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HYDROGEN, RENEWABLE DIESEL AND SUSTAINABLE AVIATION FUELS

## Integration and Digital – The pathway to a low carbon index

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# ABB Energy Industries

The portfolio integrator of ABB

## Deep oil, gas & chemicals expertise



Offshore & onshore



Midstream & transportation



Refining, chemicals & petrochemicals

- Leadership in Integrated Electrification, Automation, Instrumentation and Telecommunication solutions
- Deep relationships across industry
- 50+ years offshore upstream and downstream domain expertise

## Specialized power experience



Conventional power



Renewables



Water

- Strong digital, cyber security, and energy optimization portfolio
- #1 in DCS for conventional power
- Robust service business with long-term customer relationships
- 100+ years in power generation

## ABB Energy Industries

Deep expertise for Bioeconomy projects

- Integrated Automation, Electrification, Instrumentation & Telecommunications
- Segment-specific solutions
- Advanced digital solutions and services

## ABB Purpose

### We enable a low-carbon society

We reach carbon neutrality in our operations by 2030 and partner with our customers and suppliers to reduce their emissions.

### Integrity

### We promote social progress

We take care of our people and promote social progress with our partners, suppliers and in communities.

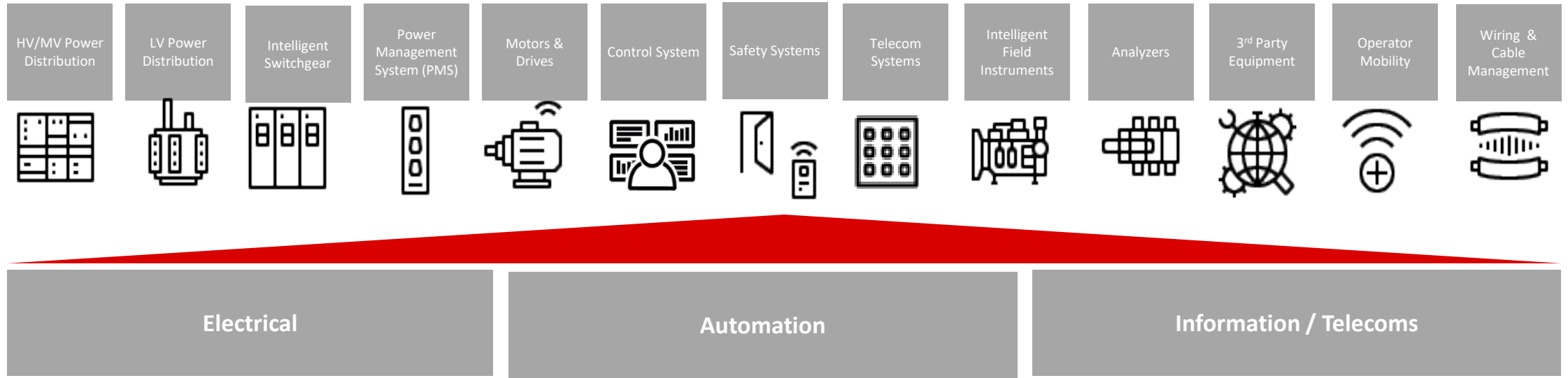
### Transparency

### We preserve resources

We embed circularity by reducing waste, improving recycling and fostering reusability.

