System Integration

visual energy energy data management

MISSION ENERGY:

Look forward to an energy-efficient future

One System. Best Solutions.

KBR
Energy Management

Analysis

Recording

Optimizing

Monitoring

Evaluating

Focus on energy efficiency: with visual energy, your energy management is ready for the future.

Energy data management

visualenergy

visual energy is your ticket to an energy-efficient future. The high-precision analysis software is certified by TÜV Süd **according to ISO 50001 for sustainable energy management,** confirming its above-average energy data consistency and plausibility as a **unique selling point** *. In addition, numerous smart functions and workflows open up new energy analysis possibilities.

* TÜV SÜD audit report, July 2016
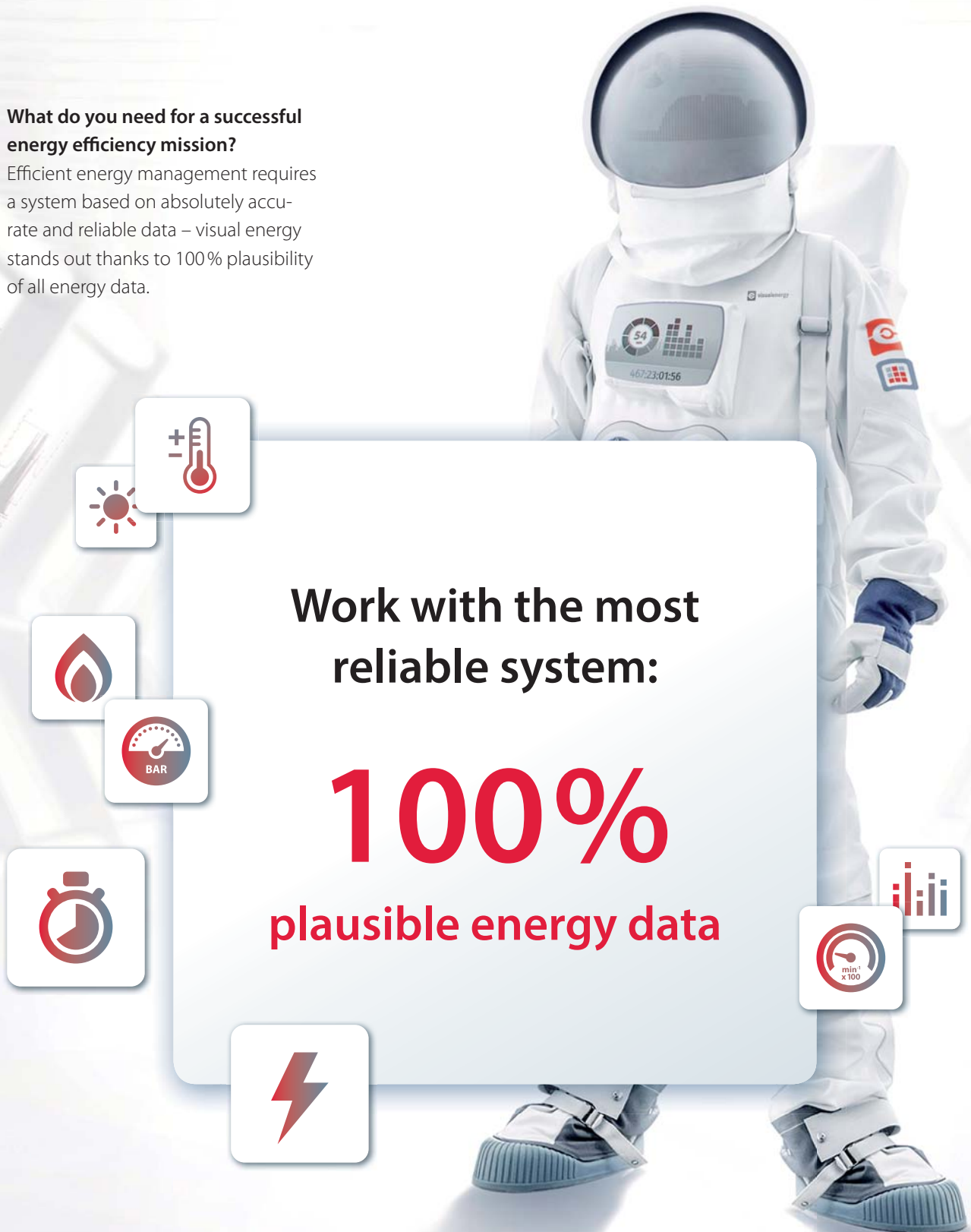
THE VISUAL ENERGY EXCELLENCE:

ABSOLUTE PLAUSIBILITY FOR 100 PERCENT RELIABLE ENERGY DATA.

What do you need for a successful energy efficiency mission?
Efficient energy management requires a system based on absolutely accurate and reliable data – visual energy stands out thanks to 100 % plausibility of all energy data.

Work with the most reliable system:

100%

plausible energy data

Greater transparency

Systematically analyze energy data and identify savings potentials precisely.

Increased safety

Comprehensively monitor consumption and react to inconsistencies quickly.

Higher productivity

Take full control of the energy used and ensure profitable processes.

»Highly accurate energy data consistency and plausibility is KBR's unique selling point in the field of EDM systems.«

TÜV SÜD audit report, July 2016

Maximum energy efficiency

Sustainably reduce energy consumption and significantly lower operating costs.

Mission energy online: www.visualenergy.de/en

THE FLEXIBILITY OF VISUAL ENERGY:

ALL IT TAKES TO COMPLETE FUTURE TASKS QUICKLY AND SECURELY.

How high is the fuse load and is my company at risk of production downtime?

How about the base load?

Are devices in inefficient standby mode?

How can we determine meaningful Energy Performance Indicators for energy, EnPIs?

An energy manager's concerns

illumination   compressed air   pumps   cooling plants   ventilation plants   process heat

A controller's thoughts

How can I create an energy forecast for next year?

