

Reference case | Energy Monitoring of EV Charging Stations (Grid Scale)

ADTEK
SMART CITY
EV CHARGING

Overview

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Suggested Customer

Related Power Distribution Operator

Potential Partner

Connectivity solutions provider
Software developer
Distributor and BTO

Location

Germany (Because of the non-disclosure agreement, we are not allowed to provide the customer information)

Product

ADP-PM-A
Multi-Circuit Power Meter



Overview

With the growing share of **electric vehicles** on Germany, there needs to be sufficient charging infrastructure and, consequently, successful integration into existing power grids.

So, there is the need for detailed monitoring of power grid components and circuits in the low-voltage range, and the distribution system operator is therefore faced with the challenge of monitoring its own network.

They need to establish cost-efficient methods of recording all relevant measured variables from the outgoing feeders in **low-voltage grids** to guarantee network stability. This requires the collection of energy parameters such as **current** and **voltage** and their transmission record in variable time intervals (e.g. minute values). These values can be transferred to a scalable cloud system. Furthermore, the methods are able to coordinate the data access from different end devices and enable the configuration via remote access (e.g. multi-circuit power meter).

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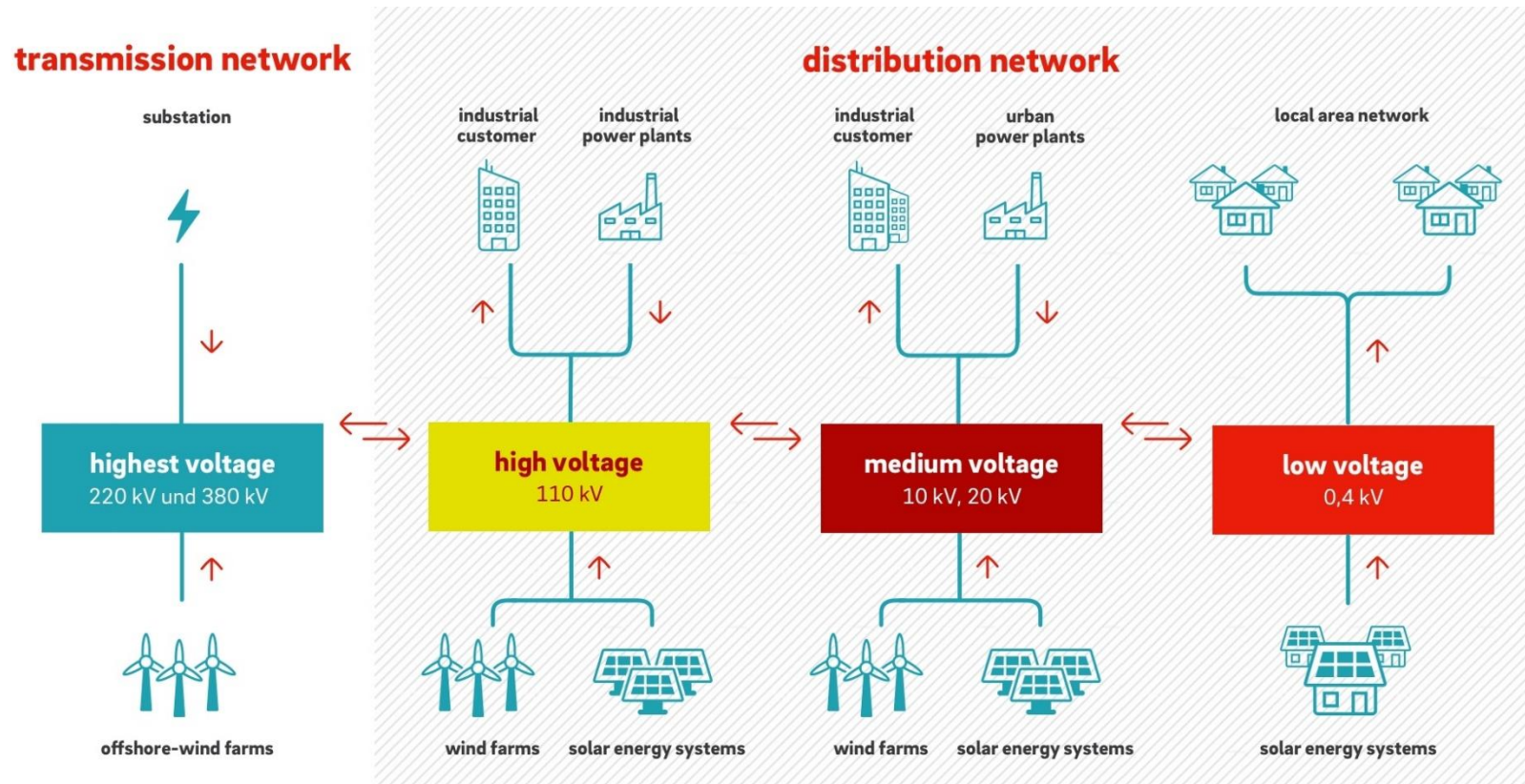
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Challenges

The volatile renewable energies are rapidly growing and expanding, which increasingly leads to grid blockages in the transmission and distribution grid, especially in networks with lower voltage levels.



