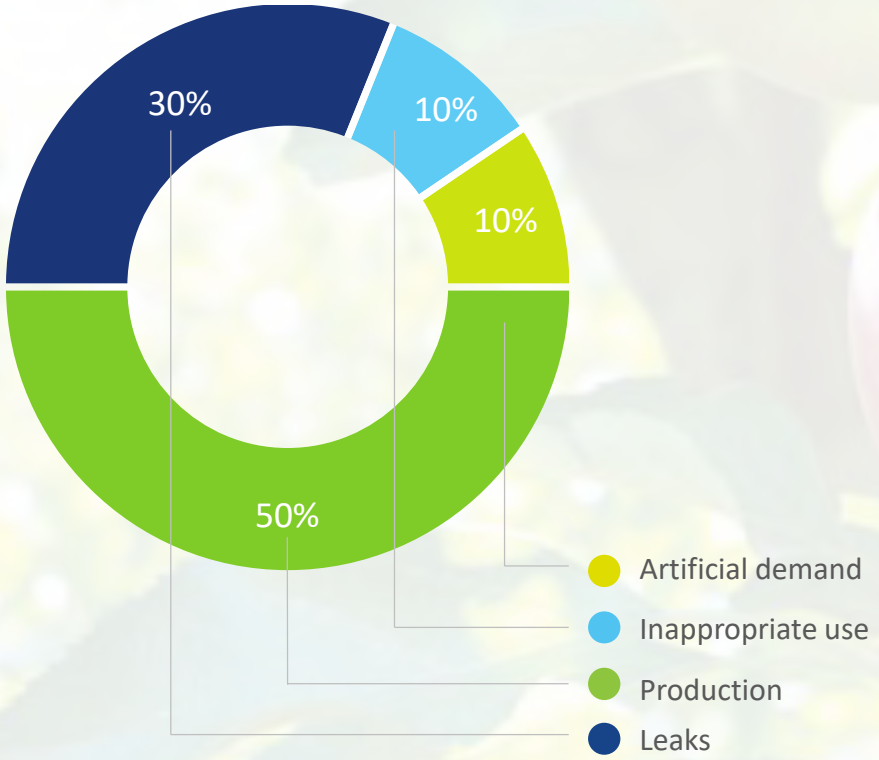
VP INSTRUMENTS

PERMANENT MONITORING OF COMPRESSED AIR SYSTEMS

Key to maximum energy savings

Compressed air:
~ 4…5 % of global electricity consumption
One of the largest industrial energy savings opportunities

Compressed air Savings potential



Return on investment (compressed air)

Compressor	running hours	Power	kWh	Euro's
1	4230	125	528750	€ 42.300
2	5330	75	399750	€ 31.980
3	250	37	9250	€ 740
Total cost/yr:				€ 75.020

Fact: 10…40 % cost savings possible

So let’s take 10% investment budget phase 1:

- Flow meters
- Basic monitoring system or data logger
- Budget: € 7.500

Example project: Steel

Solution

- VPVison
- Flow, kW, Pressure sensors in 6 compressor rooms

Savings:

- Change to blower air instead of open blows from compressed air
- Shut off old sections

