



**KIO (KLEMSAN INTERNET OBJECTS)
ENERGY MANAGEMENT IOT PLATFORM**



Klemsan®

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- ▶ KIO Case studies with our customers:
 - Burger King China
 - Medicana (Hospital)
 - Zafer Plaza (Shopping Mall)
 - Bilfen (School)
 - New business models by cooperating with different partners



Why Industry 4.0?

It leads into the
Innovation Economy.

GII (Global Innovation Index) scores and GDP per capita in PPP\$ (bubbles sized by population)

Note: 'Efficient innovators' are countries/economies with Innovation Efficiency ratios ≥ 0.66 ; 'Inefficient innovators' have ratios < 0.66 ; the trend line is a polynomial of degree three with intercept ($R^2 = 0.661$).

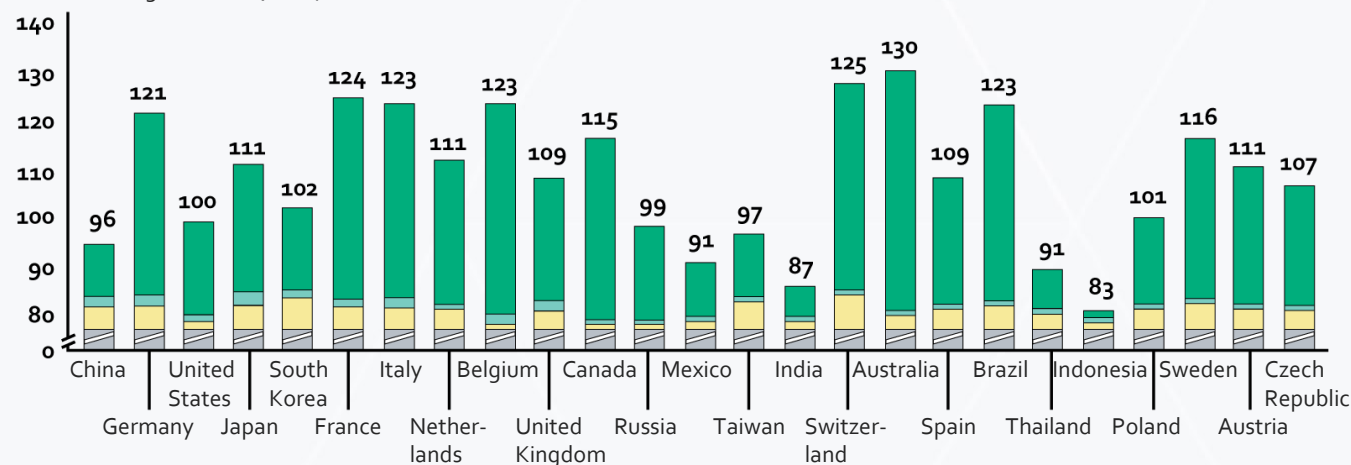


Why Industry 4.0?

Ultimate solution
of high-cost
countries which
were losing ground:

- Increase productivity
- Add value by innovation

Manufacturing cost index, 2014 (U.S.=100)



Volume of exports (highest to lowest)

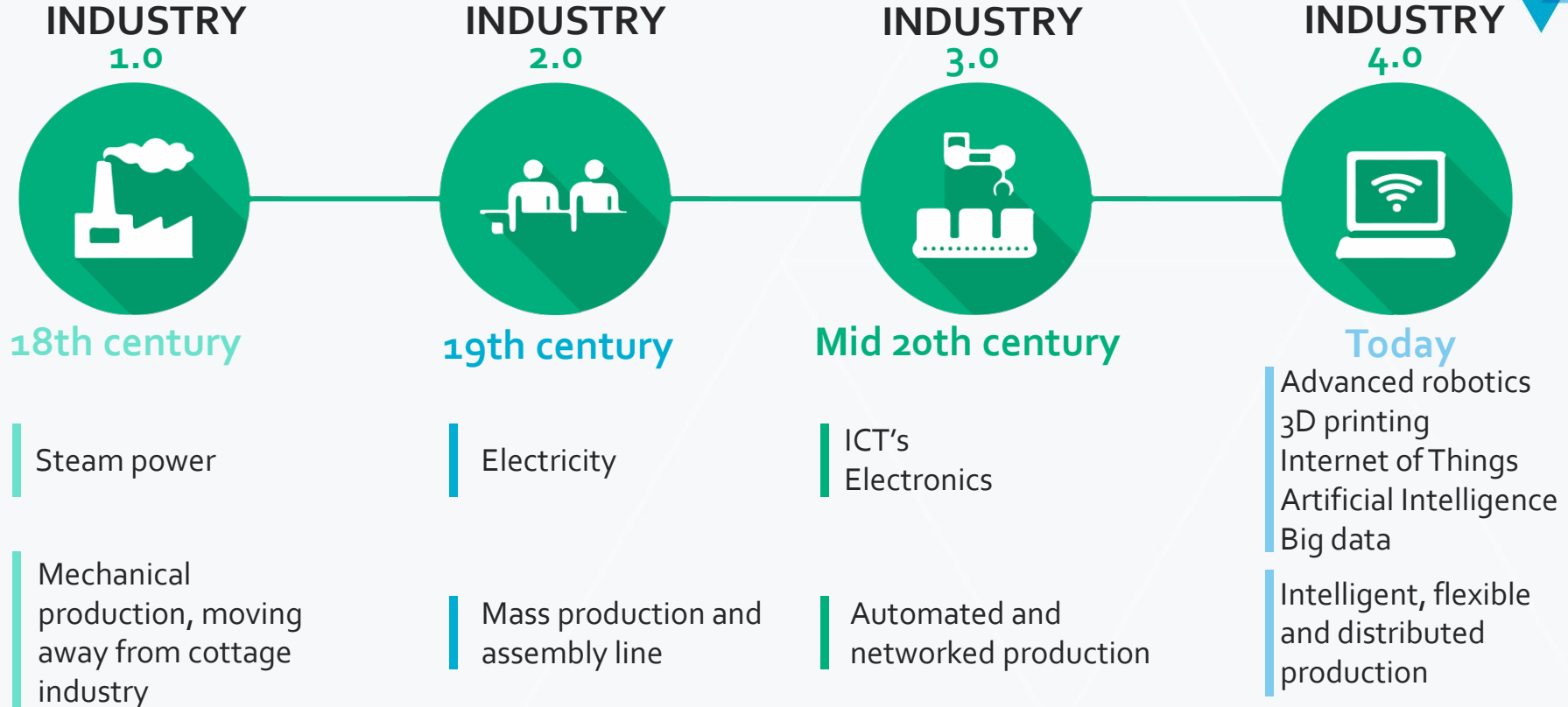
■ Labor* ■ Electricity ■ Natural Gas ■ Other

Sources: U.S. Economic Census; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; International Labour Organization; Euromonitor International; Economist Intelligence Unit; BCG analysis.

Note: The index covers four direct costs only. No difference is assumed for other costs, such as raw-material inputs and machine and tool depreciation. Cost structure is calculated as a weighted average across all industries.

(*)- Adjusted for productivity.

