

# Smart Services: 5 Use Cases



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Whitepaper

# Smart Services: 5 Use Cases

Energy use in industry: Measuring and optimizing is easier than you think.

Producing more sustainably, efficiently and cost-effectively - to achieve this, medium-sized companies need to catch up in one area in particular: energy data collection and evaluation. IIoT-based cloud services open up new approaches here that are often surprisingly simple and inexpensive to implement. This white paper first explains some basics and then uses five real-world examples to show practical approaches to solutions for greater efficiency, security and control. Find out, among other things, how you can reduce your energy costs, increase your plant availability and optimize your processes.

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# Introduction

Almost all companies suffer from high energy costs. In addition, self-imposed savings targets and new regulations motivate companies to tackle the major challenge of energy efficiency. There is potential for savings in every company; many are already known, but are not being harnessed.

Continuously recorded energy flows are what is often missing. They are the basis of every operational energy management system. In addition to the savings potential, there are other advantages of automated energy data recording on machines and plants: Plant utilization can be optimized through intelligent switching of plant components, uniform network loading and reduction of peak loads. Companies can reduce peak loads through intelligent trending and load management. And they can even minimize plant downtime - by monitoring plant parameters.

Today, recording energy flows at OT level requires integrating tens of measuring devices and connecting them to digital tools for data evaluation. Many companies are reluctant to make the effort for several reasons: They have no or very limited IT resources for implementation. Local server capacities for data storage and analysis are lacking. And they do not have specialists for data evaluation, which initially appears very complex.

Standardized and scalable cloud services can bypass these obstacles. With „Smart Services“, modern monitoring can be set up with manageable costs, effort and IT resources. This is what Smart Services can do:

- Global condition monitoring and control via direct access to device data from the field level
- Display and evaluation of cross-site energy data to identify potential savings
- Scalable monitoring of processes to derive optimization measures
- Predict failures and plan maintenance operations in a targeted manner
- Use of existing data thanks to scalable and highly available databases

These Smart Services are based on the Proficloud.io industrial IoT platform from Phoenix Contact. With the Phoenix Contact corporate group behind us, we supply hardware components (including PLC/ PLCnext, gateways, energy meters/EMpro) that enable connectivity to Proficloud.io. The hardware transmits the requested data to Proficloud.io, where the standardized and easy-to-use Smart Services run. TLS encryption ensures security during data transmission.

**Does that sound like effort and a lot of prior IT knowledge?**

As a plug-and-play IIoT platform, Profiloud.io requires no storage or computing capacity in the user company. Connecting devices usually takes only a few minutes. The Smart Services require no implementation costs and are flexibly scalable - both in terms of functionality and the number of users.

The simplicity also allows users without IT knowledge and with little training time to benefit from the advantages. The offer-

ing meets current industry requirements, for example through user and permission management and high data security, and provides user-friendly entry scenarios with free contingents - without long-term contracts.

In five examples from our practical experience, we show what you can expect.



# Use Case 1

## Cross-location overview of the machine park

### The challenge

Let's start with a typical scenario: Medium-sized company Z manufactures cargo bicycles. Their parts and assemblies are produced at several different locations. At the respective production lines, there is a certain transparency about the condition of the local machines. However, there is no overview at the company level. Location-independent equipment information is not available, which means that plant operations and production capacities cannot be planned precisely. However, if a machine at location A breaks down due to maintenance, components are missing for assembly at location B - and there, too, will be a prolonged standstill. If the upcoming maintenance had been known, the team at location B could have rescheduled.

### The technical approach

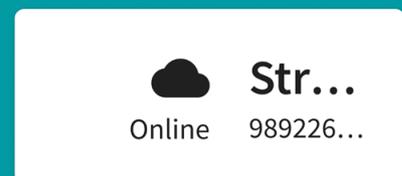
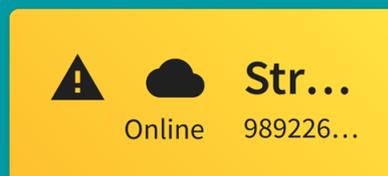
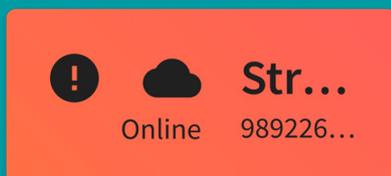
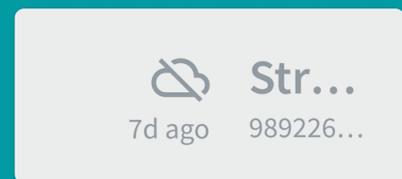
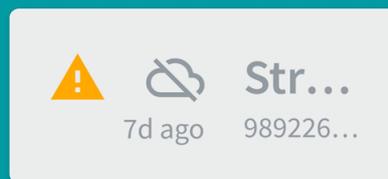
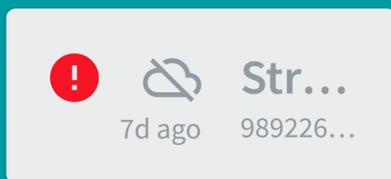
Recently, new possibilities have opened up for the Z company here - for example, via the Device Management Service. The Device Management Service provides standardized information about all controllers used and connected to Proficloud.io, al-

most in real time, made available via the IIoT platform Proficloud.io. The free Core Smart Service for device management runs with all smart devices from Phoenix Contact, for example the current PLCs, energy measuring devices and other Phoenix Contact hardware. Third-party hardware can also be connected to Proficloud.io via a gateway.

