ROBOTINA

SOLUTION PRESENTATION

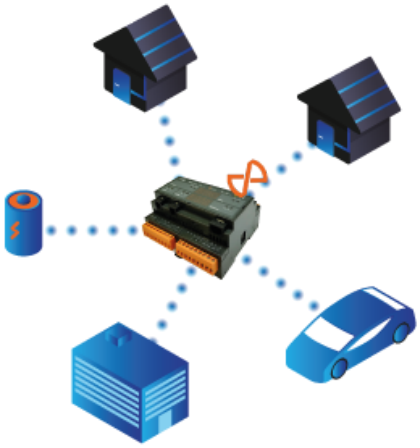
EMS

ENERGY MANAGEMENT SYSTEM

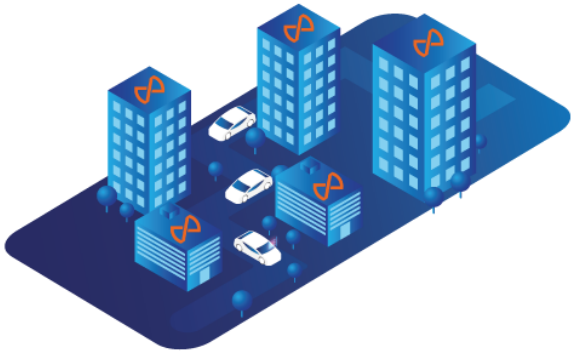
2023

CONTROLLING ELECTRICITY COSTS USING EMS

Electricity prices have risen dramatically in recent years. The trend continues, although all forecasts imply that it will rise even more. Although the price was the most noticeable to us (household and industrial customers), it was far from the most significant breakthrough in the sphere of electricity delivery.



Electrical energy sources, at least traditional ones, are limited, and some governments' (un)reasonable policies have further restricted them, while human desires and requirements change. Until recently, for example, the mass usage of electric cars was reserved for dreamers, but they proved to be visionaries, and the Tesla Y, which is, of course, electric, is currently the best-selling car in the world for the first time in history. The "experts" consider solar energy as the solution, which is of course pure and limitless, but the sun's rays reach the ground unevenly, causing variations in production. The number of comparably large and random consumers who are connected to the network at any point in time is therefore increasing.



The number of sources that function at random and are linked to various places in the network is also growing. Of course, the network was not designed or developed to meet such demands. Of course, we can locate additional resources, which is the easiest thing to do, but we also need to enhance the network and manage it better, which takes a lot of resources, careful planning, work, ingenuity, time, and compromises. Both at the same time.

The increase in charges "influences" consumers, who minimize their most expensive user patterns, which are typically ones that providers do not desire from users or that produce the largest costs to providers.

The good news is that we can impact the cost of electricity ourselves, and with reasonable steps, we can lower it by 50% or more in some circumstances. As it turns out, consumers who act optimally will pay half as much for electricity as those who use energy without a strategy.

HOW CAN WE INFLUENCE THE PRICE OF ENERGY

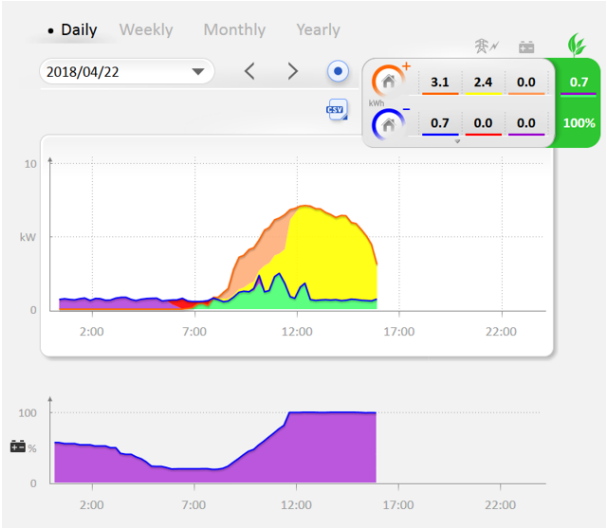
In order to be able to influence the cost of energy, we need to understand what the providers are charging us.

Regardless of the tariff system, the bulk of the cost is represented by three categories:

- connection power, which reflects how much our maximum current consumption can be,
- energy (which is beign used),
- and the cost of transporting this energy.

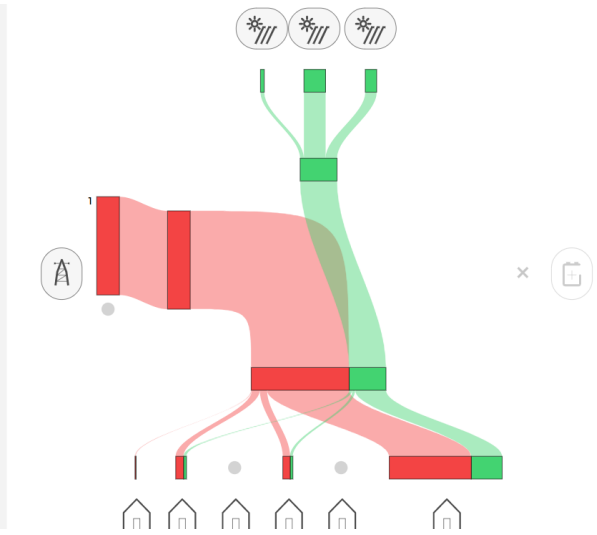
The tariff system of our provider determines individual categories. Until recently, these properties were relatively static and known in advance (example: two-tariff billing for households or peak power billing for industrial users.

