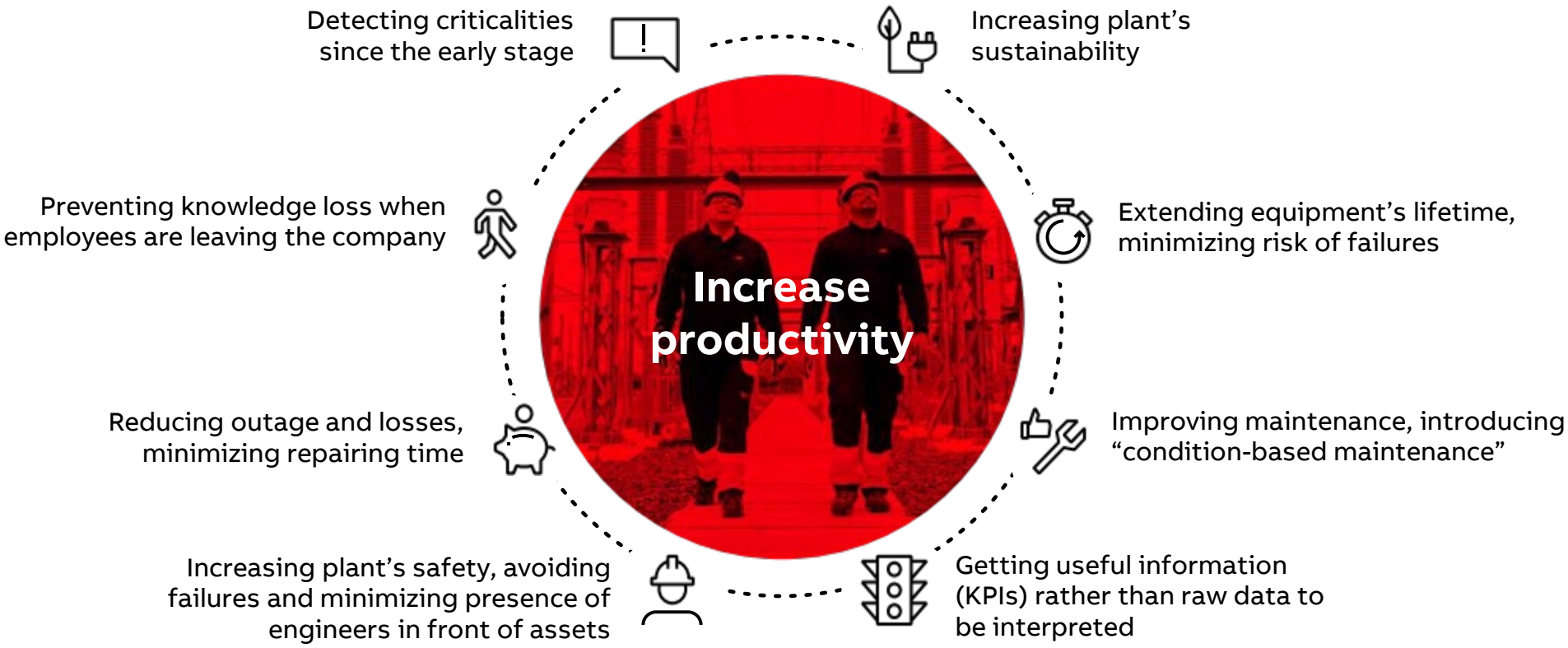
ABB ABILITY™ ASSET MANAGER FOR TRANSFORMERS

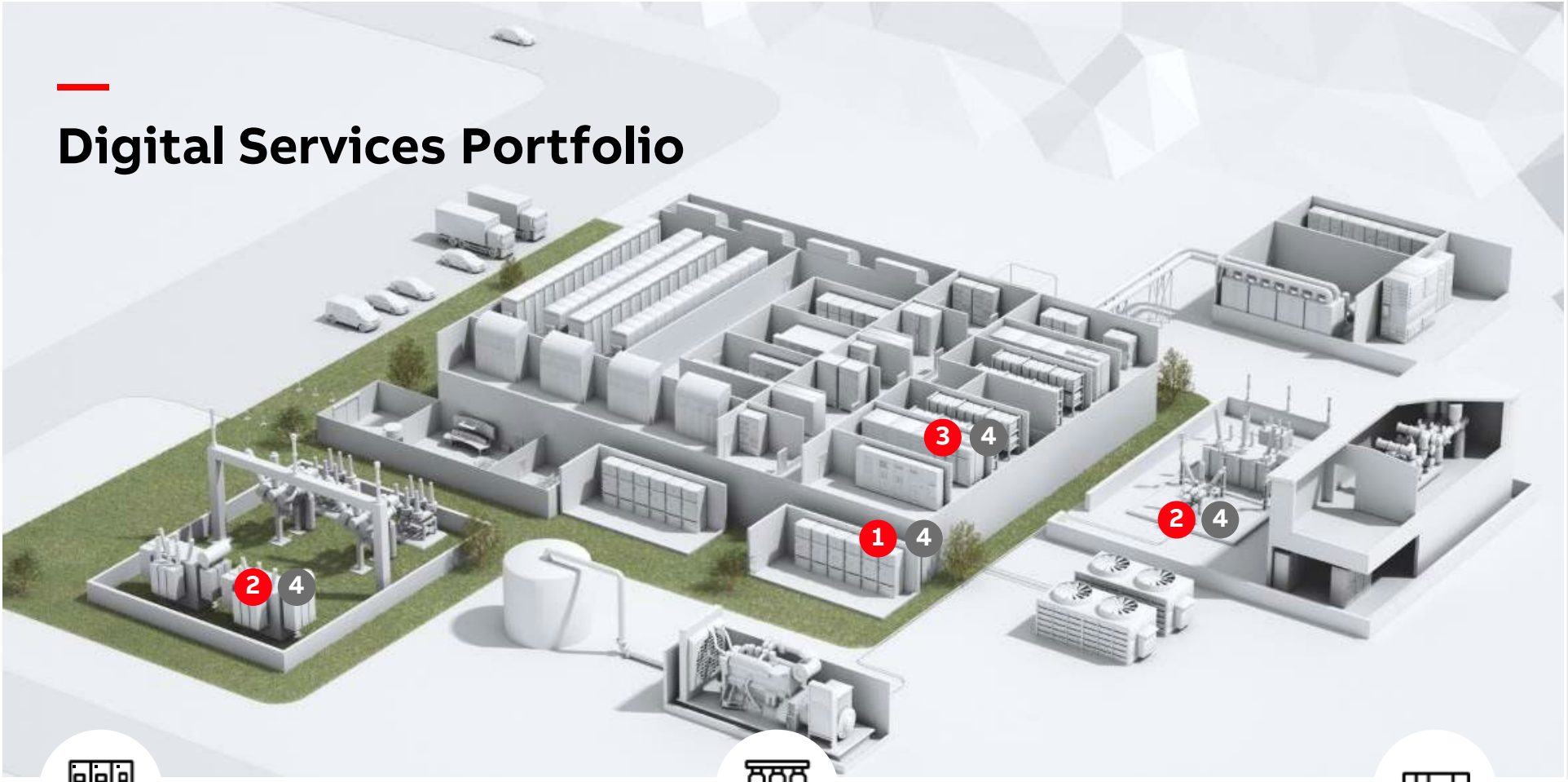
ENGINEERED TO OUTRUN

What benefits will you get from digitalization?



