value-added services.

Demand Response (DR)





USA in 2013 earned more than $ 2.2 billion from consumption regulation, without additional investments in network infrastructure

The shift in the time of energy consumption occurs when setting the maximum consumption for each of the tariffs, if exceeded, the consumption should be limited or the secondary load should be turned off.

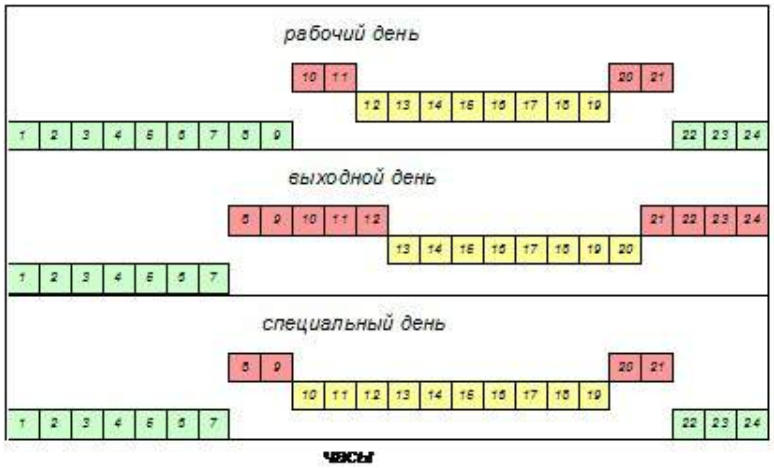
The client can set this consumption threshold himself if it is more stringent than the one set by the energy carrier.

Demand Management "DR". DMesh technology supports broadcast commands, which allows limiting the consumption of certain groups of subscribers or disconnecting the secondary load on commands from metering equipment or an operator when distribution networks are overloaded.

The average delay from giving a command to disconnecting the load of a group of consumers is about 30-60 seconds

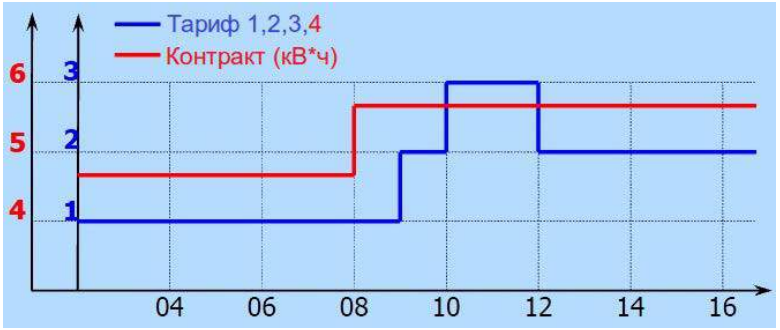
For customers installing load shedding equipment, operators offer a preferential rate

Time tariffs and contracts



Time tariffs allow to distribute the peak load more evenly during the day, as well as create an incentive for electricity consumption at night, when the cost of electricity is several times lower than the cost of electricity during peak hours.

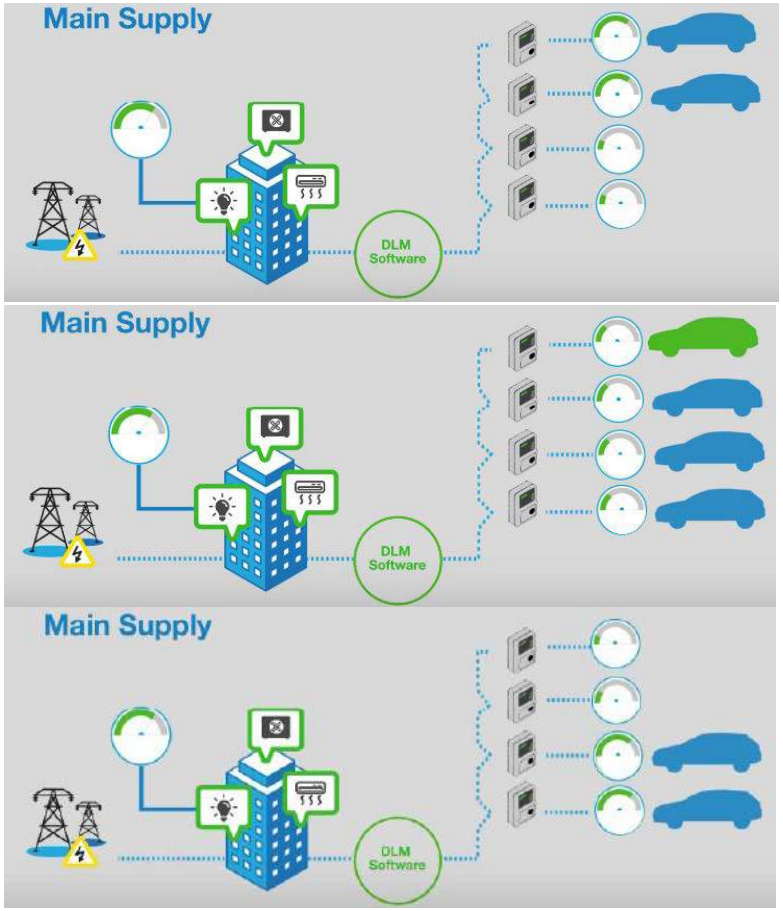
A two-part tariff is popular - day / night.



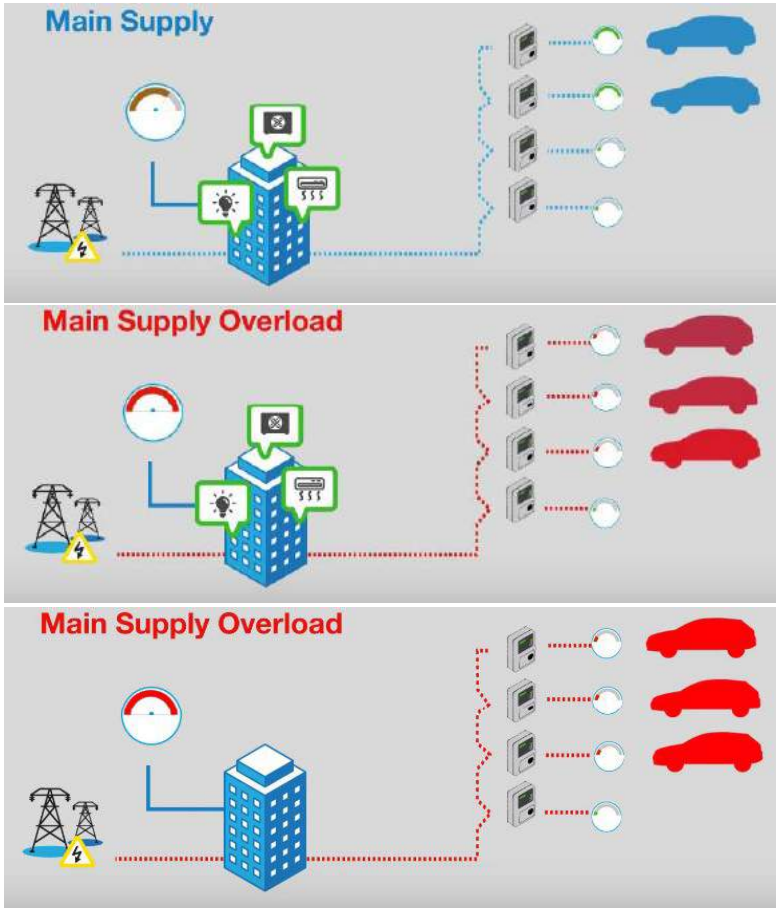
Energy metering both by tariffs and by installed or contractual capacity. If the hourly consumption exceeds the contractual consumption, the consumption can be taken into account in a separate (penalty) tariff.