Industry 4.0

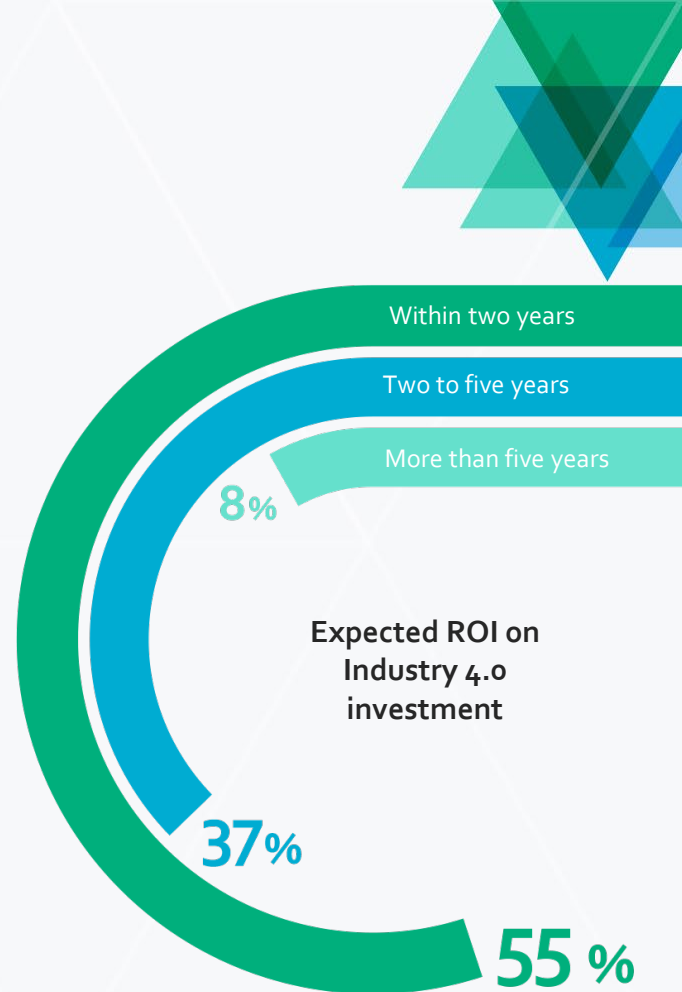


Industry 4.0

► Industrial sectors are planning to commit **US\$907 bn** p.a. to Industry 4.0 – around **5%** of revenue p.a.

- Digital technologies like sensors or connectivity devices
- Software and applications like manufacturing execution systems
- Training programs for the employees in order to improve Digital IQ and form Digital Culture in the organization

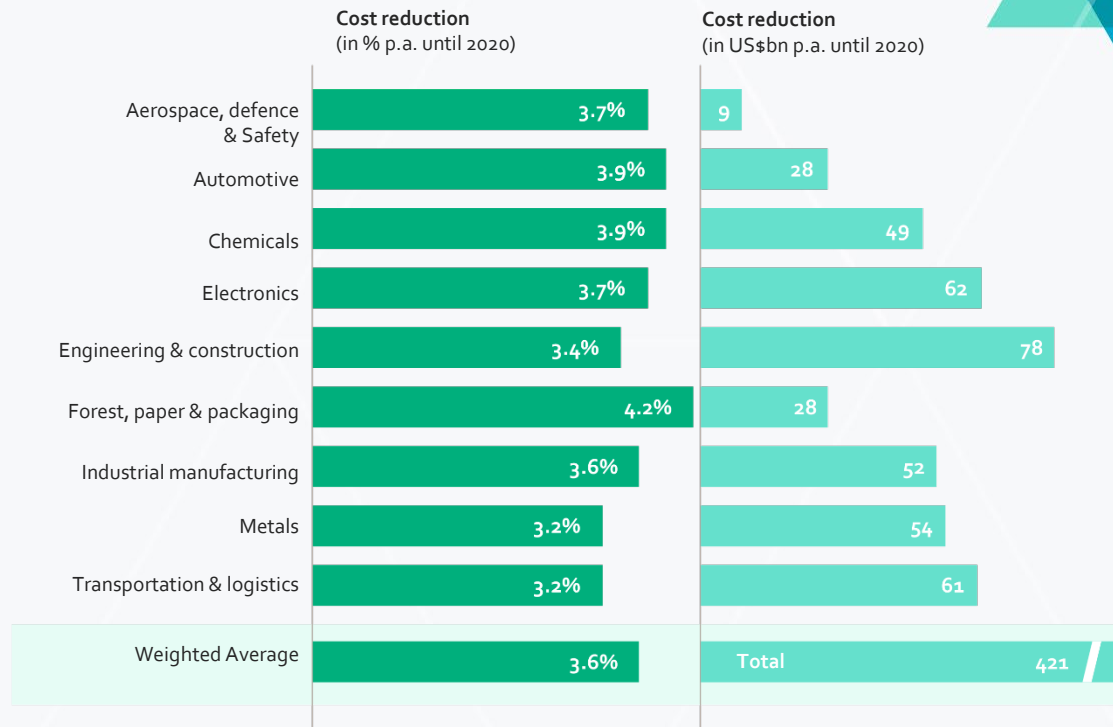
► **55%** of the investments expect a payback within two years.



