SmartLED & Smart Manufacturing Infrastructure

INNOBreak, 17 November 2020

Introduction
Who are we

Richard Schouten
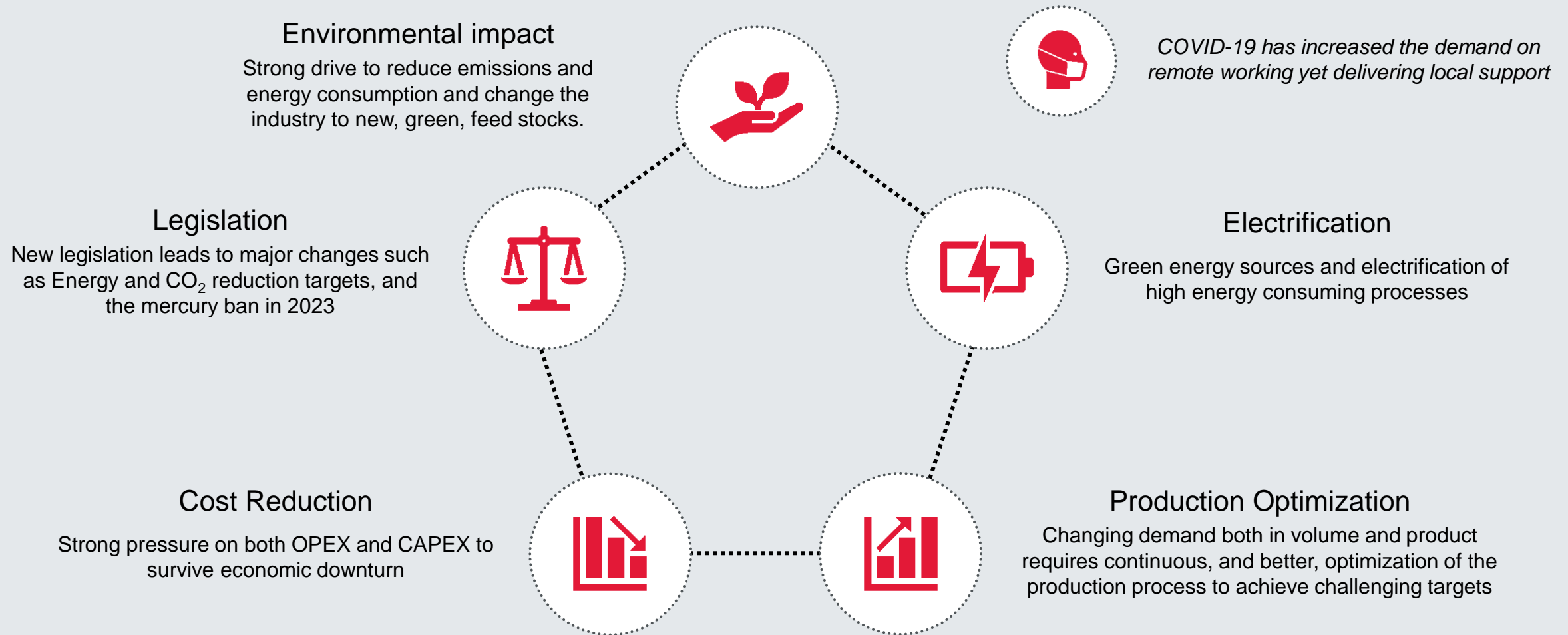
PSPL

Ralph Bisschops

CGI

Agenda

- **Challenges of the Industry**

- **From light to SMI, our story**

- **The SMI Solution**

- **Possibilities with SMI**

- **About SMI**

Challenges for the Industry

The industry today is facing many and complex issues and digitization can support finding solutions

Environmental impact
Strong drive to reduce emissions and energy consumption and change the industry to new, green, feed stocks.

COVID-19 has increased the demand on remote working yet delivering local support

Legislation
New legislation leads to major changes such as Energy and CO_2 reduction targets, and the mercury ban in 2023

Electrification
Green energy sources and electrification of high energy consuming processes

Cost Reduction
Strong pressure on both OPEX and CAPEX to survive economic downturn

Production Optimization
Changing demand both in volume and product requires continuous, and better, optimization of the production process to achieve challenging targets

Helping Sitech to implement Smart LED lighting

PSPL supported DIETAL and Sitech to develop and implement a site-wide lighting solution supporting 23 plants at the Chemelot chemical site in Geleen, the Netherlands.

Client challenges

- Sitech is constantly looking for ways to improve their services to the Chemelot site users. Sitech has a strong focus on optimizing client services and reducing the impact on the environment such as light pollution and energy consumption.

PSPL solution

- Solution designed, deployed, enabled, and configured rapidly by PSPL and DIETAL. PSPL supported contractor parties DIETAL & TCL to deploy 15.000 Smart LED light TPPL fixtures on the Chemelot chemical site.

Benefits Delivered

- 80% reduction in energy consumption
- Safer and more pleasant working environment.

"With DIETAL and PSPL, we have been able to decrease our environmental footprint and light pollution, create a pleasant and safer working environment for our operators and together with these advantages we were able to reduce our operational costs: a great contribution to the services we provide to our customers at Chemelot."

Marc Dassen, CEO Sitech
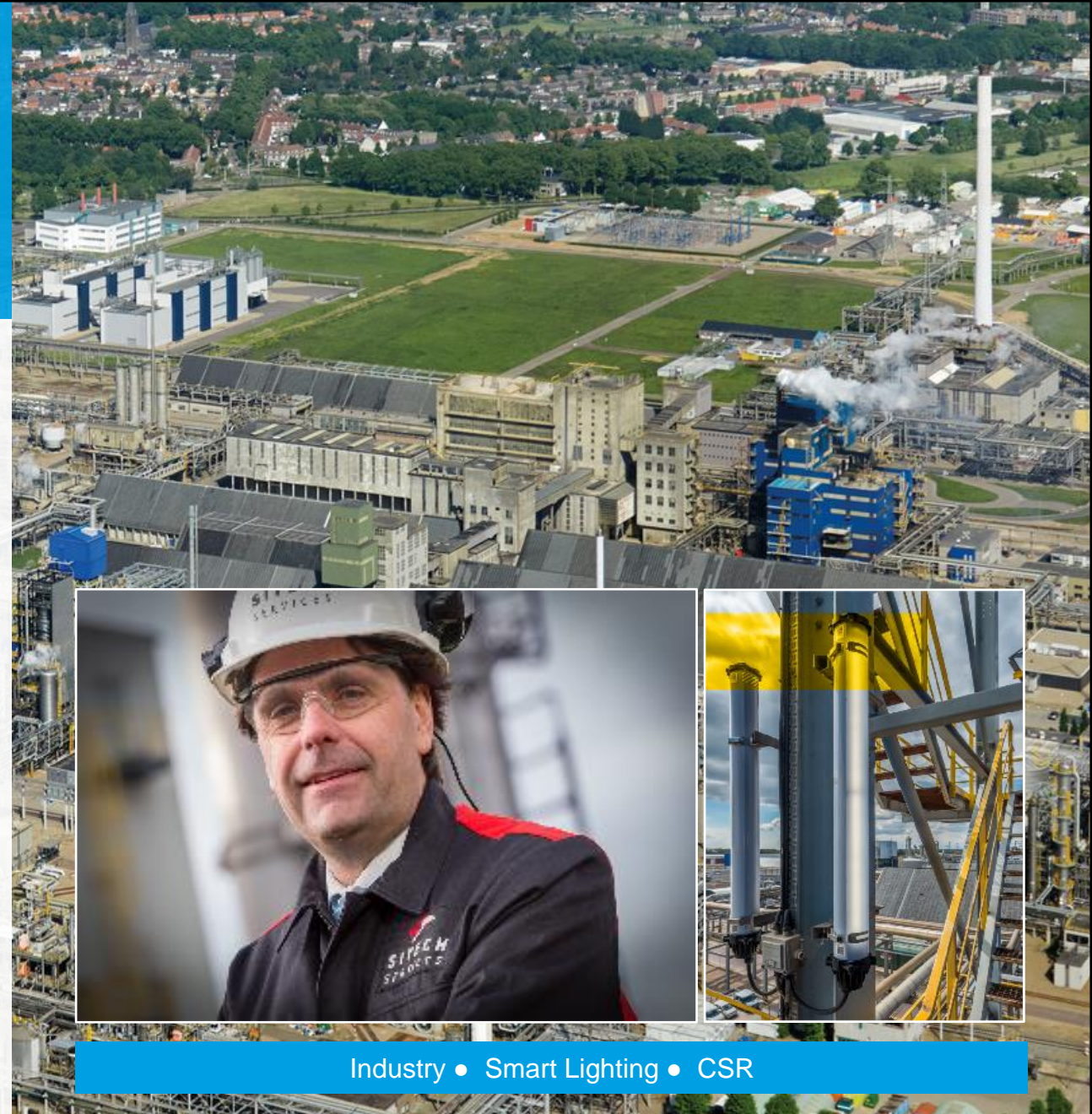
Industry ● Smart Lighting ● CSR