Demand Local Management

Local power grid with DLM



Local power grid without DLM



Network operation with a local DLM ensures network uptime by reducing consumption or shutting down individual devices

Operating a network without a local DLM does not guarantee network performance. If the load is exceeded, the network fails.

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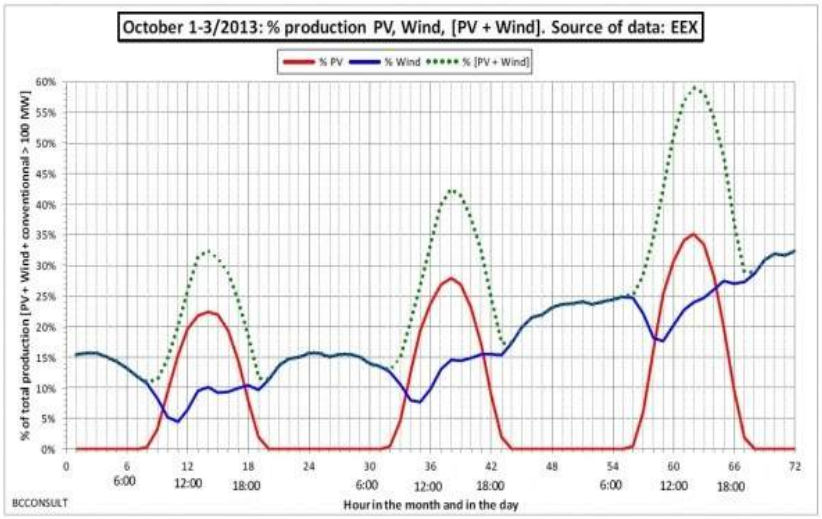
Bright or dark future?



A number of EU countries have achieved full energy supply exclusively from renewable sources. This means that there may be periods when generating stations operating on gas, coal and fuel oil will not be able to sell energy, or sell it below the level of profitability. This also applies to residential consumers with solar panels.

The number of more economical electrical appliances, both light sources and other household appliances, is growing. At the same time, the total installed capacity of household appliances is constantly increasing. This means that over 50 years the peak factor i.e. the ratio of maximum power to minimum power increased from 5-10 times to 50-100 times.

This means that the ratio of the installed generation capacity to the real sales volume should increase from about 3 times to 30 times, and this is a 10 times decrease in profitability!

The way out of this situation is known - it is the transformation of the **energy sales company** into an **energy regulating company**, and the consumer from a passive into a managed and controlled generating consumer.

In this situation, during periods of lack of wind and sun, the networks will be repeatedly overloaded and the number of blackouts will grow every day. **The only way out is to limit DR or DRL user load.**

DR and DLM algorithms

You need three outlets. Red - for electrical devices that cannot be disconnected from the mains: this is a clock, a computer (?), mandatory lighting ... Yellow – electrical devices that allow them to be turned off for a short time (from seven to fifteen minutes) without disrupting their functioning - a refrigerator, an air conditioner, boiler, additional lighting, kettle, microwave oven, vacuum cleaner, iron .. Green – electrical devices that allow them to be turned off for a long time and used, for example, only during the night rate - this is a washing machine and a dishwasher, a pump for filling a container with water, water heating, charging electric car ...

By agreeing to some inconveniences, it will be possible not only to guarantee the supply of electricity, **WITHOUT blackouts**, but **also to save money** by transferring part of the electricity consumption to the night tariff. The figure shows the load on the transformers when they are operating in normal mode (Random) and under DLM control.

If the load is within the set threshold, then the DLM system will not shut down your electrical appliances. It is enough to connect about 40% of consumers or 40% of electrical equipment for the system to work and get a positive effect.

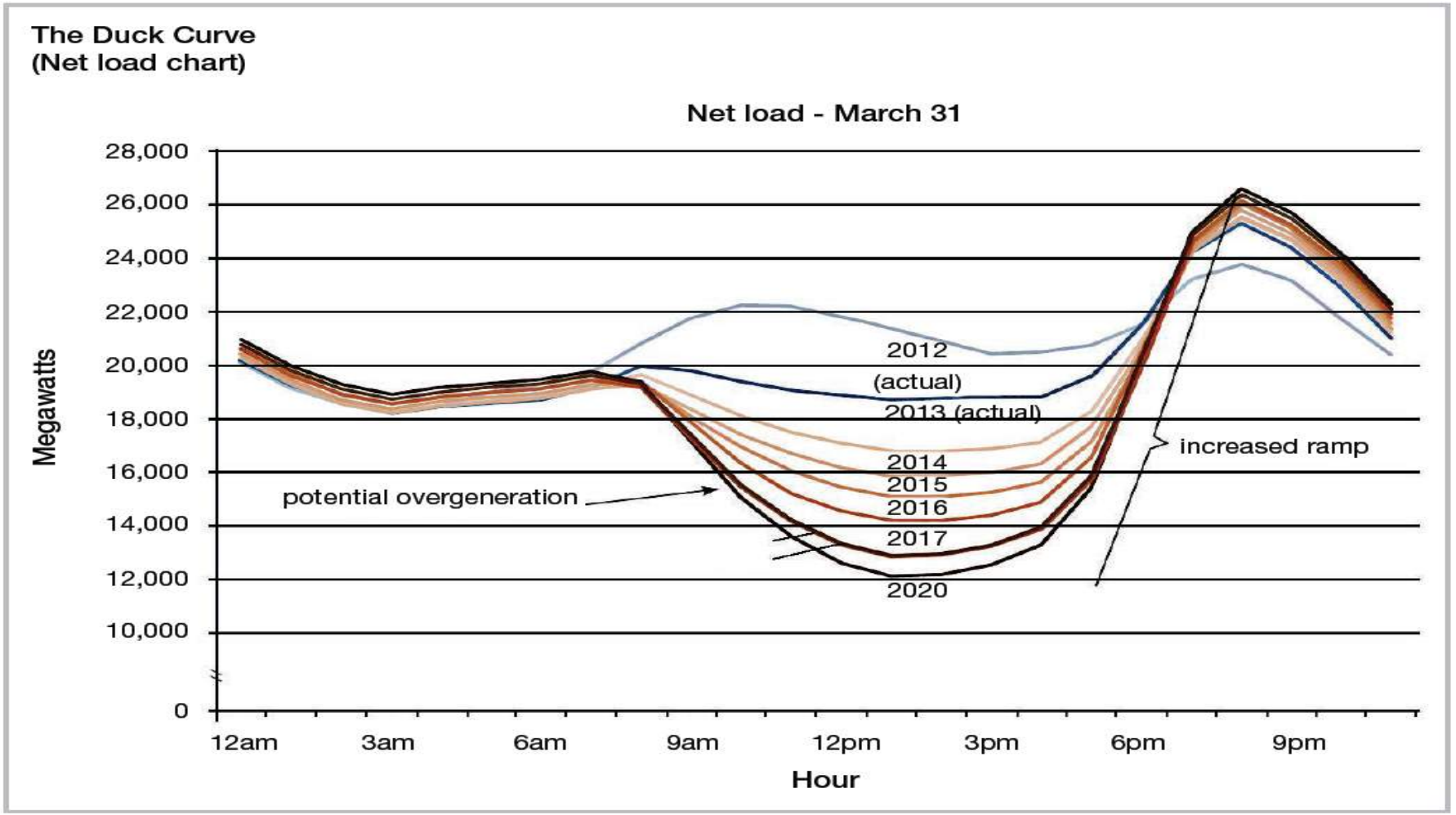
Example of DLM technology work

Example of local DLM (IDROP) operation GREEN color of the graph is initial consumption without system operation. The BLUE color of the graph is the average consumption during system operation. The GREEN arrow indicates overload consumption. RED arrows indicate a decrease in the consumption of the boiler and air conditioner. The BLUE arrows indicate the displacement of the electric vehicle charging to a later time of the day (outside the peak).