Can I reduce expensive load peaks?

What is the share of energy used for my product?

How can we check if energy consumption is changing?

How can I achieve and monitor the target of reducing energy consumption by 7%?

How can my company cut energy costs significantly?

What are the added benefits of energy data management according to ISO 50001?

Does an energy data management system give me a competitive advantage?
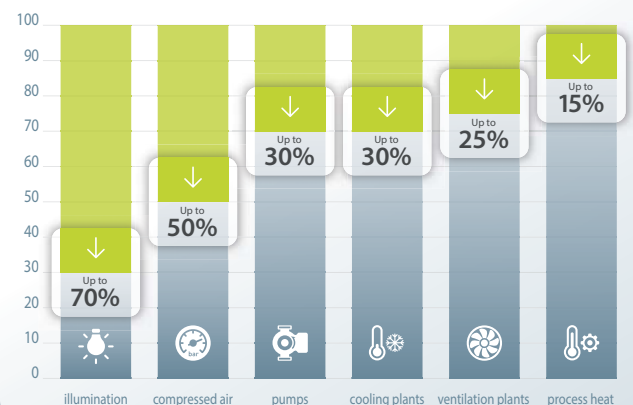
A managing director's strategy

Ready for the digital future.

Industry 4.0

Choose a future-proof solution

This image illustrates the typical savings potential in energy consumption – across all industries.

You can significantly reduce your energy consumption, increase productivity and save money with sustainable efficiency concepts.

Up to 70%

Up to 50%

Up to 30%

Up to 30%

Up to 25%

Up to 15%

illumination   compressed air   pumps   cooling plants   ventilation plants   process heat

THE POWER OF VISUAL ENERGY:

QUICK, EASY AND MAXIMUM EFFICIENCY.

DAILY REPORT

KBR current total	51,18 kWh	Value okay	✅
	1,10 kWh	No status	▬
...support	4,09 kWh	Value okay	✅
...development department	2,64 kWh	Value okay	✅
...development department	5,57 kWh	Value okay	✅
Room 5, first floor development department	1,65 kWh	Value okay	✅
...rack 1	5,85 kWh	Value okay	✅
...rack 2	25,29 kWh	Exceeded, Status 0. Rated value max: 24 kWh	❗
...n 1/2/3 socket	6,43 kWh	No status	▬
Gas total	206,15 kWh	Exceeded, Status 0. Rated value max: 175 kWh	❗

eBus

OPC

Modbus

CSV

MSCONS

Mobil

Recording and checking plausibility

- **Continuous recording** of every type and state of energy
- **100% plausible measurement** in accordance with the **BDEW metering code** and **VDE application rule**
- **Data import via MSCONS** for smooth communication on the energy market

Visualization and analysis

- **Intelligent** *workflows*
- **Filter analyses** in real time
- *Excel add-in* for flexible key figure generation
- **Automatic generation of balancing groups** with sums and relative complements

With visual energy, you have your energy consumption under control. Smart functions and expansions reliably provide you with an overview of states and consumption and ensure secure handling of all energy data – also for communication on the energy market.

Friday, 20 January, Working day

Gas total
KBR current total

OPC

PDF

EDI
MSCONS

CSV

Optimization and monitoring

- **Individual *dashboards***
- **Automatic monitoring** of network quality, consumption, projected energy volumes and device parameters
- **KBR Smart *Maintenance***
- **KBR secureF fuse monitoring**

→ Pages 16 –17

Exporting and evaluation

- Comprehensive **consumption, billing, cost center and energy benefit reports**
- Secure provision of energy data in the standard formats **PDF**, *CSV*, *MSCONS* or *OPC*
- **User roles** and **team organization**

→ Pages 18 – 19

i **Good to know:** You will find a list of explanations of all *technical terms in italics* on page 27.

A complete energy overview:

Record all states and any type of energy

visual energy records all energy data of different states and from different energy sources, automatically monitors measured values and processes them to provide you with plausible and meaningful data for evaluation.

Highlights and options:

- Manual meter reading entry
- Mobile meter reading using Android smartphones
- **MSCONS** data import from the energy provider
- Automatic **capture of meter readings** with standard Modbus measuring devices
- Automatic capture of meter readings via **OPC**, e.g. M-Bus, BACNET, Profibus, etc.
- Automatic meter reading and **load profile measurement** with KBR eBus measuring devices

TÜV Süd confirmed the high energy data plausibility and consistency as a unique selling point among certified energy data management systems*.

The perfect data pool:

100% plausible energy data

Not only does visual energy record measured values, it automatically checks them for plausibility using the mapped supply structure. Error-prone virtual measurements are a thing of the past, as is updating them in the event of changes. By using **OBIS codes**, visual energy reliably prevents measured values and energy flow directions from being mixed up. Additionally, fuses and wires in electrical networks can be monitored.

Automatic status labeling in accordance with the **BDEW metering code** and **VDE application rule** ensures secure transmission of the measurements. In conjunction with the **automatic and manual substitute value formation**, even time-critical monthly statements are no longer a problem if measurement is interrupted.

RECORDING AND CHECKING PLAUSIBILITY

Creating a perfect data pool

Recording using KBR eBus measuring devices

Load profile recording using KBR eBus devices is extremely convenient and extremely secure. These devices are equipped with a real load profile memory with status labeling – an important factor in plausible energy data management. User rights and a special parameter monitoring function protect the system from erroneous input on the part of the user.
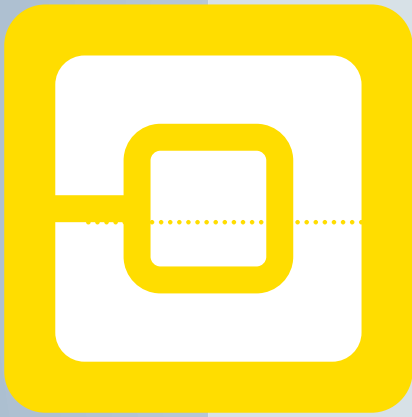
Other advantages of the KBR eBus:

- Time and period synchronization
- Device configuration via web interface
- Parameter monitoring
- Real internal load profile memory
- secureF fuse monitoring
- Event, device log and switching operations memory
- Automatic device state monitoring

Recording using Modbus devices or via OPC

You can take meter readings and read instantaneous values using commercially available Modbus devices (Modbus RTU or Modbus TCP) thanks to a universal driver. Measuring devices for other media such as water or heat meters are also easy to integrate. Periodical reading of the *load profile recording* simulates load profile measurement.