### The results

All connected devices can be arranged by operating site and described with further metadata such as „tags“. Production management can retrieve dynamic equipment health status and general information from any location. This means that employees no longer have to spend time visiting plants on site for routine checks. A quick glance at the Device Management Service on Proficloud.io is all it takes. Every status message of every hardware appears color-coded, in plain text and is understandable without expert knowledge.

## Currently there are the following different status variants:



Remote maintenance of individual devices is possible from a remote location. This saves resources, time and money. A logbook function makes all changes and extensions traceable.

In addition, the DMS enables the firmware to be kept up to date, so Company Z can now be sure that its equipment always has the latest safety patches and performance enhancements. Planned maintenance like this increases availability and makes plant operations safer. Even when devices are re-

placed, maintenance can be sure that the latest firmware and the current, correct application for the controller are running.

# Use Case 2

## Discovering hidden energy-saving potential in production facilities

### The challenge

Reducing the CO2 emissions of your own production by 20 percent: This was the ambitious target set by one of the world's largest spice manufacturers. To achieve this, the first step for Company M was to record the energy data from three production sites and make them comparable - and that with tens of machines in use. In spice production, process heat, steam, pressure, gas and water flows are indispensable. The electrical energy required comes from the company's own small power plants. For utility management (monitoring and measurement of the flows), only local solutions existed.

On the one hand, the challenge was the large number of different machines and plants at several locations. Modifying and networking these during operation for data acquisition initially seemed very risky to those responsible. And the projected expense was considered a high investment hurdle. On the other hand, there were limits to the storage of local data, and the construction of new local server capacities was to be avoided as far as possible so as not to burden the company's own IT teams.

At the same time, however, rising energy prices and the sustainability goals the company had set itself were putting pressure on decision-makers.

### The technical approach

How could the „tapping“ and evaluation of media such as gas, water or electricity still succeed in this scenario? The solution lies in the Data Collection Box from Phoenix Contact, used for „utility metering“. The completely scalable and individually adaptable switchgear combinations can be integrated quite effortlessly into already existing systems: They are easy to mount and therefore they contain, in addition to an EMpro energy meter for electrical energy, external Rogowski coils up to 4000A, connected by the open PLCnext Ecosystem and therefore the possibility to any sensor from the field level, via Mini Analog Pro signal converters by means of any interface and protocol from the OT as well as IT world, to be able to connect to Proficloud.io in no time. Proficloud.io was again used for data evaluation and visualization, together with the two Smart Services EMMA Service (Energy Monitoring, Management, Analytics) and Time Series Data Service for evaluating

time series data. Phoenix Contact thus delivered a coordinated package of hardware and Smart Services. The starting point for an IIoT framework.

### **The results**

Company M now has the local and global view of its utility management it has been hoping for. One dashboard per production site provides energy management managers with local data. The initial measures in Factory A have already resulted in energy savings of around 16 percent. The global dashboard now enables comparison: with similar basic data, it becomes predictable what effect the same measures will have in factory B. Knowledge of this kind facilitates investment decisions and priority setting, especially when there are several options to choose from.

Well thought-out user and rights management ensures that employees can view all data according to their role. The simple operation of Smart Services motivates daily use of the new possibilities and further steps into the world of the Industrial Internet of Things.

In every factory there are countless metering points, sensor systems and plants (such as machines). Knowing the right information, in the right format, at the right time, in the right place is one of the great challenges of our time. To meet this chal-

lenge, Phoenix Contact has developed the „Digital Factory now“ solution offering, which is aligned with the „All Electric Society“. With this, the metering of this information can be subsequently integrated into the factory - easily, quickly, economically and across industries.

For various segments, such as network and communication technology, data security or data collection and evaluation through IIoT and machine learning, Digital Factory now provides open and standardized automation solutions based on PLCnext Technology. These allow the machine and plant builder, system integrator or even directly the operating companies to implement individual products and solutions for the specific use case - regardless of whether the respective factory and processes are discrete, hybrid or continuous.