PSPL

At Chemelot industry park the machines talk

When chemical plants want to reduce downtime, they rely on Sitech's Asset Health Center. Together with CGI, Sitech developed this innovative predictive maintenance platform.

Challenges

- Need for predictability in production processes and equipment condition information to reduce planned and unplanned downtime.
- Desire to have predictive models for equipment to optimize MTBF, better plan maintenance and reduce MTTR

Solution

- Sitech asked CGI to help with the development of a first class asset monitoring and analytics platform. Together Sitech and CGI developed the Sitech Asset Health Center (SAHC).
- CGI delivered the technology where Sitech added their extensive knowledge of the asset's lifetime performance.
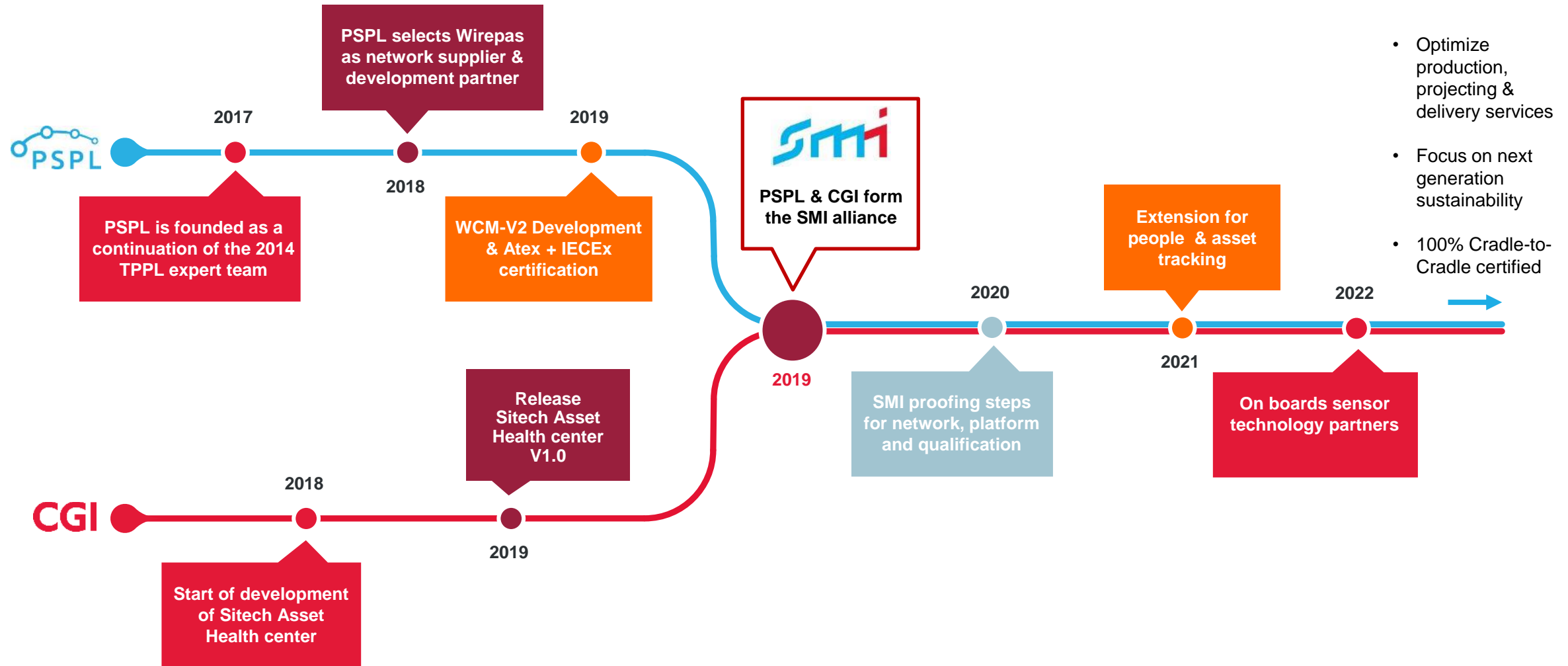
Outcomes