Digital Services Portfolio

Digital Services Portfolio



4 Cloud-based ABB Ability™ Asset Manager

- Analytics
- Multi-site view
- Health index
- Events
- Telemetry
- Documentation

(MV switchgear):

- On premises product
- Covering air-insulated switchgears and gas-insulated switchgears
- Suitable for ABB or third-parties' switchgear

(Transformers)

- Local sensor collecting data
- Non-invasive solution (no holes, no cuts, no modifications required)
- Suitable for oil and dry-type transformers, any brands (Schneider, GE etc.)

(LV switchgear)

- Digital unit monitoring air circuit breaker panels
- Temperature monitoring
- Suitable for ABB or 3rd-parties' switchgear
- Predictive maintenance on ABB / Legacy GE breakers

Electrification Service: comprehensive offer of products, solutions & services

Customer journey

Site Assessment

Site assessment
- ABB and non-ABB equipment
- Medium and Low voltage assets, transformers
- Asset's risk charts
- Basic assessment and full assessment
- Shutdown is not mandatory

Life cycle status
Asset aging
Visual observation
Testing

Monitor and diagnostic

On-premises products and sensors
- Local measurement and first level KPIs.
- It is possible to integrate local control systems (e.g. Scada)

Electrical parameters
Temperature
Mechanical operation
Vibrations
Local HMI

Asset Management

Cloud-based solutions
- Advanced analytics
- Remote access to plant's data
- Comparison of assets' data
- Multi-site view
- It is easy to enable additional functionalities

Asset Manager

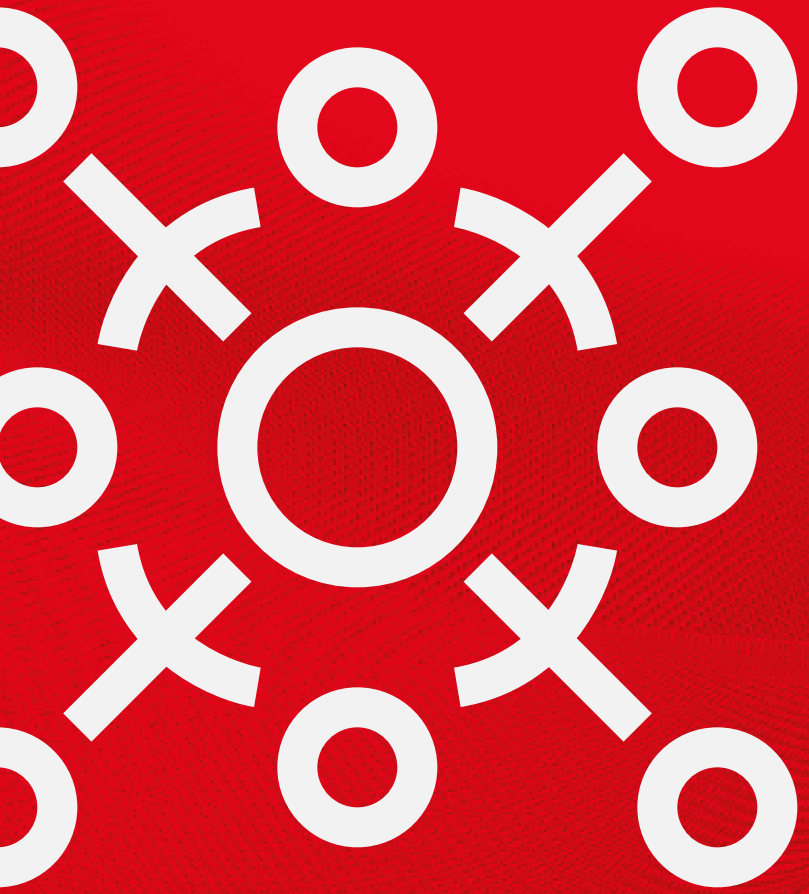
Digital maintenance contract

Advanced remote services
- ABB Expertise at the customer side in a few clicks
- Live and historical data available to ABB experts
- Better planning for site intervention if needed

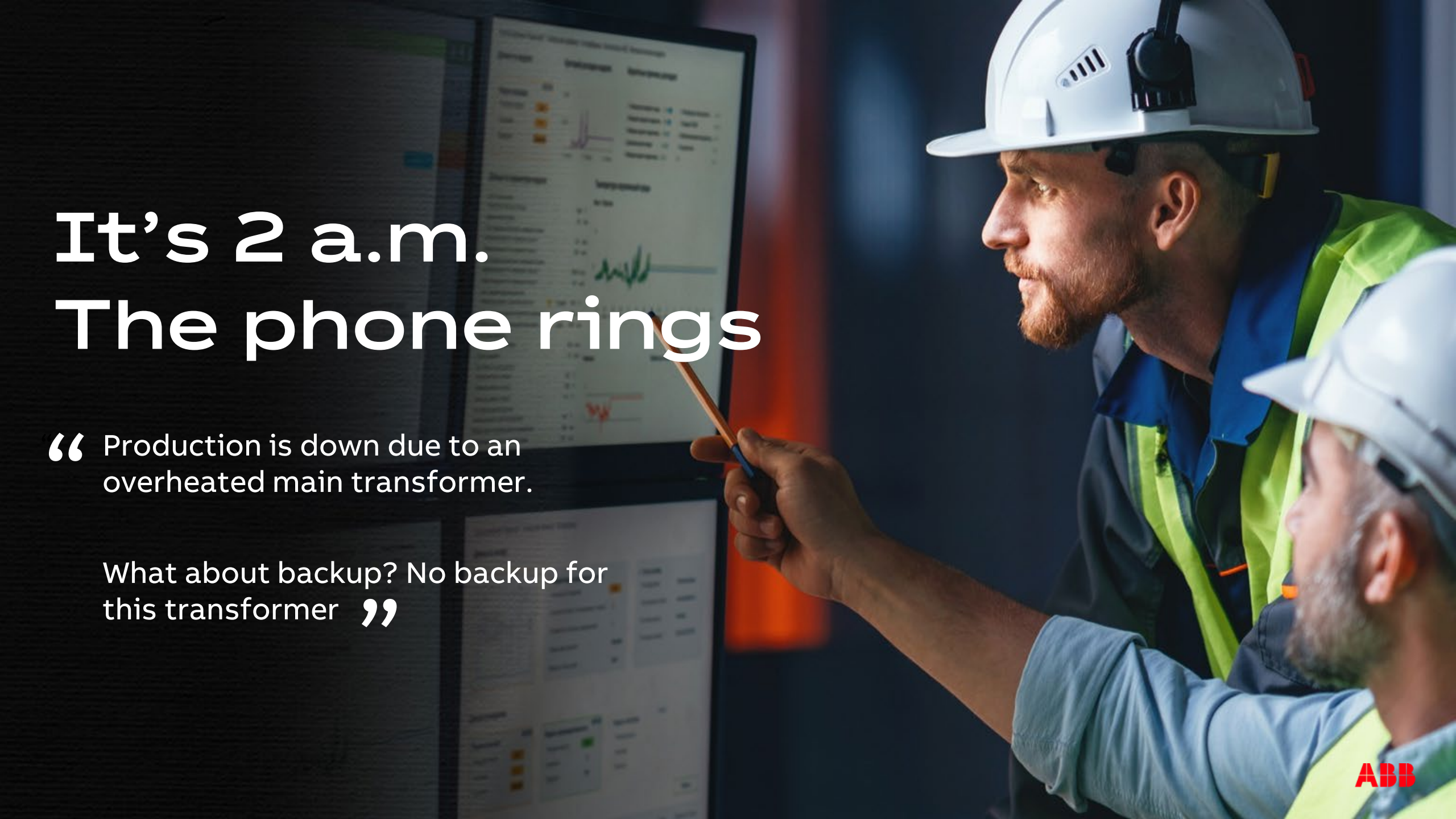
Regular data analysis
Call-out assistance

