

**Use Case**  
**VOLTEX**

## Starting position

The Use Case was created with a producing electrical engineering company in Switzerland. The electricity loads correspond to real consumption in 2018. The company does not have any renewable energy sources and therefore obtains 100% of its electricity from the regional power plant. The monthly electricity load varies strongly from 193,000 kWh to 448,000 kWh. Annual fines averaging CHF 133,000 were imposed for peak loads and the increased use of the electricity grid. The company had problems controlling peak loads and forecasting future electricity consumption. The table below shows the average monthly electricity consumption.

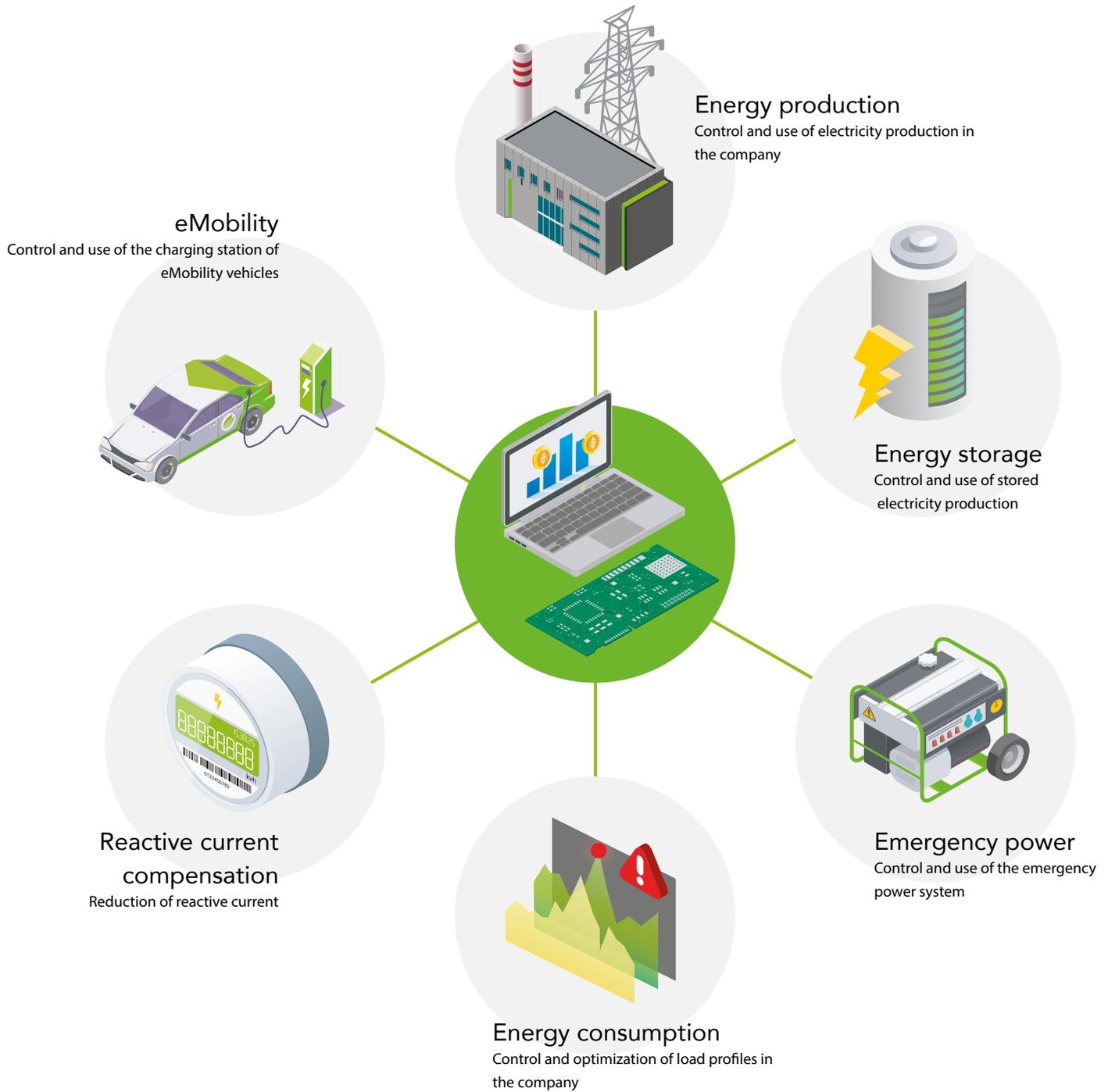


## Project goals

1. To use energy resources more efficiently and in a more environmentally friendly way
2. Economically optimized energy supply
3. To ensure security and quality of supply
4. User-optimized energy use

# VOLTEX modules

The energy management system (EMS) of VOLTEX has both a hardware and a software solution. The EMS is of modular design and can be assembled individually.



