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Energy Data Management

FOR INTELLIGENT NETWORK OPERATION

ENERGY DATA MANAGEMENT

For Network Operation

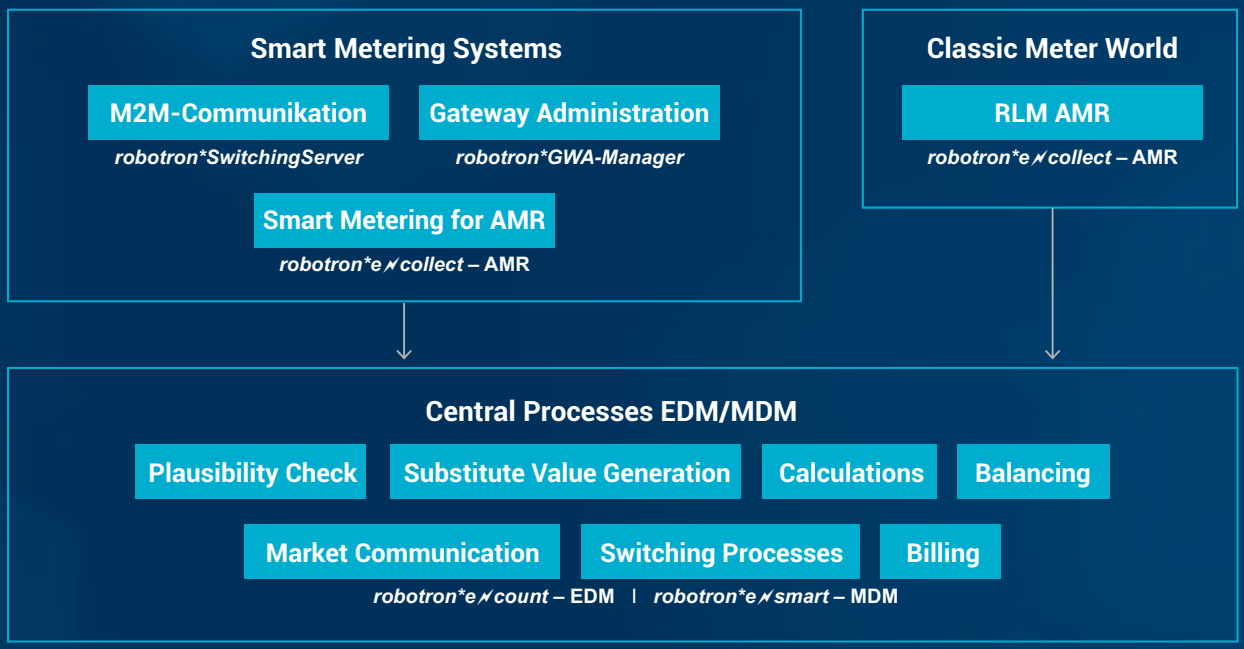
Specialization in the management and evaluation of large amounts of data and **decades of experience** in the energy industry are reflected in the performance of our software solutions. With this expertise, we have developed a unique service portfolio that covers all processes **of all market roles** and is continuously expanded and optimized.

With the **market-leading energy data management system *robotron*e*count***, the Robotron Energy Market Platform serves all functional requirements of network operators/meter operators – from advanced meter reading to billing.

Successful optimization of processes in mass customer business and communication with market partners is achieved through comprehensive automation and support for all necessary communication formats.

Robotron modules for network operators

The Robotron Energy Market Platform maps all market processes in an interface-free, cross-commodity, automated and interoperable manner.



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Process-Oriented Solutions for Secure, Efficient Processes in the Network of the Future

Plausibility Check

robotron*e⁄count is used to check the plausibility of imported load curves and meter readings. The status of the measured values and their deviation from individually configurable limits are checked. Additional checks (also in SQL) can be stored for load curves.

Substitute Value Generation

Manual and automatic substitute value generation is possible with the Robotron EDM system. **Different methods** for **substitute value** generation, such as interpolation, copying of historical measured values or copying of values from comparison meters are available. The methods can be **configured individually** and processed **automatically** one after the other. Independent of the automated methods, values can also be overwritten manually in the system.

Technical Quantity Determination

Balancing and billing energy load curves of the gas commodity are calculated from imported measured values in compliance with the Technical Rule G 685 in the currently valid version. In particular, a calculation of the K-number according to the methods SGERG-88 and AGA8-92DC, the determination of the air pressure from the altitude according to the currently valid formula as well as a calculation of the correction factor are possible.

Balancing

Balancing is available for the electricity and gas commodities. Thanks to the high degree of flexibility, the regulations of other countries can also be mapped and the module adapted to them. Robotron's (fully) automated, modular and fully integrated solution in the overall process chain is available for all market roles designated by the legislator (network operator, TSO, BCO, BGM and supplier).

Market Communication

Communication automation as a component of the basic Energy Data Management (EDM) system ensures the reduction of the daily workload when exchanging data with other market participants. The communication automation enables the cyclic checking of different data channels for newly received messages to be imported into the EDM system.