MV Switchgear MV/LV Transformer LV Switchgear

We digitalize not only MV and LV switchgears but also transformers.



Story of Failure



It’s 2 a.m. The phone rings

“Production is down due to an overheated main transformer.

What about backup? No backup for this transformer”

It’s time to change the story

We need to see better

Unplanned maintenance is **4-10 times** more expensive than planned maintenance

We need to foresee more

Maintaining only when needed reduces maintenance costs by **20-30%**

We need to optimize everything

4-10% increased profitability with higher availability and a more efficient workforce

Use cases of transformer monitoring

Reduce unexpected downtime

↳ Online monitoring **reduces unexpected downtime up to 70%**

Industry struggling with **labour shortages**

↳ Optimise maintenance workflows with **recommended actions**

Significantly more electricity needed by 2030

↳ Improve asset utilisation up to **40%**

Transformers **reaching end of life**

↳ Defer reinvestments **5-15 years**

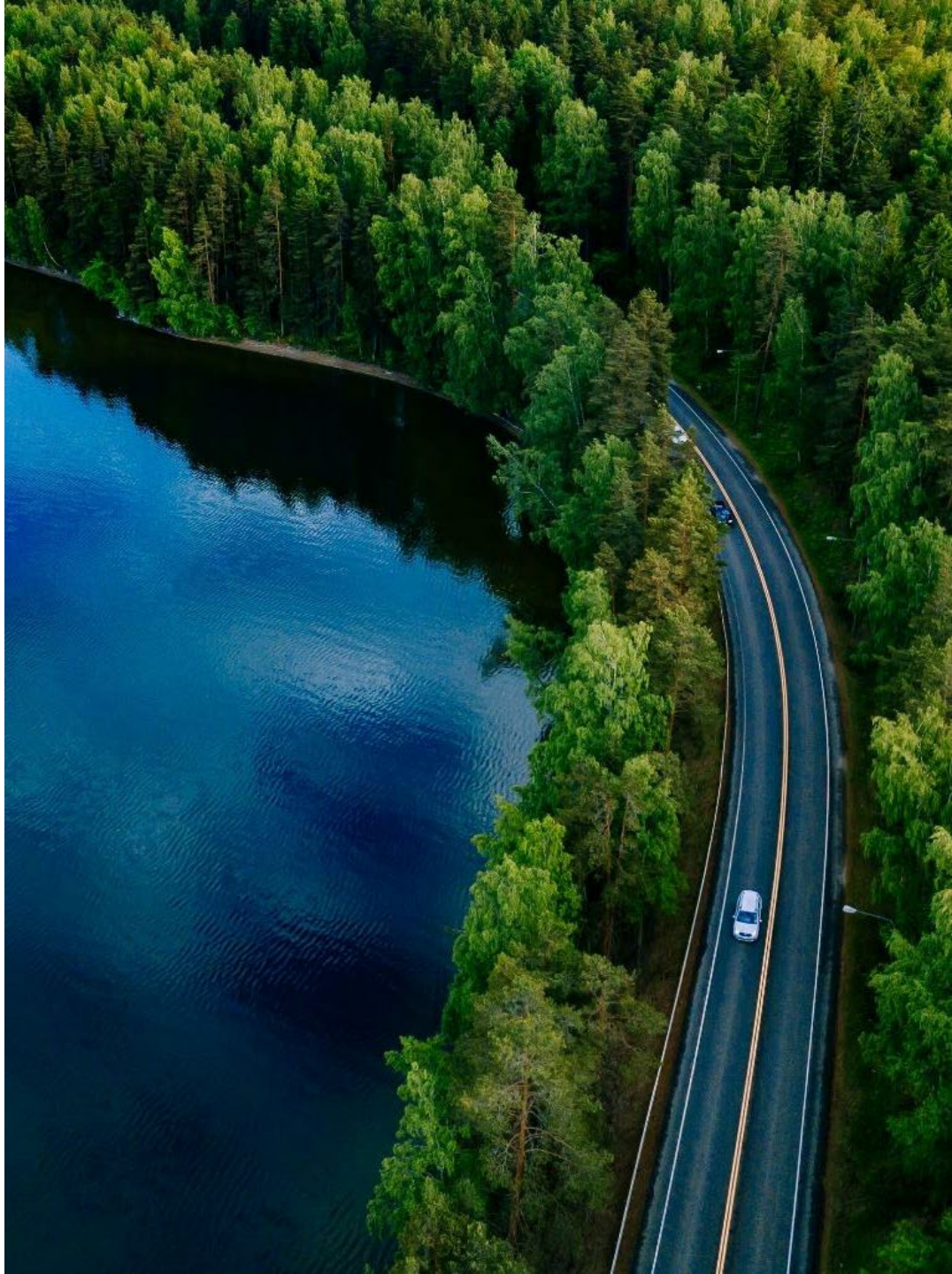


ABB Ability™

Asset Manager for Transformers

TRAFCOM

Non-invasive

A solution that does not require drilling or similar to add sensors

Easy installation

To minimize transformer outage

Brand agnostic solution

To upgrade all the transformers with the same solution

Technology agnostics

The same solution applicable to oil and dry type transformers

4G LTE-M Antenna

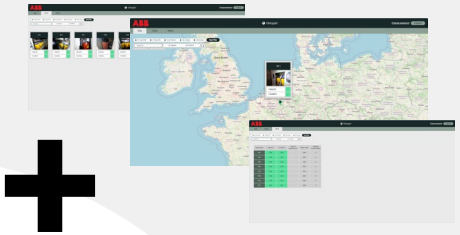


ABB Ability ™ Asset Manager for Transformers Dashboard

Robust installation

- Magnetic mount
- IP67

Non-Invasive measurements for continuous anomaly detection

- Thermal performance
- Mechanical integrity
- Ultrasonic sensing of Partial Discharge