Industry 4.0

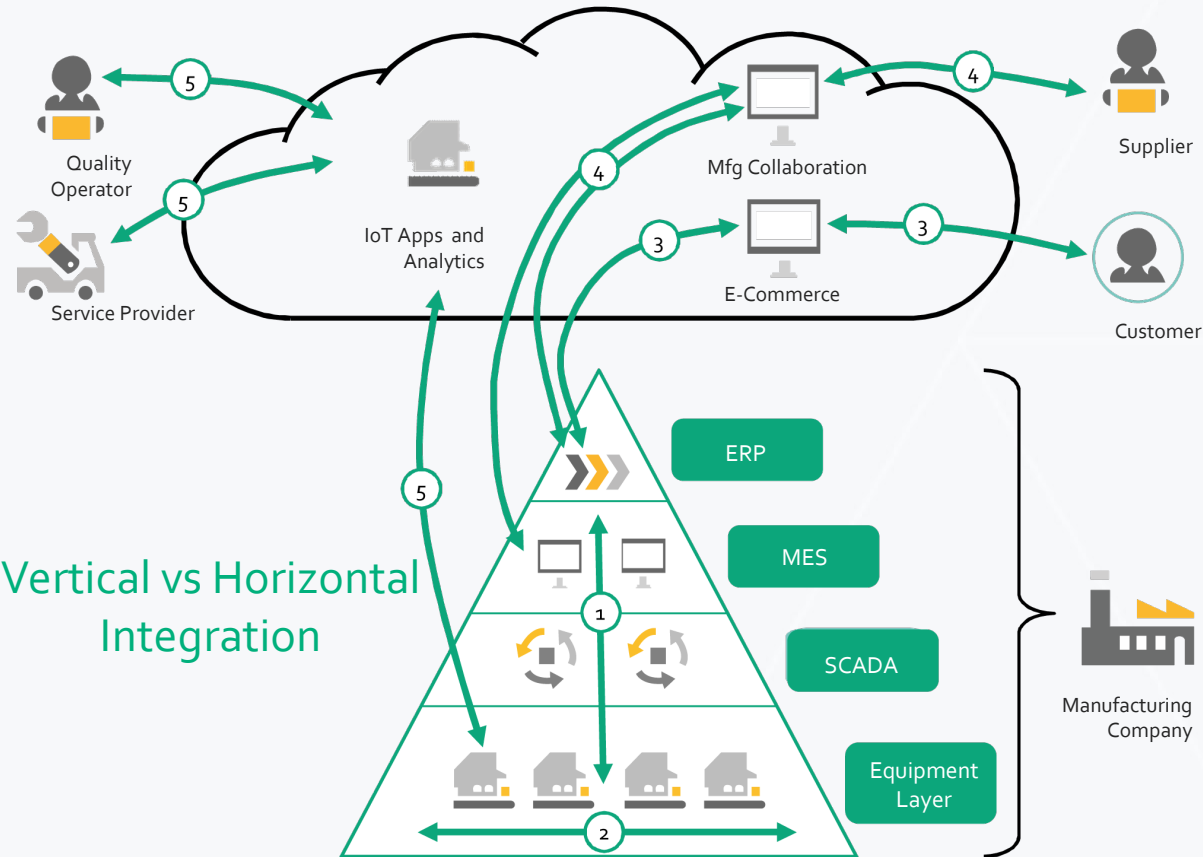


Companies in every industry sector expect significant **cost reductions**



Q: What cumulative benefits from digitisation do you expect in the next 5 years? Lower costs.

Industry 4.0



Example Scenarios:

1- Shop floor to Top floor

- Intra company vertical integration

2-Machine to Machine (M2M)

- Autonomous equipments

3-Customer Integration

- Direct integration of e-shops
- Usage pattern improvement

4- Manufacturing Collaboration

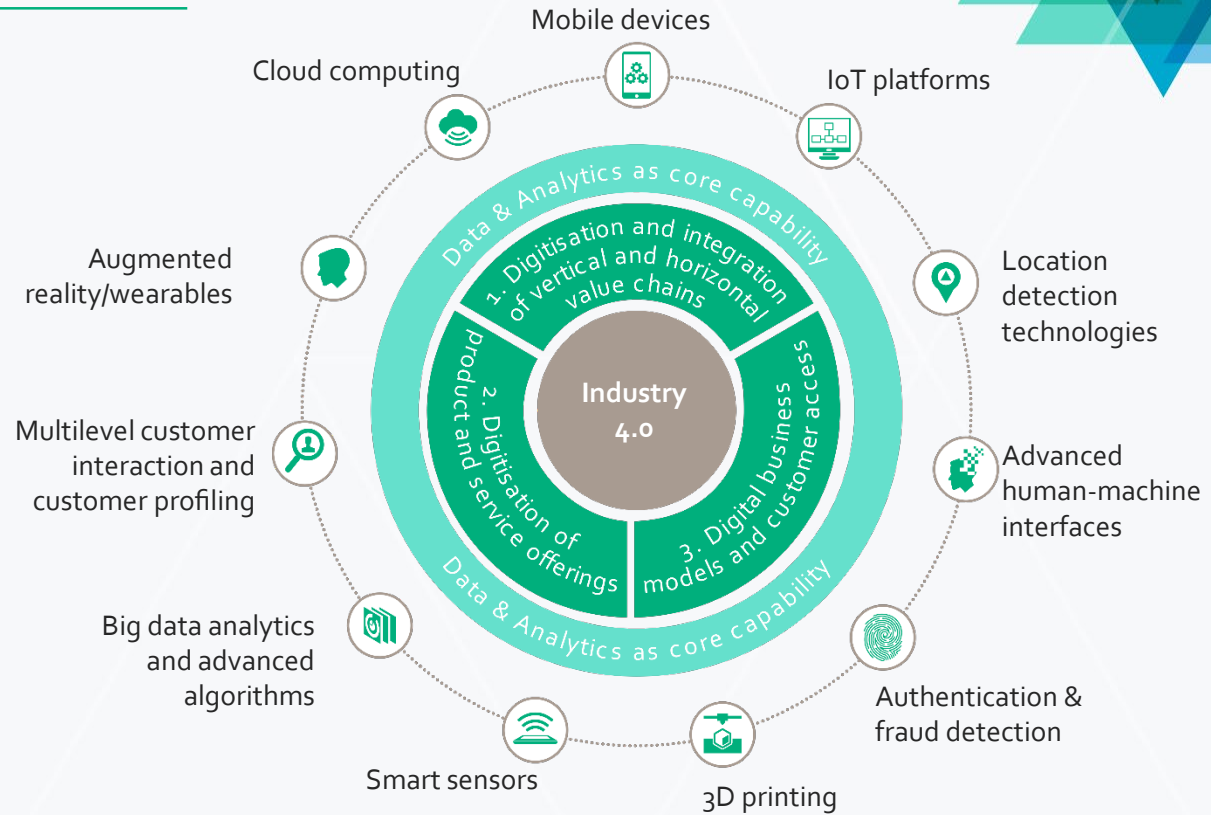
- Track and Trace
- Genealogy / Recipe
- Direct replenishment
- Asset Intelligence Network

5-Analytics

- Predictive maintenance
- Predictive quality / Reduced scrap
- OEE
- Energy Mgmt

Industry 4.0

► Industry 4.0 framework and contributing digital technologies



Current Status & Future Prospect Of IoT

"THINGS" vs "PEOPLE"