An integrated OPC client (1.0, 2.0, 3.0 DA) makes it possible to take meter readings and read instantaneous values from OPC servers. In this case, periodic reading is used to simulate load profile recording, as well.
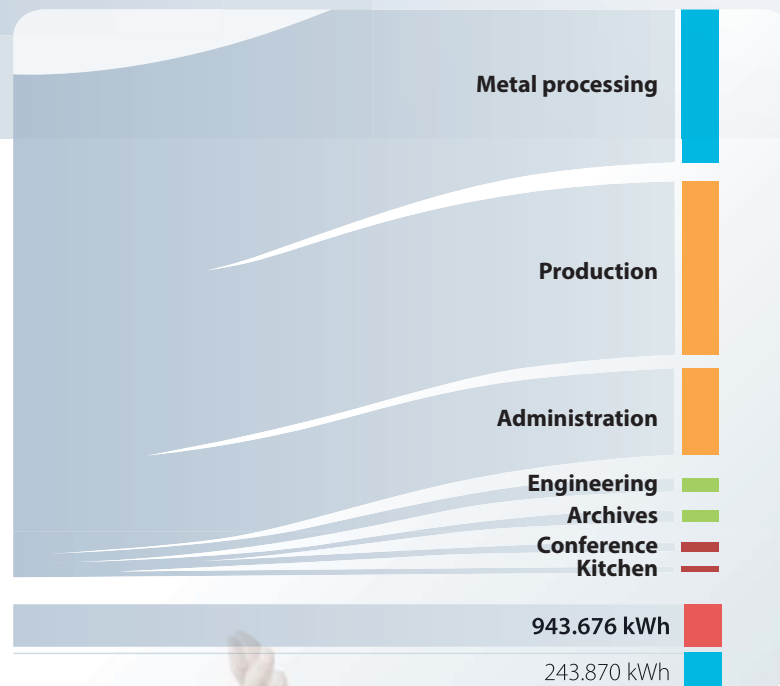
Flexible data acquisition:

Via App, eBus, Modbus or OPC

With visual energy, you can integrate any non-bus capable reading points into the system. You can either enter the meter readings into a web form or use the Android smartphone app provided.

Highlights and options:

- Definition of reading ranges and assignment of different readers
- Definition of reading sequence (travel path)
- Central reading prompt
- Data input plausibility check (meter reverse, zero consumption, higher/lower consumption)
- Meter change support
- Automatic ad hoc transfer upon data connection
- Automatic substitute value formation

Metal processing

Production

Administration

Engineering

Archives

Conference

Kitchen

943.676 kWh

243.870 kWh

Accurate results:
Automatic plausibility check based on the supply structure

Supply structure mapping is one of the highlights of visual energy. This enables operating technicians to verify the plausibility of the data from the outset. Based on the position of the measuring points in the supply structure, visual energy automatically generates virtual totals and differences on all distribution levels and on this basis generates the best visualization possible. Manual creation and maintenance of virtual measurements are a thing of the past, eliminating a common source of error and incorrect evaluations.

Forgotten measurements, incorrect formulas or incorrect energy flow direction are no longer a problem thanks to balancing group calculation. visual energy automatically calculates the totals and differences for the entire supply structure for each distributor and each measuring parameter.

Furthermore, each consumption measurement can be assigned to cost centers and energy benefits by percentage (up to 100%). The energy flow direction is always processed correctly, even in case of joint distribution and energy recovery. Higher-level measurements in outputs transfer energy to lower-level inputs and vice versa.

RECORDING AND CHECKING PLAUSIBILITY

Recognizing the potential of the data

Sankey diagrams show savings potential

visual energy visualizes energy volumes and flows with Sankey diagrams. Unlike in balancing group representation, the energy volumes are represented by arrows with a width that is proportional to the quantity of energy. Sankey diagrams provide important insights into energy and material flows and are quite useful in identifying savings potential.

+ The benefits for you:

Contemporary and standard compliant energy data management system in accordance with DIN EN ISO 50001

Eligible for BafA* funding

100% energy data plausibility and consistency for a reliable data pool – confirmed as a unique selling point by TÜV Süd

Secure data transfer and smooth communication with standard formats and bus systems

Ready for the digital future of Industry 4.0

* "Bundesamt für Wirtschaft und Ausfuhrkontrolle", the German Federal Office for Economic Affairs and Export Control

Et voilà: Get an overview. Gain insight. Identify potential.

You're all set.

Automated actions:
Workflows and triggers

A big advantage of energy data management using visual energy is working with **workflows**. These predefined scripts allow you to control recurring processes quickly and without any errors. This way, many tasks are completed almost automatically or with minimum effort. Workflows for the most common standard actions are already included. If need be, you can create individual workflows or add new ones from the KBR library: just upload them and they are ready for use right away.

Convenient: you can define start trigger criteria for each workflow. For example, you can set up a schedule trigger for data requests or a trigger for data validation upon receipt.

Optional: Activate trigger

Start workflow

Status report

Real-time data visualization:
Filter analyses

To maximize energy efficiency, you have to determine any weaknesses in the devices' energy consumption behavior and implement optimization measures. The visual energy filter analysis does this quickly and efficiently. Any consumption behavior, no matter how complex, can be visualized clearly and analyzed in detail with just a few clicks.