A completely individually scalable product for this purpose is the Data Collection Box in connection with the Secure Edge Box. With this solution, any signal from the field to the MES, DCS, ERP or cloud level can be recorded, normalized and processed bidirectionally, and the network can also be segmented in accordance with IEC62443.

# Use Case 3

## Cool potato – finally operating cold stores efficiently

### The challenge

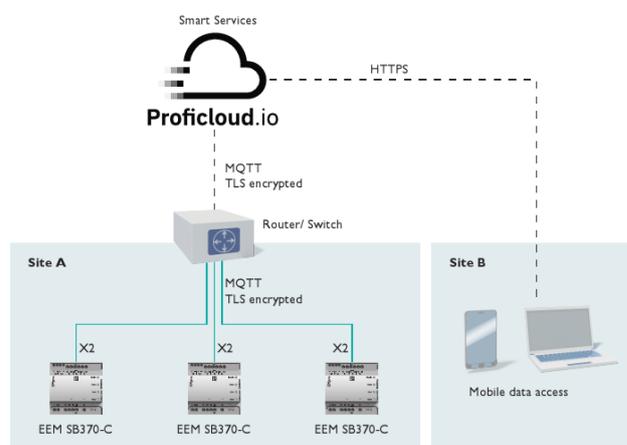
If you want to produce chips of consistent quality all year round, you probably automatically become a specialist in the ideal storage of potatoes. Snack manufacturer A is also at home in this discipline and stores tons of potatoes in cold stores all year round - with a corresponding cost block for electrical energy.

The company therefore wanted to know how electricity consumption could be reduced without restricting refrigeration - especially in situations where the potatoes are moved. In addition, energy use per kilogram of finished product was of interest, as the company aimed to achieve CO<sub>2</sub>-neutral production. The two goals were previously unattainable with the usual weekly evaluations via Excel lists. The low project budget and the limited IT resources also set limits.

### The technical approach

In this scenario, the use of EMpro meters (EEM-SB370-C) combined with Rogowski coils and the EMMA service again allowed the acquisition and evaluation of the energy data. The rather simple requirement was the connection via an Ethernet interface and the MQTT protocol via plug-and-

play directly to the Proficloud.io platform. Within the cloud environment, the Device Management Service helped to integrate the measuring devices.



**Connection of multiple EMpro measuring devices to Proficloud.io**

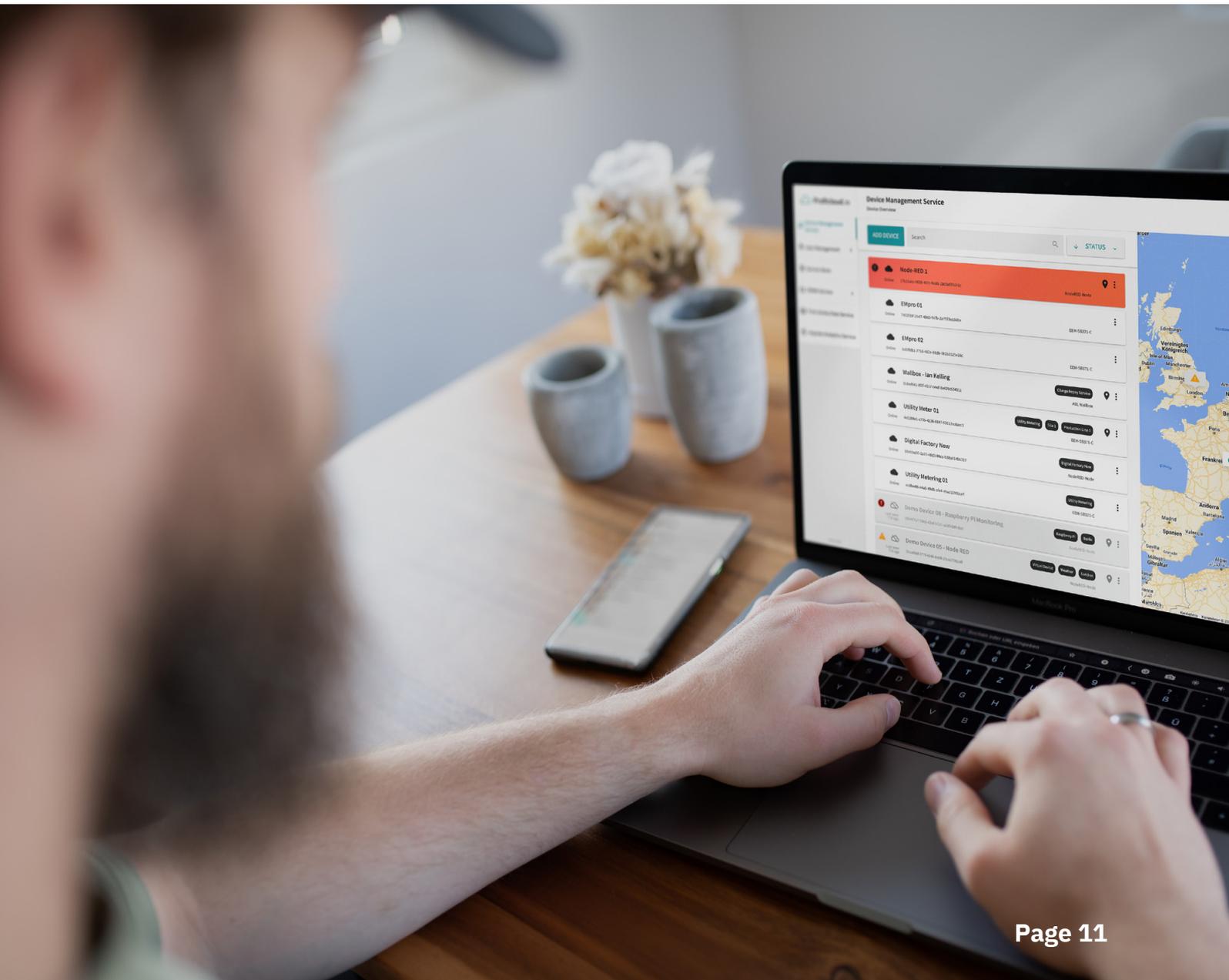
The selected measured values are transferred and stored automatically. The energy management managers have access to this data via the EMMA service and can use it directly for their statistics. In this case, snack producer A evaluates its energy consumption per kilogram of potato, i.e., kWh/kg. Many other energy performance indicators (EnPI) can be implemented. Complex configurations of classic industrial networks (for example, Modbus or PROFINET) are not required.