Redispatch 2.0

Robotron offers solutions for **optimized planning of generation and consumption plants** to avoid network bottlenecks. For the new redispatch regime, the portfolio includes modular functional models for the new requirements for **distribution system operators, plant operators, deployment managers, suppliers and balancing group managers.**

Switching Process Management

The **switching process management** solution ***robotron*WPM*** maps the market communication for the implementation of the Act on the Digitization of the Energy Transition. In this way, the Robotron solution creates the basis for the introduction of smart metering systems into market communication.

Billing

The Robotron EDM/MDM systems process various transaction data on the basis of which billing can take place. The cross-commodity **billing module** handles periodic (e. g. monthly, annually) or one-time billing. Electronic invoicing and the associated market communication are fully supported.

Your Advantages

- Entire value chain
- Modular system architecture
- High degree of automation

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ONE CORE – MANY FUNCTIONS

Integrated Core System

Robotron's EDM systems already offer a wide range of process-supporting functions in their core functionality.

Basic Functions

In addition to the multi-branch capability, the numerous separate modules of the EDM core (master and transaction data management, automatic job processing, calculations, reporting, etc.) form the basis for the high-performance storage and processing of master and transaction data.

The high-performance processing of transaction data has already been impressively demonstrated in multiple mass data tests as well as in many installations in productive use at customers of all sizes. Cross-system process automation and control, free grouping options for EDM content, the mapping of numerous other system attributes and a Europe-wide public holiday calendar are also part of the core modules.

Automated Market Communication

Communication automation as part of the basic EDM system reduces the daily workload involved in exchanging data with other market participants. Import and export activities are organized by networking the company-wide communication platforms. The import of various network charge databases for electricity and gas, the EEX prices, weather data, etc. is also carried out via the communication automation. Compliance with the latest security and signature regulations applies to all use cases. Likewise, the timely implementation of all market regulations and format requirements for switching processes of all commodities, and new market regulations is part of our portfolio.

Left Visualization: The visualization offers you extensive analysis and editing functions for consumption and forecast time series.

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Many Calculation Options

The free compilation of mathematical and statistical calculations with time series is supported system-wide by an extensive formula editor. The assignment to calculation jobs enables an automated execution, which is logically linked and result-controlled.
The calculations are executed depending on the data quality of the incoming time series in terms of status and/or plausibility parameters.

Right Lines mask: Line or time series functions are displayed compactly and in a configurable overview.

Visualization Tools

Individual load curves, group sums, control energy time series, Z-factors, temperatures, pressure ratios, price time series, solar irradiation – i. e. time series of any kind – can be conveniently visualized and analyzed with various tools. Thus, it is possible to determine key figures such as moving average, cumulative line, duration curve, forecast quality and many more already in the graph. The „Risk Management“ module is based on the „Portfolio Management“ module and, with its extensive functionalities, enables a quick overview of the risks of the portfolio. In this way, the module can contribute to risk minimization.

Individual Evaluations

In order to keep an eye on all accruing figures and to be able to efficiently process results of calculations and analyses, the system offers numerous evaluation options. In addition to predefined queries and standard reports, users can compile their own evaluations without any SQL knowledge. The „Excel Reports“ module offers a wide range of functions for automatically filling and dispatching reports of any complexity in Excel format. This eliminates the need to search for raw data in the system and copy it manually into Microsoft Excel. All reporting processes can be automated on a job-controlled basis.

Flexible Administration

The system has a comprehensive range of tools for the administration of individual or group user rights, archiving functions, logging, monitoring options, tenants, time- and event-controlled jobs (also via workflow) and much more. All jobs can be set up in a central administration interface according to a variety of criteria, processed fully automatically and checked.

MODULAR ARCHITECTURE

Convincing Functionalities and Added Value

The entire product range of the Robotron Energy Market Platform is modular. Each function/extension module can be used separately. Based on your process-related requirements, the required modules are determined and released in a cross-module installation. ***robotron*e✓count*** was designed for this form of flexibility from the very beginning. In this way, we offer you a software package that is individually tailored to your requirements.

Functions for the End-to-End Process

- End-to-end mapping of the entire value chain for the market role of network operator/ meter operator
- Complete AMR functionality with technical device management
- Extensive substitute value generation methods – manual or automated
- Extensive plausibility checks
- Automatic documentation of substitute value generation
- Complete mapping of complex supply points
- Implementation of all requirements for supply point and meter location
- Management of network structures and transfer points for electricity and gas
- Network utilization fee calculation
- Direct marketing of renewable energies
- Automated determination of excess/shortfall quantities

Fully Automated Balancing for Electricity and Gas

- **Highly flexible and automated calculations**
- **Balancing according to current market rules**
- **Balancing of renewable energies**
- **Historizable billing allocations**