You can load the values for several years to analyze a measuring point and use filter parameters for selective visualization. Any change is represented in real time. The following parameters are available and can be used individually or in combination:

- Year(s)
- Month(s)
- Weekday(s)
- Weekend
- Off-peak time
- Time of day
- Value range

VISUALIZATION AND ANALYSIS

Make informed decisions

+ The benefits for you:

"Energy guzzlers" and savings potential are visible immediately

Precise energy analysis and evaluation

Causes of malfunctions can be clearly identified

Individual evaluations with Excel add-in and adjustment without the need for any programming skills

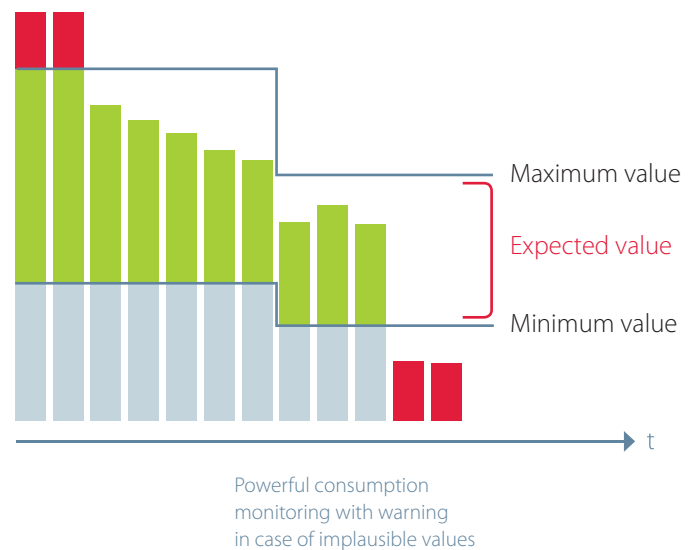Increased planning reliability and sustainable energy efficiency

Detailed representation:
Energy benefit diagrams

You can visualize and evaluate consumption, energy benefit, billing and cost centers clearly and with a nice layout – as graphics or in tables. For detailed consumption analysis, for example, you can create diagrams with variable time axes that you can easily adapt to your requirements and share with other decision-makers or others involved in your project.

Convenient Excel interface:
Excel add-in

MS Excel connectivity is really easy with the *Excel add-in*. You can use Excel functions to process energy data captured with visual energy and create individual evaluations and tables without the need for any programming skills. A project explorer facilitates your task.

Excel Add In

Keep track of everything:
Interactive dashboards

Wherever you are, the *dashboard* gives you interactive access to all your data sources so you never lose sight of important parameters. The dashboard opens as a customized website within the visual energy application and is available online without requiring the user to log in. This opens up many new possibilities: you can integrate the graphically represented energy data in business portals and update or expand them with additional information in a matter of seconds.

With the **Dashboard-Designer**, you can adapt the graphical representation and change the layout of the data on screen to suit your individual requirements.

Maximum value

Expected value

Minimum value

t

Powerful consumption monitoring with warning in case of implausible values

Continuous efficiency monitoring:
Consumption monitoring

Monitoring and optimizing supply structures is a central task in energy management. Here, you can rely on the consumption monitoring function integrated in visual energy to warn you of unusually high or low consumption. The values to be monitored are defined as the load profile. You can set a matching maximum and minimum value for each type of day (work day, holiday, etc.) to define it as the expected target for each measuring point.

OPTIMIZATION AND MONITORING

Ensure process efficiency

Active early-warning system:
KBR Smart Maintenance

Industry 4.0 calls for solutions and services that are able to dynamically react to various challenges in real time. The KBR *maintenance* service is like a radar for your energy data management system with visual energy. It detects irregularities early on and actively notifies you. KBR's team of experts is always there for you with practical recommendations and services, such as checking your system telemetry data, if you wish.

Maximum security:
KBR secureF security concept

To ensure the highest possible system availability and supply reliability, KBR has developed the secure F© security concept, designed specifically for electrical fuse monitoring. Here, visual energy is combined with KBR eBus devices to ensure continuous monitoring and control, sending notifications in the event of any irregularities. Thanks to flexible relay modules, warnings and alarm messages can easily be linked to an error message system.

Maximum security with secure F©:

- Alarm on overload tendency
- Immediate warning if the fuse rating is exceeded
- Blown fuse alarm
- Quick setup: most of the functions have default system settings

➕ The benefits for you:

Optimal energy distribution and system utilization

Reliable basis for decision-making on energy targets

Comprehensive comparison options with benchmarks

Gentle and secure processes

Rapid amortization thanks to a sustainable reduction in energy costs

secureF©

KBR security concept
Method for monitoring
of fused outgoing circuits.

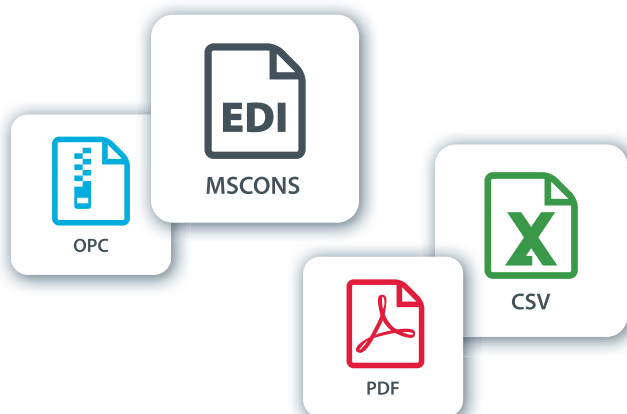## Individual evaluations:
Energy Performance Indicators

Energy performance indicators for energy are very useful for any company, as they can provide valuable insight in terms of energy efficiency and can help to detect savings potential. You can, for example, determine an energy performance indicator for the amount of energy used for a product during the development stage and later monitor this value accurately during production. This allows you to react quickly if there are any deviations.