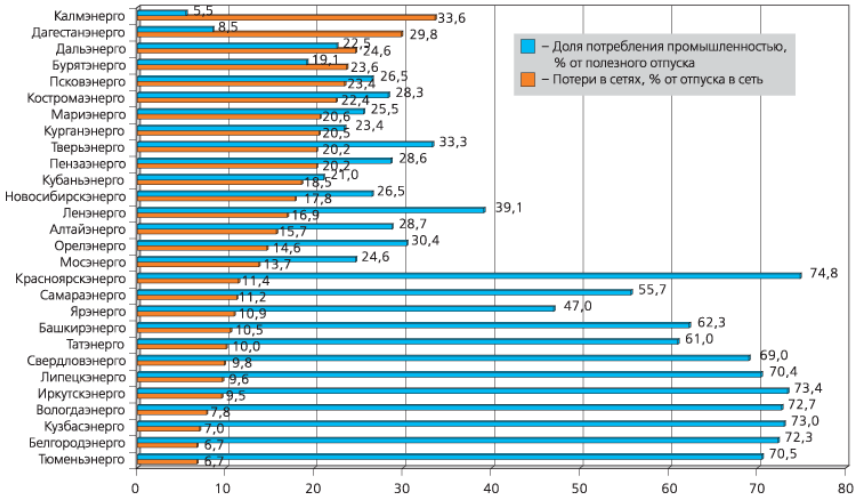
An example of the impact of green energy

Consumption Profile California March 31

https://www.cgi.com/sites/default/files/white-papers/cgi-demand-response-whitepaper.pdf



BALANCE - LOSS reduction analytics

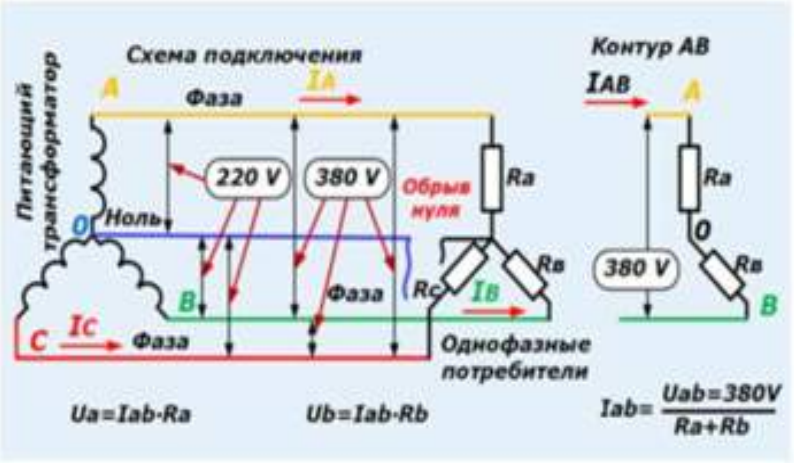


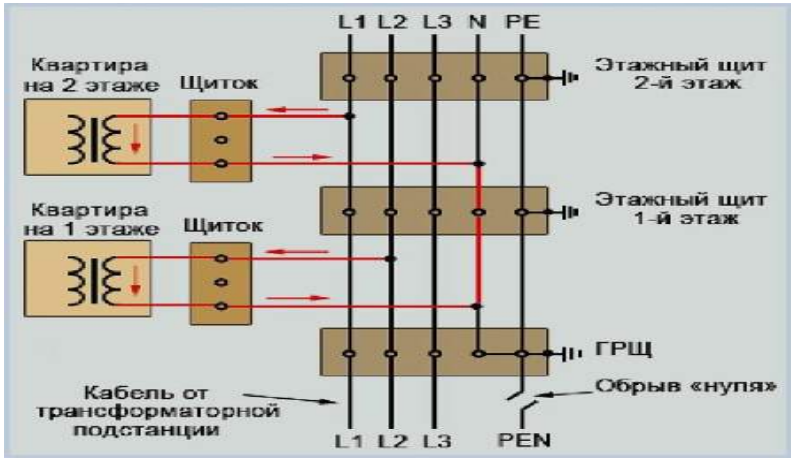
The analytical module of the BALANCE metering system allows you to calculate phase-by-phase losses on in-house networks and issue recommendations for the optimal distribution of consumers by phases, as well as identify consumers who want to supply two or three phases (for example, divide the consumption of the kitchen and the rest of the apartment). This allows you to significantly equalize the loads on each of the phases and increase the safety of in-house networks.

For each consumer, along with the consumed electricity, his contribution to the losses of in-house networks is also calculated.

For the electricity supplier, this is a significant increase in income. A simple calculation shows that when installing the BALANCE metering system and distributing loads according to the recommendations of the analytical module, losses can easily be reduced by a third - from an average 12% to 8%. With an average electricity bill of about 300 lei / month, the gain is about 12 lei / month. With the average cost of data transmission equipment (with connection to the radio module of three apartments) about 400 lei / apartment, the equipment pays for itself in 33 months, i.e. in less than three years, only by reducing losses.

BALANCE - additional OPPORTUNITIES





The analytical module for detecting theft and faulty metering devices (based on the correlation of consumption profiles and imbalance profiles) allows you to further reduce losses by up to 4%.

A neutral wire failure is very dangerous and it is guaranteed to disable household appliances - air conditioners, computers, refrigerators ...

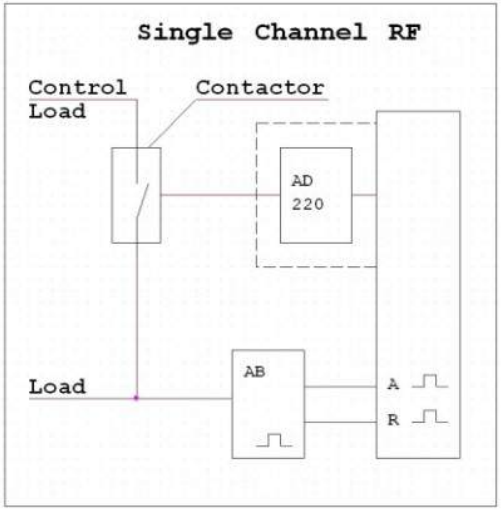
You can install a voltage relay that will turn off the home network in the event of a zero break, or a powerful arrester that will protect devices from short-term voltage surges.

And if you are not at home when this happens, but if this happens only from time to time - for example, sparking in twists, spikes, bolted joints, connections in sockets? How to fix this and prevent an accident in the future?

To monitor the safety of in-house networks, an association or a power supply company can additionally install sensors:

- Phase voltage loss sensors;
- Voltage sensors on the neutral wire;
- Phase voltage sensors;
- Sensors for arcing wiring (poor contacts).

Sensors, adapters and contactors for control



To control the consumption of the local network (DLM), a conventional three-phase (single-phase meter) or a current relay connected to the radio module is used as a sensor for the allowable power threshold.

To control the load to be switched off, a single-phase or three-phase contactor for the corresponding currents is required. The D100FC radio module can be equipped with an AD220 adapter for controlling the contactor with remote opening and closing. The adapter allows you to control a contactor with an operating voltage of the control circuit of 220 VAC and a current consumption of up to 100 mA.