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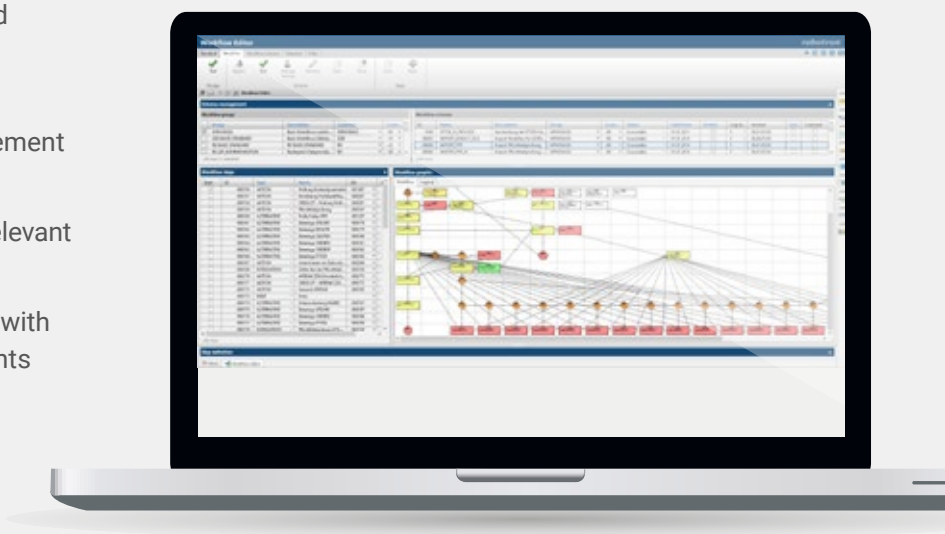
- High-performance data processing and provision for other market participants (market communication)
- Market and switching process management for electricity and gas
- On-time support of all current market-relevant EDIFACT formats
- Market communication in accordance with all Federal Network Agency requirements
- Billing completely integrated into the EDM system with financial accounting
- Digital signature and encryption