Power Supply

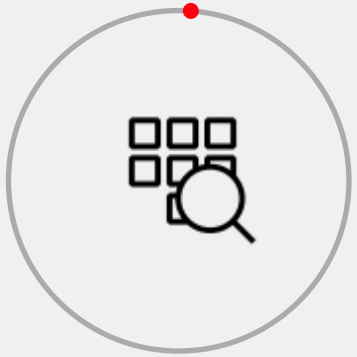
Battery Back

Cloud connectivity

Embedded gateway for connectivity to cloud-based functionalities

3 steps towards digitalizing transformers

Site assessment (optional)



To define priority in the digitalization. Which transformers need to be digitalized first?

Installing hardware

Less than 15 minutes required for installation and commissioning of **ABB Ability™ Condition Monitoring for Transformers – TRAFCOM**

Connecting to the cloud

ABB Ability™ Asset Manager for Transformers is the online application for monitoring transformer's health and performance delivering measurements, KPIs and insight to support better decisions

Overall Process

From pre-requisites to onboarding the customer

1

Prerequisites

- Fill the prerequisites excel sheet
- Make sure that the customer has 4G LTE-M coverage

2

Quoting and shipment

Send e-mail quote to Oktogrid. Shipment and login information will be returned.

3

Installation and commissioning

Install the sensor using the Oktogrid Installation App.

Scan the QR code or go to: Install.oktogrid.io

6

Customer onboarding

Customer will receive a link for dashboard access along with login information after successful I&C.

5

Getting started workshop

Customer will receive an invite for getting started with the TRAFCOM dashboard.

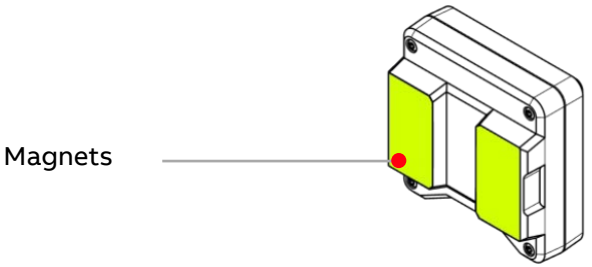
4

Task completed!

Process is completed.

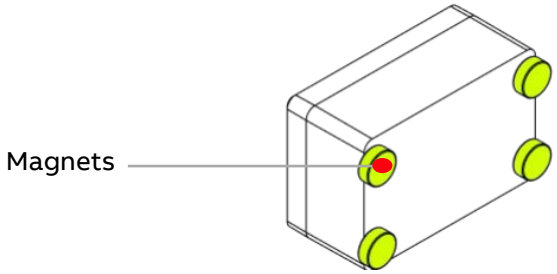
Activities

Sensor & Gateway



Antenna

Battery / Power supply



Transformer energized

Transformer de-energized

Share in advance transformer details like: power, nominal current, load loss, etc.

Connect the battery and sensor. Make sure that connections are tight

Install the sensor as close to the center of the core as possible

Place the battery away from the transformer with the arrow pointing upwards

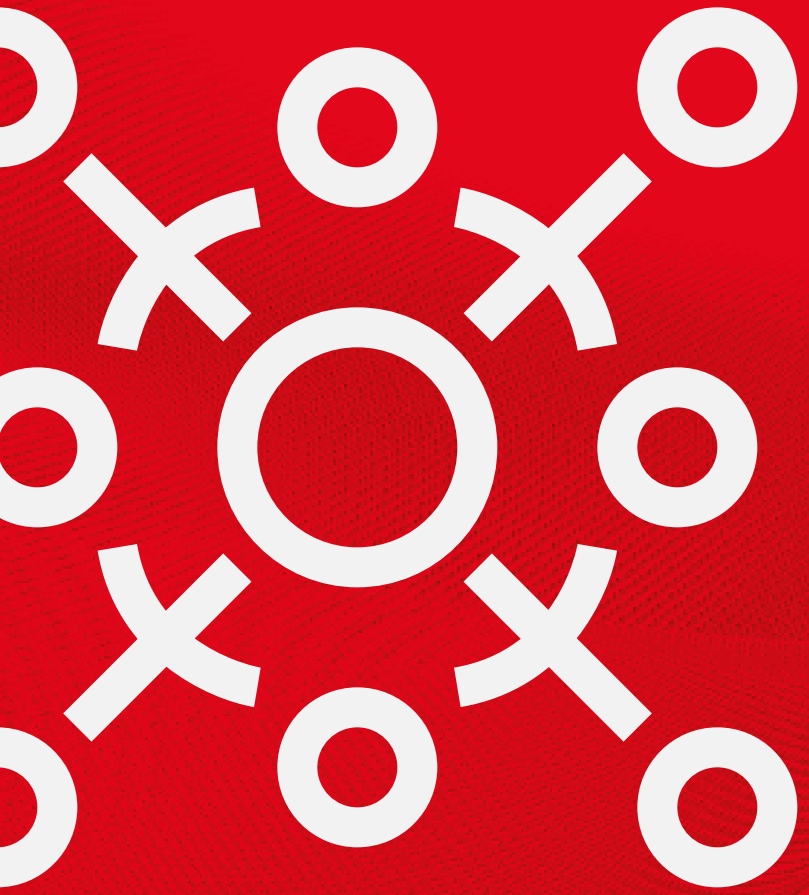
Place the antenna as high as possible within safety regulations

Secure the wires with the wire-clip and zip ties

Fill the data in the app

Reconnect the transformer

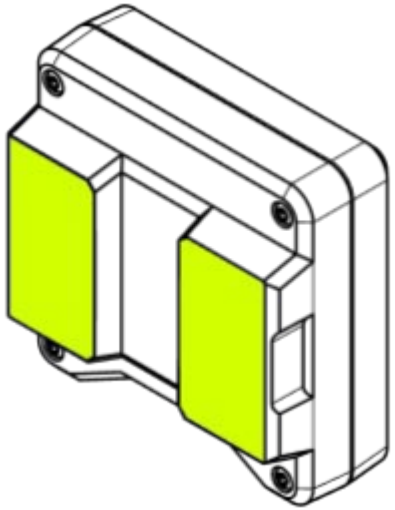
No drilling required! Average transformer outage < 15 minutes



Installation

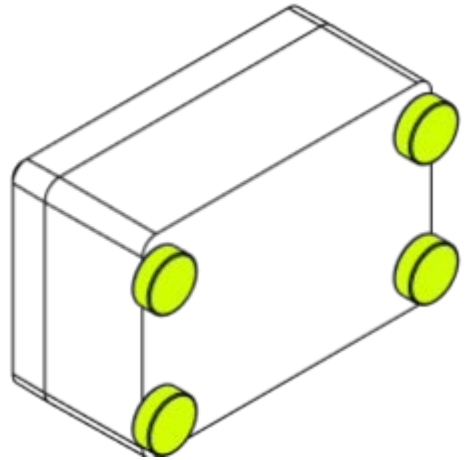
Installation

ABB Ability™ Condition Monitoring for Transformers - TRAFCOM



The Data Collector™ has two strong magnets on the bottom side.