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Challenges

Due to the poor levels of monitoring the network in low voltage area, the surplus or shortage of energy can only be detected and analyzed in the higher voltage area. This leads to increasing requirements for:

- How to maintaining and stabilizing the voltage band at the grid connection point?
- How to avoiding the overloads of cable and transformer?
- How to installing the energy monitoring equipment?

How to address these increasing requirements at a reasonable cost?

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Solution

Monitor the feeders in the low voltage area and the local network station with external **Industrial IoT equipment and a cloud-based monitoring system.**

For this solution, ADTEK work together with German partners to customize a robust IIoT solution for local electricity providers. Below are two main features of this solution:

1

The hardware can be installed easily at the transformer, and it measures voltage, current, frequency, and consumption every minute. It contains a web-based dashboard with near real-time data views, analysis of the uploaded telemetry data to understand energy usage trends, and alerts users of issues over email and SMS. When there's an abnormal condition, it can find out and correct the error instantly.

2

With the fast integration of the software, hardware, and each equipment's advantage in the solution, this case has become an important building block for the coordination of local EV charging processes. By optimizing the charging operations, it is available to transport more electricity through existing grids and make the usage of electricity more efficient.

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Suggested Customer

ADTEK's partner in Germany, and we can only provide its brief introduction due to the non-disclosure agreement- It is the largest regional distribution system operator in eastern Germany, and it is responsible for planning, operating and commercializing the electricity grid.

Its grid area covers an area of 30,804 km² in the four grid regions of Brandenburg, Saxony-Anhalt, South Saxony and West Saxony, and thus supplies around 2.3 million people in this territory with electricity.

The company's top priority is to ensure a reliable, economical and environmentally friendly supply of energy to households, companies and municipal partners through its network.



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Project details

For implementing the monitoring, ADTEK and its German partner integrate all related partners' hardware bundle. This bundle consists of a German company's edge gateways, and include ADTEK's cost-efficient measurement hardware and its German partner's software component.

One of ADTEK's partner is a supplier of cloud-based energy management system for distribution network providers. It provides real-time monitoring of relative energy parameters in low-voltage networks and alerting notification with external measurement technology, and its cost performance price is better than other international famous brands .

ADTEK's partner collects all relevant data of the low voltage distribution level and thereby allows to assess the status of the outgoing low voltage feeder and make the arrangement for maintaining these networks.

The continuous monitoring provides to the distribution system operator better conditions for maintaining the voltage band at the network connection point and avoiding cable and transformer overloads.

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Project Bundles

For implementing the monitoring, ADTEK's partner also integrate the robust hardware bundle with its software supplier. This bundle is made by the German edge gateway supplier, and it includes ADTEK's multi-circuit power meter ADP-PM-A , current transformer US-CTV, Rogowski Coil, sensor and the software invented by the German customers, which make the bundle a robust solution one

Schematic overview over the application

Software

German Partner
Software developer



Hardware

German Partner
Edge gateway



ADTEK Product

Multi circuit Power Meter
ADP-PM-A



(1..n)