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ADVANCED METER READING

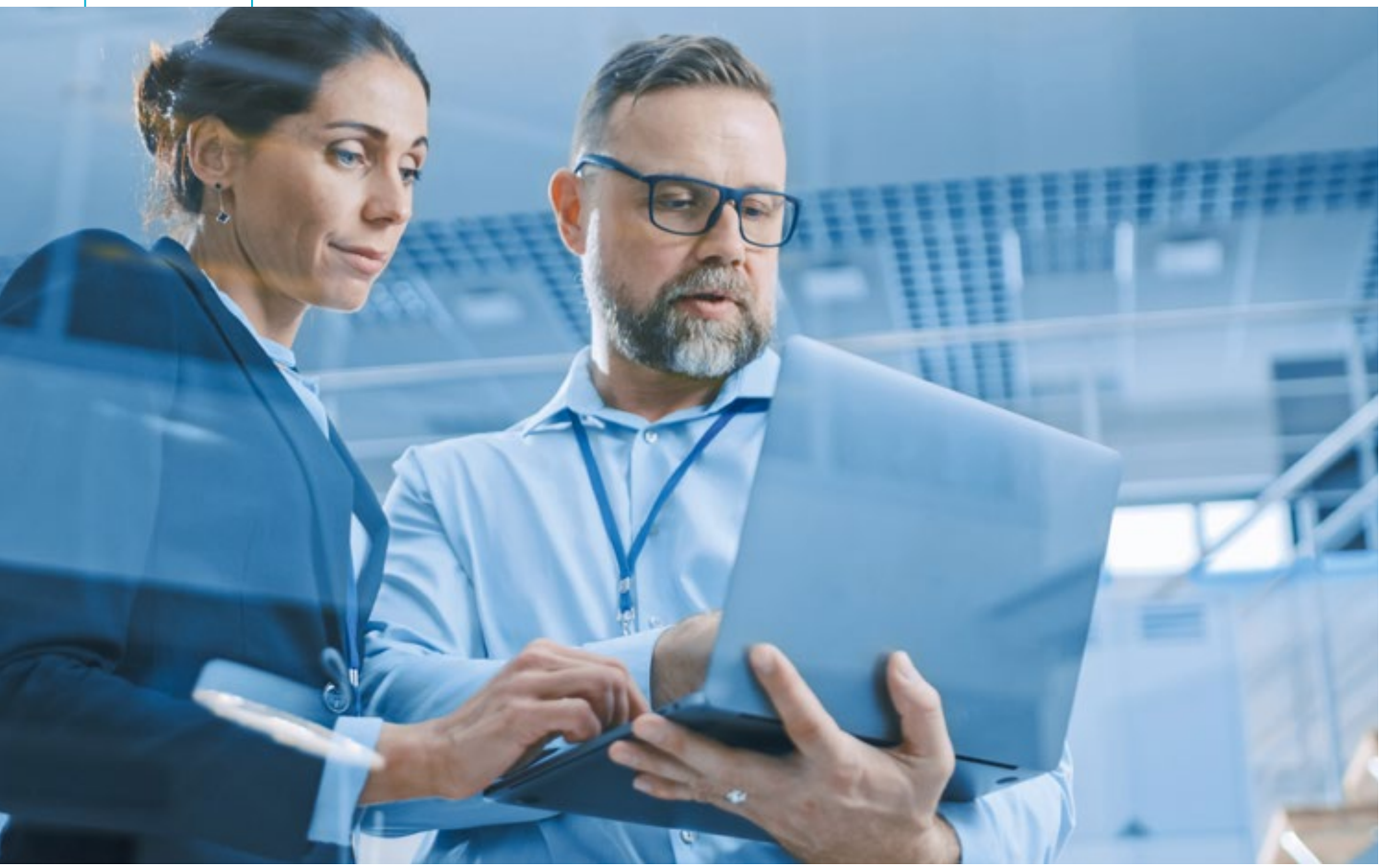
Interface-Free from Meter to Dispatch

In addition to the classic functional requirements of an EDM system for network operation, the process chain from the meter to the dispatch of billing-relevant data is mapped without interfaces using Robotron's solution for advanced meter reading (AMR) ***robotron*e⁄collect***.

The Robotron AMR system supports both push and pull operation when reading meters. Remote parameterization of the devices for time synchronization, firmware updates, tariff switching or remote blocking is possible, regardless of the meter manufacturer.

In addition to integrated AMI management, technical device management and comprehensive process monitoring are also available.

By using ***robotron*e⁄collect***, you not only save the interface between AMR and EDM, but also the redundant data storage of meter data in both systems and, above all, valuable processing time during process handling.



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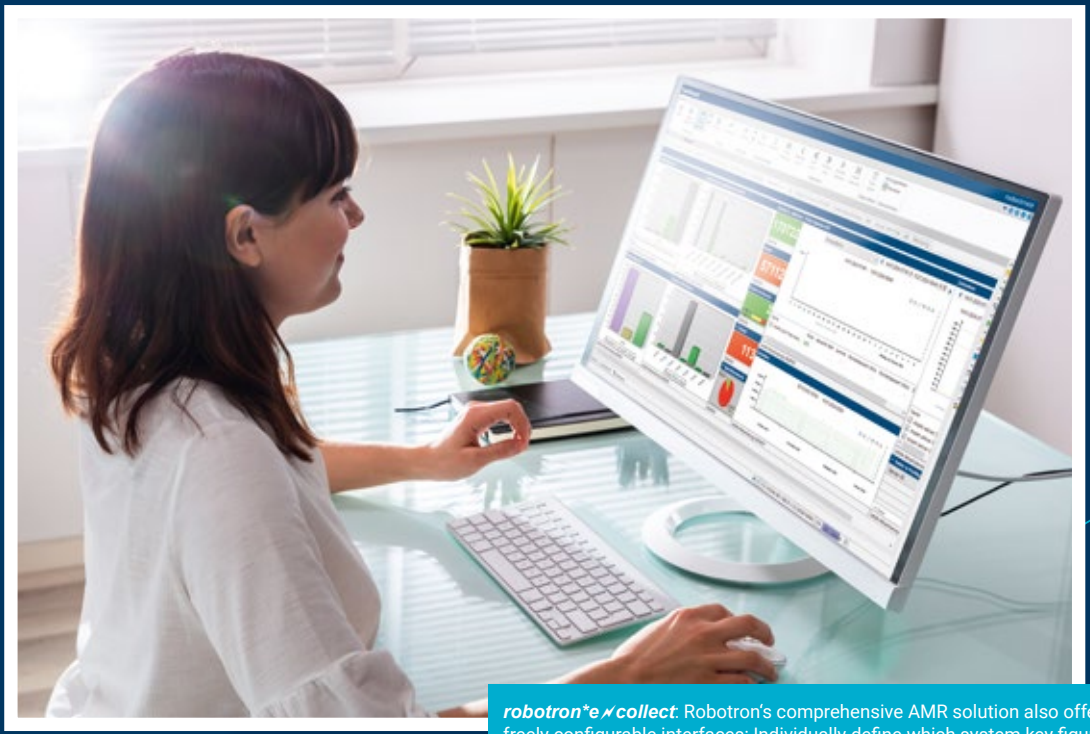
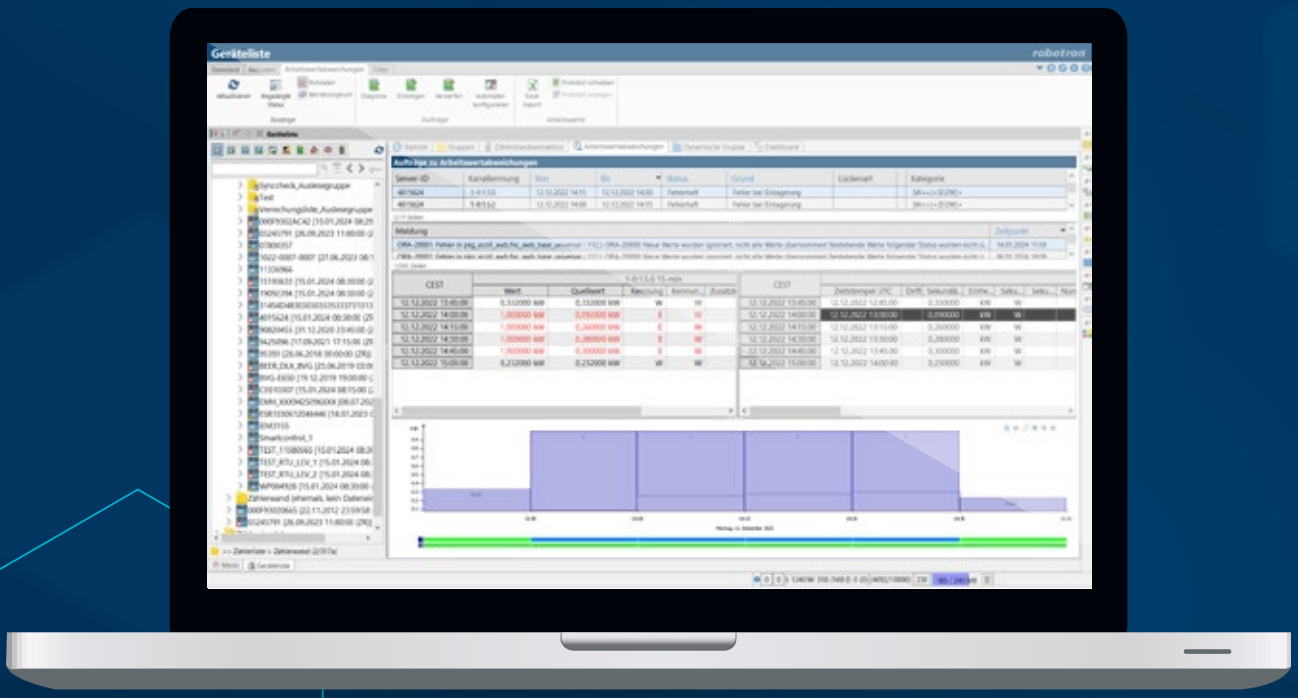