The diagram shows a D100FC radio module with an AD220 adapter connected and a contactor for load control, while the radio module can only support up to two pulse inputs. Pulse inputs can be from two electricity meters or from one device with separate outputs for active and reactive energy. Using the adapter, you can control a load with an active power of up to 50 W.

The user (if authorized) can turn off the electricity supply in the event of abnormal situations, for example, increased electricity consumption in the absence of the owner or electrical appliances forgotten to be turned on.

What is interesting BALANCE

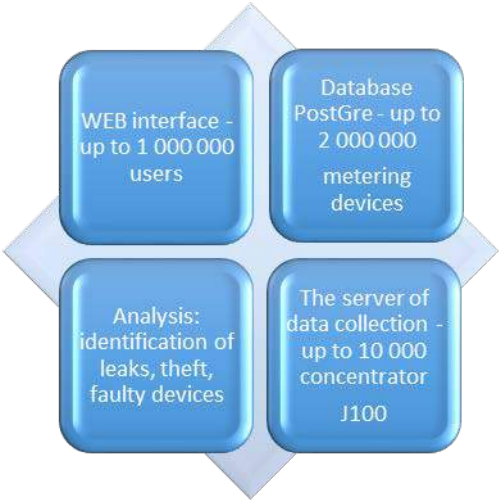
We use ALREADY INSTALLED COUNTERS with pulse output = cost reduction
ANALYTICS DETECTS LEAKS and REDUCES LOSSES by 80 - 90% = cost reduction
GUARANTEE 100% data delivery from metering devices = balance calculation
COMPLETE ACCOUNTING of electricity, water, heat and gas = cost optimization up to 40%
Consumption Management = timely payment for energy
Support for progressive tariffs on consumption value = social rate
Full, timely and reliable accounting of energy consumption
Identifies loss sites, as well as theft facts = allows you to exclude them
Support for multi-tariff metering = lower costs for night consumption
Monitor hourly consumption profiles and theft
Daily and hourly balances at home, street, district, city, region level
Data hierarchy for metering devices as well as balanced groups
Recommendations for reducing technical losses in distribution networks
Cost reduction: multi-channel metering of up to 6 devices per radio module
Cost reduction: multi-tariff metering on devices with pulse output
Data reliability control: open circuit, short circuit, external magnetic field
REALLY: self-installation by residents of the BALANCE system = Plug @ Play
Advanced High Level = objects on the map and accident filters
WEB access, personal account, including mobile application at Android
Subscription to warnings about maximum and forecast consumption on a mobile application

Return on Investment: Pirmasens, Deutschland

We calculate the return on investment by including in the monthly fee payment for equipment in the amount of 1.99 Euro per month. We see that BALANCE pays off about two years, which is three times faster than EMERIS. Prices are subject to change, please check with your local representative. Also, the costs of installing the system, its operation and other overhead costs are not included. A more detailed layout can be obtained from regional representatives.

System cost ELSTER-EMERIS/DJV-COM-BALANCE		EMERIS	EMERIS	BALANCE	BALANCE
Equipment (prices in euros without VAT)	Qty	Price(euro)	Price Sum.	Price(euro)	Price Sum.
Magnetic sensor INZ-61 / MDT-2	10 000	22,50	225 000	5,06	50 600
Radio module TRC600p 2Z / D100-FC	10 000	83,60	836 000	31,24	312 400
Repeater TRC601	2 386	83,60	199 470	0,00	0
Hub Wavegate 310 GPRS TRC602w	7	1 234,00	8 638	0,00	0
Application software	1	12 500,00	12 500	0,00	0
EMERIS Server Software -?	1			0,00	0
EMERIS Server -?	1			2000,00	2 000
Repeater D100FC-E (according to statistics 4%)	400	0,00	0	62,65	25 060
Hub J100UC (statistically 1 on 80 D100FC)	125	0,00	0	140,38	17 548
Total (EURO)			1 281 608		407 608
Total with VAT (EURO)			1 537 929		489 129
Payback calculation using Pirmasens as an example (10,000 subscribers with a monthly subscription of 1.99 Euro)					
SYSTEM: ELSTER-EMERIS / DJV-COM-BALANCE			EMERIS		BALANCE
Monthly service charge of 10,000 subscribers			19 900		19 900
Amount of investments (EURO)			1 537 929		489 129
Payback period (months)			77,28		24,57
Payback period (years)			6,44		2,05

The structure of the metering system BALANCE



Communication level

Each metering point must be equipped with a metering device with a pulse output, a D100 radio module and, if necessary, a pulse sensor.

Server Software

Free database (PostGre) and free server software for LINUX, xBSD.

User-friendly interface for both the administrator and operators and managers.

Remote installation of server software on your computer.

The ability to use the server of the system supplier with a small number of users.

The program allows you to generate reports on energy consumption, disconnect subscribers and track alarm messages.

Analytics gives a forecast of consumption and warns of leaks.

For work, only Internet access is required.

DMesh - data network structure

(M) Radio module: up to six metering devices with pulse output

Accounting electricity, water, gas, heat

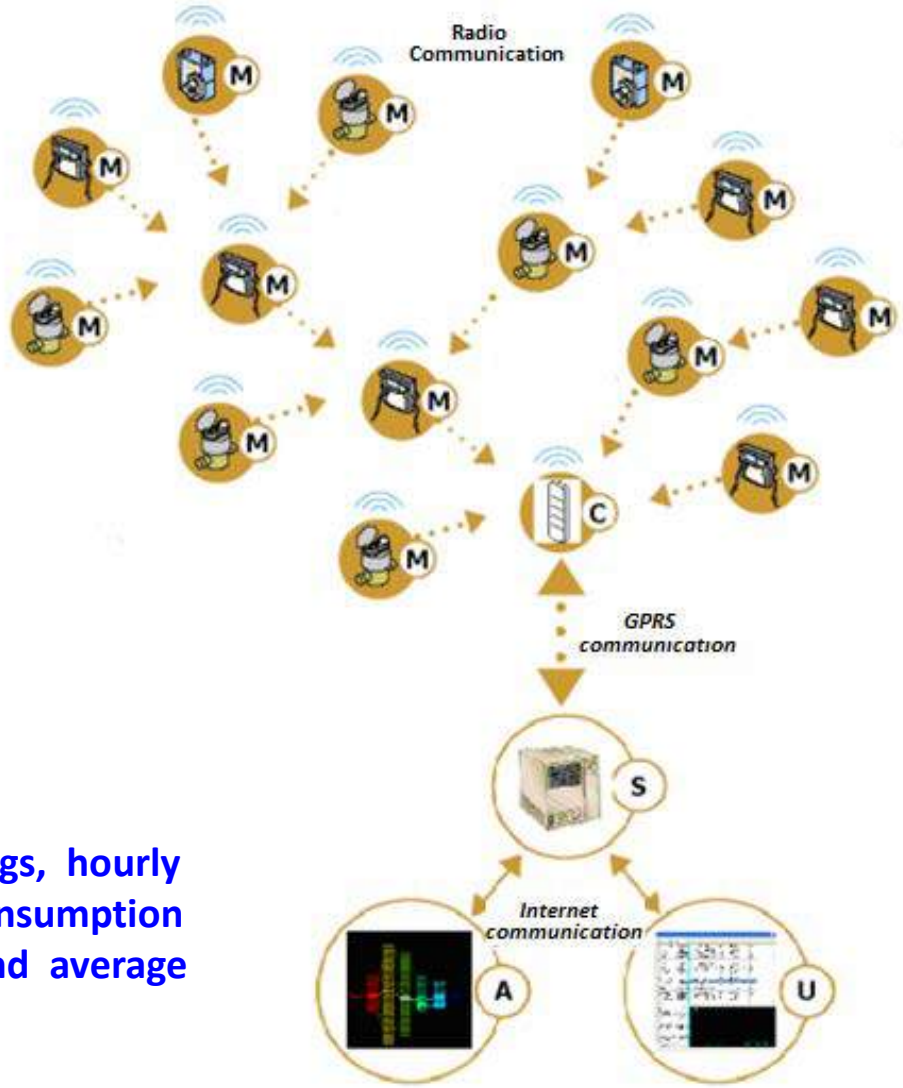
DMesh, 433MHz, up to 30 relay levels

(C) Concentrator - up to 480 metering devices per logical network and supporting up to eight logical networks