- The results achieved are tremendous – until now 26 chemical plants are connected and over 4,500 critical assets are monitored.
- Early warnings on equipment failure, up to 12 years for some failure modes.
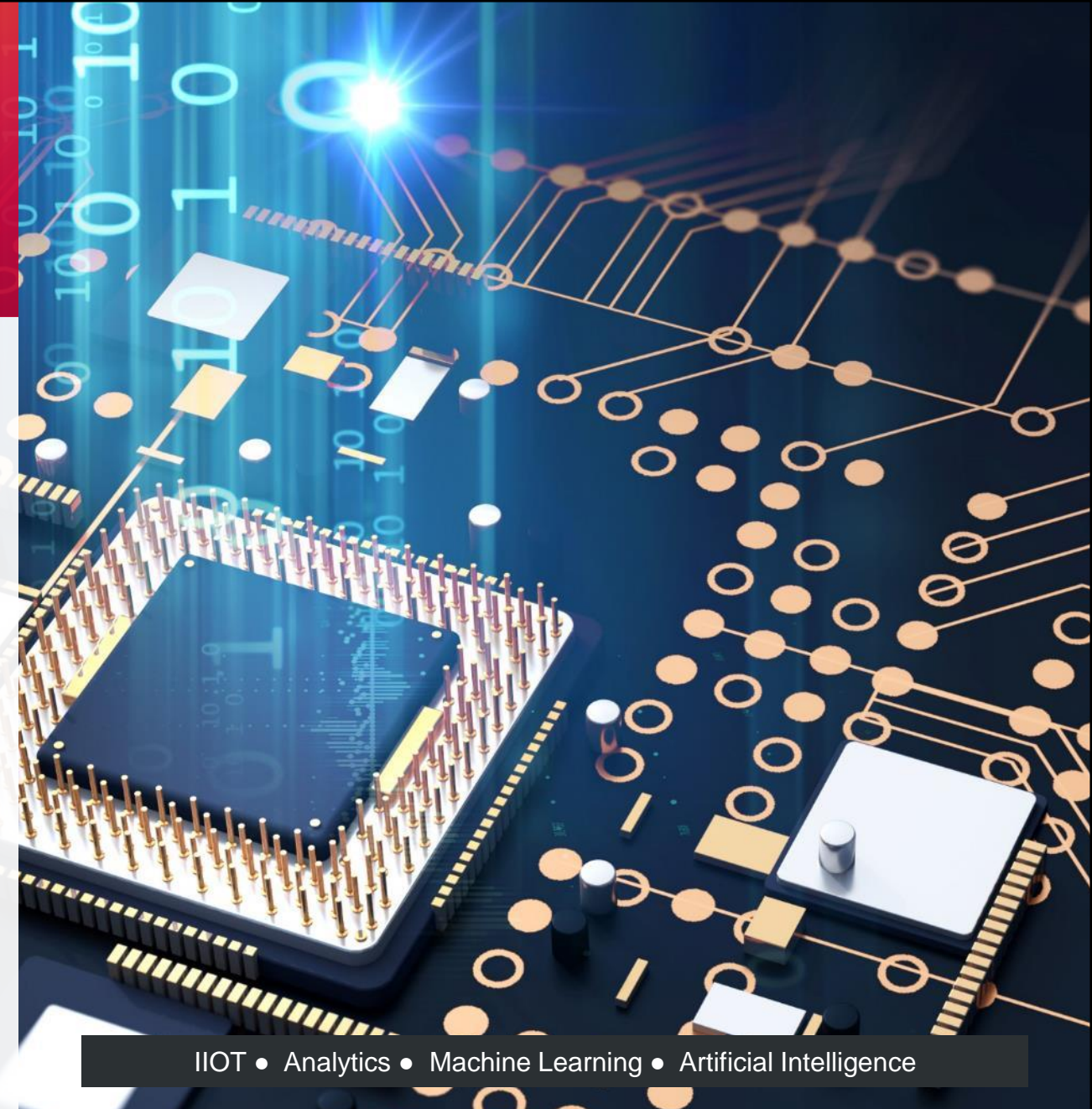
IIOT ● Analytics ● Machine Learning ● Artificial Intelligence
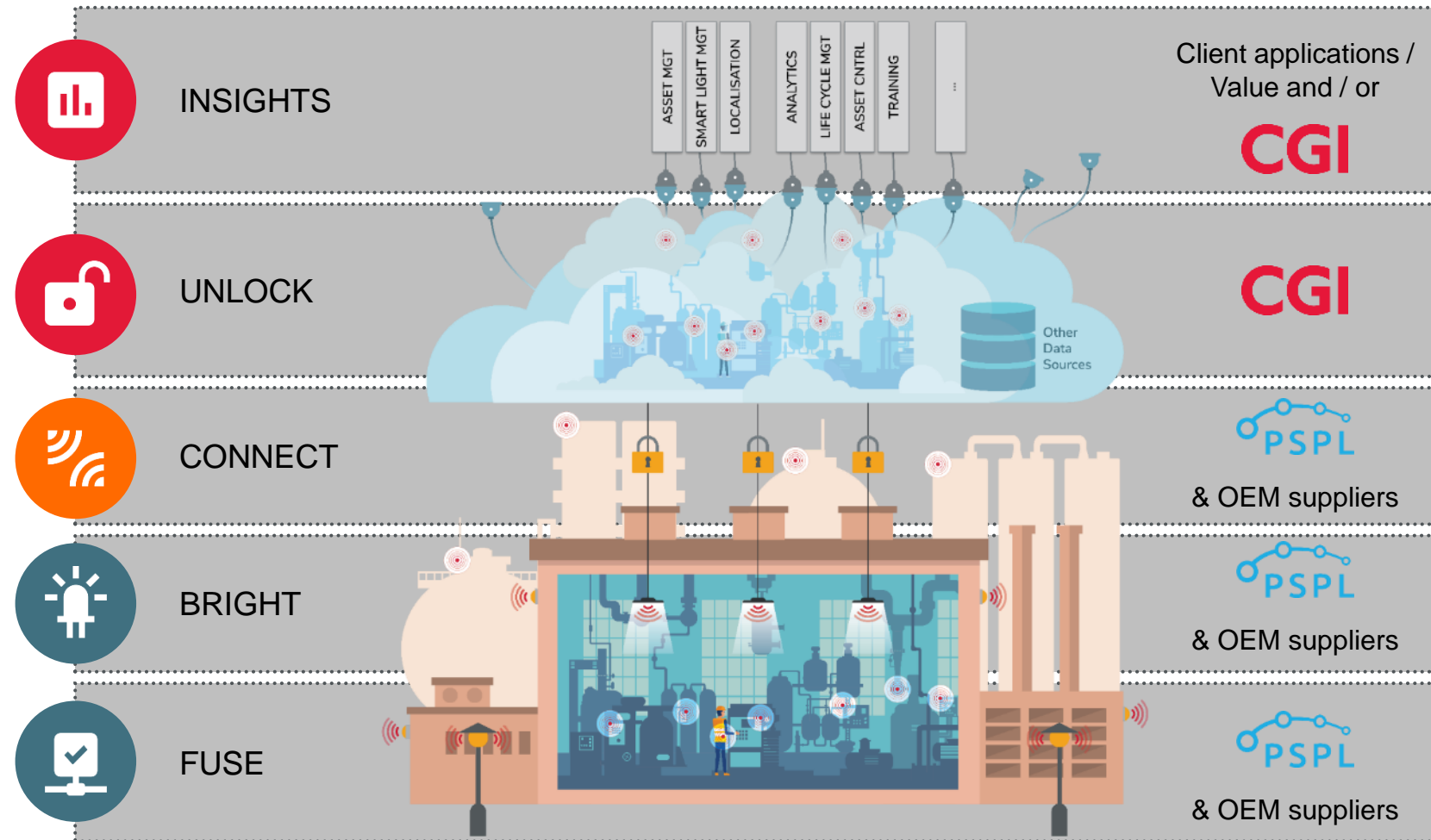
CGI

The PSPL and CGI Journey

The path of the development to the Smart Manufacturing Infrastructure

PSPL selects Wirepas as network supplier & development partner

2017

2018

2019

PSPL & CGI form the SMI alliance

PSPL is founded as a continuation of the 2014 TPPL expert team

WCM-V2 Development & Atex + IECEx certification

Release Sitech Asset Health center V1.0

2019

CGI

2018

2019

Start of development of Sitech Asset Health center

2020

2021

2022

SMI proofing steps for network, platform and qualification

Extension for people & asset tracking

On boards sensor technology partners

- Optimize production, projecting & delivery services
- Focus on next generation sustainability
- 100% Cradle-to-Cradle certified

An end-to-end solution

SMI is the missing link between the asset and your insights platform

INSIGHTS

UNLOCK

CONNECT

BRIGHT

FUSE

ASSET MGT | SMART LIGHT MGT | LOCALISATION | ANALYTICS | LIFE CYCLE MGT | ASSET CNTRL | TRAINING

Other Data Sources

Client applications / Value and / or

CGI

CGI

PSPL

& OEM suppliers

PSPL

& OEM suppliers

PSPL

& OEM suppliers

Smart Manufacturing Infrastructure

A next step in technology to support the industry into improve safety, reduce emissions, and increase production

After the development (2014-2015) of TPPL, an ATEX certified smart LED with integrated Mesh network to actively switch off the lights when not required in the plants customer requested us to develop a new generation which supports light on demand and connectivity for wireless sensors.