## The results

As a result, the energy management team experimented with the logistics processes surrounding refrigeration and found out in which quantities and in which cold stores potatoes ideally need to be stored and retrieved in order to maintain the required refrigeration with as little energy as possible.

A positive side effect: Snack manufacturer A can now also access the energy data of

other international locations and production lines that have also been connected to Proficloud.io. In this way, he continuously identifies further potential energy savings and can make data-based decisions for possible investments in modern cooling systems.



# Use Case 4

## Avoid the natural gas cost trap

### The challenge

Since February 2022, natural gas has become a critical energy source. Sharply increased prices and unclear availability are unsettling private households and also manufacturing companies. The impact on production costs is significant. At present, the additional costs are passed on to product prices as far as possible, but this can lead to competitive disadvantages. If, in addition, availability is in doubt, production processes based on natural gas and also energy generation in CHP units become a risk for every company.

So how can gas be saved or replaced in production? Facility managers, energy managers and purchasers in companies in particular are looking for answers. The fact is: Only when the causes of high consumption are known in detail (and the costs of each individual consumer) can production management and management derive effective decisions. Only then can they weigh the options, such as whether to modernize, replace or operate their plant technology differently. Replacements for gas consumers, for example, can be created by investing in biogas, heat pumps, solar thermal or photovoltaics. Sometimes it is also worthwhi-

le to stick with one technology and retrofit modern technology.

Optimizing the operation of a production line or individual machines in terms of energy consumption, finding process windows that are energy-optimized - these are possibilities for which many companies would not have expended any effort in the past. Today, such considerations are commonplace. And even outside of production, a number-based foundation is needed to exploit savings potential: for example, when the operation of the heating system is adapted to the home office behavior of employees, office space is merged, or the construction of a new low-energy building is to be justified.

### The technical approach

All of the above investments require a payback calculation, which can only be meaningfully prepared if the current costs are known. For fact-based decisions, companies need time series data. And Phoenix Contact has the right tools for this.

### Setup is done through these essential steps:

- Nowadays, almost all natural gas main meters are already network-compatible, as are most submeters. Retrofitting is also possible. In most cases, readings are also available in Excel or similar manual notepads. Companies should network the meters - and install additional meters at critical points and consumers. This is also possible temporarily for an inventory.
- An account on Proficloud.io is quickly created, which is free of charge and requires no customer number.
- We show how easy it is to connect devices in the account and in simple explanatory videos.

### The results

- Via Proficloud.io, networked gas and electricity meters and their data are visible. Users can see the current readings at any time - via individual dashboards on any device with an Internet browser.
- Users should additionally import the available data of the last years online to get an overview and a feeling for the temporal course right from the start.
- By evaluating time series data (with the EMMA Service or Time Series Data Service), companies learn where investments make sense, where the greatest potential lies - and where perhaps less is being consumed than previously thought.

### Phoenix Contact provides holistic support:

from technical consulting, installation and modernization of measuring devices and meters to commissioning and data evaluation via Proficloud.io and Smart Services.