(S) Database: up to 2,000,000 metering devices per server

(A) Web Admin - network, consumption and access control

(U) Web User/Operator - current readings, hourly consumption profiles, leak notification, consumption forecast, comparison with estimated and average consumption by object

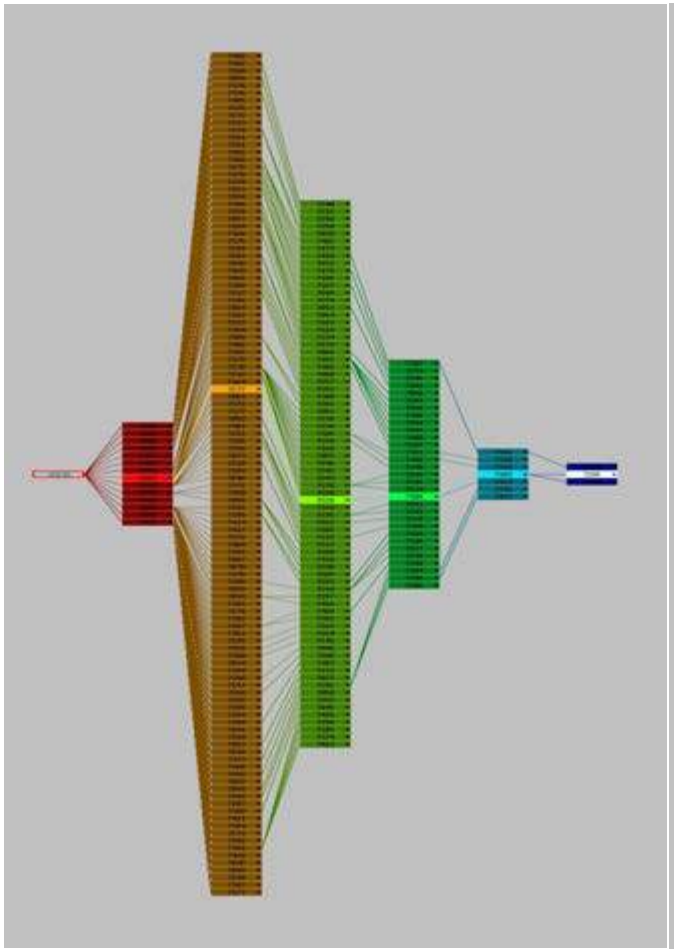


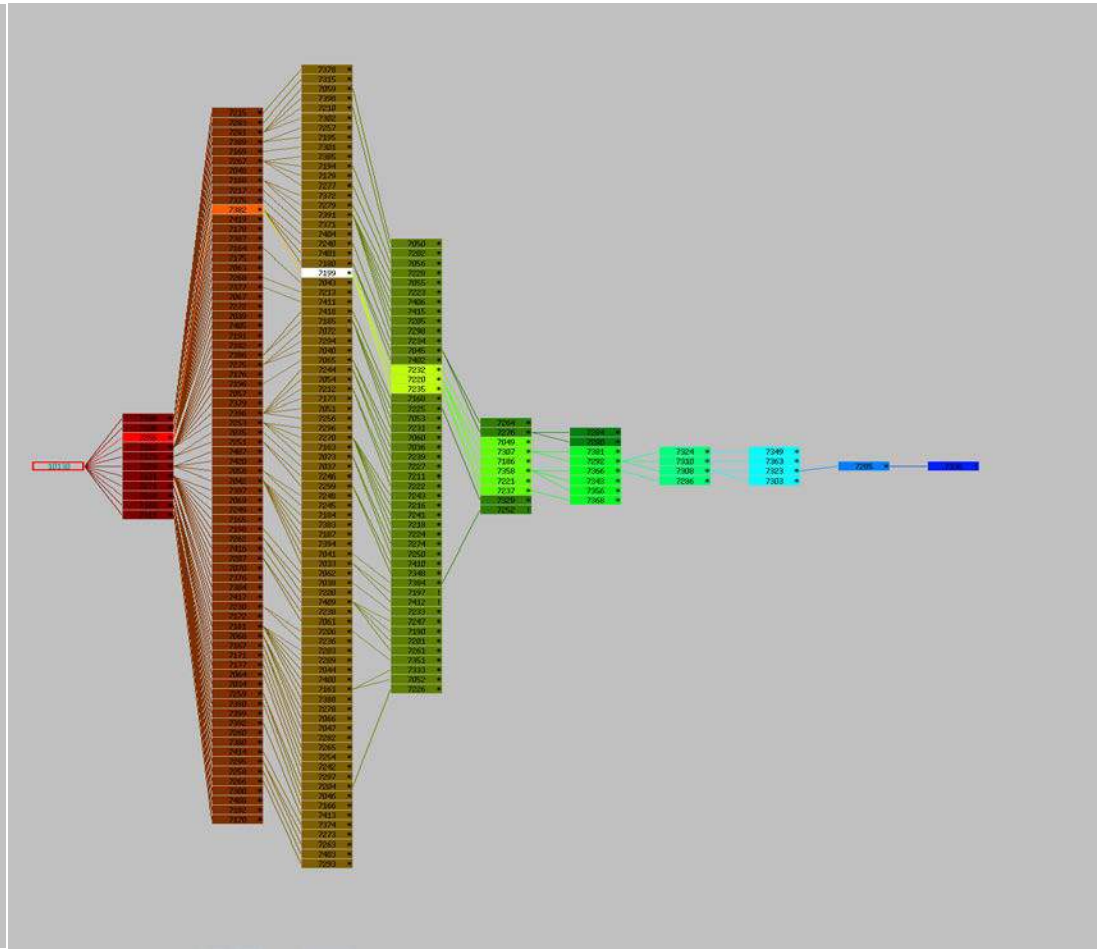
DMesh Technology Description

- D-Mesh operates in the frequency range 433.12 - 434.72 MHz, which does not require licensing;
- 433 MHz has 6 dB less attenuation than 868 MHz and 12 dB less than 2400 MHz. In distance it is 2 and 4 times more.
- Radio modules work like routers; No additional routers with high consumption are required;
- The coverage area of the DMesh network through relaying can reach up to 2 km (in the rural zone) and up to 10 km (for multi-story buildings).
- Advanced network monitoring features;
- Equipment with ultra-low consumption, battery powered with a life of 6 years;
- The ability to remotely enable / disable consumption in case of no payment or danger;
- Remote secondary consumption control during peak hours of consumption
- It is a competitive product with affordable prices. You can calculate the costs with an accuracy of 5% -10% for a city, region, country.
- The payback period for installing the BALANCE accounting system is only by identifying losses within 2-5 years;