# Adding value through integration across multiple packages

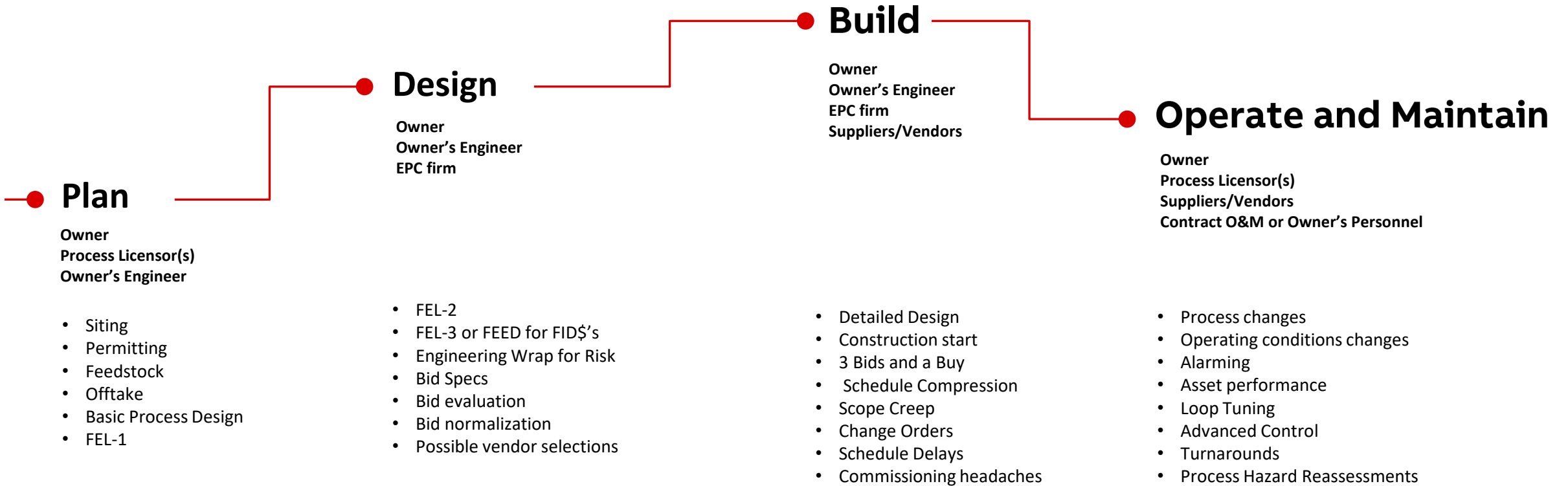
## Lifecycle Management



ABB's Integrated Solutions can reduce OPEX and CAPEX by 20% of this scope

# Typical project development

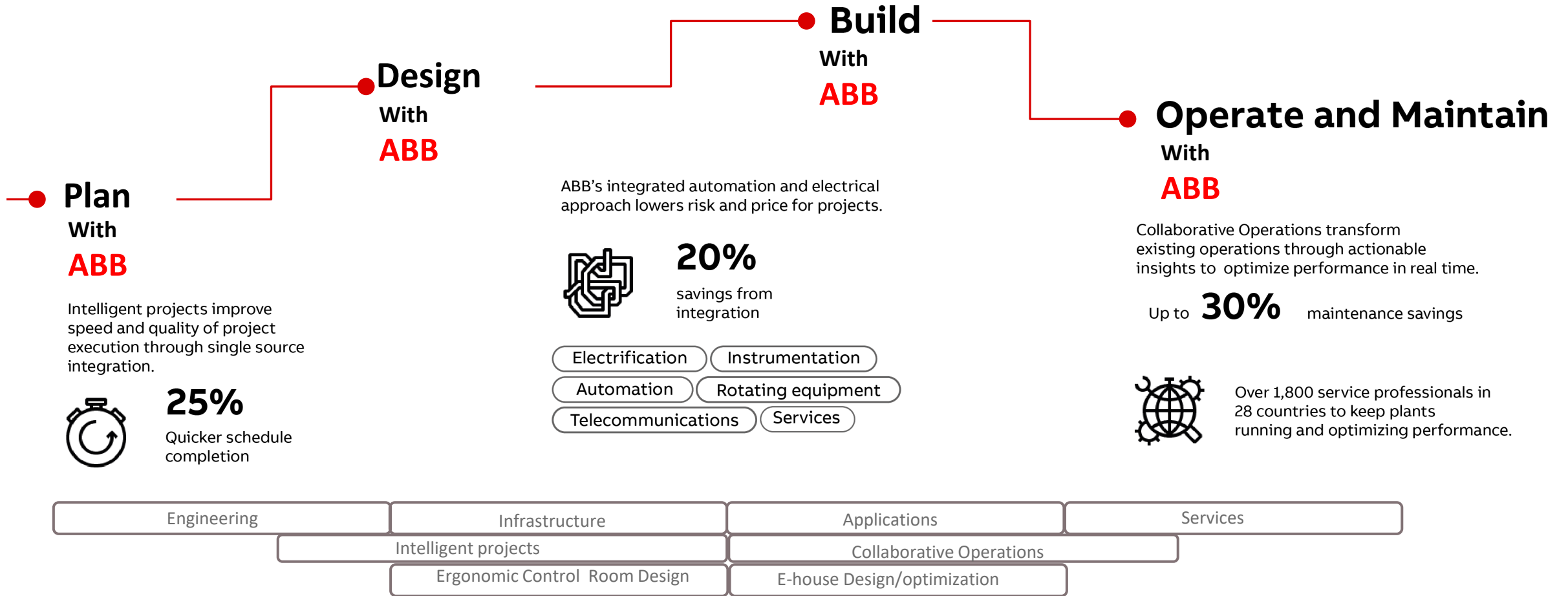
Cost Creep, Risk Creep and Schedule Creep