robotron*e✓collect: Robotron's comprehensive AMR solution also offers freely configurable interfaces: Individually define which system key figures you want to monitor in the dashboard. Various information from the business processes and workflows can be graphically prepared here.



The device list provides a comprehensive overview of all read-out data and their status information, value changes through processes to improve data quality and the option to manually intervene in these processes.

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BALANCING

Electricity and Gas

Electricity Balancing

The balancing module for the electricity commodity was developed especially for the execution of the clearing processes required by the Federal Network Agency. It is provided in the respective version for all market roles designated by the legislator.

The Following Processes Are Supported:

- Implementation of all balancing rules
- Automatic receipt, processing and checking of activations and balancing sums from the TSO (incl. DZU) as well as ordering and importing of the associated clearing lists (according to MaKo 2020)
- Versioning of all changes in lists and sums
- Automated activation/deactivation of time series types with message dispatch
- Automatic dispatch of balancing sums incl. tracking of check and billing status
- Display of negatively acknowledged sums in the to-do list for effective processing
- Maintenance and dispatch of profile definitions
- Profile group subscription management
- Import and storage of assignment authorizations
- Request/import of clearing lists for DZR
- Display of missing or outdated data in the balancing sums
- Maintenance and receipt of network load time series and network time series, automatic determination and dispatch of inspection notifications
- Dispatch of the balancing group allocation list
- Automatic list generation per balancing group/ supplier/time series type and summation of contents
- Dispatch of clearing lists to suppliers (on individual request or by subscription)
- Timely provision of the current EDIFACT formats required for balancing all market roles
- Dispatch of supply point-exact curtailment quantity to suppliers
- Aggregation of curtailment quantity at pool and balancing group contract level and communication of curtailment quantity transfer time series
- Automatic determination of excess/shortfall quantities (also for iMS that are balanced at the TSO)

In the Balancing mask, all balancing sums are clearly displayed with the relevant information.