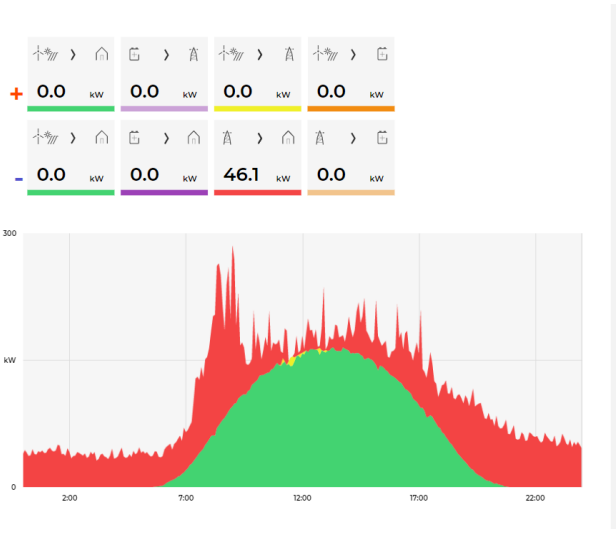
The current trend in energy prices is toward dynamic energy price changes and pricing modifications based on connection power. We can reduce our energy expenses by focusing on steps before or after the meter, or in the future, by adopting hybrid methods such as aggregators.



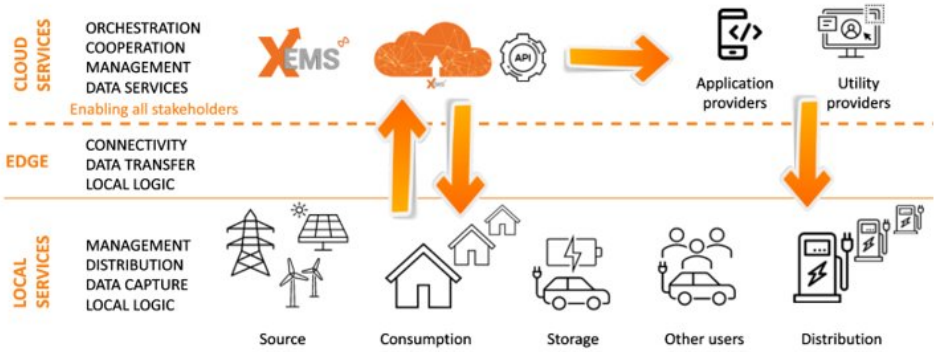
Measures in front of the meter include, in particular, supplier selection and tariff scheme. This allows us to affect the prices of various categories as well as our ability to optimize by selecting the charging method. For a long time, we have had the option of optimizing by selecting an energy provider, and people choose the best manner for themselves.

Display of energy flows
Source: Robotina





OPTIMIZATION BEHIND THE ELECTRIC METER



Source: Robotina

We have two alternatives with optimization behind the counter. The first is the development of our own resources, mostly photovoltaic power plants that support our own needs and are sold or stored in excess. The second method is to actively manage electricity consumers and other equipment (for example, batteries).

Active management is particularly intriguing because it allows us to take use of the tariff system's characteristics by decreasing fixed costs to a bare minimum and controlling variable costs in such a way that we pay the least amount possible for the necessary energy and power each time. These technologies can be paired with battery storage devices to further improve the outcomes. The theory is relatively basic and easily understood by everyone: when we know the pricing and price projection of particular categories (power, energy, network fee), as well as our demands and the forecast of needs, we manage the devices in such a way that they best meet our goals. However, this is not an easy task since when we use the devices, we influence their operation and hence their effect. Also, because the goals can be complex or even conflicting (for example, everyone should have as much comfort as feasible at the lowest possible cost), this optimization cannot be accomplished through physical management of devices, even when computer simulations assist us. To accomplish the desired results, we require a dynamic system for managing energy systems "behind the meter," also known as an enhanced EMS (Energy Management System). However, not every EMS is effective. A good EMS must support reliable device control, multi-objective optimization, prediction, and simulation.

All of this must be done in real time, while also adapting to the user, the tariff system, the price and condition, and the needs of each unique device. Despite this, he must specifically pursue the goals, or do everything in his power to attain them. As a result, modern EMS employs control technologies (PLC), machine learning and artificial intelligence, computing at the edge (EDGE), and cloud computing (CLOUD). Simultaneously, it generates and consumes a tremendous amount of data (BIG DATA). All this is built into Robotina's xEMS solutions, which allow businesses and homeowners to save money regardless of how tariff systems alter in the future.