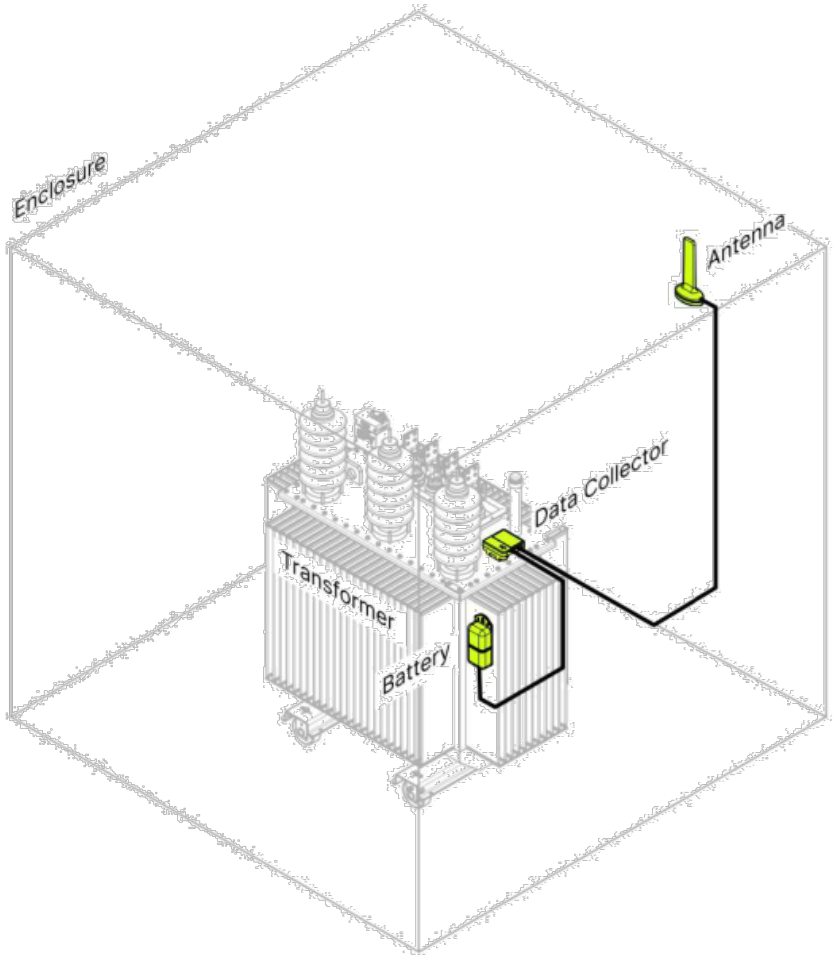
The bottom surface of the Antenna is magnetic.



The bottom surface of Utility power/battery is magnetic.