Secure*

Highly secure connection, no one should be able to intervene in the network

Wireless

Completely wireless and scalable, predictive maintenance requires a lot of additional sensors and these should be connected easily with a long battery life
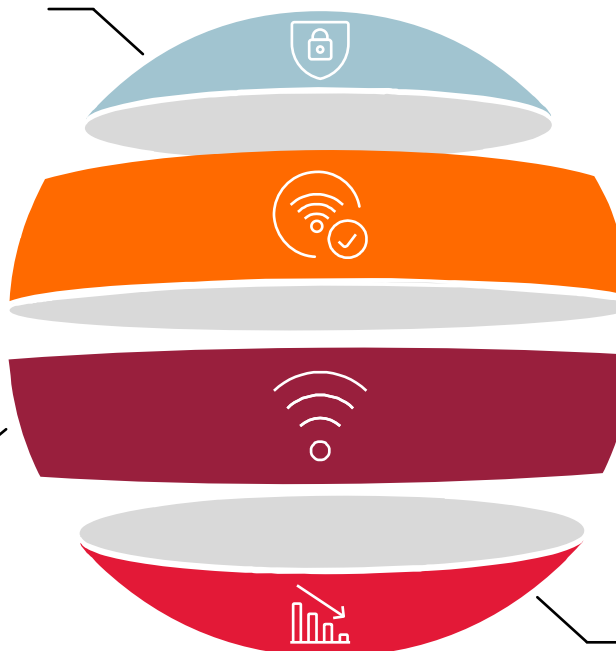
High availability

High availability, the connectivity should be available at all times

Low Cost

The investment should be at minimum 5x lower compared to competitive solutions, targeting 10x lower cost compared to price level 2020

* ISA-99/IEC 62443

Key Features

SMI differentiates from existing solutions…

Security by design

SMI is a secure industry grade end-to-end solution based on secure elements on each SMI connected node.

Stand alone network

Mesh topology with high scalability minimizing infrastructure requirements, simplify network design, planning and management, and accelerate ROI by addressing multiple use cases with one unified wireless infrastructure.

Made for the Industry

We design all our products with the industry in mind meaning that all our products are available with relevant ATEX and IECEx certifications.

SMI module

Small form factor SMI network boards facilitate connectivity for multiple types of sensors, multi-diversity antenna, bi-directional communication, and the secure element for maximum cyber security.

Plug and Play

Easy & fault free implementation by a contractor of choice. Battery powered highly efficient devices avoid the hassle of power wiring thus lowering both CAPEX and OPEX

Bright – Connect - Fuse

The SMI Product portfolio

BRIGHT

CONNECT

FUSE
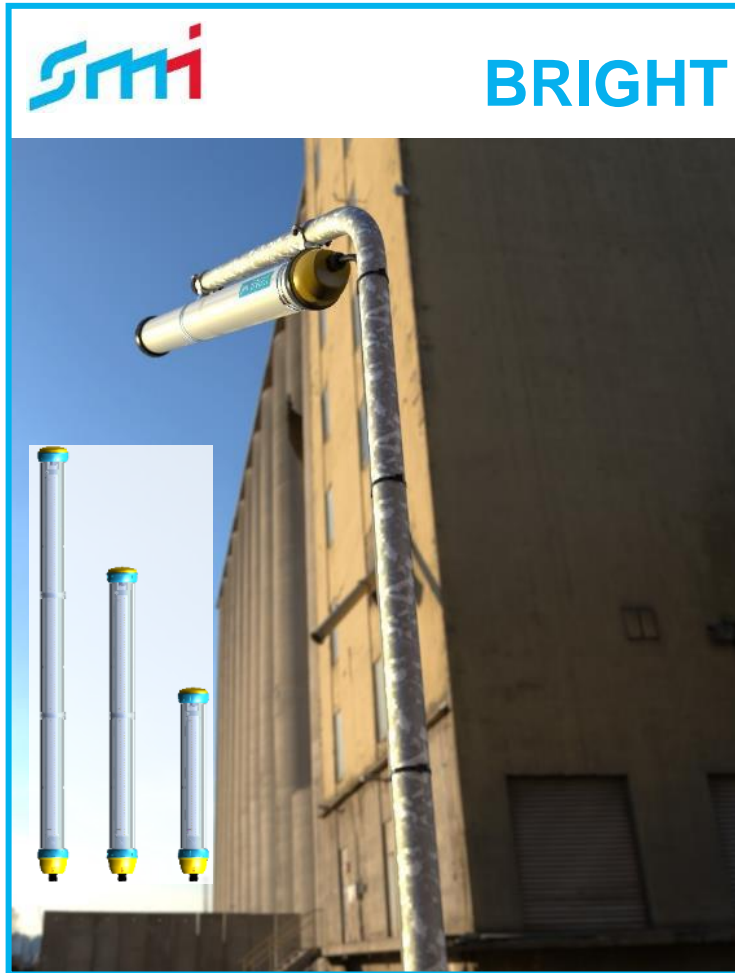
SMI Bright

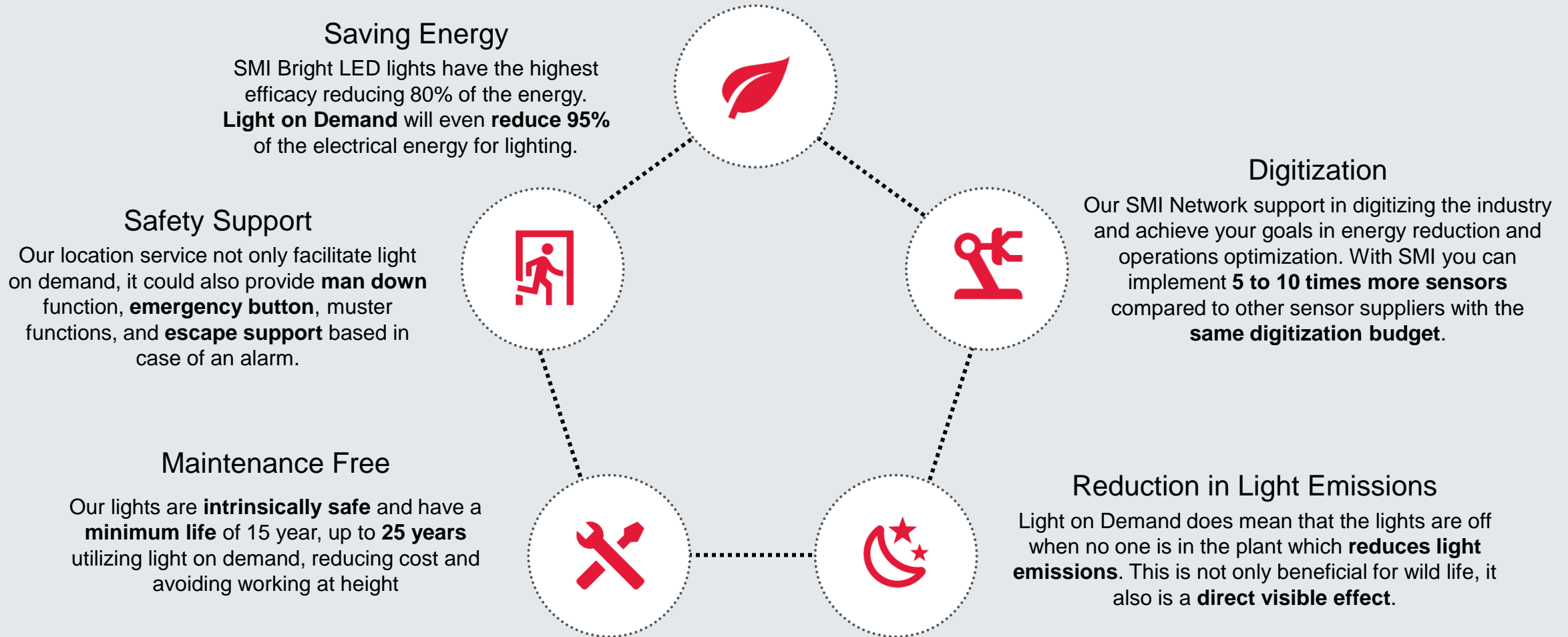The features of our SMI Smart LED Lights

- High efficacy Smart LED Lights offering 165-180 lm/W system performance
- SMI network capabilities inside
- ATEX & IECEx Cat 2 Zone 1 & 21 certified
- HCCAP certified on all models

| Icon	Feature	Icon	Feature
	Light Dimming		Actual power consumption (W)
	RH (% RH)		Weighted burning hours (ageing yrs/yrs)
	Ambient Temperature (°C)		Burning hours (yrs/yrs)
	Internal Hotspot Temperature (°C)		Power supply connection hours (yrs/yrs)
	XYZ orientation (3D vector)		Remaining operational lifetime (yrs)
	Ambient Vibration (Good, Poor, Bad)		Constant Light Output ILM feature (%)
	Ambient Light Level (lux)		Net lumen output (lm)
	Energy consumption (kWh)		Actual light efficacy (lm/Watt)

Key Benefits

Besides a ROI of less than 3 years, SMI features also delivers direct value on key business drivers

Saving Energy

SMI Bright LED lights have the highest efficacy reducing 80% of the energy. **Light on Demand** will even **reduce 95%** of the electrical energy for lighting.