# Use Case 5

## Monitor wind rotors for optimized operation

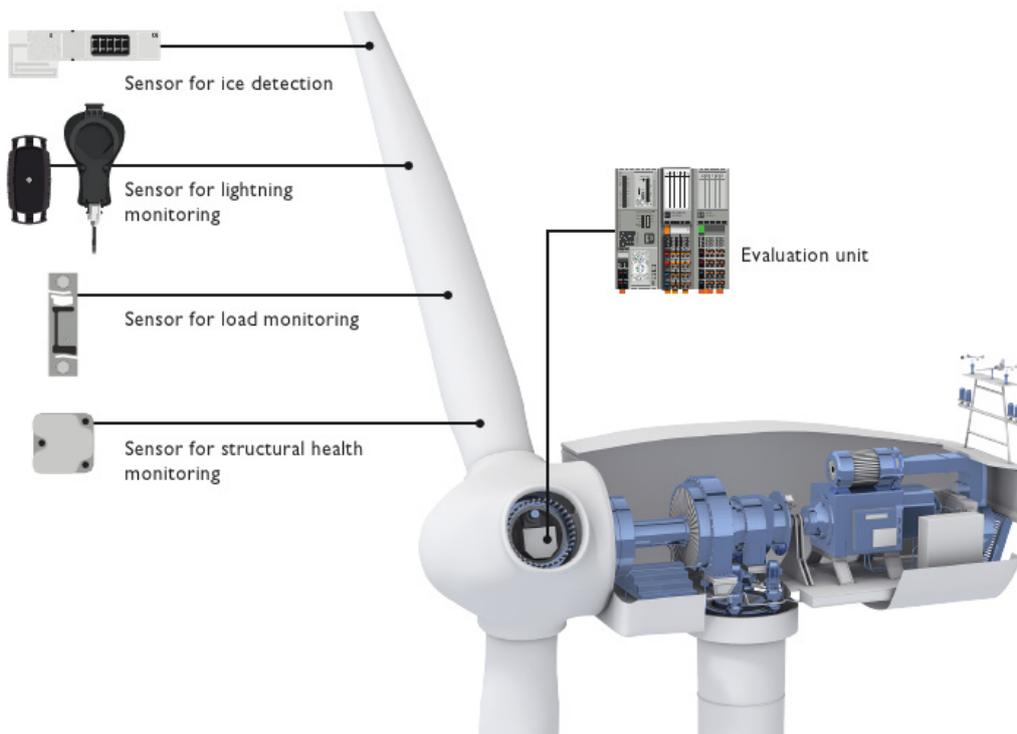
### The challenge

Wind turbines (WTGs) have evolved greatly in recent decades. What was once a fairly simple machine has become a highly complex power plant - and has also grown massively in height and in the length of the rotor blades. Modern wind turbines therefore require comprehensive monitoring and control. The rotor blades in particular are exposed to high loads and have a high potential for wear and damage. Only continuous condition monitoring guarantees that problems can be detected and remedied at an early stage. And timely maintenance avoids expensive repairs and long downt-

imes. It thus increases plant efficiency - and also safety.

### The technical approach

The Phoenix Contact solution Blade Intelligence monitors the condition of the rotor blades and combines ice detection, load monitoring, lightning current measurement and structure monitoring for this purpose. The solution is available in several variants and can be retrofitted and reliably integrated into existing systems.



Sensors specially developed for use on the rotor blade supply the necessary data for processing in a common evaluation unit in a compact control cabinet. Expansion with additional sensor technology is possible at any time. The technology and wireless sensors allow sustainable maintenance management, but also efficient retrofitting of existing turbines.

**Blade Intelligence typically consists of four components:**

- Wireless ice and temperature sensors can be self-adhesively mounted on the rotor blade, tower or nacelle. A radio receiver with 868 MHz or 915 MHz frequency band is used for communica-

tion.

- Optical lightning sensors detect and evaluate lightning strikes.
- Sensors monitor loads on the rotor blade - with magnetic shielding and line resistance compensation.
- Sensors detect vibration, damage and imbalances on the rotor blade to predict structural weaknesses.

## Excursus:

### What happens if the lightning current measurement on a wind turbine is missing?



Mainly two things: arresters are replaced, although it would not have been necessary yet. And records for the insurance company are missing if lightning should strike. If the worst comes to the worst, expensive external experts have to be commissioned. The LM-S lightning current measuring system ensures full transparency of events in the rotor blade. Lightning strikes are precisely measured, evaluated and analyzed, and operators can permanently view the performance of their wind turbine and react at an early stage. Thanks to continuous remote monitoring and merging of the measure-

ment data with the operating parameters of the wind turbine, the decision-making basis for preventive maintenance operations is improved. And if lightning does strike, operators have access to all important data and parameters for insurance purposes. The LM-S detects and analyzes all important parameters of the lightning surge currents. It is integrated into networks autonomously via a modem or via the integrated Ethernet interface: Without much effort into an existing design simply by calling the IP addresses.