World Population

6.3 Billion

6.8 Billion

7.2 Billion

7.6 Billion

Connected Devices

500 Million

12.5 Billion

25 Billion

50 Billion



Connected Devices
Per Person

0.08

more
connected
devices than
people

1.84

3.47

6.58

2003

2010

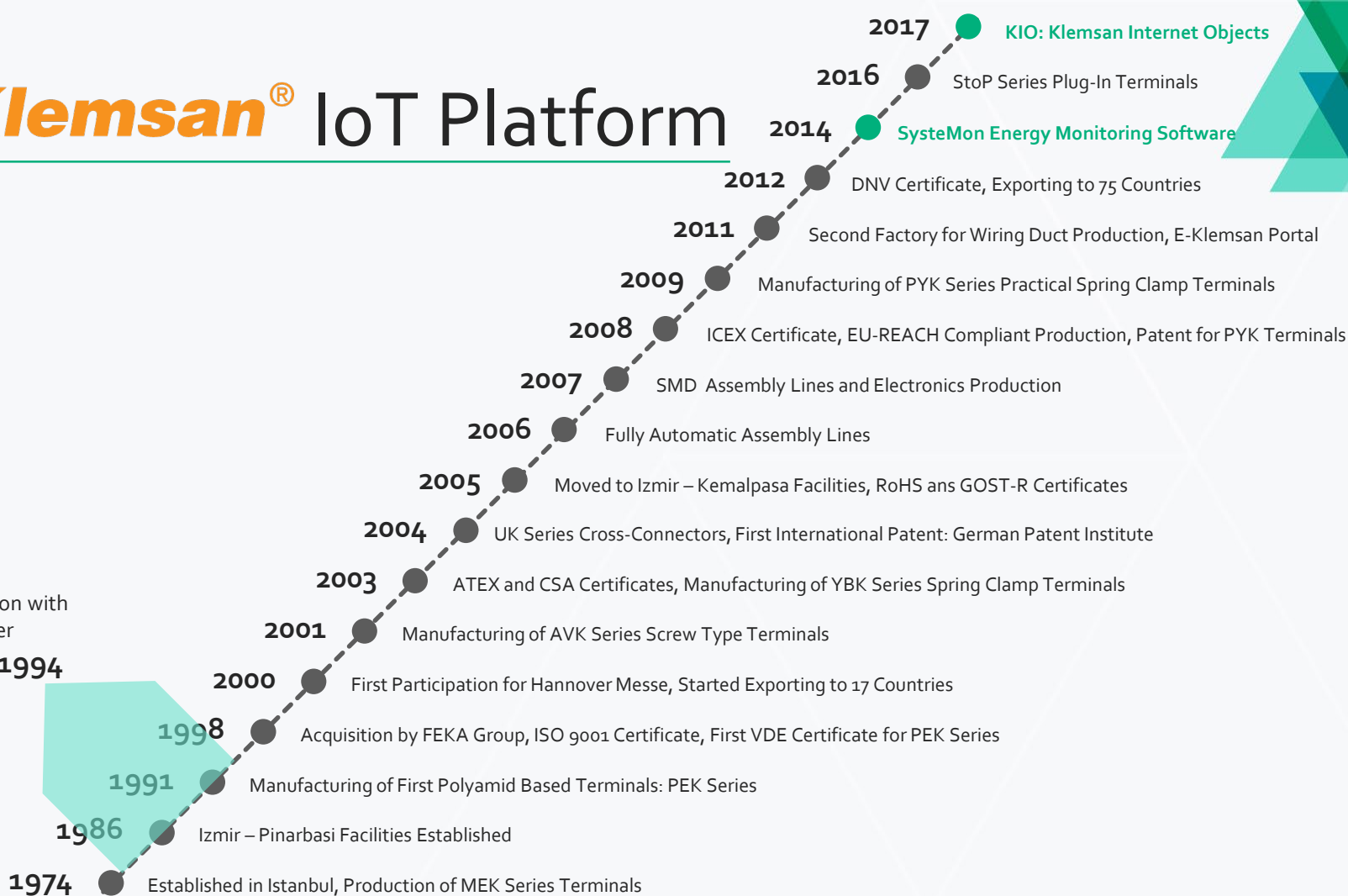
2015

2020

Klemsan® IoT Platform

Cooperation with
Weidmüller

1980 - 1994

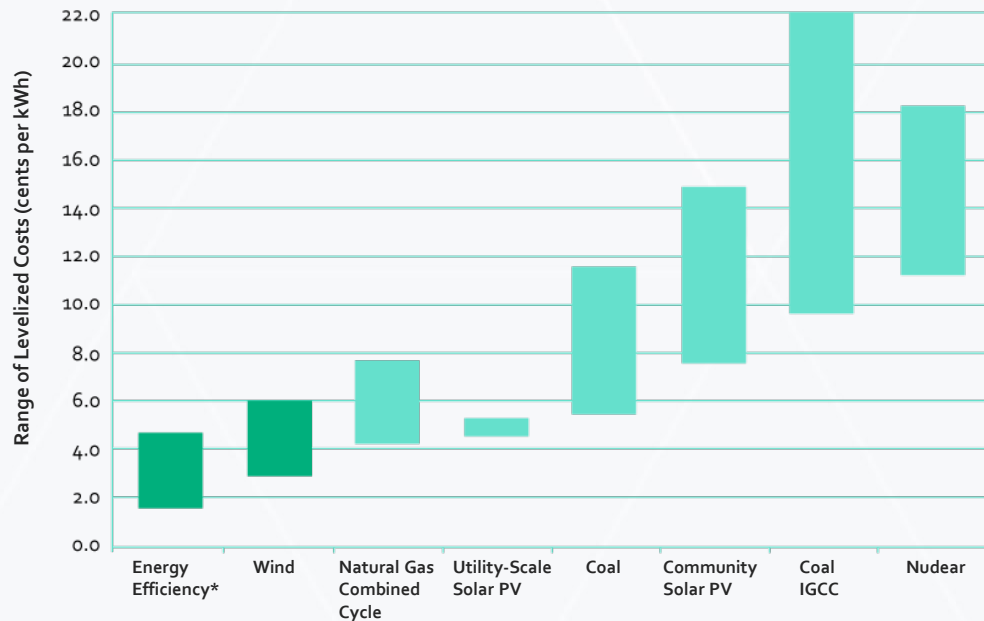


Why KIO?

► **Energy saving** is still **cheaper** than obtaining energy.

Energy efficiency investments have still the lowest cost among all other energy investments.

Return on investment in energy efficiency is too short.

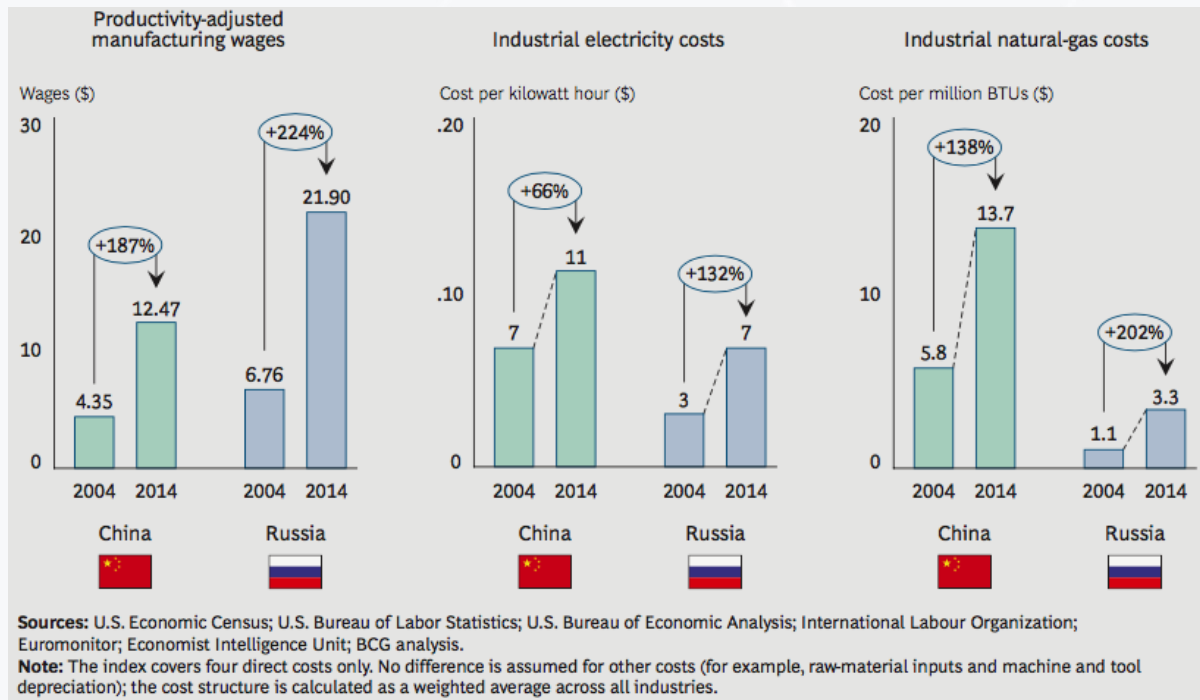


*Notes: Energy efficiency program portfolio data from Molina 2014;
All other data from Lazard 2017.
High-end range of coal includes 90% carbon capture and compression.