Current Transformer
US-CTV



Rogowski Coil
US-RC

Partner
Power Supplier



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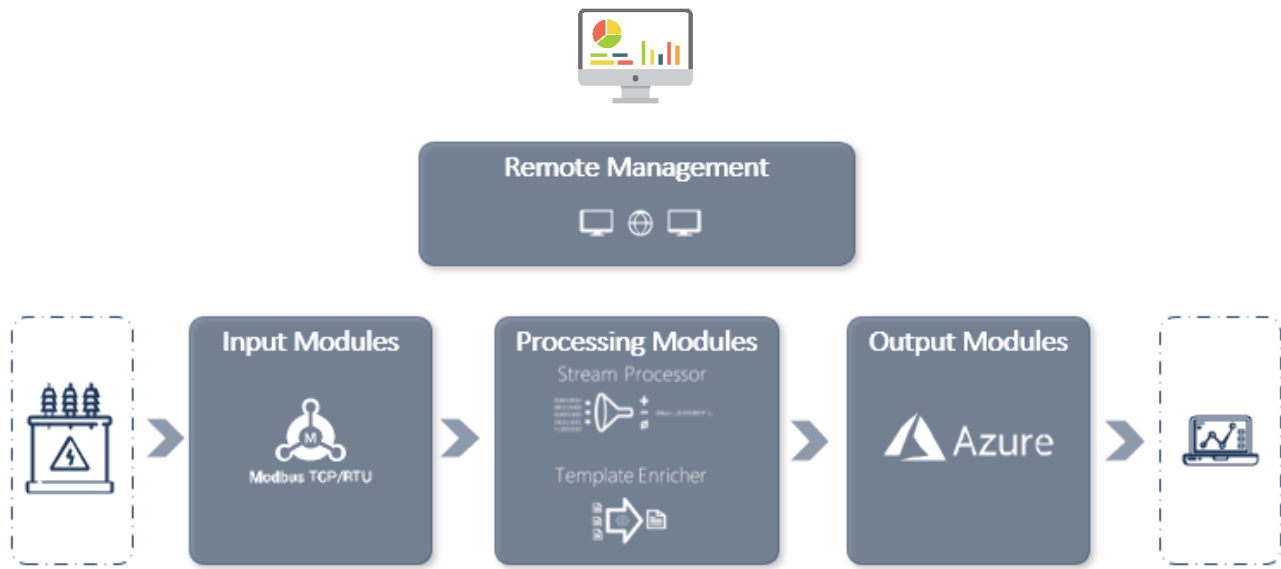
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Data acquisition, processing, and visualization are available by Microsoft's Azure-native solution and PaaS components, such as Azure IoT Hub and Azure Data Explorer through the gateways

The measurement data is transmitted to the Azure IoT Hub via MQTT and LTE.

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The EMS system of the solution is installed in low voltage transformer monitoring stations of energy grid operators



The data is sent to Azure, where it is processed and visualized in a collection of dashboards with information the energy grid operators need

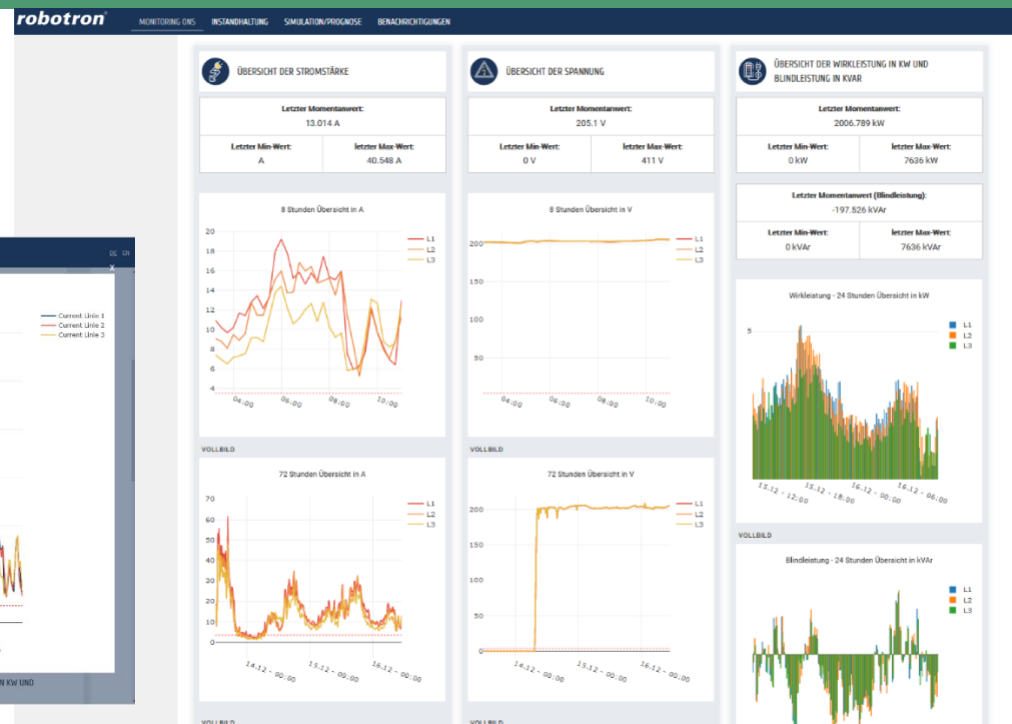
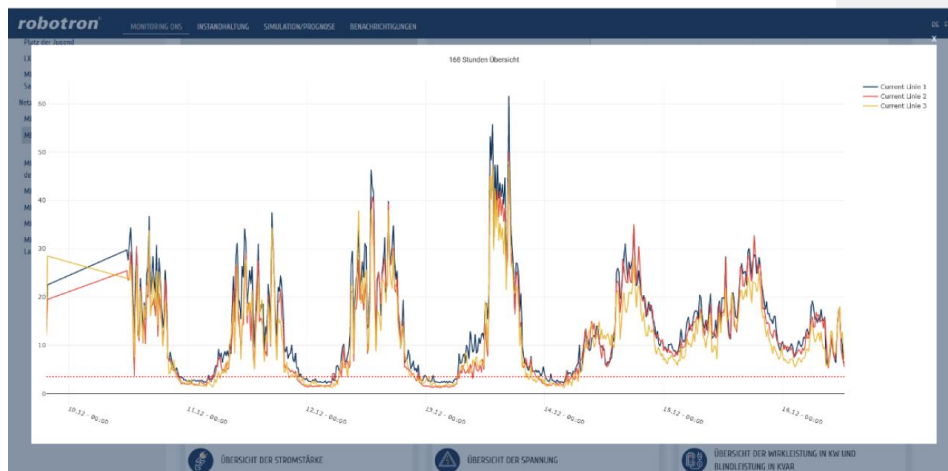
ADTEK's German partner make a new arrangement for the traditional low-voltage monitoring

