Energy Management System

EMS - Energy Management System
Technical facts / Specifications and equipment

Basics and concept

EMS is a development to produce energy in an optimized and decentralized way. Basis is a project to create a highly available small electricity generation (micro power station) for the self-sufficient use on gas pipelines of the Russian Gazprom in unapproachable areas without electricity supply. Fuel gas is directly taken from the transport pipeline at a pressure up to 100 bar and is transformed through the CHP (combined heat and power unit, dt. BHKW) into electricity for supplying technological objects. The heat is used to self-supply the container. This concept can be used for different constructions, efficiencies and for varied terms of references. Core is the self-developed energy-management-system (EMS). A space-optimized realization to install into the container makes the solution structurally independent, flexible, transportable and quickly operational.

Storage and recovery

In general EMS is a function, a programmed logic to control sources depending of its consumptions or needs. Energy sources can be CHP units (dt. BHKW), Fuel Cells and PV-Systems. Production and consumption of all types of energy is monitored and surplus energy is stored. If there is a link to external supply networks the surplus energies can be refed and economically reasonable models to cover peak- loads can be found.

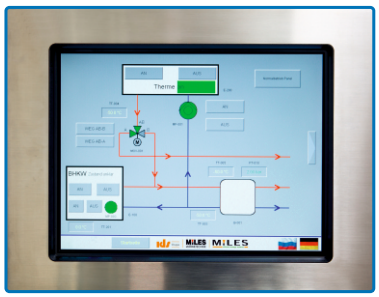
Costs and benefits

Aim of the EMS is to achieve a maximum efficiency or a maximum energy yield at minimal costs. Two examples: If there is only one CHP unit (dt.BHKW) to produce energy, it will be driven either with focusing on the heat or on the electricity. The other sort of energy is then a “waste-product” and is used in many cases economically less reasonable. But if you store it until required, nothing or only a little bit will be lost depending on storage and duration. An outside supply can be rejected. If the CHP unit (dt. BHKW) is for example carried by heat and the storage is well designed, the parallel produced electricity can cover the total demand. The external networks are then only used as a security-backup.

If you expand to one more PV-System and the heat storage gets one more electric heat-element the CHP unit (dt. BHKW) will practically be the backup in case the PV-System can´t cover its needs. Therefore gas will be saved and the lifetime of the CHP unit (dt. BHKW) and its service intervals will increase.

Planning and control

To plan a system with EMS you have to consider technical and economic factors, to analyze consumption behavior and to define an optimal storage layout. Then EMS – with the corresponding parameters - takes over control of the sources through to monitoring of consumption, storage status and if necessary also considering information and specifications which are transferred by a central office, e.g. the operator or the “Stadtwerke” (municipal energy supplier).



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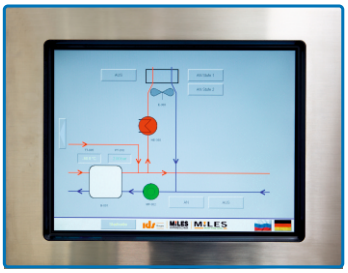
Technical specifications of the basic model

Electrical power output	1,2 to 1,5 kW_{el} on a required service interval of 1 year 55,2 kW_{el} on a service interval of about 3.500 h (= maintenance interval BHKW)
Tension	400 VAC
Battery pack	24 x 8 OPzV SOLAR.POWER 1000 - 1085 Ah at 48 VDC
Operating modes	Stand-alone operation Stand-alone operation with mains-backup Mains operation with stand-alone-backup
Connection to the public power supply network	Depending on the operating mode – separable Recovery can be allowed but also inhibited (mains operation with stand-alone-backup)

Power spectrum

Electric	5,2 kW_{el} to 63 kW_{el}
Thermal	12,5 kW_{th} to 150 kW_{th}
Operating mode	Self-sufficient or mains parallel
Source of energy	Natural gas / liquid gas / biogas
Battery capacity	Practically unlimited
Tension	400 VAC



Variants

- Involvement of solar power
- Involvement of solar heat
- Use of fuel cells
- Use of Stirling-CHP unit (dt. BHKW) to use landfill gas and sewage gas with low methane content
- Involvement of adsorption refrigerating plants for hot-cold-coupling

Applications

- Self-supply of sensitive objects, e.g. hospitals, small data centers and similar, by the combination of power generation, also cold and USV-function
- Replacement of diesel-powered emergency generators by CHP units (dt. BHKW) powered by natural gas or liquid gas
- Remote points of consumption like homesteads, mountain lodges and similar
- Energy security (electricity and heat) for luxury real estate
- Centrally controlled swarm operation for covering peak loads in small and medium supply areas

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