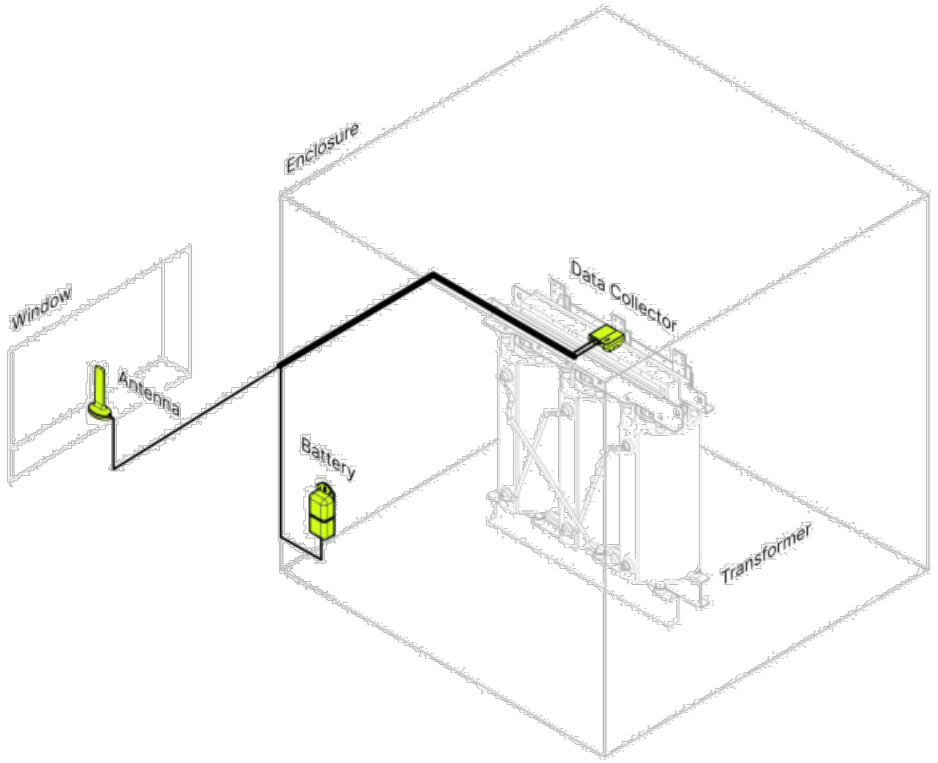
Oil transformer installation example

ABB Ability™ Condition Monitoring for Transformers - TRAFCOM



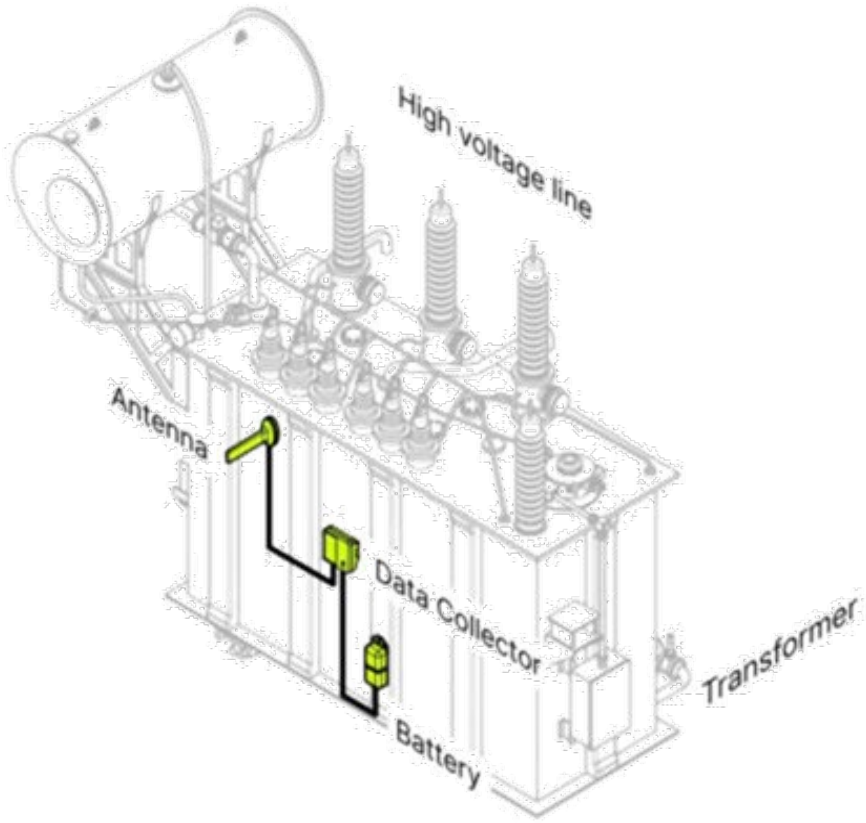
Dry transformer installation example

ABB Ability™ Condition Monitoring for Transformers - TRAFCOM



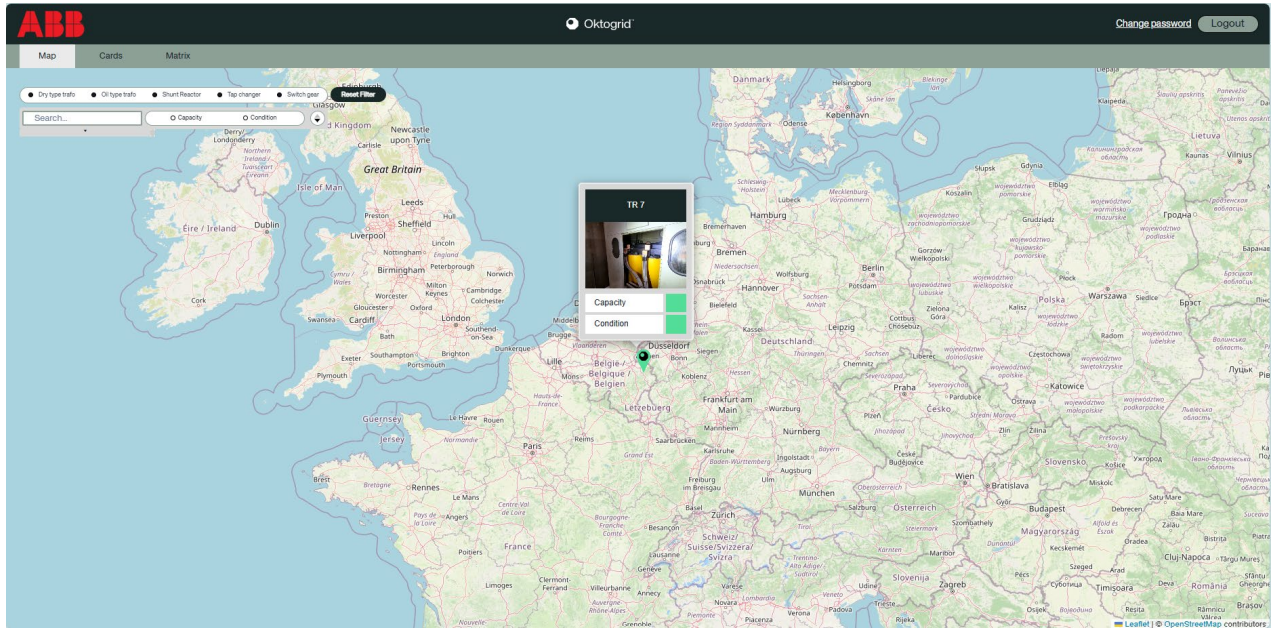
HP oil-immersed transformer installation example

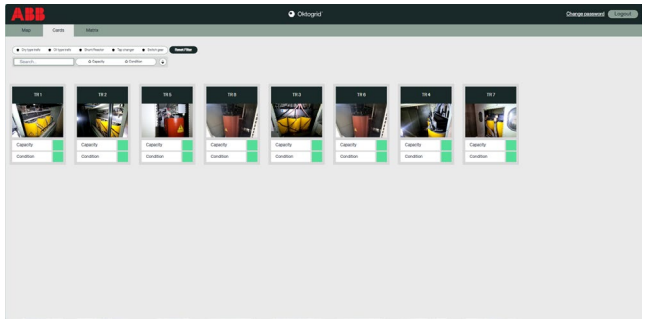
ABB Ability™ Condition Monitoring for Transformers - TRAFCOM