**Focus on Operational Excellence and Asset Performance Management during project development.**

# New paradigm project development

Proven technologies for minimizing cost, schedule and risk through the project lifecycle



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# Integration

– to incorporate into a larger unit or to unite with something else

Process Units

Heat and Energy

Operating Systems

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# Integration of systems in Process Plants

System 800xA is an integration platform

## Process Control **ISA-106 for Operational Excellence**

Process Safety

Process Fire and Gas

Electrical Control

## Power Management **Control the power and control the carbon index**

Machine monitoring

Compressor control

Turbine control

## Terminal Management

Maintenance and Operations Management System(s) or MOMs

Enterprise Asset Management

Plant communications (4-7)

# How many systems will be in your control room?

[https://www.controlglobal.com/assets/knowledge\\_centers/abb/assets/the\\_power\\_of\\_integration.pdf](https://www.controlglobal.com/assets/knowledge_centers/abb/assets/the_power_of_integration.pdf)



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# Power Management System

For multi co-generation power behind the meter

Grid Power is grid power. Do you incorporate:

- PV panels
- Wind power
- BESS
- ORC power plant
- Steam turbines

When you have multiple sources, how do you shed non-essential loads when one generator goes off-line to keep the plant operational? **IEC61850 communication protocol is the start.**

## Control the process and power to control your carbon index

[https://www.controlglobal.com/assets/knowledge\\_centers/abb/assets/power\\_up\\_your\\_plant.pdf](https://www.controlglobal.com/assets/knowledge_centers/abb/assets/power_up_your_plant.pdf)

[https://library.e.abb.compublic/b931a6ea576a3428525778300643725/ABB.Integrated.Process\\_and\\_Pwr.Automation.rev3\\_FINAL.pdf](https://library.e.abb.compublic/b931a6ea576a3428525778300643725/ABB.Integrated.Process_and_Pwr.Automation.rev3_FINAL.pdf)

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# Digital

Applications, electronic tools, systems, devices and resources that generate, store or process data.

# Digital Portfolio Examples

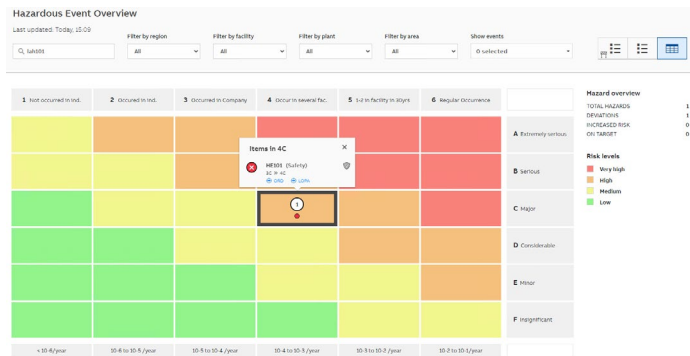
On Premise or in the Cloud – Integrated Dashboards