Why KIO?

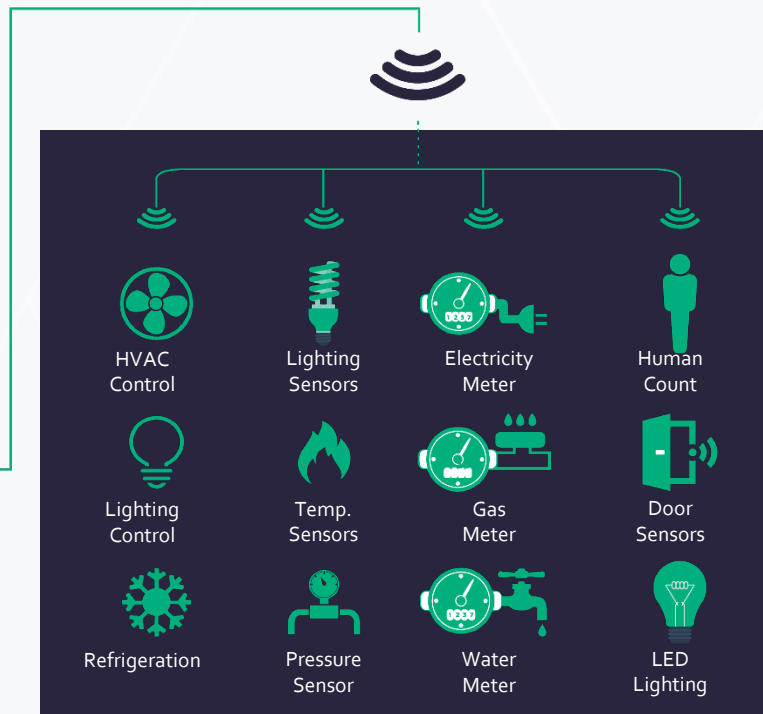
► Energy costs have dramatically increased over the last 15 years



KIO – Energy Management IOT Platform



Gateways



Features of KIO



Alarm Management and Real-Time Monitoring

Device parameters and alarms can be monitored in real-time.



Expandable Structure

Functions can be fully customized with expandable modular structure.



Advanced Reporting

Advanced reporting enables creating report formats, automated reporting and fast invoicing features.



Brand Independent Integration

Klemsan or other branded products can be added to the system and energy consumption of all products in the system can be monitored.



Mobile Application

Mobile application in mobile phone or tablet enables to manage the energy management of the business instantly.



Single Line Scheme (Mimic Diagram)

Single Line Scheme can be designed through web-based system. Features similar to SCADA system can be defined.



Web Based System

Users can gain access to the system regardless of the platform, simply through a standard web browser.



Advanced Database

Advanced database features enable detailed device monitoring, parameter logging, analyzing and reporting.



Time Zone Support

Different time zones can be defined for the devices located at different regions with time zone support.



Energy Efficiency

Energy efficiency reports enable to optimize the production process, in addition to carbon emission and TEP calculation which serves for environmental energy management.



Security

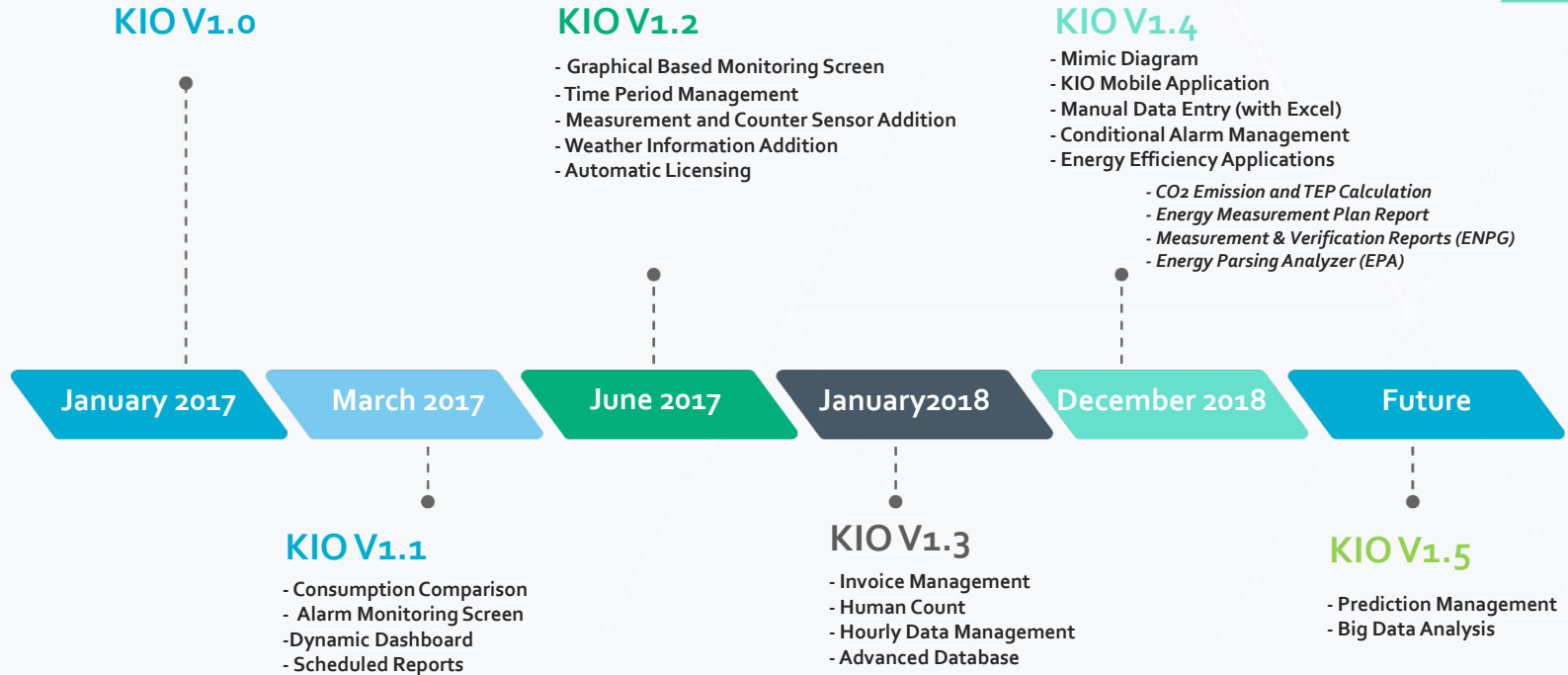
HTTPS support, user passwords, functions and profile based user authorization ensure a high level of system safety.