You need to combine the available energy data with your production data to make the most of energy performance indicators. The perfect tool for this task is the *Excel add-in*, an integrated Excel interface which allows you to merge almost any information from the visual energy data archive with production data to generate the required energy performance indicators. This is really easy and requires no programming skills. One click is all it takes: Excel generates the relevant values and evaluations right away.

Secure export:
PDF, CSV, MSCONS or OPC

Using the *EDIFACT* interface, you can also export measurement and consumption data to other systems. If the recipient does not have an *EDIFACT* interface, you can choose configurable periodic *CSV* export instead. All standard data formats are also available for transfer, ensuring safe and smooth communication with energy providers and system or meter point operators. Reports are created in convenient PDF format.

EXPORTING AND EVALUATION

Providing real-time energy data

Sharing real-time analyses with your colleagues?

Nice. Here's to the new energy data culture!

Convenient reporting:
Measuring point and cost center reports

You can create customized energy reports with meaningful visualization in next to no time and visual energy periodically generates and transmits PDF reports. This saves time and is reliable. If, for example, you want to analyze the consumption behavior, you can create diagrams with adaptable time axes and save the results in custom evaluation folders.

Good cooperation:
User and team organization

With intelligent user rights management, organizing the cooperation of all parties involved is a piece of cake. You can control the user flexibility by creating individual access rights for functions and data. Thanks to visual energy's scalability, you can create user groups for team organization in highly complex projects. All roles except the project manager and system administrator are defined according to location or medium.

+ The benefits for you:

Easy cost center billing

Secure data export and seamless interaction with other systems such as SAP

Energy supply according to demand and accurate consumption forecasts

Convenient team organization and user management

Individual energy indicators and linked process and energy data

THE VISUAL ENERGY EXPERIENCE:
IT CAN BE SO EASY TO MEASURE SUCCESS.

Attl Foundation: »Short payback period«

Puma AG: »The perfect toolbox
for energy managers«

ZF Friedrichshafen AG:
»Clear and simple«

visual energy was developed with the customer's perspective in mind and in in close cooperation with users. The result: an integrated, intuitive and secure system for your energy data, which you can easily use and profit from, as the following customer testimonials show.

With visual energy, we are able to display the energy consumption of our estate transparently, bill consumers for the energy they consume, and spot anomalies in consumption at an early stage. It has also enabled us to cut our long-term energy costs, meaning that the investment will pay off quickly.

Markus Dullinger, Technical Manager

visual energy gives energy managers a toolbox which caters to all of their needs efficiently and effectively. visual energy is a holistic approach to energy data management. Software and hardware are ideally coordinated, making it possible to create or adjust all of the measuring points, evaluations and analyses in next to no time whenever you want.

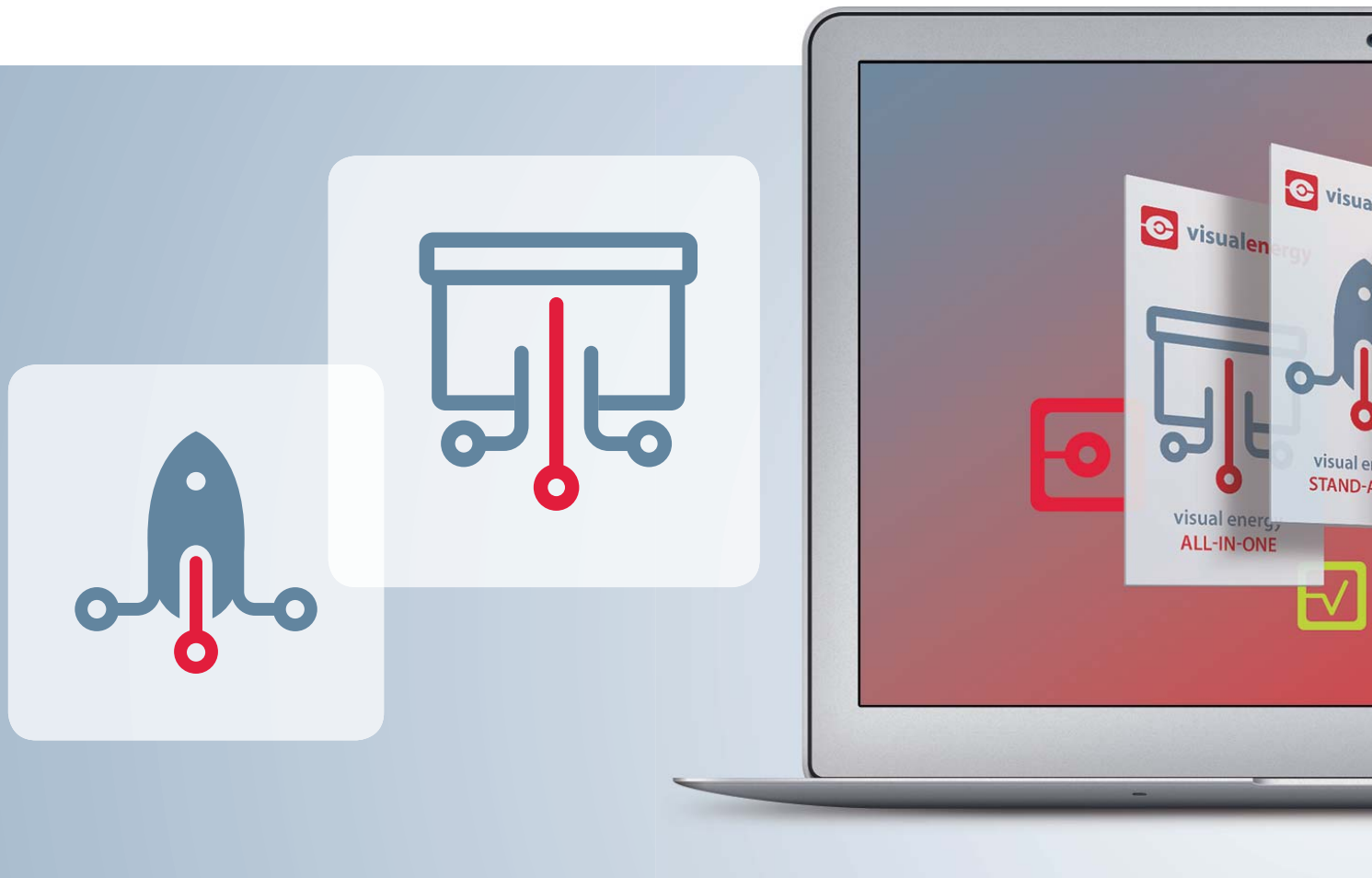**Jörg Rauhtäschlein**, Senior Facility Manager