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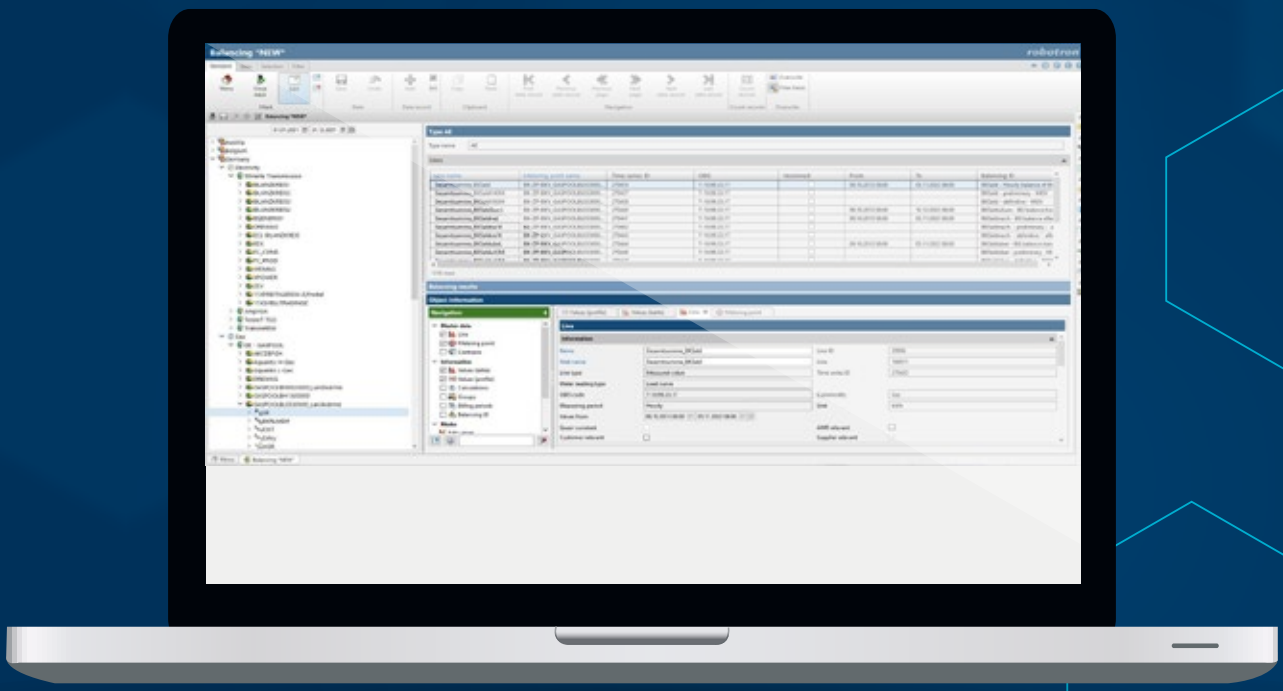

Balancing (gas commodity) at a glance: For gas balancing, all data of a billing period are clearly displayed and visualized in one mask.

Balancing Gas

The balancing module for gas represents the basis for daily balancing according to GaBi Gas for the gas network operator. It enables the SLP forecast in the synthetic or analytical method on the day before delivery and is thus the basis for the automated dispatch of the data in ALOCAT format. The energy quantities of the tariff customers are rolled out via standard load curves, taking into account the influence of temperature. The systematics of TU Munich, SigLinDe and HTWK Leipzig are supported. For analytically balancing network operators, the scaling of the synthetic forecast is based on the residual load. Subsequently, the balancing group sums for SLP for the following day are sent to the MAM in ALOCAT format.

Other physical time series types (except standard load profiles) are aggregated starting from the single metering point level. The dispatch for the RLM case groups takes place on time in ALOCAT format. Separately, the aggregation and dispatch of the RLM case groups is carried out on a monthly basis, revalued with the billing calorific value. The allocation of the remaining time series types also takes place in this way.

A shadow calculation for the network account is carried out with the ALOCAT messages affecting the balancing group and the feed-ins and outputs to upstream and downstream network operators. The balances determined are checked against the imported network account messages (ALOCAT, allocation data reports) by the MAM.

Excess/shortfall quantities can be aggregated for the network account up to market area level. The excess/shortfall quantities aggregated per network account are dispatched to the market area manager via SSQNOT.

robotron*e✓count also offers a solution for the network operators if a pro-rata decision of general scope is published. They are supported in importing self-declarations, determining the target values per supply point taking into account historical savings and determining and sending target value exceedances in the prescribed format.

BGM: Balancing group manager
DZR: Delta time series
iMS: Smart metering system
DZU: Delta time series transfer
MAM: Market area manager
RLM: Recording power measurement
SLP: Standard load profile
TSO: Transmission system operator
DSO: Distribution system operator

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BILLING

Flexible Solutions for Optimized Billing Processes

Robotron's EDM/MDM systems contain all the necessary data on the basis of which billing can take place. For the implementation, our billing module is used as a cross-commodity solution. This additional component supports users in the periodic (e. g. monthly, annually) or one-time billing. The export to the financial accounting system as well as the electronic billing and the corresponding market communication are fully supported. In addition, an optional invoice verification module ensures that shadow invoices can be created and thus incoming invoices can be verified.

Network Utilization

The system facilitates the proper, daily and metering point-exact billing of network utilization fees including taxes and allocations up to EDIFACT-INVOIC generation. There are various billing models available, including:

- **Event-dependent correction:** In the event of changes in the annual maximum output and/or the full utilization hours above/below 2,500 h/a, the corresponding items from previous months are corrected retroactively during the year (sliding recalculation).
- **Event-independent correction:** Independent of changes in the annual maximum output or the full utilization hours, corresponding items from previous months are corrected retroactively during the year (iterative billing).