Safety Support

Our location service not only facilitate light on demand, it could also provide **man down** function, **emergency button**, muster functions, and **escape support** based in case of an alarm.

Digitization

Our SMI Network support in digitizing the industry and achieve your goals in energy reduction and operations optimization. With SMI you can implement **5 to 10 times more sensors** compared to other sensor suppliers with the **same digitization budget**.

Maintenance Free

Our lights are **intrinsically safe** and have a **minimum life** of 15 year, up to **25 years** utilizing light on demand, reducing cost and avoiding working at height

Reduction in Light Emissions

Light on Demand does mean that the lights are off when no one is in the plant which **reduces light emissions**. This is not only beneficial for wild life, it also is a **direct visible effect**.

Comparison of the Total Cost of Ownership

Traditional TL lamps, Standard LED and SMI LED

Example: Operating 6.000 ATEX fixtures for 15 years
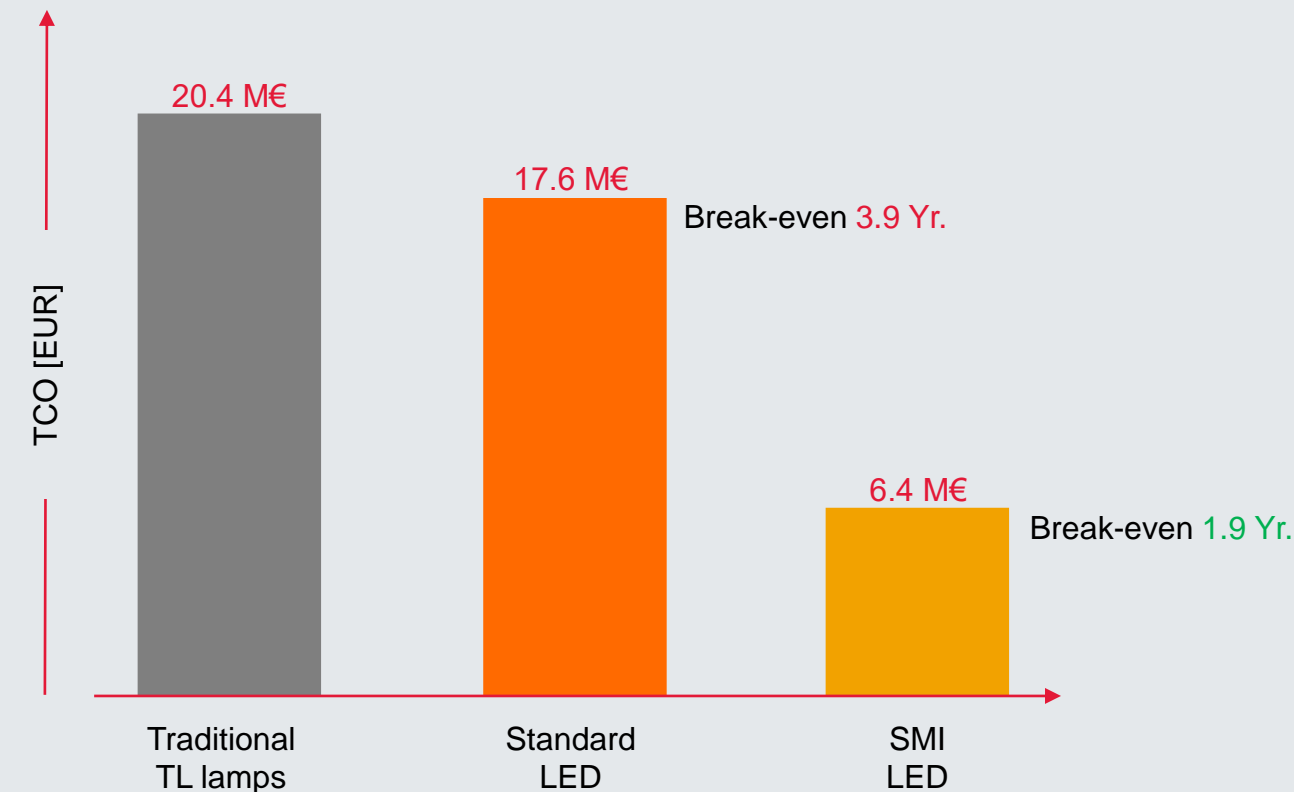
TCO Assumptions:

- Installation and project management costs are assumed equal for all solutions
- Replacement of conventional tubes each 3,5 years
- Replacement of standard LED fixtures after 10 years 24/7 operation
- SMI LED has a lifetime of at least 18 year considering twilight or on-demand operation
- SMI LED is fitted with a fully functional site covering SMI network
- Solutions include energy, CO_2 emission, and services costs

Chart: TCO [EUR]

- Traditional TL lamps: 20.4 M€
- Standard LED: 17.6 M€ — Break-even 3.9 Yr.
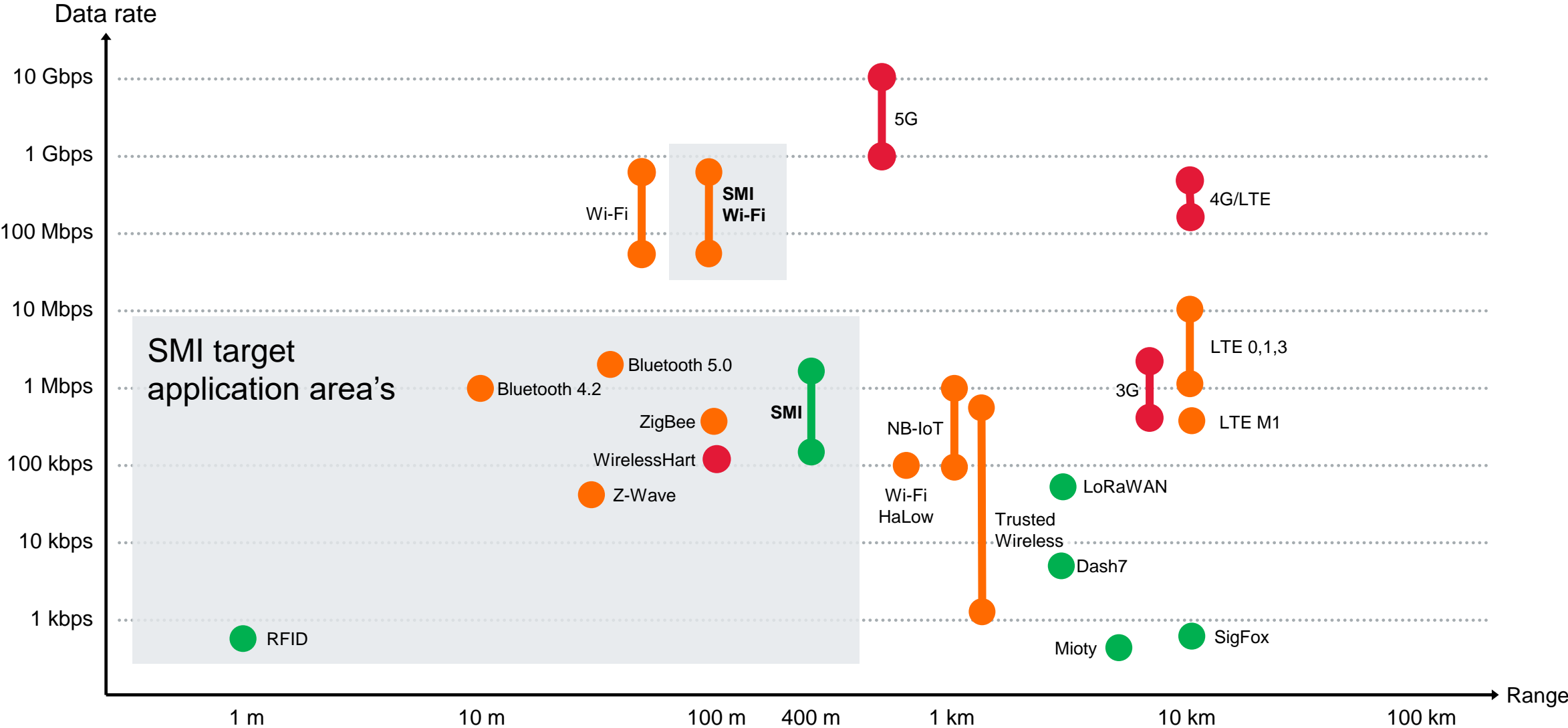- SMI LED: 6.4 M€ — Break-even 1.9 Yr.