## Energy Management

### ABB Ability™ – OPTIMAX® Energy Management

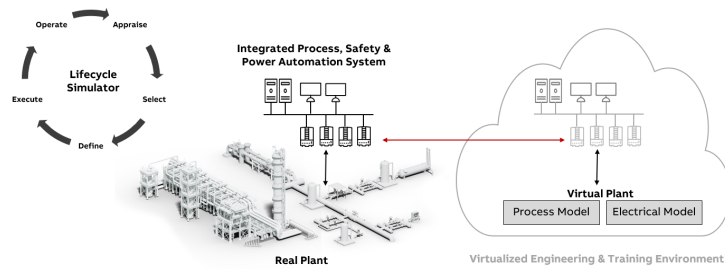


## Lifecycle Safety Management

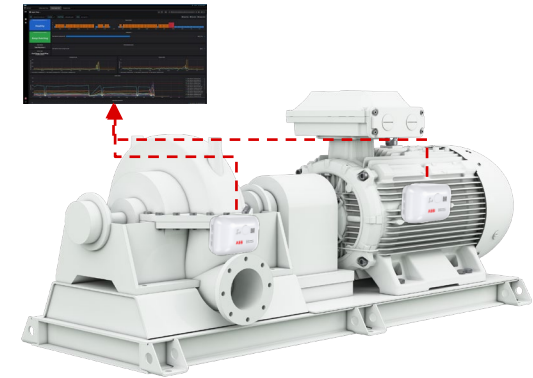


## Process/Electrical Simulation

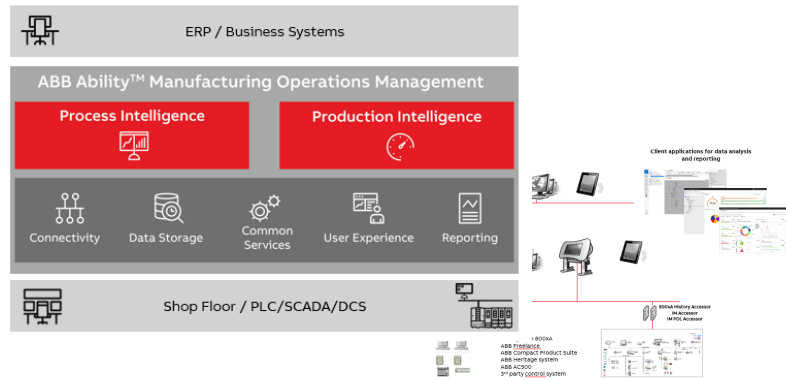
Reduce onsite commissioning effort by 50%



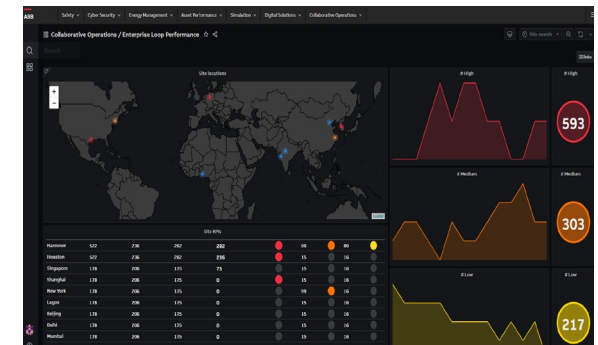
## Rotating/Electrical Equipment Analytics



## Manufacturing Operations Management



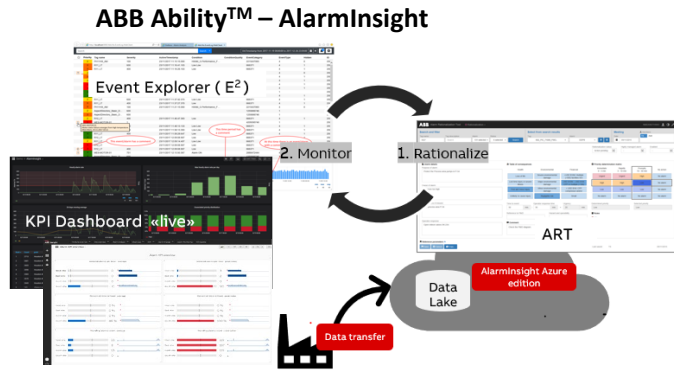
## Control Loop Analytics



# Digital Portfolio – Examples

On Premise or in the Cloud – Integrated Dashboards

## Lifecycle Alarm Management



## Mobility

**ABB Ability™ Augmented Field Procedure**  
Enables safe and consistent procedure execution

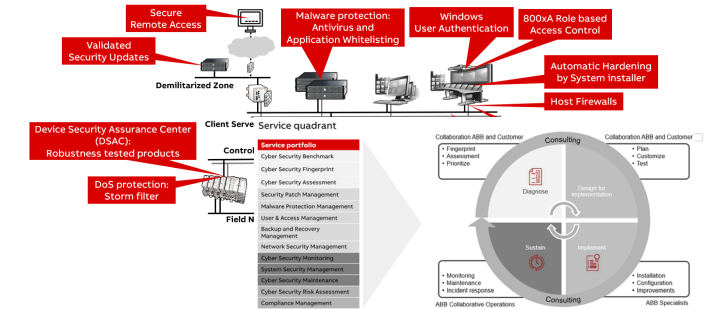
**ABB Ability™ Remote Insights**  
Live video sharing application that improves interaction by allowing remote experts to interact with field personnel and 'see what they see.'