# One principle, a thousand possibilities:

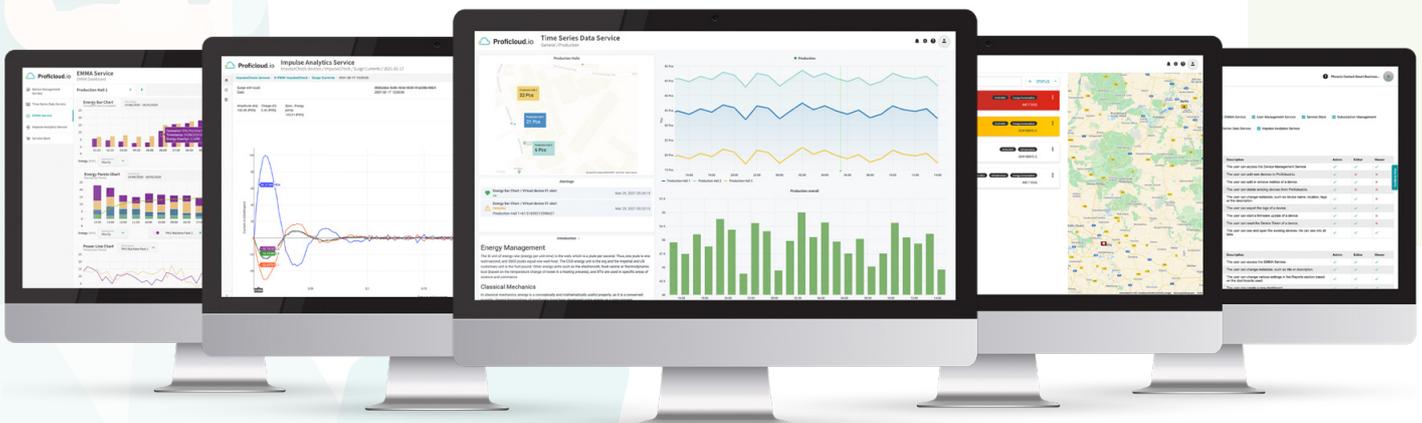
## Let's talk about the potential in your company

There are many reasons for manufacturing companies to monitor the actual operating status of their machinery and use this data to optimize production processes or initiate other measures: It's about energy consumption, planning reliability, higher machine productivity, lower downtimes and repair times, longer service life and consistently high product quality.

Just a few years ago, this type of data collection and condition analysis of a machine

was very costly. Today, IIoT technologies offer functionalities to collect, process and analyze the large and high-frequency data streams in a simple and efficient way - and to draw valuable insights from them.

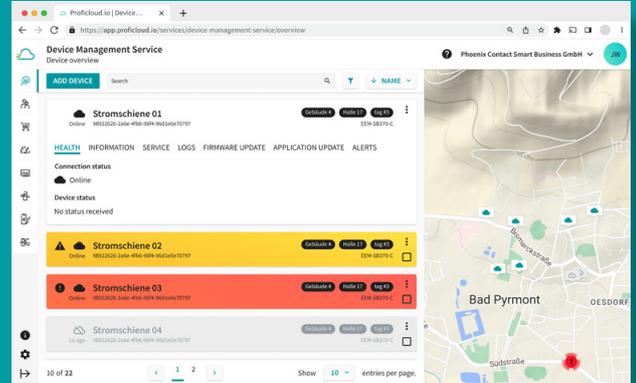
We would be happy to advise you on the potentials and on a pilot project in your company.



# Our top five Smart Services:

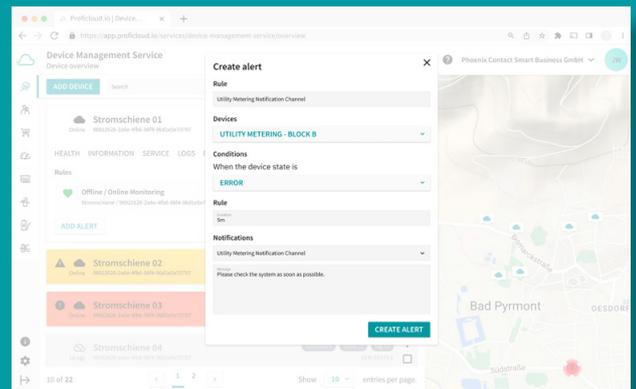
## Device Management Service:

This Smart Service allows users to add and manage their devices, machines and equipment. It offers standardized device information in real time: Users can see the status at any time on a clear interface. Firmware updates for Phoenix hardware can be imported in a centrally controlled manner.