Final billing takes place for all models in the form of the market standard 13I or 13R.

Meter Location Operation

The billing process for metering point operation for smart metering systems and modern metering equipment can be carried out in the system for connection users and suppliers.

The invoice processing process can be used to create offers based on the electronic price sheet and individual offers. The invoices can be sent as electronic invoices to suppliers (EDIFACT-INVOIC/REMADV) as well as by invoice document and e-mail to connection users.

Excess/Shortfall Quantities

Excess/shortfall quantities can be determined and billed according to the specifications in the BDEW guidelines for electricity and gas. ***robotron*e✓count*** determines the allocation lists, the balanced quantities and handles the market communication. The query of balanced quantities at the TSO for iMS market supply points is also supported. Especially for the medium gas, SLP substitute values of the MAM messages are taken into account when creating the allocation lists.

Your Advantages at a Glance

- **Save time:** You reduce time by using standardized billing products (e. g., metering point operation, network utilization fees, excess/shortfall quantities).
- **Increase quality:** You reduce the billing error rate through a very high level of automation, thereby minimizing invoice complaints, ensuring faster receipt of payment, and increasing customer confidence.
- **Reduce costs:** You reduce your IT cost base in billing through standardized interfaces when integrating into your existing IT landscape.
- **Ensure flexibility:** You gain competitive advantages by using flexible products.

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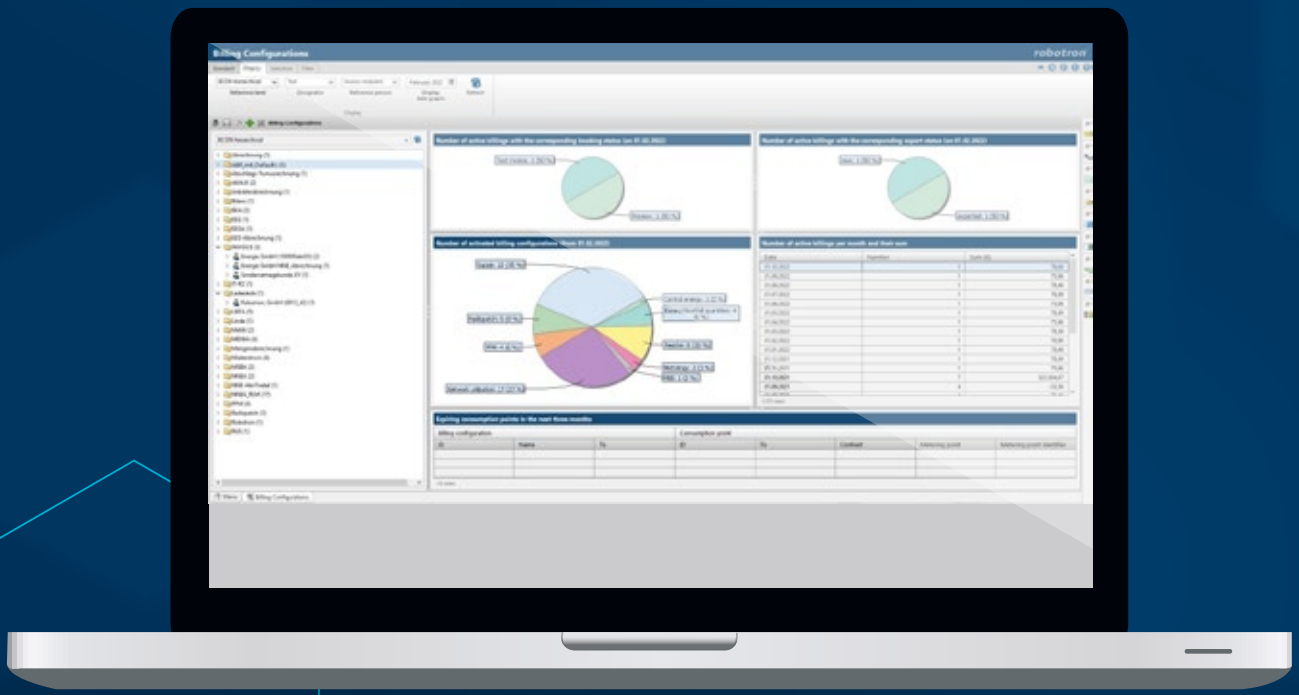
EDM billing: Billing and incoming invoice verification in EDM



Intuitive: The billing configuration allows easy editing of the billing parameters.