Two people at our plant manage over 800 measuring points for various media using visual energy. The system is clear and intuitive, easy to operate and guarantees a high degree of operational safety and reliability thanks to permanent monitoring. Warnings and alarms are sent by e-mail and inform the user in good time in the event of predefined thresholds being exceeded or fallen short of – helping us to avoid unpleasant surprises due to production stoppages.

Thomas Meisinger, operations and maintenance, TGA

More practical examples online: www.visualenergy.de/en

THE VISUAL ENERGY PACKAGES:
PRACTICE-ORIENTED AND WITH THE BEST POSSIBLE SERVICES.

Package 1: Stand-alone

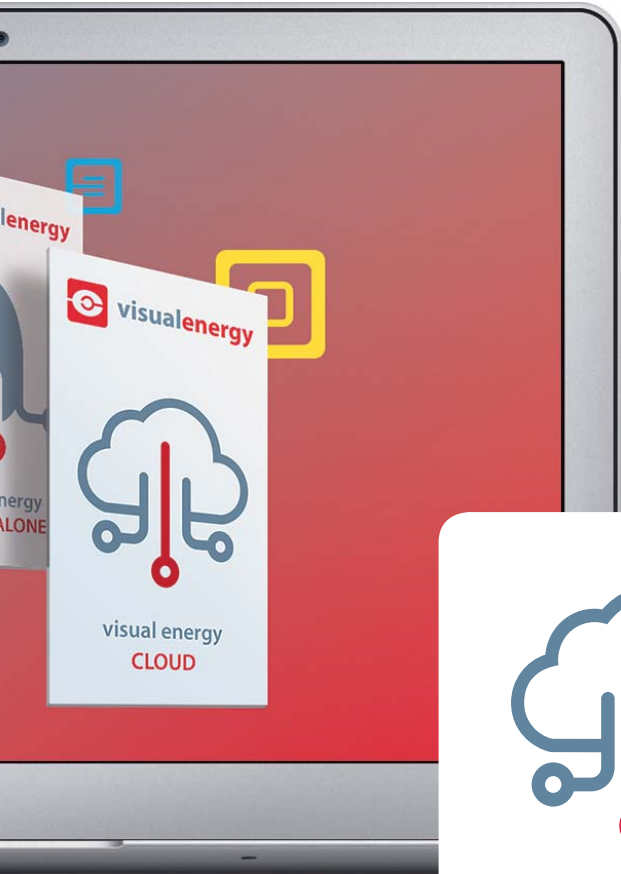**visual energy as a stand-alone software solution for existing systems**

Want to buy the software and install it on your own server? No problem at all! visual energy can be integrated into existing systems as a web application and also works with your hardware.

Package 2: All-in-one

visual energy as full package including server, ready for immediate use

A software and hardware package that leaves nothing to be desired. You get the latest version of the visual energy software including SQL and web server on a KBR 19-inch rack. On request, we can also configure all relevant requirements for your project before delivering the hardware to you.

visual energy is available as a stand-alone version, an all-in-one package or a cloud solution. All versions can be seamlessly integrated into existing systems. Another bonus: system scalability. Subsequent expansions of the supply structure are no problem at all.

+ The benefits for you:

Solutions and services tailored to your company's requirements

No licensing or other restrictions on the number of users or locations

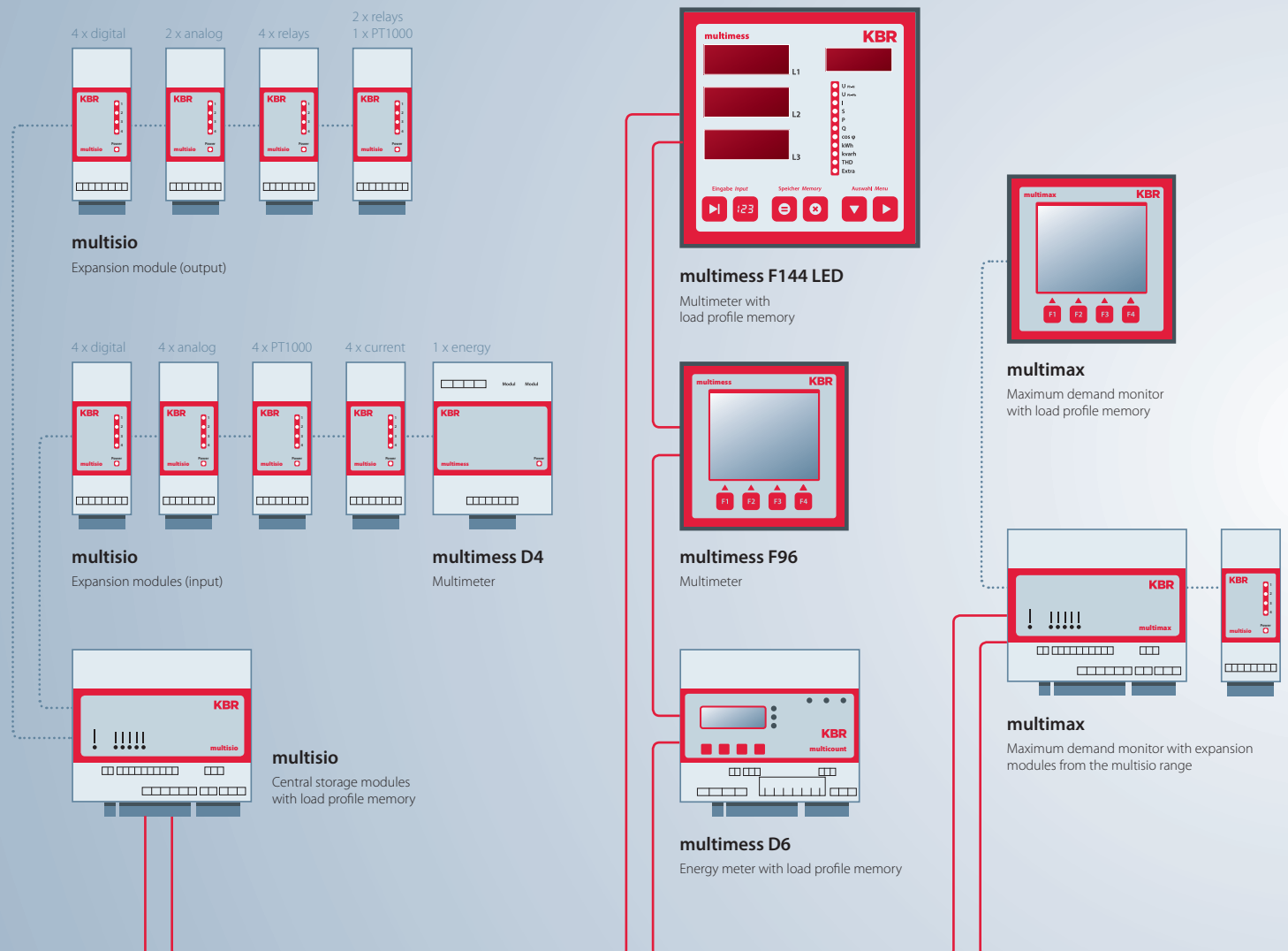Advice and technical support provided by KBR's team of experts

Package 3: Cloud

visual energy as a cloud-based application for maximum flexibility

If you do not want to have to deal with software updates and database maintenance, the cloud package is perfect for you. Data backup included. Fast and secure server connections let you work with the highest possible level of flexibility from day one.
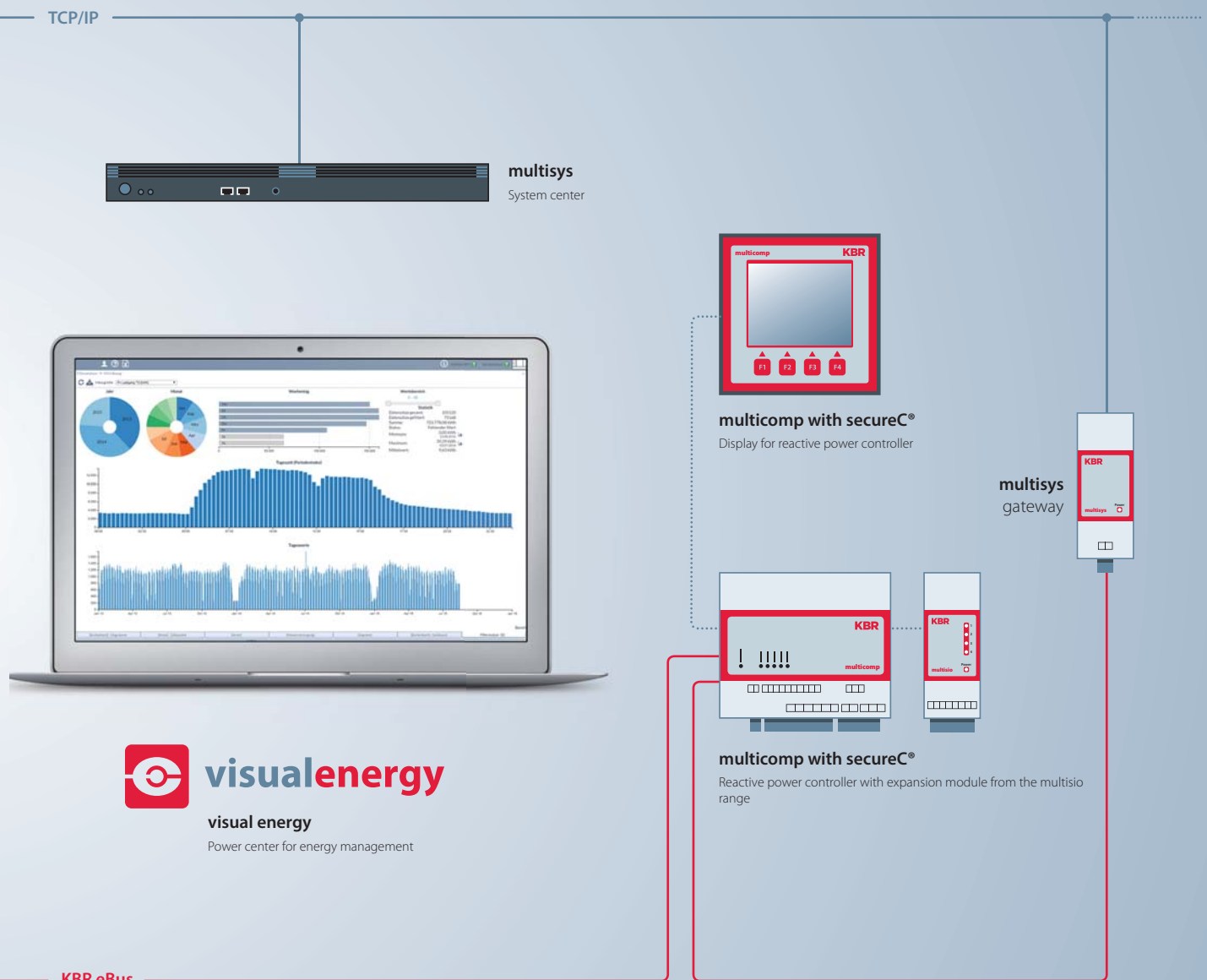
THE VISUAL ENERGY NETWORK:
A HIGHLY FLEXIBLE SYSTEM WITH PERFECTLY COORDINATED COMPONENTS.