SMI takes Mesh to the next level

The Benefits of SMI Mesh vs standard Mesh

Extremely Scalable, up to 4.000.000 devices in one network

Self healing, when one or multiple nodes fail, the network will find a new path to transmit data

Easy to **increase range and throughput** adding nodes and gateways

Low Latency, less than 10ms can be achieved in large networks

High Reliability, already proven over 99.99% in a 100.000 devices network

High security, utilizing a secure element on the network board, data is encrypted end-to-end

Plug & Play, add and configure nodes within minutes

**Intrinsic safe**, all our components are intrinsic safe and ATEX and IECex certified

Wireless landscape 2020

… where does Smart Manufacturing Infra fit in

Cost: € €€ €€€   SMI Scope: ▪
Low ⟶ High

Data rate

- 10 Gbps
- 1 Gbps
- 100 Mbps
- 10 Mbps
- 1 Mbps
- 100 kbps
- 10 kbps
- 1 kbps

5G
Wi-Fi
SMI Wi-Fi
4G/LTE

SMI target application area's

Bluetooth 5.0
Bluetooth 4.2
ZigBee
WirelessHart
Z-Wave
SMI
NB-IoT
Wi-Fi HaLow
Trusted Wireless
LoRaWAN
Dash7
3G
LTE 0,1,3
LTE M1
RFID
Mioty
SigFox

Range

1 m   10 m   100 m 400 m   1 km   10 km   100 km

Our SMI Sensor Hub

To make standard sensors wireless through SMI and unlock the information at the customer platform
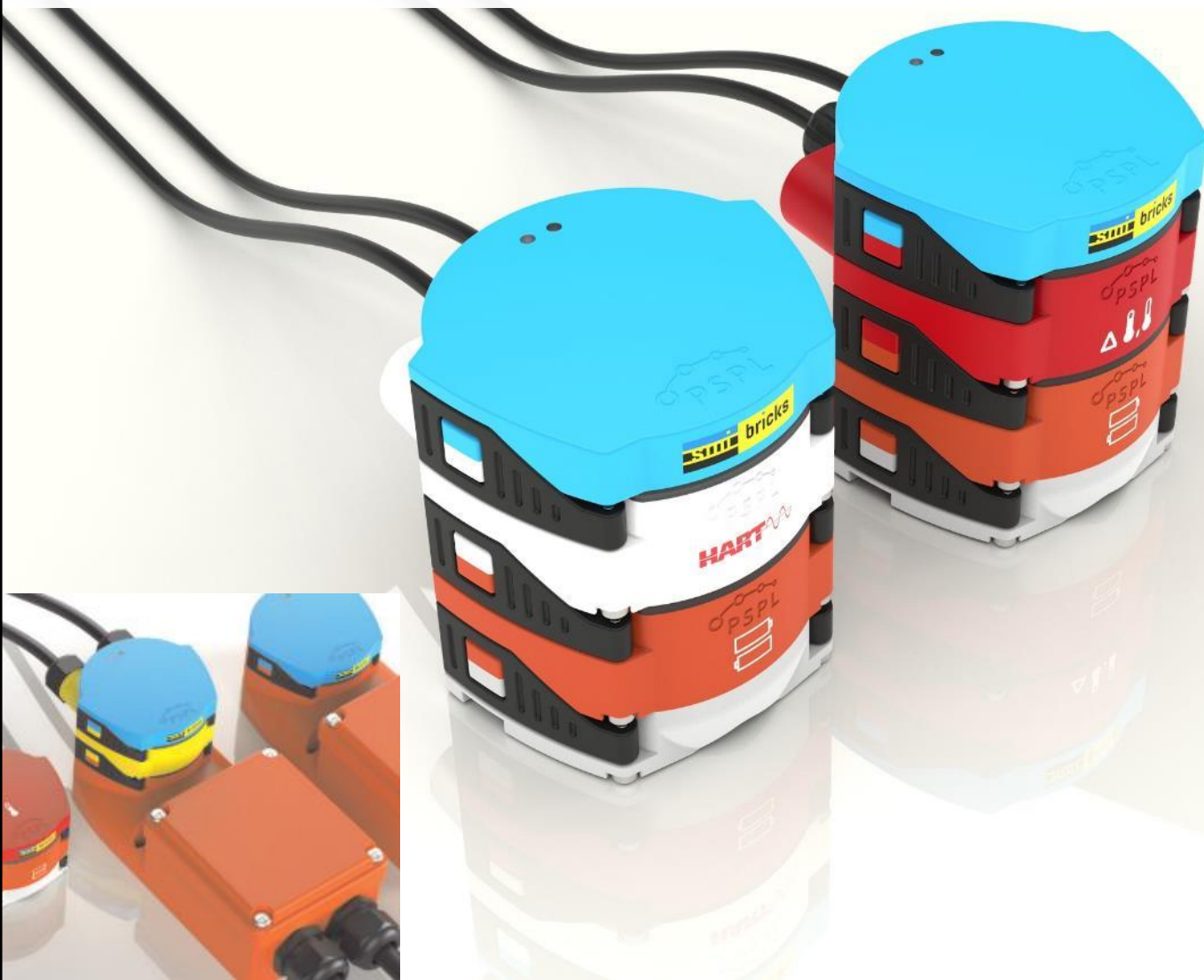
SMI Module
Wireless
communication
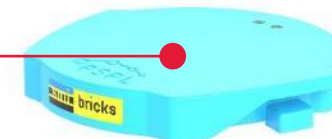
Sensor module
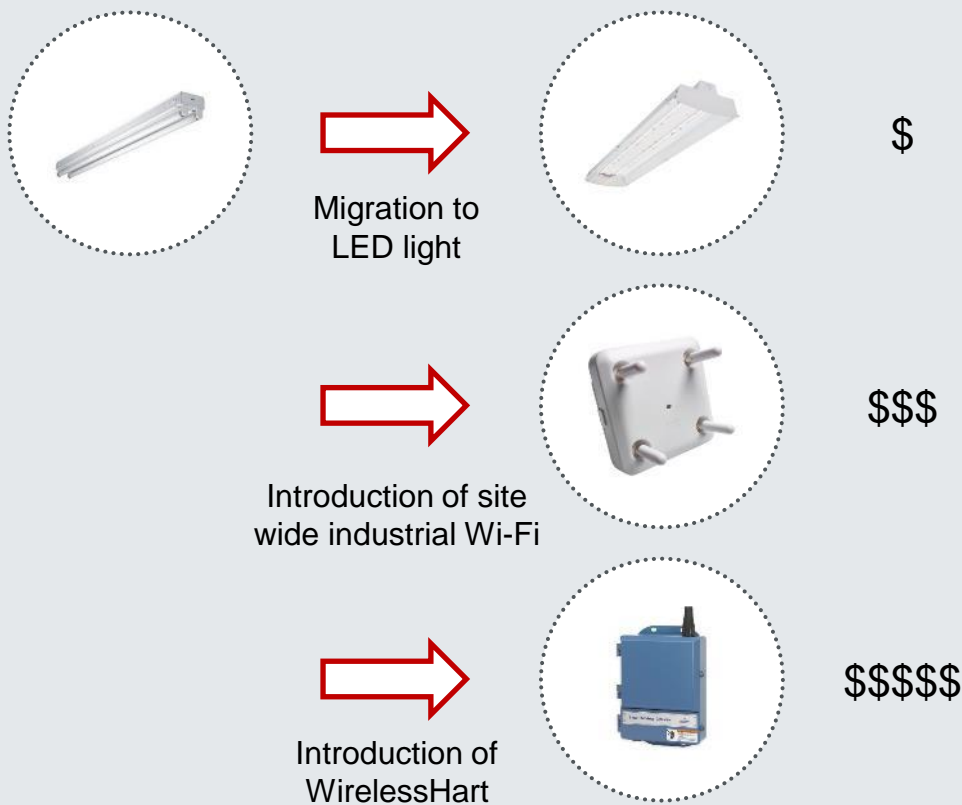4-20mA
PT1000
Wired Hart
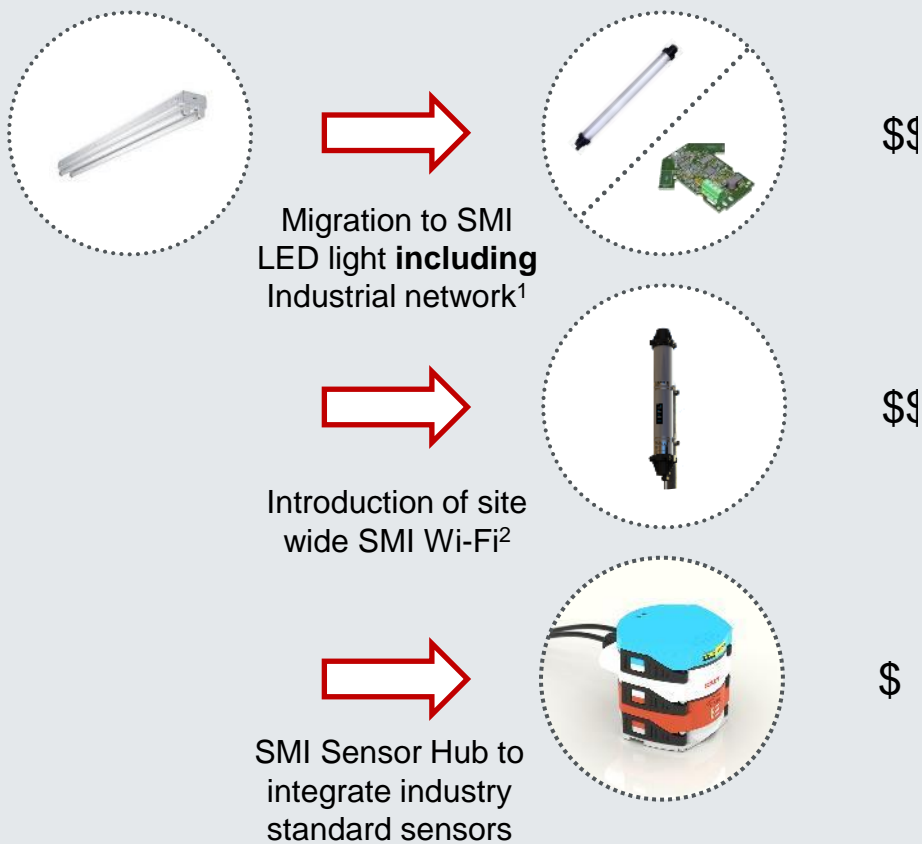
Power module