EMS FOR BUSINESS AND INDUSTRIAL USERS

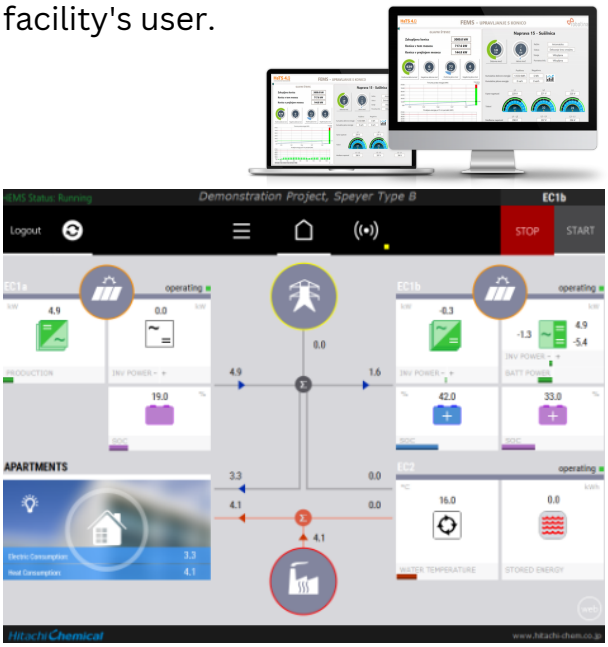
xEMS is a product and solution that enables energy optimization of all types of buildings as well as groups of buildings. We distinguish between business processes such as offices, retail centers, and hotels (BEMS) and production processes (FEMS) in the business world. The xEMS variations can be integrated, and effective management of electric vehicle charging systems can be included. The key in commercial facilities, as in all others, is to ensure current power optimization, which usually shows itself as a 15-minute peak and the purchase/sale of electricity in time zones when it is most favorable to the user. Furthermore, rule-based optimization, machine learning, and artificial intelligence are gaining traction, particularly in commercial facilities.

We have three main functions while performing energy optimization:

- DMS (Demand side management): dynamic management of loads, sources, and accumulators in order to match the required current power characteristics as closely as possible and so avoid expenses.
- FLEXIBILITY: dynamic control of loads, sources, and storage units by managing energy exchange with the network in the most cost-effective manner for the user.
- COS (Cognitive Optimization System): a rule-based, machine-learning, and artificial intelligence-based system that dynamically alters the settings of devices and systems in the facility to ensure that it is always optimum.

xEMS is a system that gives the biggest impact with the least amount of investment and is regularly supplemented and enhanced. It is recommended to begin any energy optimization project with the installation of a simple xEMS system, which immediately begins with essential parameter measurements. Based on this, we implement a number of procedures that, if necessary, are combined with the building of a photovoltaic power plant, the installation of battery storage units, and the installation of electric vehicle charging stations.

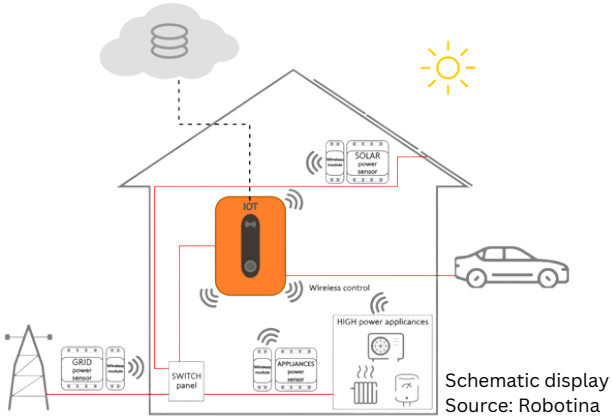
The system is linked to a cloud server, and a team of professionals regularly monitors and optimizes the effects, as well as adjusting the settings in response to changes in tariff systems. In this manner, the subscriber assures that the optimal cost of electricity is maintained in perpetuity. Let us reiterate that it is a fully regulated optimization "behind the counter" whose effects are enjoyed by the facility's user.



Source: Robotina

HEMS FOR PRIVATE USERS

Although this article is primarily aimed for business and industrial users, managing energy expenditures for private users such as residential and small commercial buildings is even easier. We created HEMS, a solution that can be installed rapidly by any skilled electrician and is designed to control all critical consumers and resources quickly, easily, and efficiently. Our most recent HEMS solution is integrated into a cutting-edge electric car charging station that wirelessly handles essential loads, providing the user with the most advanced HEMS for the cost of a charging station.



Schematic display
Source: Robotina

HOW TO GET YOUR OPTIMAL ENERGY SOLUTION?

The path a user takes to find the best answer for themselves vary depending on whether he is a business or a private user. Because it is almost always a tailored solution for business users, we tackle it project-by-project. We assess the state of the client's energy supply with them, agree on the desired goals, and then build a plan that we implement following confirmation. Following that, the facility is constantly monitored and optimized.

Private customers should contact their electrician and request an estimate that includes an RDC charger with an integrated HEMS. The item will be delivered, installed, and configured by an electrician. Despite the fact that it is a new product, some business partners have already received installation and commissioning training, while others may see it as a commercial opportunity.

WHY XEMS

- one-time investment,
- with a subscription, you will be notified of any future changes,
- a community that will collaborate.

EV product - RDC charging station
Source: Robotina