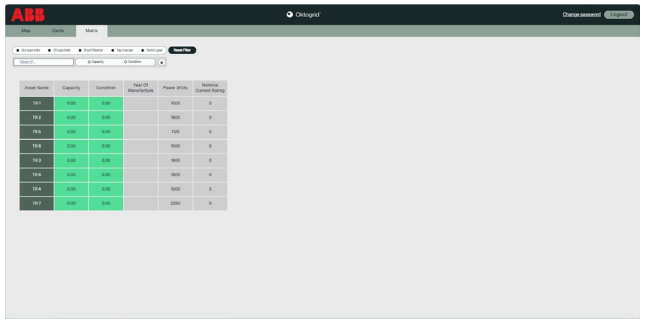


Dashboard

Landing page
ABB Ability™ Asset Manager for Transformers







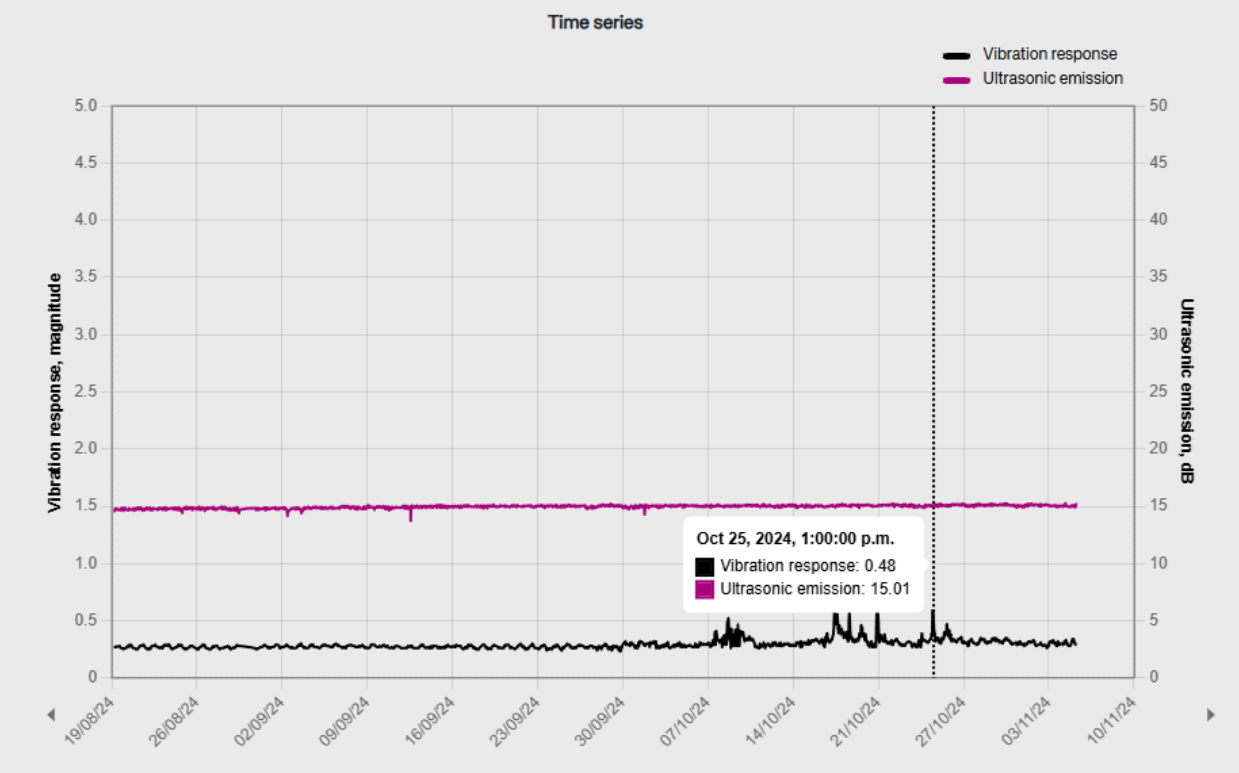
Landing page offers a user three different options:

Map
Visualization of the physical location of transformers

Cards
Summary of KPIs with traffic light indication

Matrix
Compact view of Transformers technical data and main KPIs

Dashboard
Condition - Mechanical Integrity

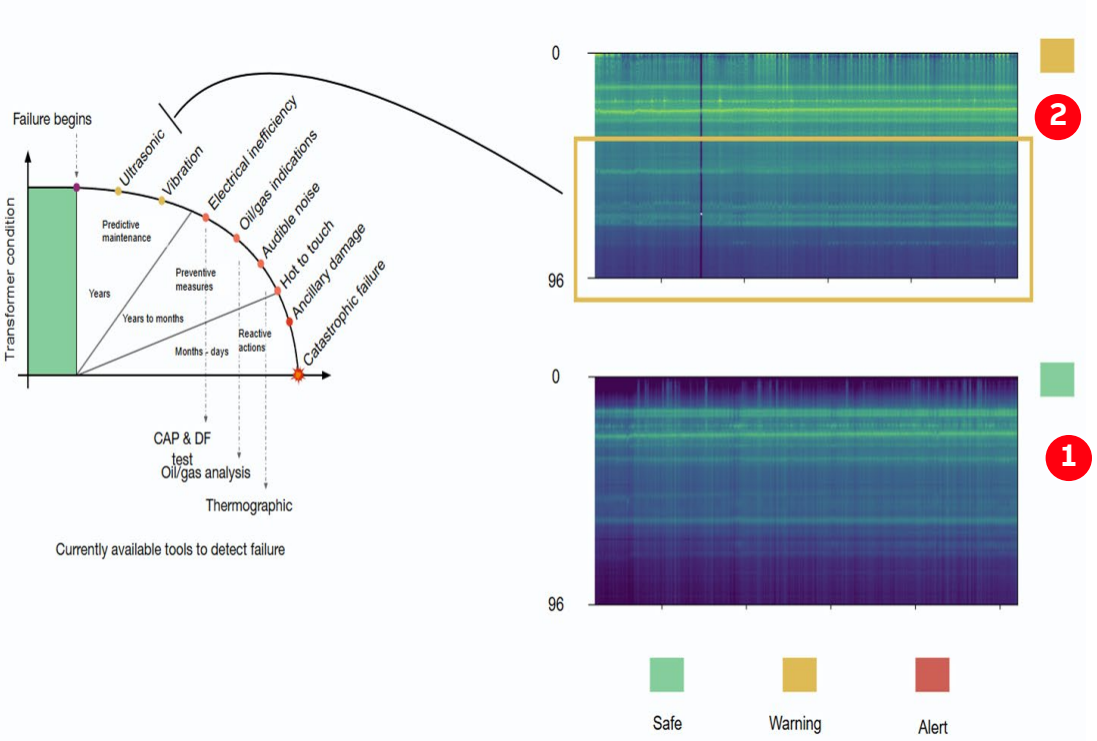


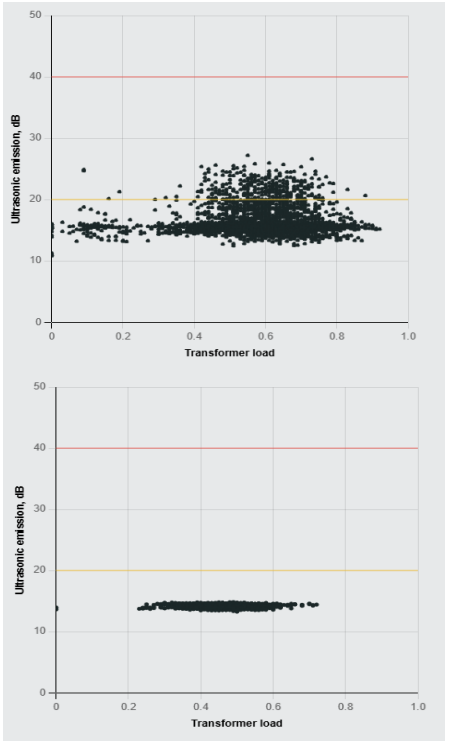
With vibration analysis algorithms are looking at the core and winding. This relates to changes to the **mechanical integrity of the core**:

- Loosening of core
- Loosening of windings
- Eccentricity of windings

Dashboard

Condition - Partial Discharge indication





Partial discharge is an early signal of insulation degradation for electrical components, which can end up with catastrophic failures.

The indicator shows the abnormal ultrasonic waves which indicates the partial discharge.