Load Share

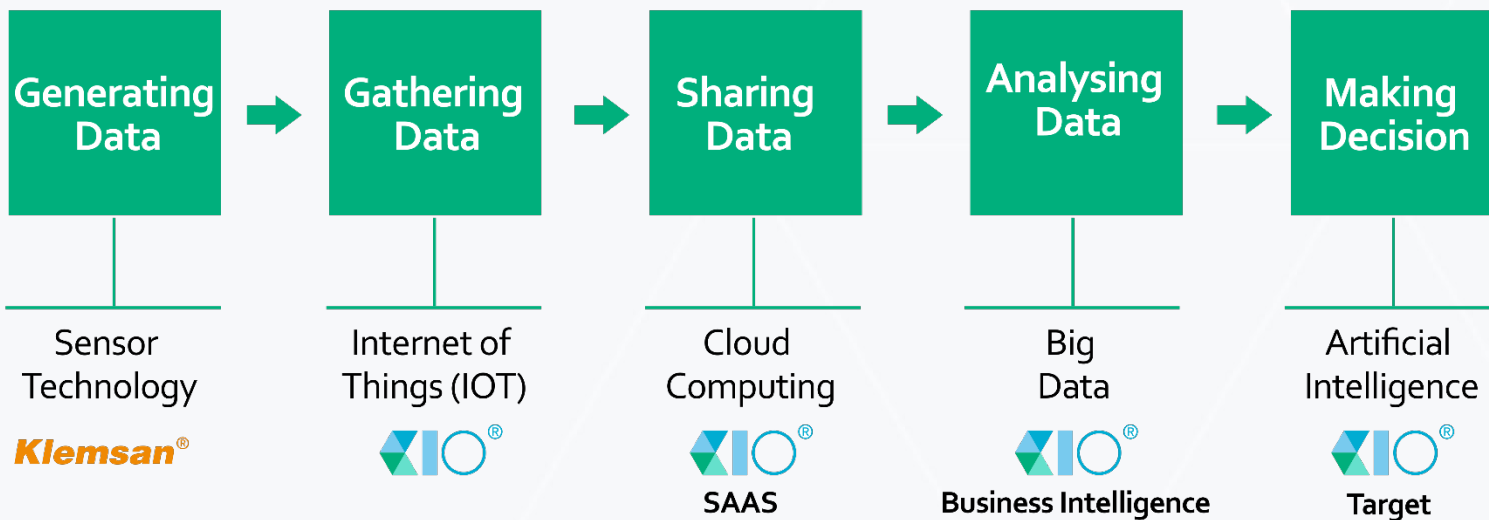
Number of devices that communicate is infinite with load share, a single server supports more than 2.000 devices.

Roadmap of KIO



Digital Conversion in Energy

ENERGY 4.0





CASE STUDIES in Klemsan



Case Studies in KLEMSAN



▶ **ENERGY EFFICIENCY PROJECTS:**

1. Lighting
2. Heat Insulation of Injection Machine
3. Monitoring Consumption of Assembly Line

▶ **SAFETY PROJECT:** Protection against overvoltage or lightning

▶ **PREVENTIVE MAINTENANCE PROJECTS:**

1. Compressor
2. Air flow pipe

▶ **COMPENSATION CONTROL**

▶ **ONGOING PROJECTS**



Energy Efficiency Project - Lighting

BEFORE



Fluorescent Lighting

AFTER

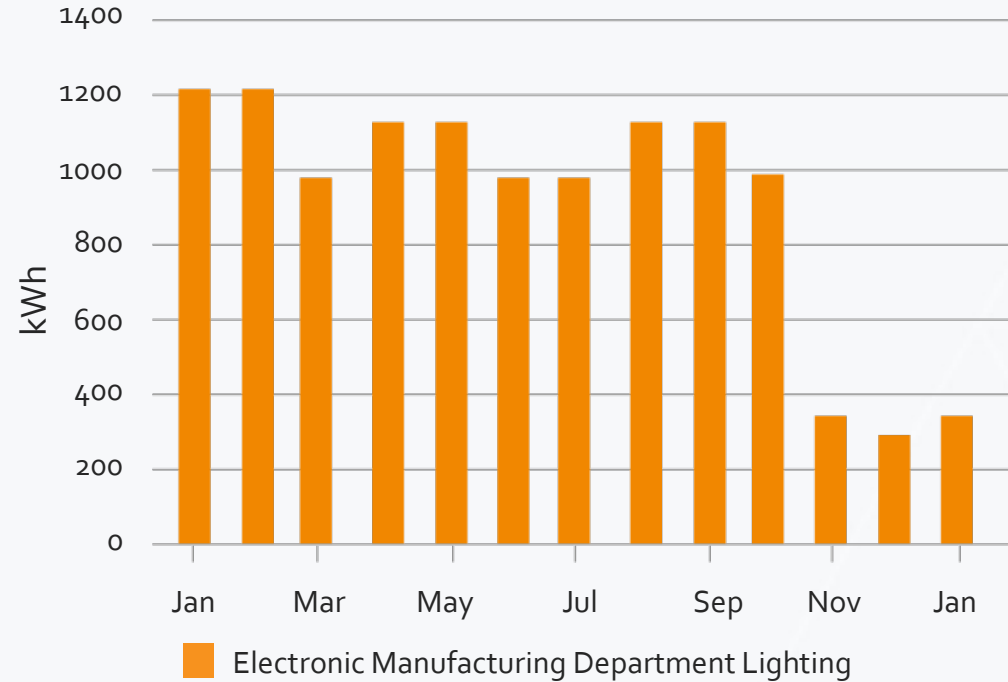


LED Lighting



Lighting System Transformation

Energy Efficiency Project - Lighting



► Benefits:

- Reduction in electricity bill
- Improvement in ambient conditions

Energy Saving:

68%

Return on Investment (ROI):

24 Months



Energy Efficiency Project - Heat Insulation of Injection Machine

BEFORE



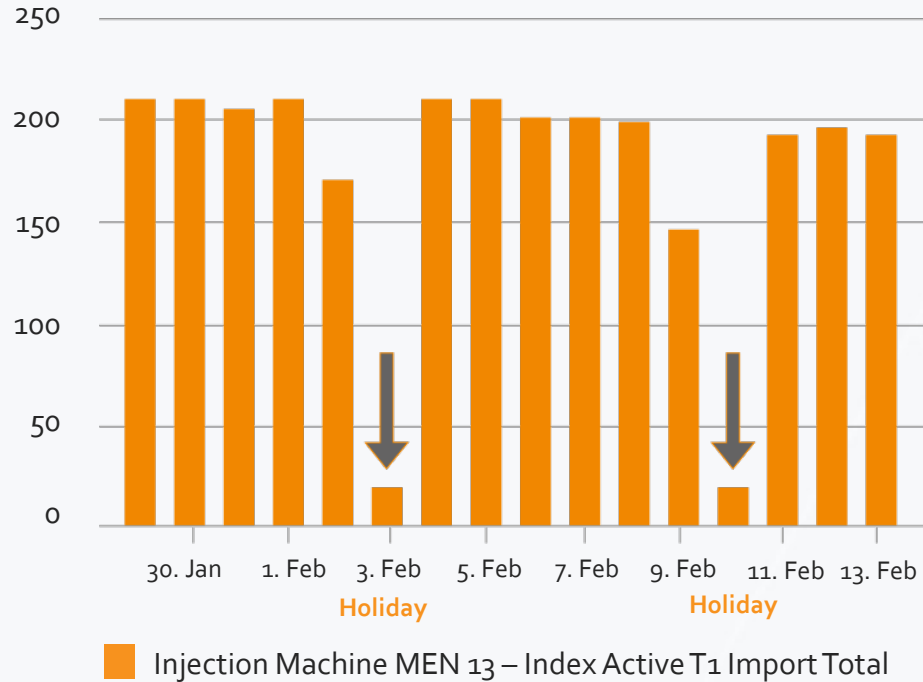
Without Jacket

AFTER



With Jacket

Energy Efficiency Project - Heat Insulation of Injection Machine



► Benefits:

- Energy Saving
- Increase in Machine Efficiency

Energy Saving:

8%

Return on Investment (ROI):

8,7 Months



Predicted annual saving: 290.000kWh

Energy Efficiency Project - Monitoring Consumption of Assembly Line

BEFORE



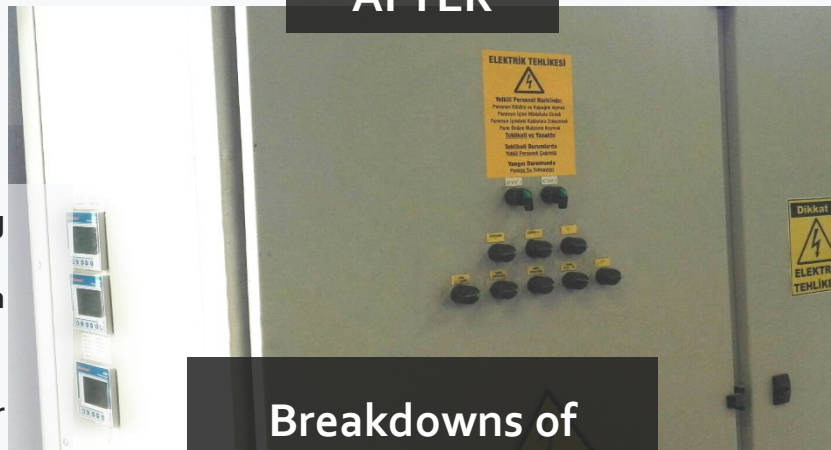
**Main Consumption
of Automatic
Assembly**

Lighting

Ventilation

Air
Conditioner

AFTER



**Breakdowns of
Automatic Assembly**

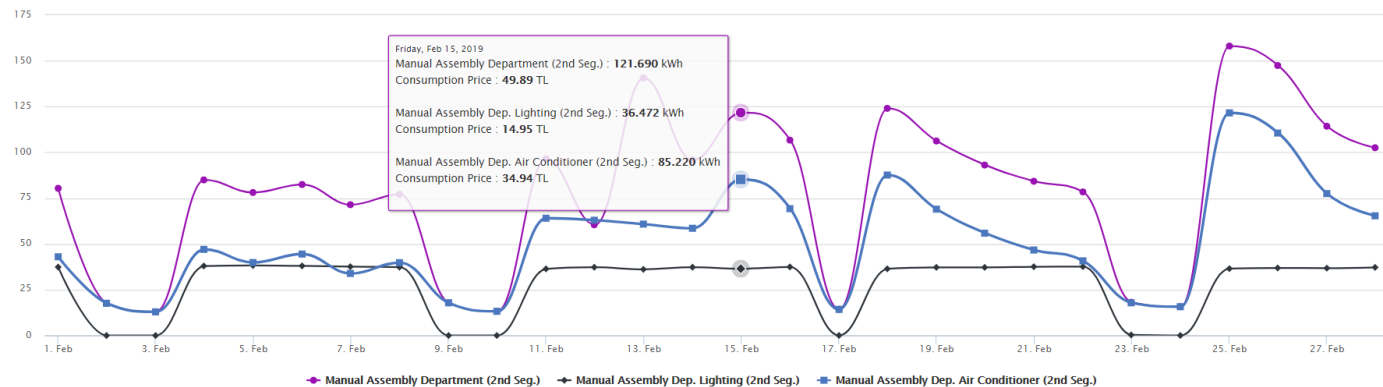


Lighting – Air Conditioner - Ventilation

Energy Efficiency Project - Monitoring Consumption of Assembly Line



Device Based Consumption Comparison Graph



► Benefits:

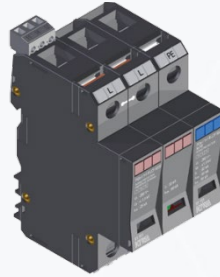
- Deeper analysis of energy consumption by monitoring breakdowns
- Comparative energy consumption analysis
- Avoiding unnecessary usage of electricity



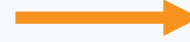
Safety Project - Protection against overvoltage or lightning



Over Voltage or
Lightning



Surge arrester

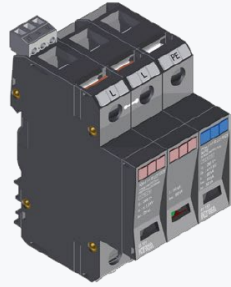


Factory



Note: Approximately 1800 lightning strikes around the world per minute. *
(*) – Statement from General Directorate of Meteorology in Turkey.

Safety Project – Protection against overvoltage or lightning



Surge arrester



EASIO



Gateway



► Benefits:

- Preventive Maintenance
- Facility Safety

TURKCELL

4.56% 97% 14:53



KLEMSAN

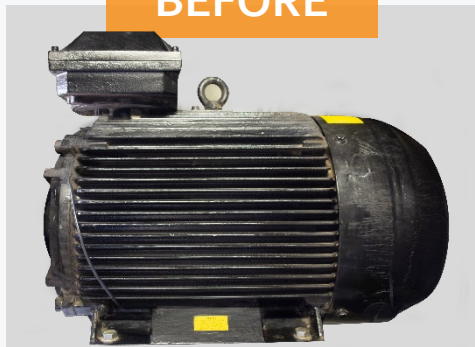


Kio Alarm Notification - Warning -
Izmir - Main Feeder Parafudr

11:52

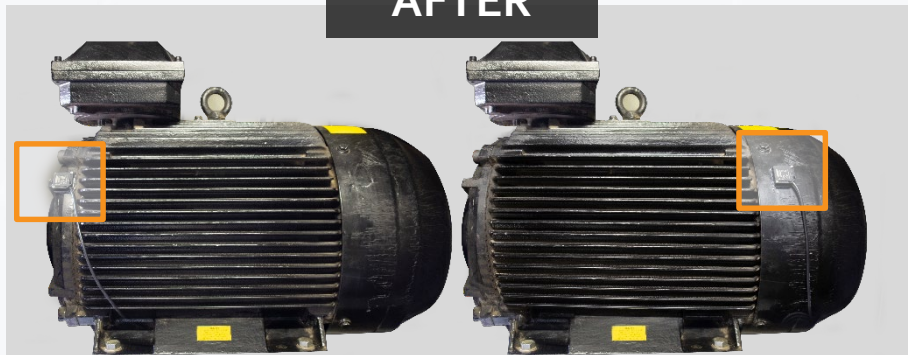
Preventive Maintenance Project - Compressor