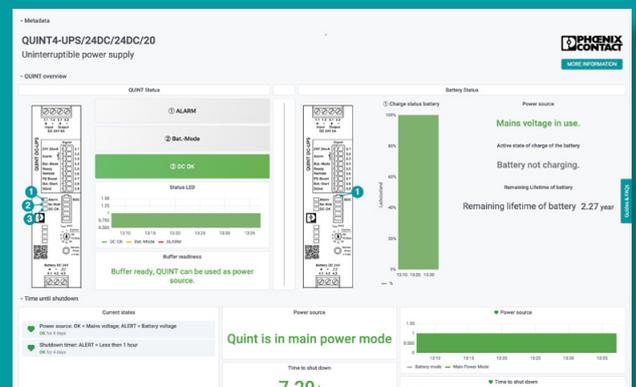
## DMS Basic Add-on:

The first add-on of the Device Management Service offers additional functions for the control of distributed systems. Particularly useful: automatic firmware updates; notification system for notifications of changes in the health status of a device; remote application update (currently only for PLCnext hardware); creation of device groups.



## Time Series Data Service:

This allows access, monitoring, and recording of all types of process data. This includes, for example, the flow rates, temperatures, and energy profiles of machines, which can be used for long-term data-driven decisions. An alert function informs users as quickly as possible if defined threshold values are exceeded anywhere.



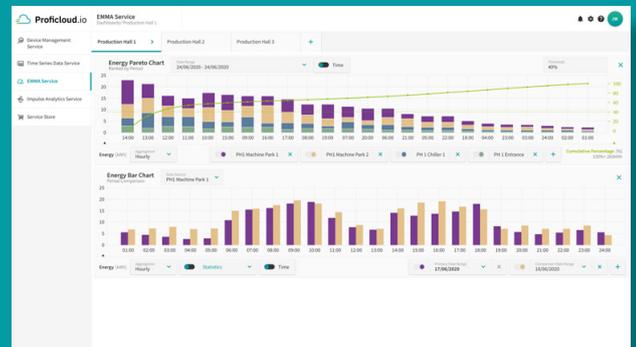
## Impulse Analytics Service:

In combination with the IoT-enabled devices for ImpulseCheck, this service is the first intelligent assistance system for surge protection. The state of health of all protection devices integrated in the cloud is visible, so that the service life can be predicted much better.



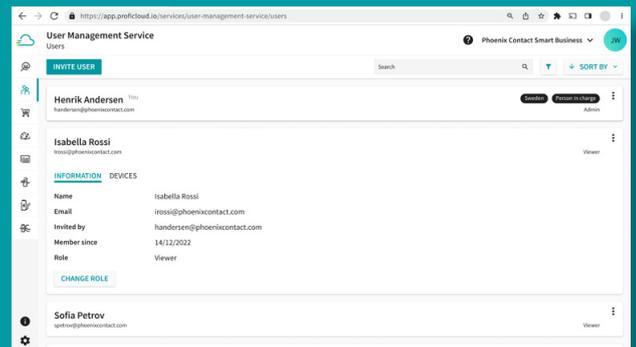
## EMMA Service:

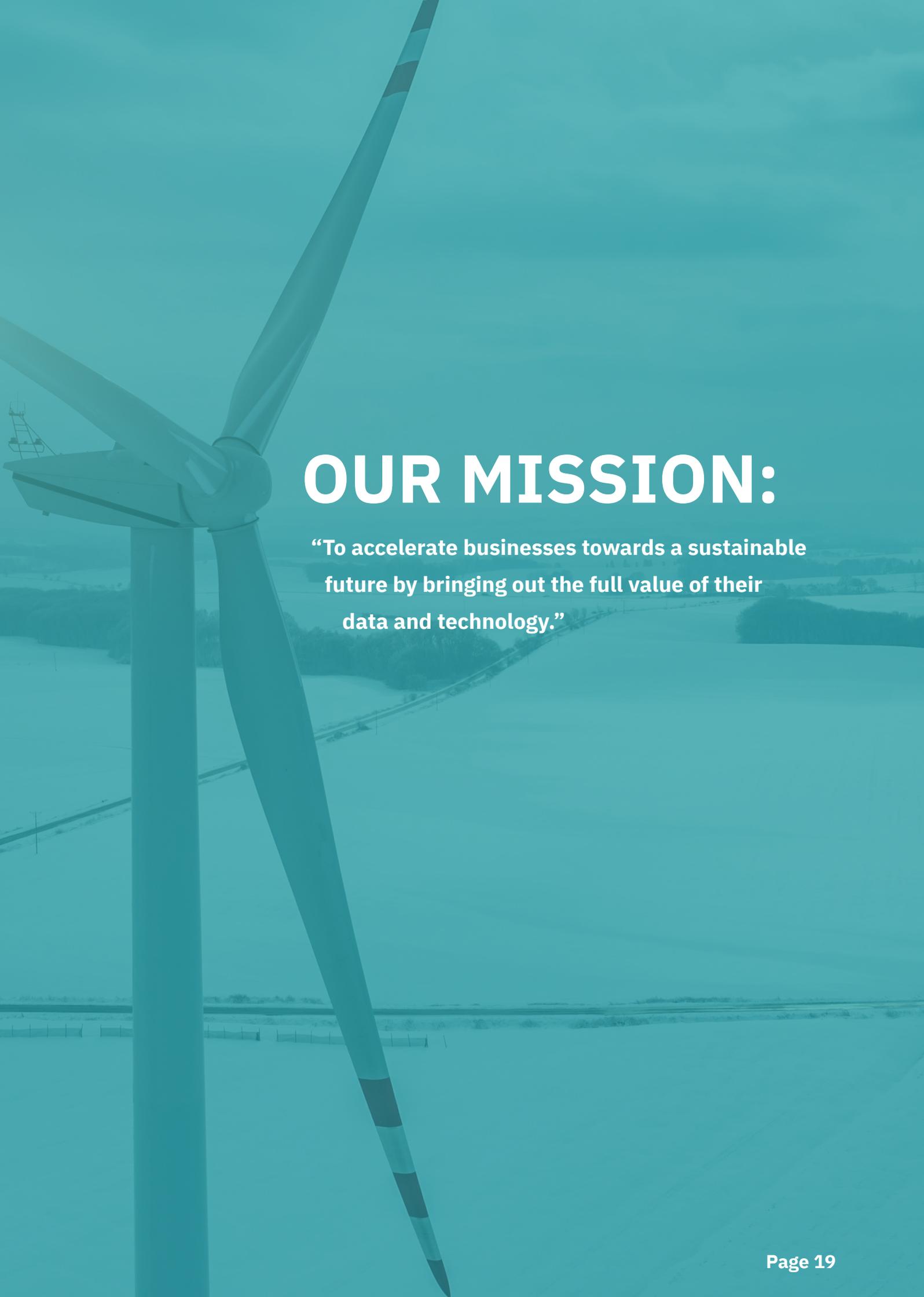
The abbreviation stands for Energy Monitoring, Management, Analytics. This Smart Service and the IoT-capable EMpro energy meters enable modern energy management that, among other things, identifies and exploits savings potential. Individually adjustable alerts inform immediately when threshold values are exceeded.



## User Management Service:

With this core service, the company organizes its users in Proficloud.io. They can be assigned individual devices, roles (admin, editor, viewer) and permissions, giving users access to the dashboards and data relevant to them.





# OUR MISSION:

**“To accelerate businesses towards a sustainable future by bringing out the full value of their data and technology.”**



### **Take back control of your maintenance and operations**

Smart Services are easy-to-run, standardized and scalable cloud services for industrial environments that empower small and mid-sized companies to manage their operations and maintenance processes as efficient as possible.

Reduce manual and redundant work steps with remote monitoring across devices and locations. Increase the availability of your systems thanks to early error detection and automatic alerts. Make better, data-based decisions and gain full transparency on the status of your systems – at any time, from any location.



### **Your ticket to industrial IoT**

Proficloud.io is a Plug and Play IIoT platform that empowers small and mid-sized companies having no own or only limited IT resources to easily connect their devices to a cloud infrastructure. The goal? Use the full scope of advantages of Smart Services to unleash the full potential of your business!

Thanks to intuitive web interfaces and dashboards, Proficloud.io offers maximum simplicity when using the cloud platform. Registration only takes a few minutes and no previous (IT) knowledge is required to use the platform. Moreover, the Proficloud.io Service Store offers – thanks to well-known web-shop features – full transparency on functionalities and pricing models when booking Smart Services. All of this is integrated in a highly available cloud environment that always complies with the highest security standards available. What are you waiting for? Convince yourself!



**Phoenix Contact Smart Business GmbH** is the centre of excellence at Phoenix Contact for cloud services and data analytics in industrial automation.

A growing team of currently more than 30 employees located in Berlin, Bad Pyrmont and India creates standardized and scalable software-as-a-service solutions – so-called Smart Services – to empower small and mid-sized companies to take full advantage of digitization and Industrial IoT.

## **The core competencies of Phoenix Contact Smart Business:**

### **Cloud technology, data analytics, software services**

Cloud-based services based on Industrial IoT technologies enable users to gain an overview of the status of their application – from anywhere and at any time. By using various algorithms for forecasting, optimizing, and analyzing, users of Proficloud.io and Smart Services manage operations and maintenance processes as efficient as possible by reducing downtimes and optimizing redundant workflows – across devices and across locations.

## **About Phoenix Contact**

Phoenix Contact is a globally present, Germany-based market leader. Our group is synonymous with future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation. A global network across more than 100 countries and 17,600 employees ensure close proximity to our customers, which we believe is particularly important.

# Contact



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