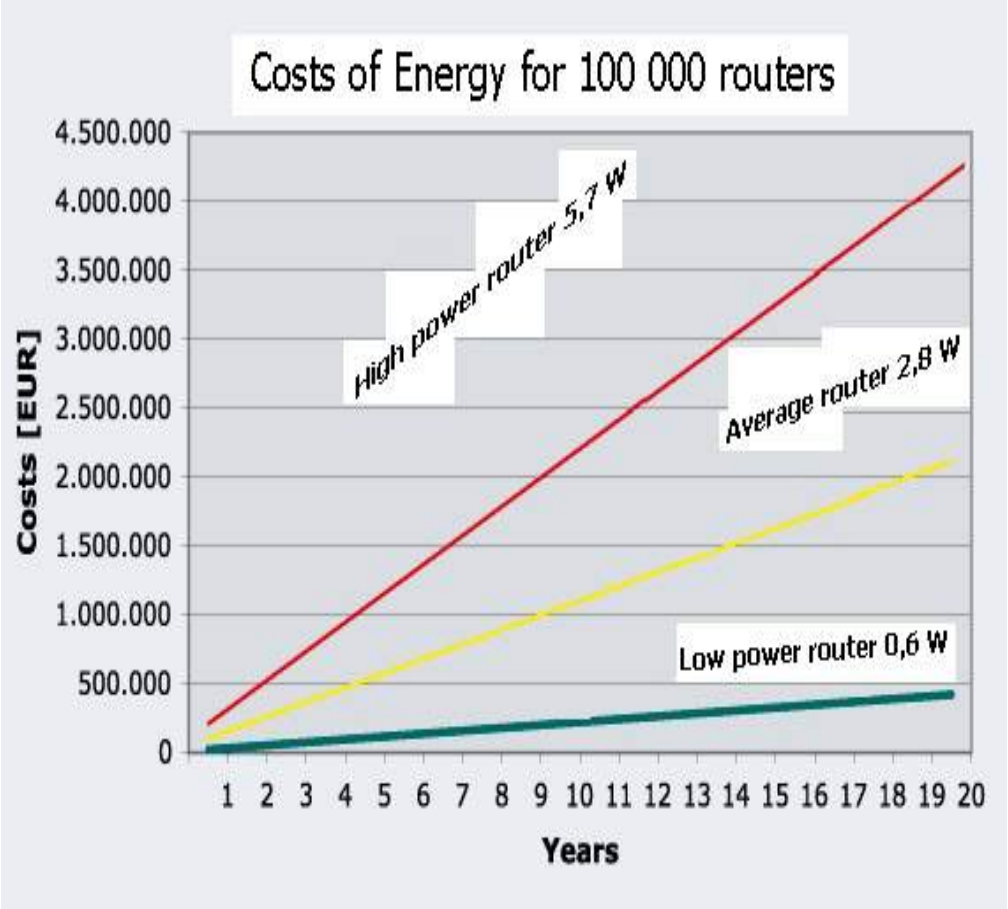
Auto build DMesh network

Koshevogo St. 18 (Leninogorsk, Tatarstan)
on January 20 and 21, 2014





Data transmission and control equipment



Radio module J100UC
Concentrator / Router - one per subnet, support up to 8 logical / time subnets, consumption 0.6 Watt, 220 / 240 AC Volt (or version with a solar battery);

D100FC radio module
with a maximum of 240 pieces per subnet; powered by lithium battery "A" ER18505M 3500 mA / h, supporting up to 6 metering devices (cable up to 10 meters);

Impulse sensor - for each gas / water meter or cable for the electricity meter, up to the maximum of 480 meters per subnet;

Lithium battery
"ER18505M" 3500 mA / hour - 1 piece for each D100FC radio module;

Consumption management adapters - on request; **Shut-off valves or load control relays** on request too.

Data transmission and control equipment

Radio module

D100FC

D100FC-E

Concentrator

J100UC

J100UC-M
MANUAL COLLECTION

Additionally

AD220/50
Adapter

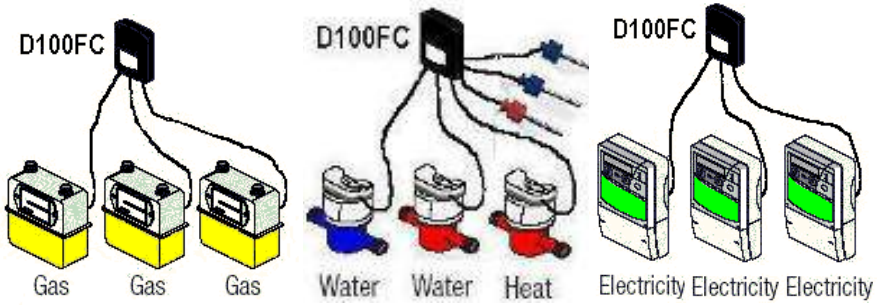
AD12/1000
Adapter

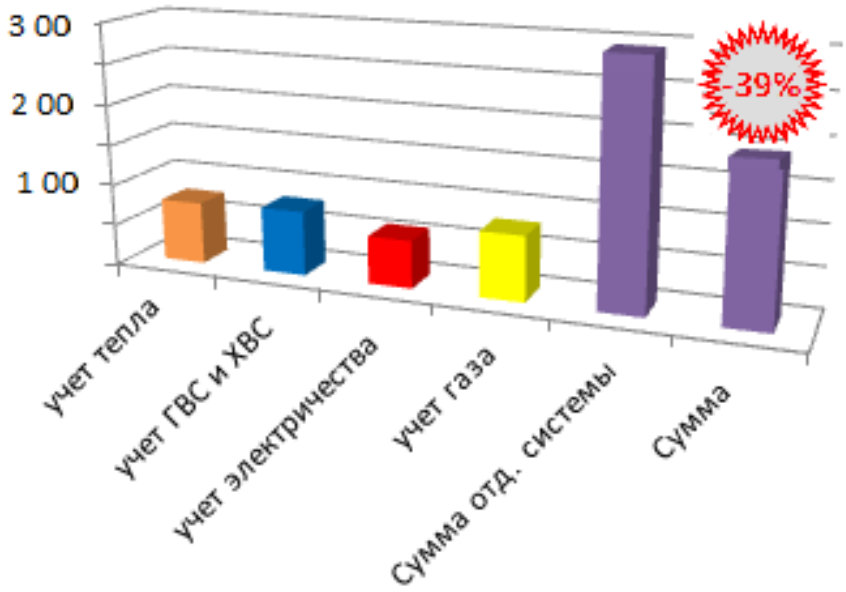
“A” ER18505M

MDT-02
gas sensor

SD-25
water sensor

Integrated accounting: connection options





Turnkey Accounting System

Do you want to get a service or buy equipment? When buying a system in parts, the cost of it can exceed any of your expectations, and whether it will work as a result is a separate issue.

BALANCE supports a comprehensive energy metering: Gas, Electricity, Water and Heat, and when purchasing individual metering systems for each of the energy resources, you will have to return to this issue many times and if you have enough money, you will eventually become the happy owner of three or four separate accounting systems.

The universal BALANCE system allows for complex accounting to save both on equipment and maintenance, while the savings can be up to 30 - 40%. Access to accounting data will also be unified from your personal account.