BEFORE



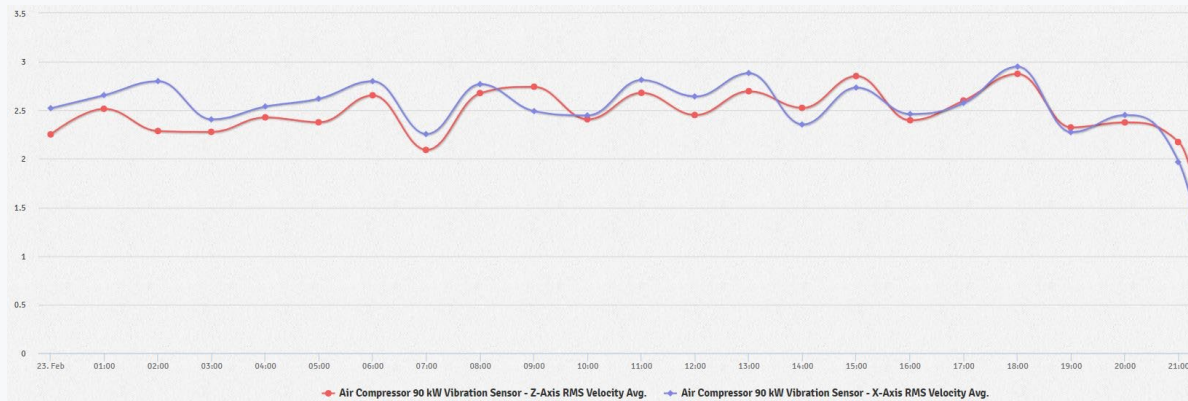
**Motor in
Compressors**

AFTER



**Compressor Motors Monitoring with
Vibration Sensor**

Preventive Maintenance Project - Compressor



- **Benefits:**
- Predictive and Preventive Maintenance
 - Facility Management
 - Machine Efficiency



		Fixed Assembly
RMS Velocity (mm/s)	>11.0	D
	7.1 - 11.0	D
	4.5 - 7.1	C
	3.5 - 4.5	B
	2.8 - 3.5	B
	2.3 - 2.8	B
	1.4 - 2.3	A
	0.00 - 1.4	A

Zone A: New Machine Installation

Zone B: Unlimited Working

Zone C: Limited Working

Zone D: Stop the Machine

Preventive Maintenance Project - Air Flow Pipe

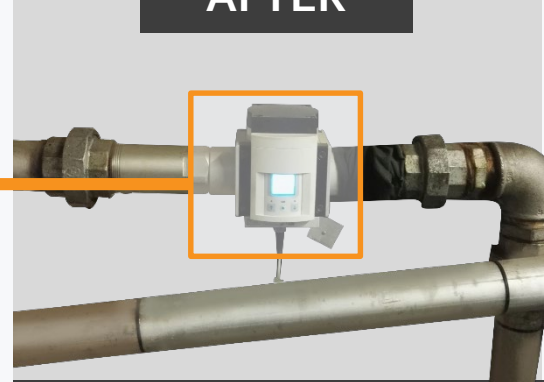
BEFORE



Air Flow Pipe

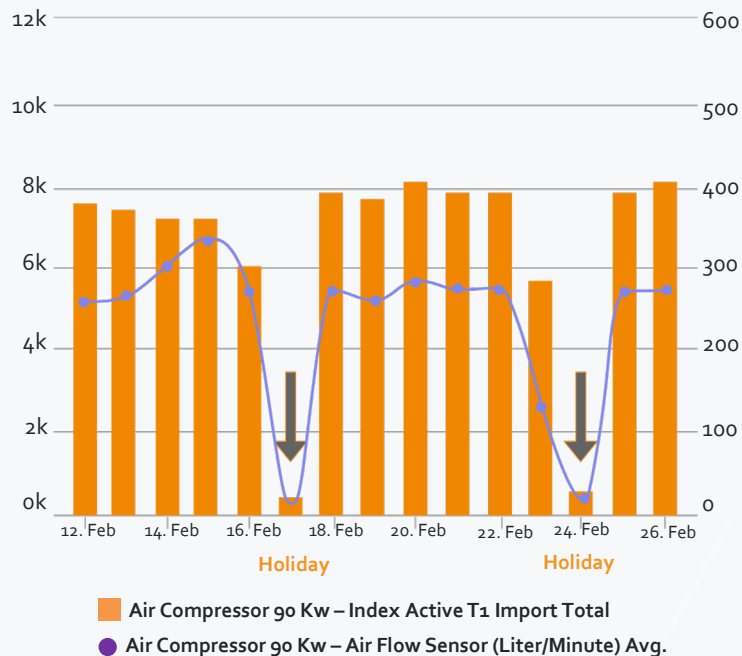
AFTER

Air Flow Meter



Air Flow Meter in Pipe

Preventive Maintenance Project - Air Flow Pipe



► Benefits:

Scheduled Maintenance

- Air Leakage Detection
- Machine Efficiency

Energy Saving:

7%

Return on Investment (ROI):

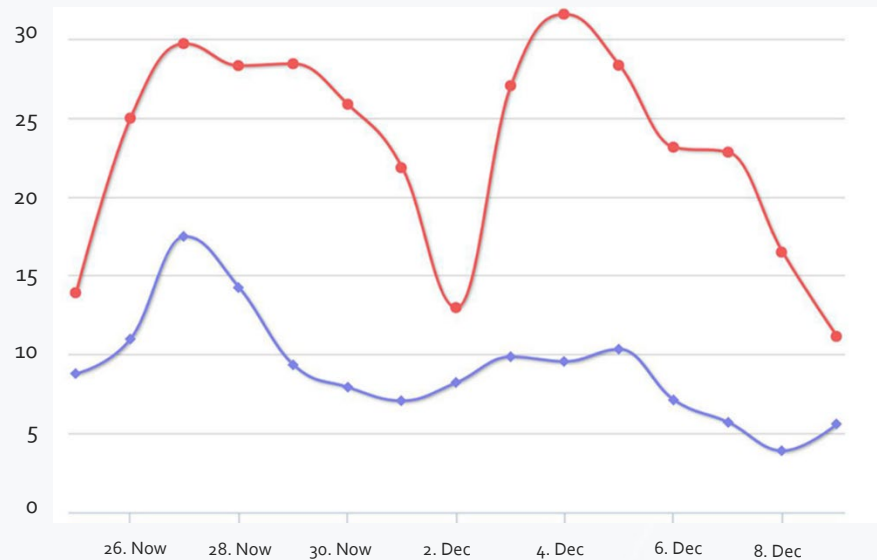
12 Months



Compensation Control



Compensation Control



● Step 10 Temperature Sensor – Thermocouple Temperature Sensor 1 (°C) Avg.
◆ Kemalpaşa – Temperature Avg.

- **Benefits :**
- Predictive Maintenance
 - Facility Management
 - Comparison with Outdoor Temperature



Ongoing Projects

- ▶ Uninterruptable Power Supplies Monitoring
- ▶ Determination of Air Conditioning Set Values by Measuring the Outdoor and Indoor Air Temperature (**Klemsan Temperature Sensor**)
- ▶ Preventing Excessive Water Consumption (**Monitoring of Water Meters**)





THANK YOU