**ABB Ability™ Mobile Operations**  
View faceplates and monitor alarms as values in the control system

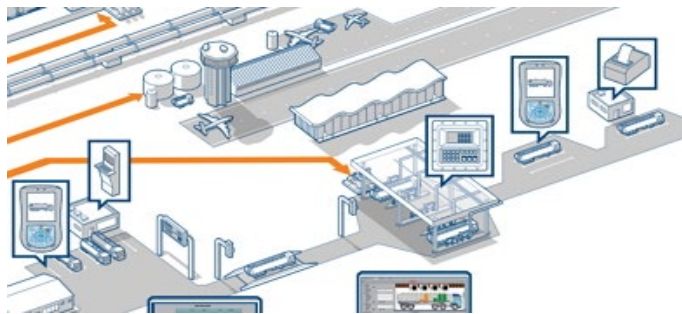
## Cyber Security (Products and Services)

### Defense in Depth in 800xA

Security features built in...

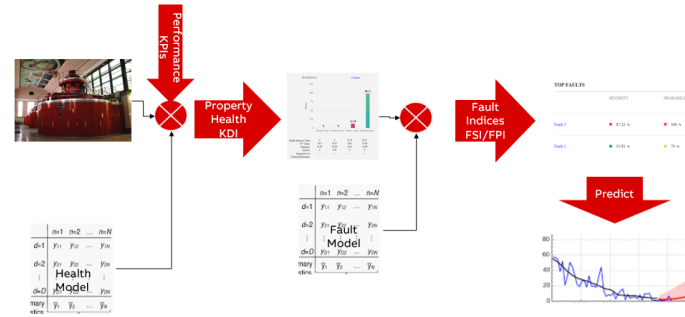


## Terminal Management



## Asset Health Predictive Models

Asset Health – Combining Data Driven, First Principle and FMEA Models



## Batch/Continuous Process Data Analytics

ABB Ability™ – BatchInsight/Plant Insights

**Batch Analysis - PV View**  
Root cause analysis of quality deviations  
Quickly compare multiple batches to identify abnormalities in batch process

**Batch Analysis - Duration View**  
Cycle time reduction  
Quickly compare multiple batches to identify delayed operations and abnormal idle time

**Batch Analysis - Gantt View**  
Reduction of unplanned downtime  
Quickly compare multiple batches in Gantt chart with drill-down of different recipe levels

**Batch Modelling**  
Efficient batch modelling lifecycle  
Data-driven batch model for RCA and online batch monitoring

**Online Batch Monitor**  
Detect and correct anomalies early in your batch production using statistical batch models, easy integration in DCS

**Batch Analysis - Asset Utilization View**  
Increase the productivity of each asset  
Efficient overview about asset utilization and batch production distributions

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# Carbon Index

The number of grams of CO<sub>2</sub> equivalent per 100g of product.

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# Carbon Index components

Emissions count against you

**Feedstocks** – have their own carbon index depending on type and origination

**EPA Scope 1 Emissions** – the carbon index attached to the power you get off the grid.

Renewables being added to the grid

Integration of Power generation and storage added at the plant

CHP

Waste boilers/steam generation

Steam pressure letdown generation

BESS

Solar

Wind

**EPA Scope 2 Emissions** – the carbon index you add to the feedstock processing it into product

Integration is the key to operational excellence

Faster start-ups, Fewer process trips/shutdowns, Reduced flaring

CCUS

WAGES optimization (Water, Air, Gas, Electricity, Steam)