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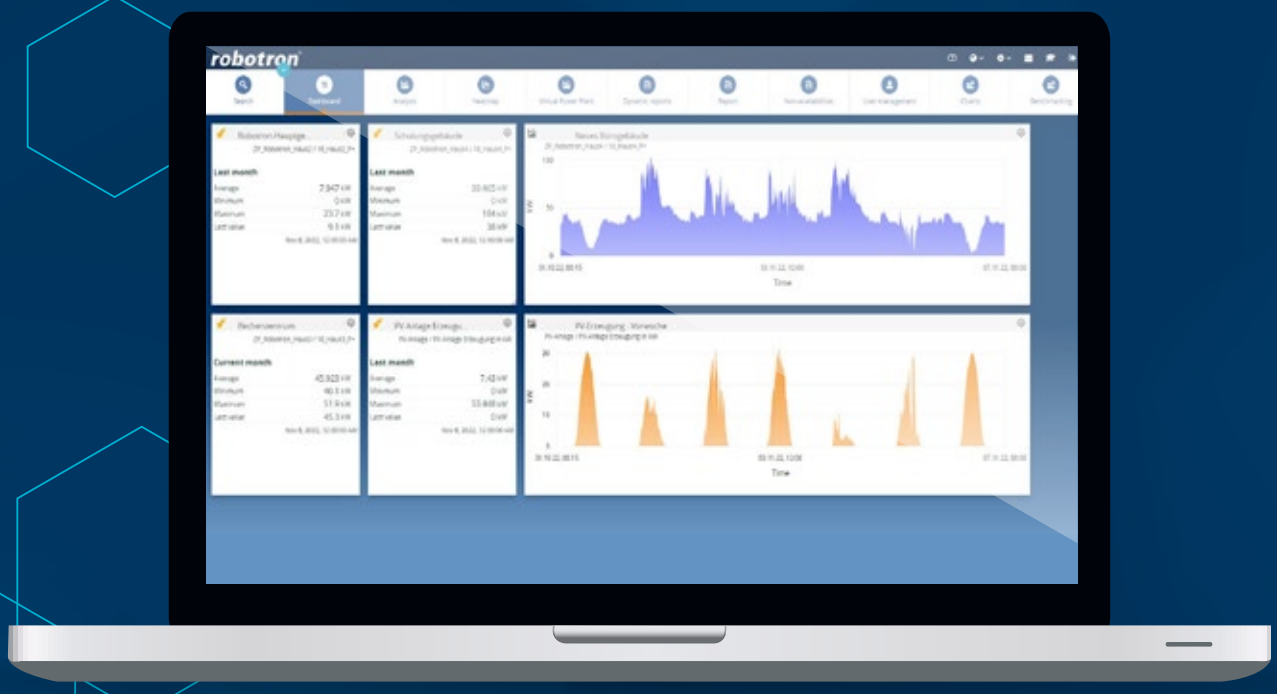
MOBILE OVERVIEW

Your Energy Data on the Web

With the modularly developed ***robotron*Webportal***, you can provide energy data from ***robotron*e count***, ***robotron*e sales*** or ***robotron*e collect*** online for your private and business customers.
The ***robotron*Webportal*** is flexibly configurable for the corresponding user group, regardless of which market role you operate in:

- Optimal mapping of EDM processes on the Web for different target groups, including smart metering, energy trading, branch management and other self-service offers
- Can be integrated into existing Web sites, operated as a stand-alone solution in your data center or as SaaS in the Robotron Energy Cloud

With the Web-based Robotron Management Cockpit, energy distributors keep an overview of the key business figures from ***robotron*e sales***, ***robotron*e count***or third-party systems and create individual evaluations in no time at all.



***robotron*Webportal:** From load profile analysis to MDM functionalities – a wide range of application options on all end devices.

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OUR SERVICES

Your Partner from Planning to Operation

- **Cloud Solutions:**
  Robotron is your innovative service provider for software solutions from the **Robotron Energy Cloud** (SaaS, BPO) and offers modular services for optimal business processes (IaaS, PaaS, BPaaS).

- **Projects and Customer Support:**
  Benefit from the use of selected modules of the Robotron Energy Market Platform and the extensive experience of our experts. With our flexible and standardized products, we achieve short project runtimes and rapid productive use of your systems.

- **Integration:**
  The products of the Robotron Energy Market Platform are mostly integrated in a heterogeneous system world as a central data hub. Users of our software can therefore draw on a broad spectrum of realized interfaces and methods as well as extensive project experience.

- **Training:**
  The **Robotron Training Center** offers a wide range of courses on the Robotron Energy Market Platform. The course participants are taught knowledge and skills for the efficient use of Robotron products, according to their respective tasks.

- **Services and Support:**
  As a product manufacturer and operator, we offer you comprehensive support for all aspects of Robotron products. We provide support in planning, setting up and operating harmonizing infrastructures. Sophisticated service-level agreements for operation and service of the products ensure the continuous performance of the systems around the clock. Certified administrators and consultants reliably facilitate your daily operation of the applications with highly specialized services.

- **Robotron EDM Appliance:**
  With the Robotron EDM Appliance (REA), we provide you with a fully preconfigured, optimized and highly available complete system. The software you require individually from the wide range of the Robotron Energy Market Platform is combined with the necessary hardware to suit your needs.

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