Project details

A browser-based dashboard shows measured values such as **current, voltage, frequency, active power or reactive power**. The information and results are visualized, for example, as a phase-by-phase display of time series and chart display. With the alert notification module, it will notify the measured anomalies via e-mail.

A total of **20 local transformer stations** will be equipped with the gateways made by ADTEK's partner, and a total of almost **150,000 measured values** per hour are supplied by these gateways.

V / A / W / Var



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Why ADTEK

The data from the power lines of low voltage transformer stations is collected to monitor the consumption of each single line.

ADTEK ADP-PM-A is a valuable product for different types of power circuit, and it can be used from 12 single phase to 4 three-phase circuit power input. Din-rail mounting provides easy installation and space saving. Below are its four main features:

- easy to install and set up with a computer
- easy to maintain, diagnose and replace
- over voltage protection
- independent channel configuration

Hardware standard built in a RS485 (Modbus) communication port, demand function, data logging and 2 MB internal flash memory, ADTEK multi-circuit power meter (DIN Rail) **ADP-PM-A** is flexible for increasing demand of data measurement and transmission under the Industry 4.0 trend.



AC & DC power
monitoring



Power
quality



Energy
saving

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Why ADTEK

Providing great flexibility in all applications, ADTEK multi-circuit power meter ADP-PM-A

can be used for many applications on power saving and industry energy monitoring.

Easy integration with existing structure and equipment.

Adaptability to different installation locations and operating conditions.

ADTEK's partners' equipment can retrieve I/O data from the **ADP-PM-A** and convert the data to other protocols at the same time, allowing other applications to get connected easily and effortlessly.

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Market opportunities

The monitoring of low-voltage grid is an essential building block for ensuring grid stability at EV charging stations.

ADTEK Power Meter solutions can monitor the power and energy consumption of LV power grids, and thus assure the smart grid capabilities for energy management and cost optimization.

An essential advantage is the integration with existing systems and equipment and extracting the necessary data to be exported for analysis.

Furthermore, the project has created a blueprint suitable for a large-scale rollout to the network distributor's entire grid area without much additional effort. With ADTEK and the German partner's solution, the distributor can make the combine use of the hardware component and the local cloud software. For SI costumers, they can have a fast implementation and gain the future projects with those product's advantages.

It's available to inquire the solution arranged by the German SI with ADTEK products in Microsoft system, and they will promote those solutions to other large players in the market in both Europe and North-America.

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Partners that ADTEK needs in this solution

Energy Management System Integrator

It can leverage SI's experience in energy management solutions, and applies it to a simple and scalable, yet effective cloud-based solution.

Communication Equipment Manufacturer

The manufacturer and the distributor that can provides industrial-grade information and communication equipment. It can offer "zero touch provisioning" service its customers by preparing the individual gateways before shipping to the extent that they can simply be installed at the customer location without further configuration needed by local staff.

Distributor

Big distributor for communication gateway and other related products. It has installed a BTO Service (BTO = Build-To-Order) by integrating different manufactures' products and providing the complete service for its customers

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