Consumption Profiles and Leak Detection

	id	object	leak_ob	hevents	flag_
57	74	Object_Mircea_cel_Batrin_20/6	633	0x1C	0
58	75	Object_Botanica_Veche_45	0	0x10	0
59	77	Object_Mircea_cel_Batrin_39/3	0	0x18	0
60	78	Object_Tiraspol_2/1	0	0x0	0
61	79	Firma_Ovadenco_N	72	0x0	0

flag_sum(0)

	slave_id	count_id	offset_cou	hour	date	idnp	name	ap	count_value_0	24h	master	slave_s	hever	leak_fl	s
92	4496	28558678	0.1960	00:00:00	2013-08-28	06443	TONU OLGA	91	19.2660	0.0000	23	2	0x0	0	8
93	4813	28558886	0.0750	00:00:00	2013-08-28	06443	COTOS ALLA	92	0.0750	0.0000	20	0	0x0	0	8
94	4817	28558744	0.2780	00:00:00	2013-08-28	06443	TONU OLGA	93	2145.4980	1.1400	52	2	0x0	0	8
95	4816	28558909	0.0780	00:00:00	2013-08-28	06443	CHILARI LUDM	94	2537.4280	1.1400	88	25	0x0	0	8

object = Object_Botanica_Veche_45 slave_id = ---

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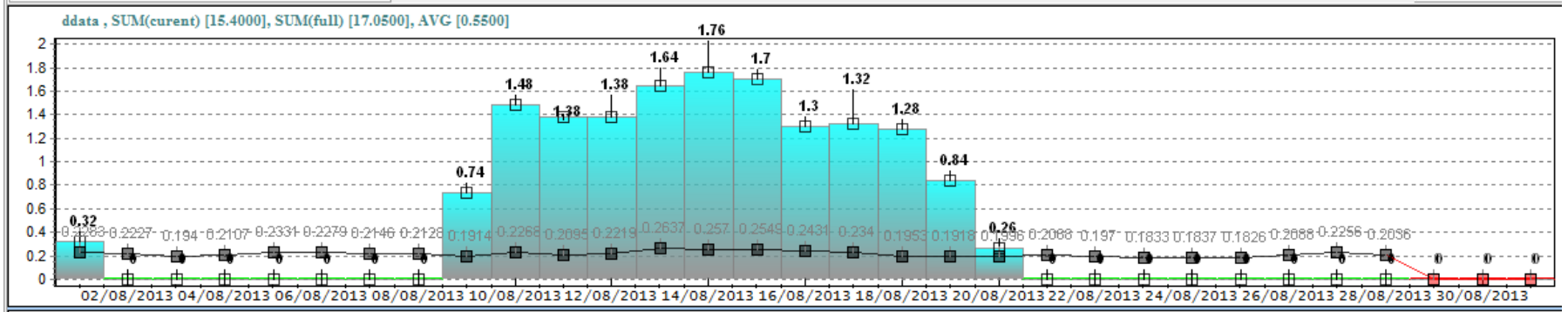
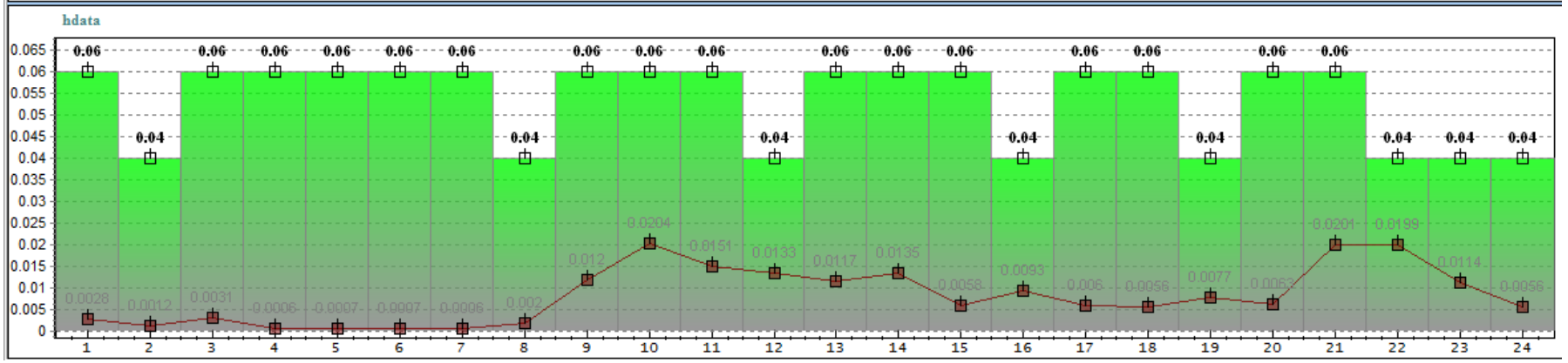




Manufacturability system BALANCE

ALTERNATIVE ACCOUNTING SYSTEM	BALANCE ACCOUNTING SYSTEM
Difficult to design - ambiguity	The project is very simple, often not required
Too many different equipment	Radio modules and devices with pulse output
Optional Equipment Required	No additional equipment required
Difficult to install	Installation 2 guys/140 metering points/day
Difficult to set up	Simple or factory set up
Hard to get started	Start-up - no setup required: Plug @ Play
Hard to use	At the level of computer use
Paid Software	Software is included in the price of equipment
Purchase server	Use the DJV-COM server
Too expensive	Two to three times cheaper alternatives
Low reliability	Higher wired system reliability
Sophisticated Interface	Intuitive, customizable interface
Lack of access via WEB	WEB access for operator and client
Need programmers to operate	No programmers needed
Poor product support	Escort 24/24, 7 days a week
Delays with updates	Updates in one place - in the database
Paid Updates	Included in the cost of equipment
System Parts Warranty	Guaranteed results - all from one source
No access from mobile devices	Access also from mobile devices

User Consumption Profiles

Consumption profiles

https://djv-com.net/web/public/pv/auth/login

As for example, enter 23835 and 27826929.

Schedule of daily consumption "Month / Day / Hour" polyline - the average consumption of the object, shows current consumption since start of month and consumption forecast at the end of the month.

Schedule of monthly consumption "Year/Month/Day" polyline - last year's consumption.

In the calendar, you can select the one you are interested in date and see the counter

Consumption coefficient indicator:

the ratio of your consumption to the average.

Temperature coefficient indicator:

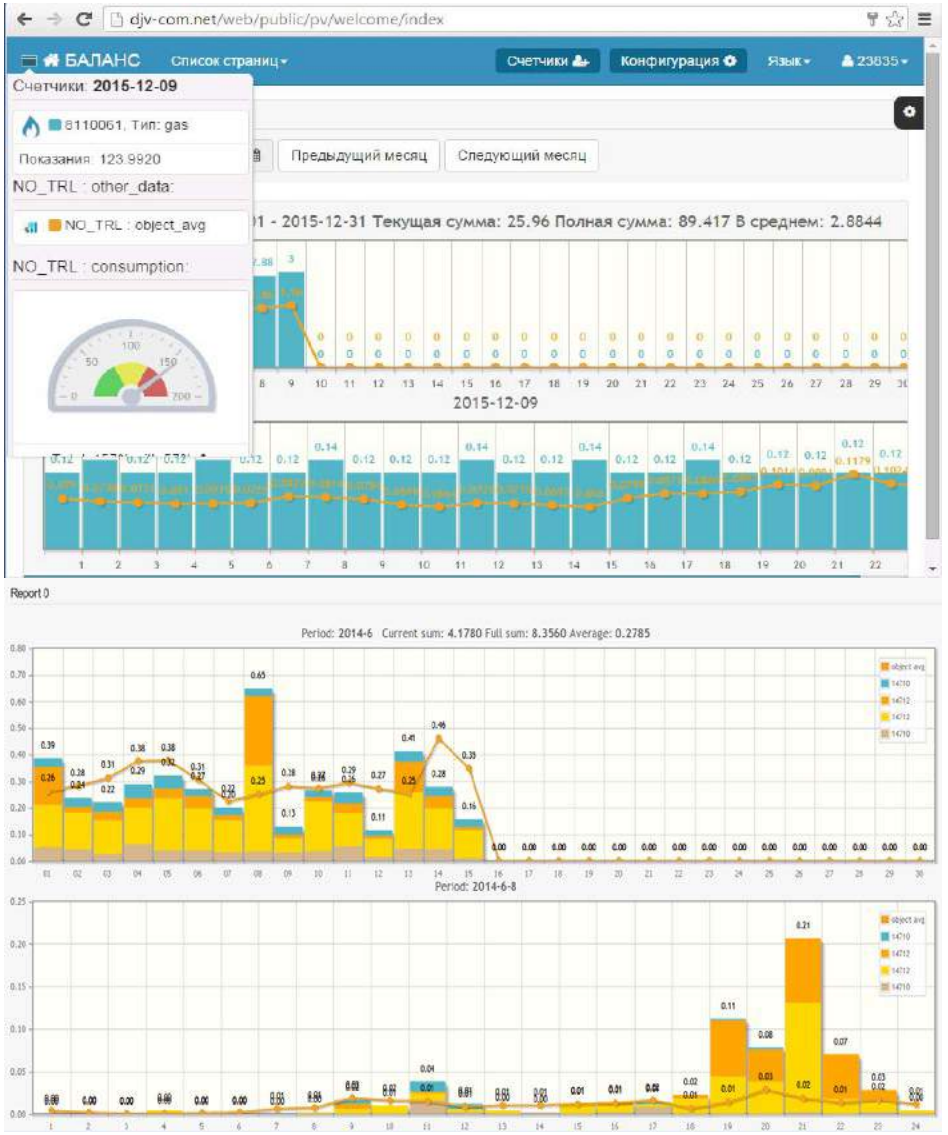
the ratio of your temperature to the average at home