4 x digital

2 x analog

4 x relays

2 x relays
1 x PT1000

multisio
Expansion module (output)

4 x digital

4 x analog

4 x PT1000

4 x current

1 x energy

multisio
Expansion modules (input)

multimess D4
Multimeter

multisio
Central storage modules
with load profile memory

multimess F144 LED
Multimeter with
load profile memory

multimess F96
Multimeter

multimess D6
Energy meter with load profile memory

multimax
Maximum demand monitor
with load profile memory

multimax
Maximum demand monitor with expansion
modules from the multisio range

Signals and energy data

Recording and optimizing energy

If you want to invest in an energy-efficient future, you need a system that not only meets current technical standards, but is also able to grow to meet new challenges. Our products and solutions are perfectly coordinated and of excellent quality and flexibility.
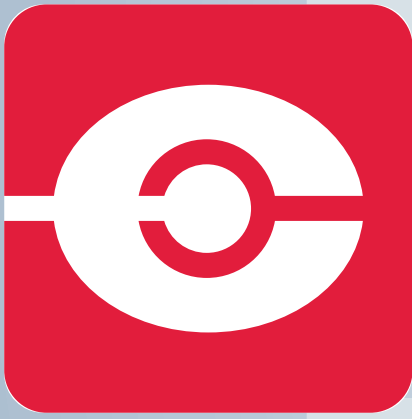
TCP/IP

multisys
System center

multicomp with secureC®
Display for reactive power controller

multisys
gateway

visualenergy

visual energy
Power center for energy management

multicomp with secureC®
Reactive power controller with expansion module from the multisio range

KBR eBus

System integration

Analyzing and controlling energy

Power quality

Reactive current compensation and active filters

VISUAL ENERGY SYSTEM REQUIREMENTS

visual energy	**Version:** 4.7 **Release:** 0 **State:** current release **Released:** May 2017 ■ Microsoft Server: 2008 R2 / 2012 R2 / 2016 ■ Microsoft Internet Information Services (IIS): 7.5 / 8.5 / 10 ■ Microsoft Message Queuing (MSMQ): 5.0 ■ Microsoft .NET Framework: 4.6.2 ■ Microsoft SQL Server 2008/2012/2014/2016, Standard or Express ■ Clients: current HTML5 browser, Chrome or Firefox
Bus master/starter	**Version:** 4.7 **Release:** 0 **State:** current release **Released:** May 2017 ■ Microsoft Windows: 7 / 8 / 10, (32 or 64 bit) ■ Microsoft Internet Information Services (IIS): 7.5 / 8.5 / 10 ■ Microsoft Message Queuing (MSMQ): 5.0 ■ Microsoft .NET Framework: 4.6.2 ■ Microsoft SQL Server: 2008/2012/2014/2016, Standard or Express ■ Clients: current HTML5 browser, Chrome or Firefox
Excel add-in	**Version:** 4.7 **Release:** 0 **State:** current release **Released:** May 2017 ■ Microsoft Excel: 2007/2010/2013/2016, (32 or 64 bit) ■ Microsoft .NET Framework: 4.6 ■ Microsoft Office Runtime VSTO 4.0

VISUAL ENERGY

System requirements and technical information

BRIEF EXPLANATION OF TECHNICAL TERMS

BDEW metering code	The BDEW metering code defines the minimum requirements that meter point operation and measurements have to meet as defined by the BDEW (German Association of Energy and Water Industries) in accordance with the German Energy Industry Act.
CSV	CSV is a standardized data format for storage and transmission that defines the structure of a file containing simply structured data. It can be used for easy energy data exchange between the energy data management system and MS Excel, for example.
Dashboard	A dashboard is a control panel that you can use for customized and clear representation of data.
EDIFACT	EDIFACT is an international standard used for electronic business data across industries.
Excel add-in	The Excel add-in is an interface for integrating your energy data management into MS Excel.
Load profile recording	Load profiles are periodically cumulated energy volumes (e.g. active energy used in 15 minutes) recorded by measuring equipment. In most cases, these volumes are indicated as power values (e.g. in kW on energy bills).
Maintenance	A maintenance system is needed to keep technical systems running smoothly. This ensures that the system stays operational or is functional again quickly in the event of a breakdown for complete and seamless energy data.
MSCONS	MSCONS is a data format for measured energy data. It is used for communication throughout the entire energy market and makes non-discriminatory energy data management (EDM) possible.
OBIS codes	OBIS codes (Object Identification System) are used for the unique identification of measured values (energy volumes, meter readings) in electronic data exchange between communications partners using different message types (e.g. MSCONS).
OPC	OPC is the standard for manufacturer-independent communication in automation technology. With this software interface, you can, for example, transmit values and meter readings in real time.
VDE application rule	The VDE application rule "Metering Code" is an universal standard for recording and transmitting measured data.
Workflow	A workflow is an automated chronological sequence of functionally, physically or technically related processes.
Capture of meter readings	Capturing meter readings is the cheaper, but also more error-prone, method of simulating a load profile measurement.

KBR is your reliable energy management partner.
The KBR system ensures sustainable and future-proof energy supply
and creates a decisive competitive advantage for your company with
high-precision technology, efficient solutions and a comprehensive range
of services.

Our services:

- **Planning and advice**
- **Energy measuring devices**
- **Analysis software visual energy**
- **System integration**
- **Seminars and workshops**
- **First-class services**

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