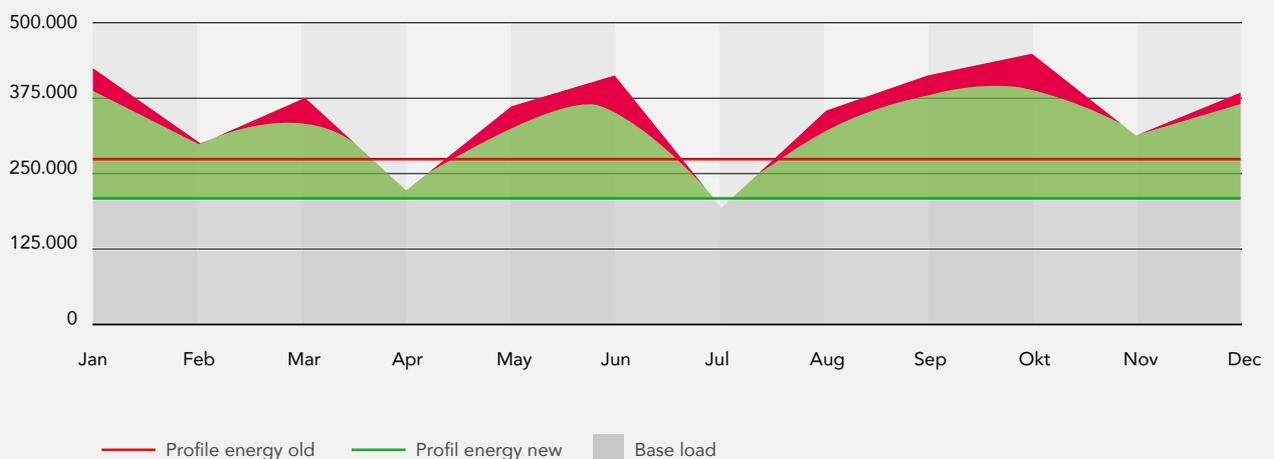
# Solution approach

The energy consumption (load management) module was used for this project. With the correction of the profile energy and the entire load management annual savings of CHF 203,840 can be achieved. This corresponds to a cost reduction of 4.4 %. Return On Invest (ROI) takes place after 9 months. From this point onwards the company can save costs and sustainably increase its energy efficiency.

Compared to before, the profile energy costs and the balancing costs are lower. As the balancing energy costs per kWh are 46% higher than the profile energy costs, the share of balancing energy is reduced. In load management, the peak power requirement is reduced by briefly switching off unneeded consumers or by clever production control. Our intelligent energy management system takes over this task and can switch consumers off and on again fully automatically in accordance with defined parameters without negatively affecting production.

To provide an overview, a table with the most important electricity consumption figures has been created. The result is a reduction of the total energy costs of CHF 203,840. Due to energy optimization with VOLTEX, both peak loads and the purchase of expensive balancing energy can be reduced. This saves CHF 69,160 in balancing energy costs.

Energy consumption without VOLTEX		Energy consumption with VOLTEX	
Energy requirement	35,000 MWh	Energy requirement	35,000 MWh
Optimization of load profiles	0 %	Optimization of load profiles	4 %
Profile energy costs	4,459,000 CHF	New energy requirement	33,600 MWh
Profile energy per kWh	0.13 CHF	Profile energy costs	4,324,320 CHF
Balancing energy costs	133,000 CHF	Profile energy per kWh	0.13 CHF
Balancing energy per kWh	0.19 CHF	Balancing energy costs	63,840 CHF
Share of balancing energy	2 %	Balancing energy per kWh	0.19 CHF
Cost savings	0 CHF	Share of balancing energy	1 %
Energy costs	4,592,000 CHF	Cost savings	203,840 CHF
		Energy costs	4,388,160 CHF



Further optimization measures such as a rechargeable battery, reactive current compensation or a solar system could reduce energy costs by up to 25%.

# Further optimization potential

Further optimization could reduce costs still more. We have therefore proposed further measures to the company.