Installation module
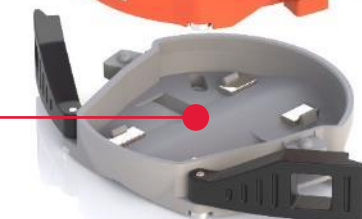
Cost comparison

SMI replaces multiple dedicated infrastructures at lower costs

Separate solutions available
on the market today

SMI integrated
solutions

Migration to
LED light

$

VS.

Introduction of site
wide industrial Wi-Fi

$$$

Introduction of
WirelessHart

$$$$$

Migration to SMI
LED light **including**
Industrial network[1]

$$

Introduction of site
wide SMI Wi-Fi[2]

$$

SMI Sensor Hub to
integrate industry
standard sensors

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[1] SMI will not replace (Wireless) Hart, for process control Hart is the preferred solution.
[2] SMI Wi-Fi also contains an SMI industrial network module.
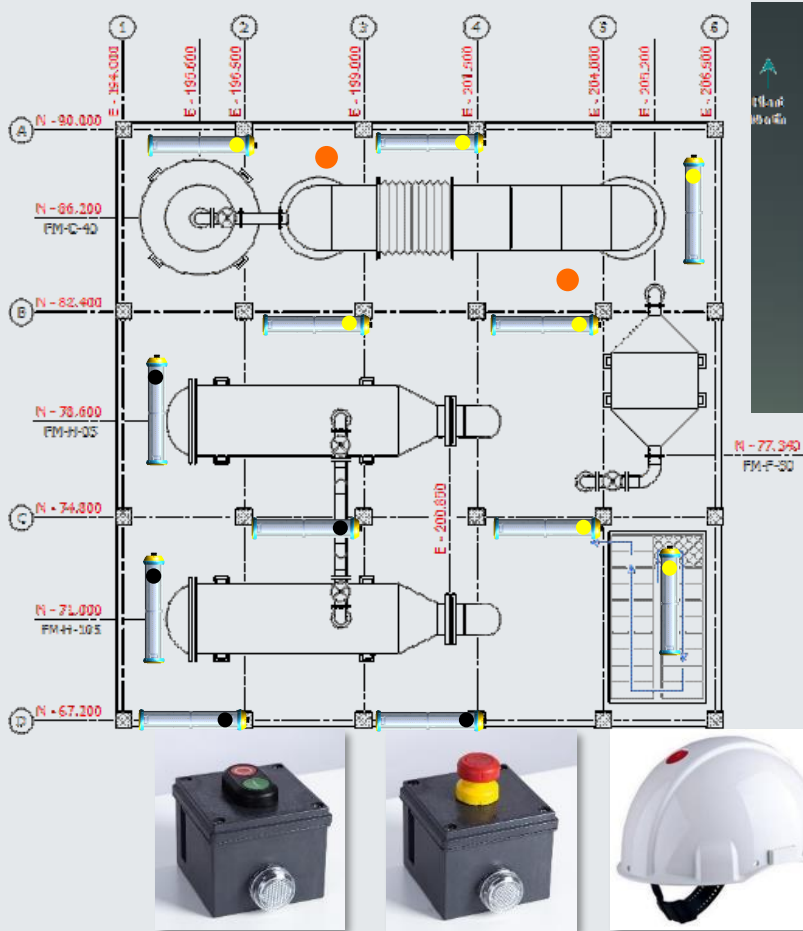
SMI use cases