Energy Efficiency Indicator:

ratio of your energy efficiency to average

The ability to display several metering devices on one chart, this handy if you have for example four water meters.

In the configuration for each of the counters you can choose the display color.



BALANCE mobile for iOS

BALANCE mobile is a simple and effective solution for intelligent data reading of energy resources in your home. The mobile app has the same functionality as the BALANCE web app but is targeted and optimized for mobile devices. If you have the remote BALANCE system from DJV-COM. you can use BALANCE mobile to access your electricity, gas, water and heat consumption data: you can use user 23835 and password 27826929

*** View daily and hourly consumption profiles.**

*** Viewing consumption at the beginning of the month compared to average consumption and end-of-month forecast.**

*** Events notification. You define the desired daily intake and, if consumption exceeds, the app will notify you.**

*** Monitoring temperature and energy efficiency.**

•The possibility of adding or removing gas, water, heat and electricity meters to control all the resources in your home / apartment.

•Current data query and consumption management (* with access rights)

Download app: [DOWNLOAD APLICATION.]

For support, contact us at mobile@djv-com.net.

BALANCE mobile for Android

BALANCE mobile is a simple and effective solution for intelligent data reading of energy resources in your home. The mobile app has the same functionality as the BALANCE web app but is targeted and optimized for mobile devices. If you have the remote BALANCE system from DJV-COM. you can use BALANCE mobile to access your electricity, gas, water and heat consumption data: you can use user 23835 and password 27826929

*** View daily and hourly consumption profiles.**

*** Viewing consumption at the beginning of the month compared to average consumption and end-of-month forecast.**

*** Events notification. You define the desired daily intake and, if consumption exceeds, the app will notify you.**

*** Monitoring temperature and energy efficiency.**

•The possibility of adding or removing gas, water, heat and electricity meters to control all the resources in your home / apartment.

•Current data query and consumption management

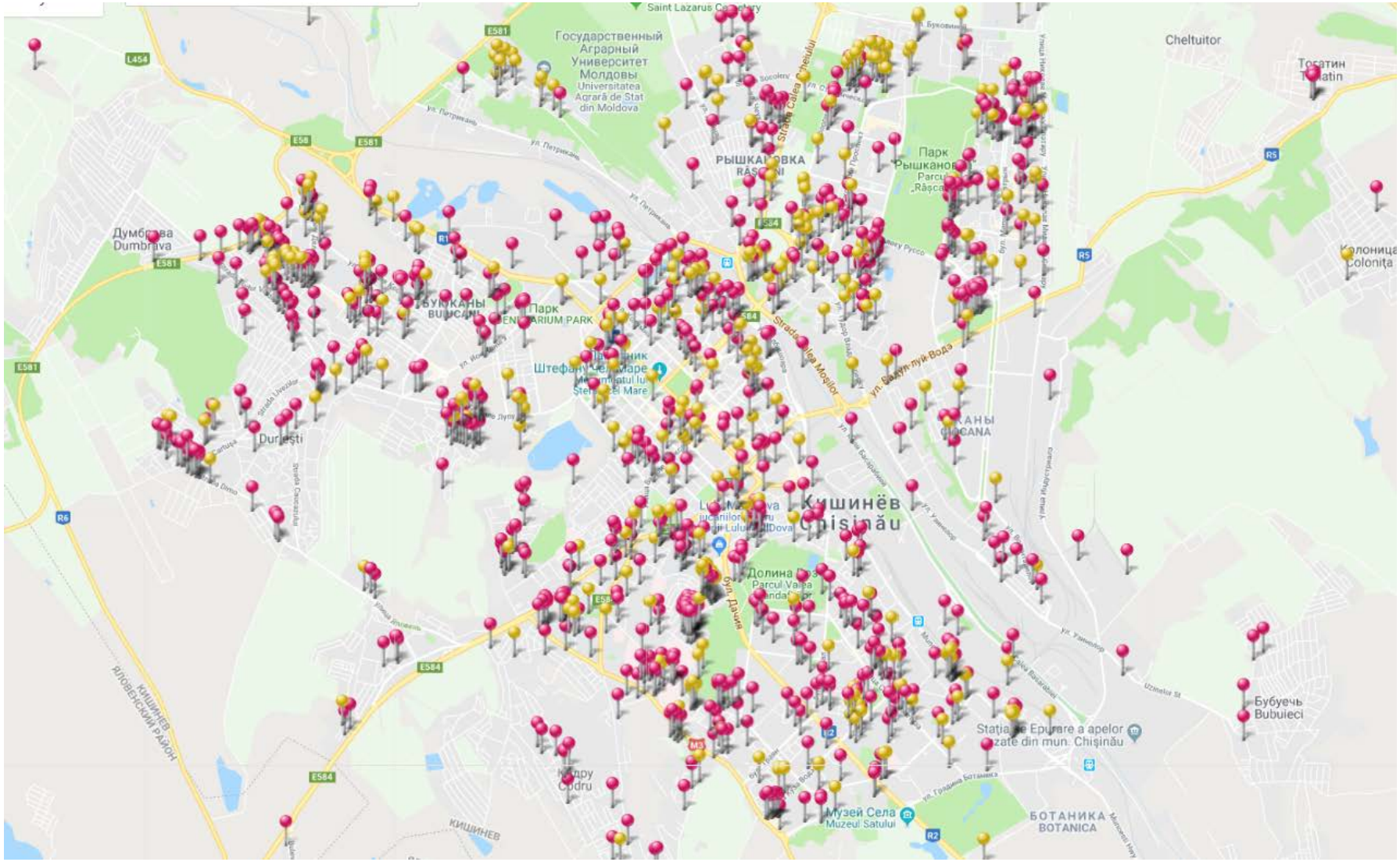
(* with access rights)

Download app: [DOWNLOAD APLICATION.]

For support, contact us at [mobile@djv-com.net].

Geography of the BALANCE system projects

The geography of projects can be viewed at https://djv-com.net/web/public/map/main/index



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Thank you for your attention