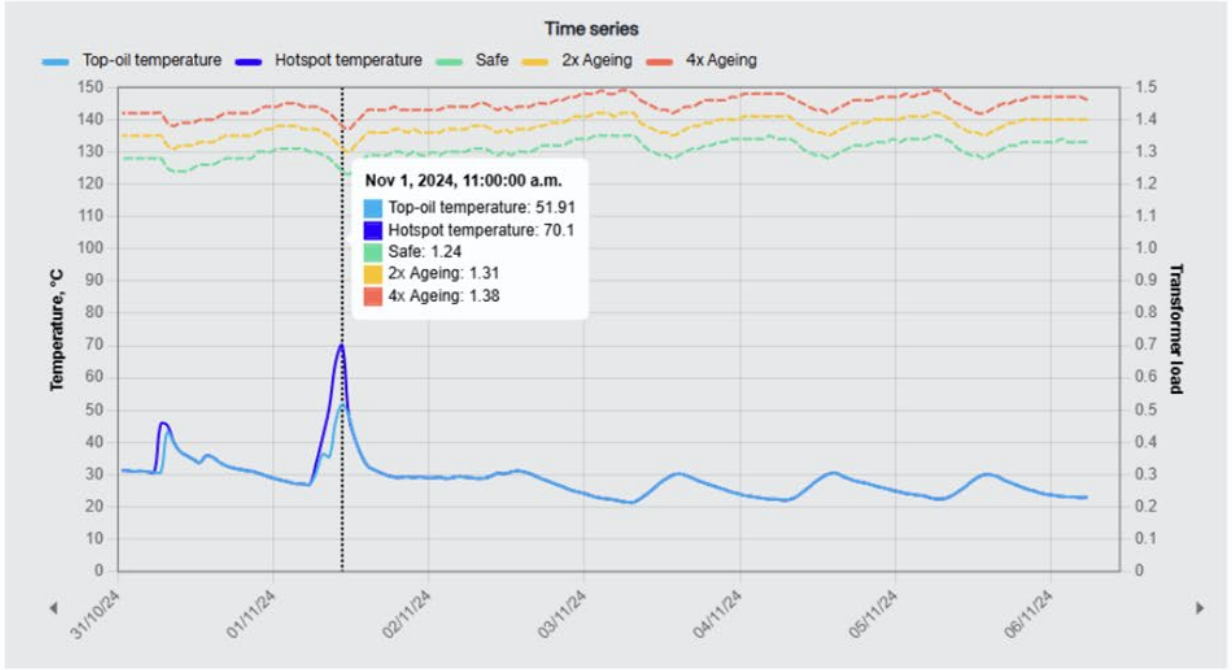
1. The healthy wave
2. The unhealthy wave

Dashboard

Capacity - thermal capacity & thermal response

Dynamic thermal rating based on IEC60076 indicate the dynamic capacity limit for the transformer.
In this case up to 25% more capacity can be utilised without loss of life

Temperature of core reflects how ambient temperature and short and long-term loading on the transformer affects thermal performance



Safe
No loss of life

Warning
2x loss of life

Alert
4x loss of life

Transformer Monitoring

Five critical metrics for tracking transformer performance

Dynamic load (%)	Transformer load (%)	Mechanical integrity	Partial discharge level (dB)	Top-oil temperature (°C)	Hotspot temperature (°C)
130	34	0.01	1.7	19.21	25.42
127	35	0.09	3.9	24.46	29.56
128	59	0.11	4.4	35.75	48.81
120	88	0.19	4.4	50.62	72.50
128	81	0.01	6.1	52.06	76.03
130	53	1.12	5.5	58.54	69.17
129	69	0.19	5.2	88.25	103.66
130	55	2.80	6.0	31.28	43.09
130	47	5.00	8.2	29.62	39.68

- Transformer load: load profile of asset
- Mechanical integrity: vibration harmonics indicating mechanical stress, µg/√Hz
- Partial discharge: ultra-acoustic emission, dB
- Core/top-oil temperature: core or top-oil temperature, °C
- Hotspot temperature: hot-spot temperature, °C

Transformer Monitoring

E-mail notification is sent to ABB ELSE contact

Example of e-mail notification:

Observations	Comments and possible causes	Severity
Electromagnetic field: Slightly elevated across all upper harmonics	Possible winding aging effects, minor core nonlinearity, or harmonic contamination from grid.	Low to Moderate
Vibration harmonics: 1st harmonic high, 2nd harmonic moderately elevated, 3rd 4th 5ht 6th slightly elevated	Core magnetostriction effects, core clamping issues, or mild mechanical looseness.	Moderate
Temperatures: Normal (Top-oil 58°C, Hotspot 69°C)	Indicates cooling system (ONAF) is functioning well, and there are no excessive losses.	No concern
Acoustic levels: Normal (~57 dB SPL)	No major core loosening, insulation degradation, or structural resonance.	No concern
Peak load: Moderate (> 50%)	The issue is not due to excessive loading, so harmonics are likely caused by mechanical or magnetic aging effects.	Investigate

Delivering remote services through service agreement

Service contract for digital plants

ABB Power Care

The next generation in tailored service agreements, underpinned by remote and digital solutions

Emergency & Troubleshooting	Diagnosis & Condition assessment	Maintenance	Knowledge	Safety & Sustainability	ABB Power Care contract pillars
Historical assets data is available to better understand the events	24/7 data collection to define asset's status and plan further actions	Possibility to switch to condition-based maintenance	Prevent knowledge loss due to high turnover or employee absence	Minimized operators' presence in front of assets (Safety)	**Digitalization impact for end users**

Success Story

Success story – ELSE Finland, TRAFCOM

Digital monitoring solution ensures clean bill of health for Finnish hospital's power supply

- New digital solution from ABB monitors crucial electrical infrastructure and supports 100 percent uptime to safeguard patients
- Software provides access to critical operational performance data in real time via the cloud
- Benefits include more reliable and sustainable power supply, prolonged component life, early fault detection and improved condition-based maintenance
- HUS consumes electrical energy equal to a small town. Supporting this output is a network of transformers, which require regular inspection and occasional shutdown – an almost impossible task in a hospital requiring 100 percent uptime to safeguard patients' lives.

Who is the customer?

End Customer: HUS Kiinteistöt Oy

Location: Helsinki, Finland

What did they buy?

ABB scope:

ABB Ability™ for Transformers + 2x TRAFCOM

Words from the customer

We are now getting uninterrupted real time data on the transformers, which wasn't possible with visual inspections, which could only tell if there was a leak or change in either the temperature of the unit or the sound it's making," adds Korhonen. We can monitor the transformers 24/7 and are immediately aware of any issues that may require our attention.

FULL STORY: https://new.abb.com/news/detail/120918/digital-monitoring-solution-ensures-clean-bill-of-health-for-finnish-hospitals-power-supply

Keeping in mind
Safety & Sustainability

Safety

Reduced time spent next to the assets

Checking asset’s health indications before entering the substation

Sustainability

Digital and remote services can **radically reduce the travel miles** and therefore the CO2 footprint caused by Field Service Engineers traveling to the customer's site.

By using asset management, you are avoiding failures and therefore you are **limiting emergency material delivery and filed service engineers travelling**, both typically made by plane.

CO2 emission[1]

Medium car (diesel) = **171g** per passenger-kilometer

CO2 emission[1]

Short-haul flight (economy) emission: **156g** per passenger-kilometer

Eurostar emission: **6g** per passenger-kilometer

1. Our World in Data link


ABB