**Transportation and Distribution** – has a carbon index depending on mode and destination

Alarms  
**19**

Warnings  
**19**

Battery

36

SoC

Current Energy Price  
**96 €/MWh**

Current Energy Cost  
**85€/h**

Lifetime Energy Cost Savings  
**2000 kEUR**

Lifetime CO2 Savings  
**2145 t**

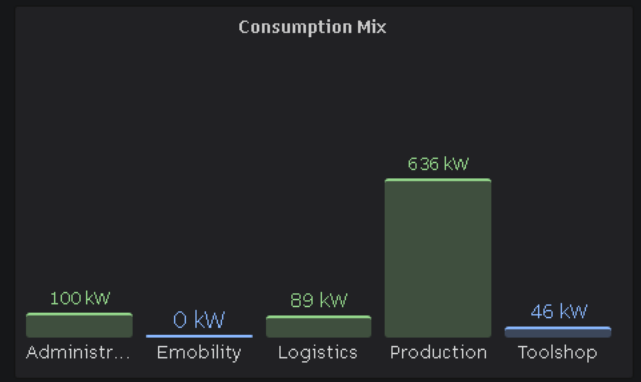
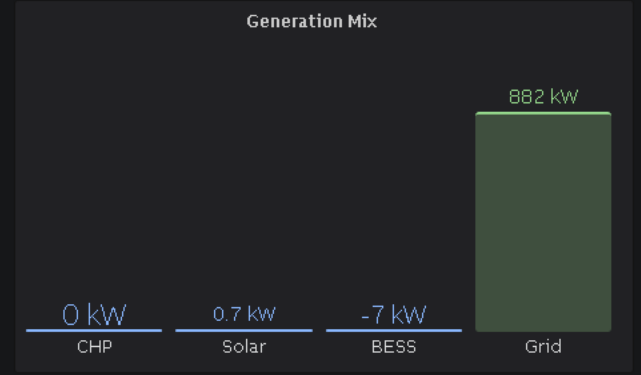
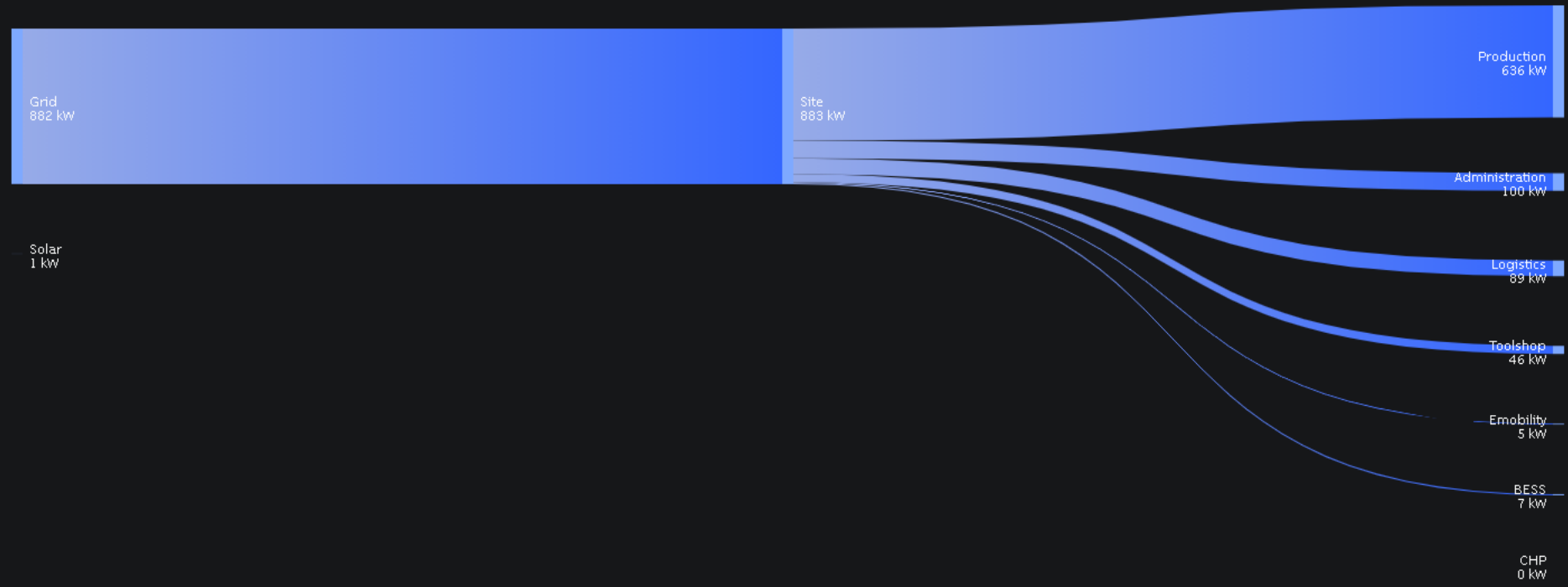
Current CO2 Emission  
**0.418t/h**

Current CO2 Emissions fac...  
**474 g/kW**

Grid Independence  
0.08%

Renewables  
0.7 kW

Energy Production & Consumption



~70% of Electricity usage in a plant goes to pumping, grinding, mixing, compressing and conveying materials

Day-Ahead Optimization Energy Forecasts



Battery Characteristics



Grid Characteristics





# Seek vendors aligned with you to help you succeed

Before, during and after



## Facility of the future requires:

Agile performance decisions leveraging comprehensive information

Data-driven operations from device to enterprise to lower CI and improve production

Collaborative partnerships with suppliers

Specialized domain and technology expertise

Increased attention to regulations

– What's your challenge? We'll find a solution!

So, let's talk....

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"There is not a single problem ABB cannot solve for us with their people, knowledge and integrating the ABB Ability(TM) technology." - Eric Ernst, CTO Formula E



"I dwell in possibility." - Emily Dickinson

**ABB**