## **Rechargeable battery**

With a rechargeable battery solution, the company has the opportunity to purchase electricity cheaply and use it for peak loads. This reduces the load on the network and smoothes the power consumption. This shift in power consumption allows the batteries to be recharged in the low tariff and discharged in the high tariff for production, thus saving costs.



## **Reactive current compensation**

Reactive current is the portion of the electricity supply which is paid for but not used as active current. Using the „Reactive current compensation“ module could save the costs for reactive current and reduce transmission losses.



## **Heat pump**

In production, a large amount of heat is produced by the plants. This heat can be sucked in by a heat pump and converted into electricity. In this way, 17 MWh of electricity could be produced per year.



## **Water turbine**

The company consumes 619 million litres of water every year. This water is used for cooling the production machines and other processes. Instead of letting the water run off as before, it can be driven by a turbine and thus generate energy. This step serves not only to optimize energy, but also as a connection to an intelligent energy ecosystem.

# Results / Summary

The company can not only optimize consumption, but also make operations and production more sustainable. Compared with the previous year, savings of CHF 203,840 can be achieved. Strategic measures such as the use of a heat pump, a water turbine or a rechargeable battery are also agreed. They help the company to achieve an additional increase in efficiency and a user-optimized use of energy. In this way, the company can reduce its own degree of independence from the energy supplier and plan its energy consumption in a more resource-efficient and environmentally friendly way. With further optimization measures through the energy management system, energy efficiency can be increased to a maximum of 25 %.

Modules	Optimierung	Resultat																																										
Energy production	<table border="1"> <thead> <tr> <th colspan="2">Energy consumption without VOLTEX</th> </tr> </thead> <tbody> <tr> <td>Energy requirement</td> <td>35,000 MWh</td> </tr> <tr> <td>Optimization of load profiles</td> <td>0 %</td> </tr> <tr> <td>Profile energy costs</td> <td>4,459,000 CHF</td> </tr> <tr> <td>Profile energy per kWh</td> <td>0.13 CHF</td> </tr> <tr> <td>Balancing energy costs</td> <td>133,000 CHF</td> </tr> <tr> <td>Balancing energy per kWh</td> <td>0.19 CHF</td> </tr> <tr> <td>Share of balancing energy</td> <td>2 %</td> </tr> <tr> <td>Cost savings</td> <td>0 CHF</td> </tr> <tr> <td>Energy costs</td> <td>4,592,000 CHF</td> </tr> <tr> <th colspan="2">Energy consumption with VOLTEX</th> </tr> <tr> <td>Energy requirement</td> <td>35,000 MWh</td> </tr> <tr> <td>Optimization of load profiles</td> <td>4 %</td> </tr> <tr> <td>Energy requirement new</td> <td>33,600 MWh</td> </tr> <tr> <td>Profile energy costs</td> <td>4,324,320 CHF</td> </tr> <tr> <td>Profile energy per kWh</td> <td>0.13 CHF</td> </tr> <tr> <td>Balancing energy costs</td> <td>63,840 CHF</td> </tr> <tr> <td>Balancing energy per kWh</td> <td>0.19 CHF</td> </tr> <tr> <td>Share of balancing energy</td> <td>1 %</td> </tr> <tr> <td>Cost savings</td> <td>203,840 CHF</td> </tr> <tr> <td>Energy costs</td> <td>4,388,160 CHF</td> </tr> </tbody> </table>	Energy consumption without VOLTEX		Energy requirement	35,000 MWh	Optimization of load profiles	0 %	Profile energy costs	4,459,000 CHF	Profile energy per kWh	0.13 CHF	Balancing energy costs	133,000 CHF	Balancing energy per kWh	0.19 CHF	Share of balancing energy	2 %	Cost savings	0 CHF	Energy costs	4,592,000 CHF	Energy consumption with VOLTEX		Energy requirement	35,000 MWh	Optimization of load profiles	4 %	Energy requirement new	33,600 MWh	Profile energy costs	4,324,320 CHF	Profile energy per kWh	0.13 CHF	Balancing energy costs	63,840 CHF	Balancing energy per kWh	0.19 CHF	Share of balancing energy	1 %	Cost savings	203,840 CHF	Energy costs	4,388,160 CHF	<ul style="list-style-type: none"> <li>• Saving of CHF 203,840</li> <li>• Cost reduction of 4.4 %</li> <li>• ROI after 9 months</li> <li>• 52% less balancing energy costs</li> <li>• 4% lower energy requirement</li> <li>• 25 % increase in energy efficiency due to optimization measures</li> </ul>
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