Industry solutions

SMI Light on Demand

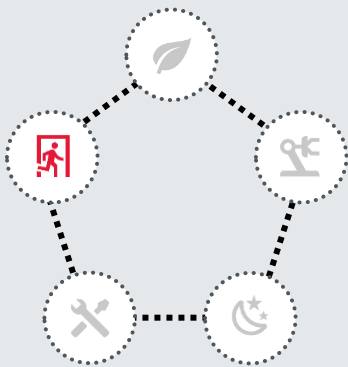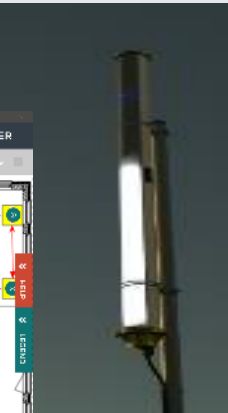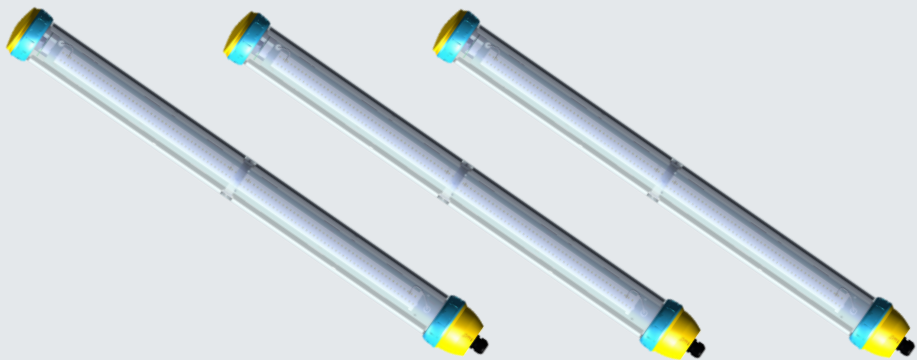Light is emitted, only when you really need it
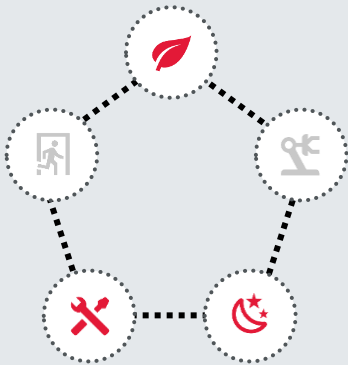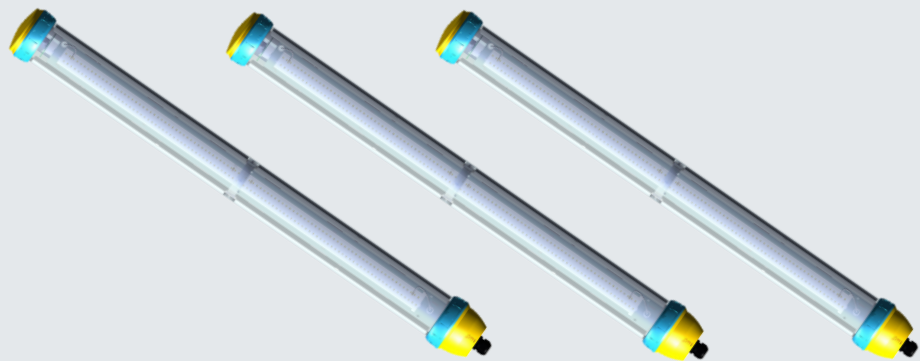
Up to 95% energy saving

Reduction in Emission

Lifetime 25 years

Support Dark Sky

SMI Smart localization

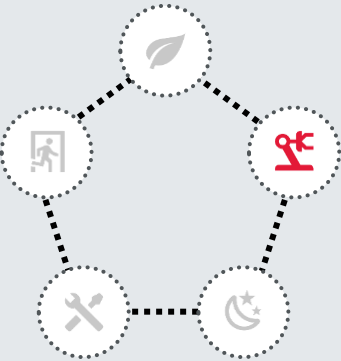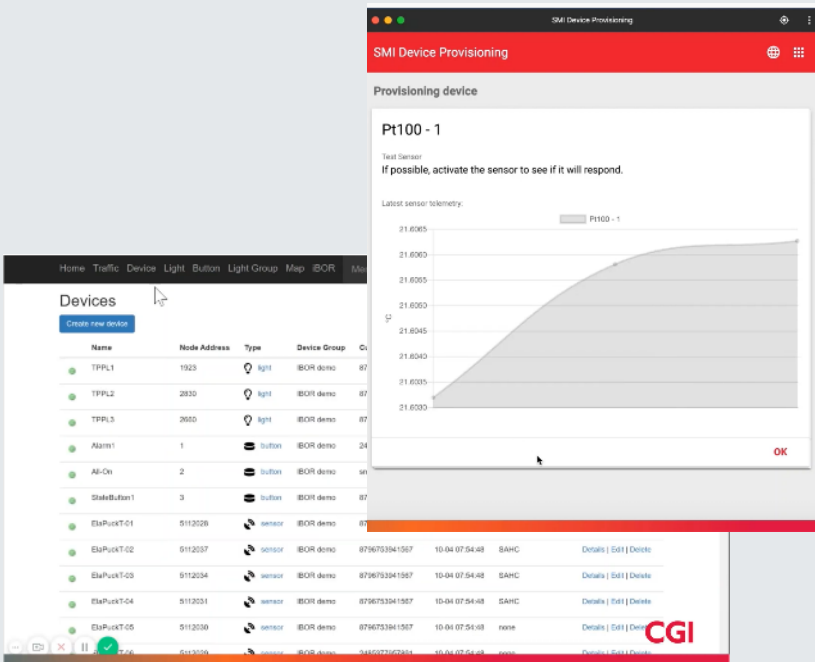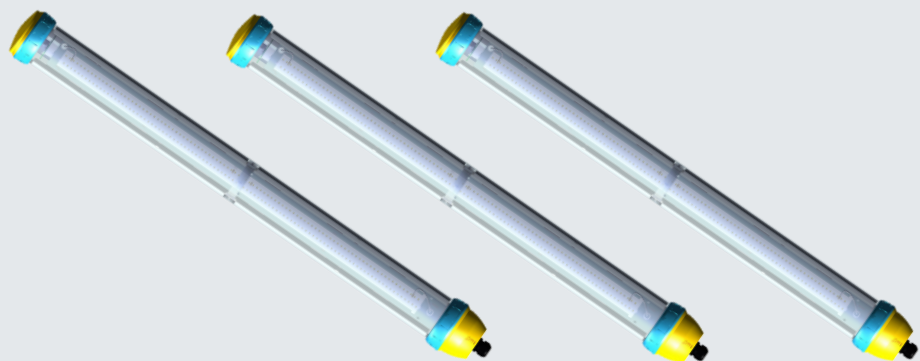Increasing safety through location tracking and man-down solutions

Asset tracking

Man-down support

SMI Sensor Hub

Solving the problem of insufficient data

More information at lower costs

Our technology partners and suppliers

We cannot do it alone, we need partners to reach our goals and expand our solution

Thank you for your attention

If you have questions or are interested in our solution please contact us

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About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. Operating in hundreds of locations across the globe, CGI delivers end-to-end services and solutions, including strategic IT and business consulting, systems integration, intellectual property, and managed IT and business process services.

CGI works with clients through a local relationship model complemented by a global delivery network to help clients achieve their goals, including becoming customer-centric digital enterprises.

cgi.com

About PSPL

PSPL and partners have developed and validated a full scale Wirepas based plug & play networking standard for demanding hazardous and industrial environments. PSPL's connectivity technology is at the heart of the industrial TPPL® led lighting solutions and forms the backbone of the smart manufacturing infrastructure network. This technology is IECEx/ATEX certified and will be found at the core of smart TPPL® LED lighting fixtures, wireless sensors, sensor interfaces, location trackers, and sensor & actuator transmitter solutions.

PSPL is motivated to contribute to a more sustainable future for the manufacturing Industry.

psplighting.com