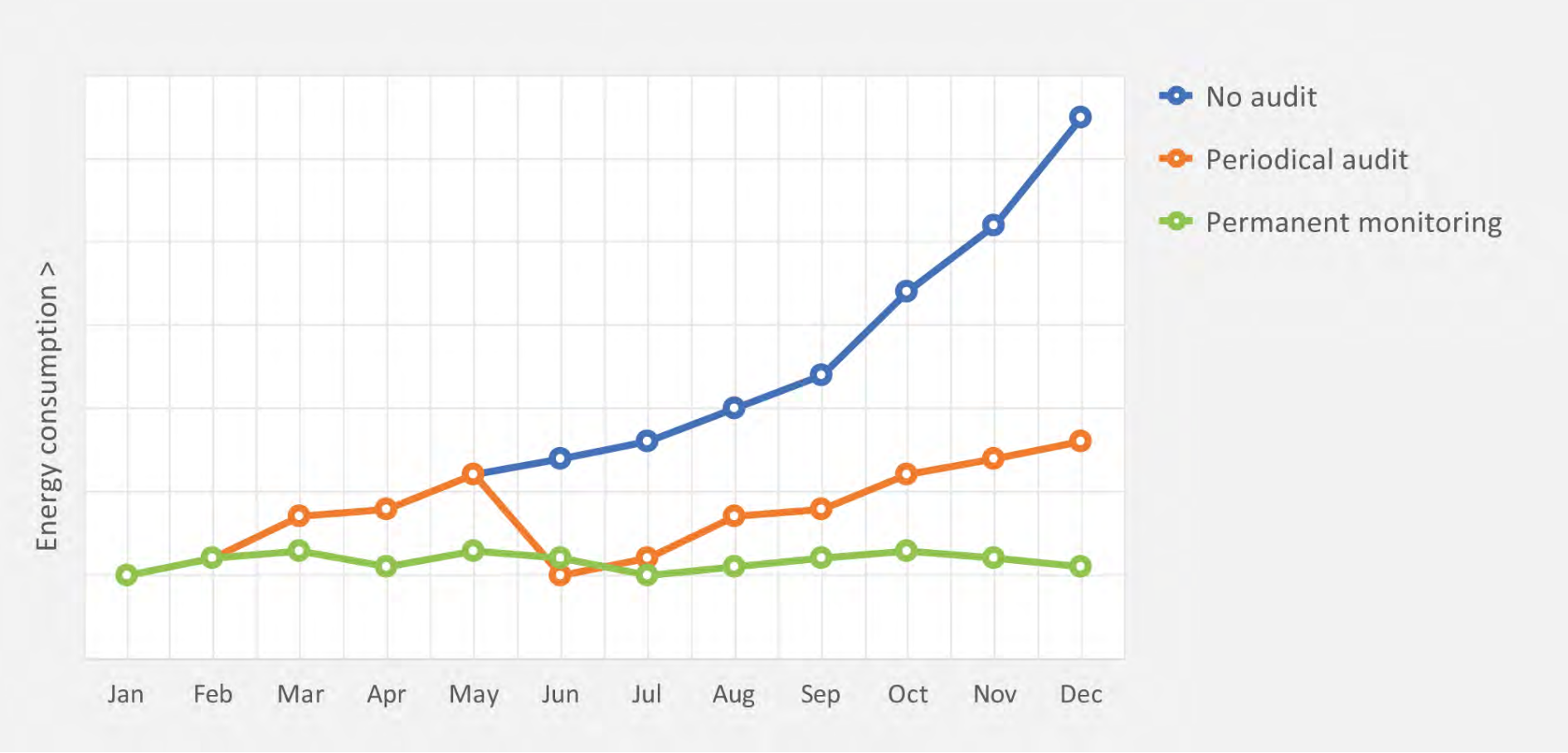
ROI:

- ½ year
- Total > 300 K USD/year

CALIFORNIA STEEL INDUSTRIES, INC.

‘The VPVision system is easy to understand and we have been able to customize it to meet our monitoring needs.’

Why permanent monitoring?

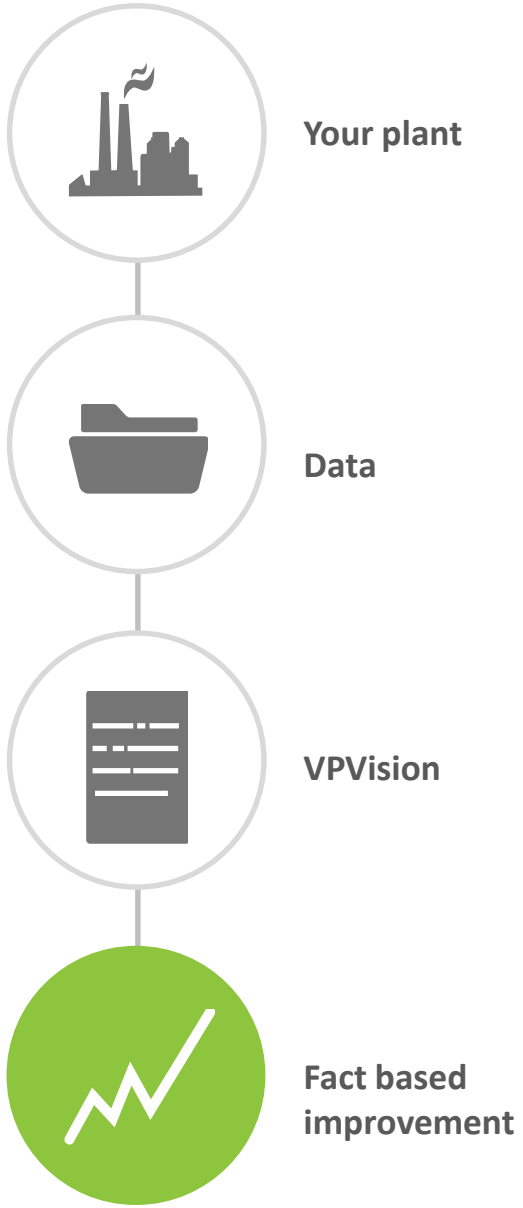


Why permanent monitoring?

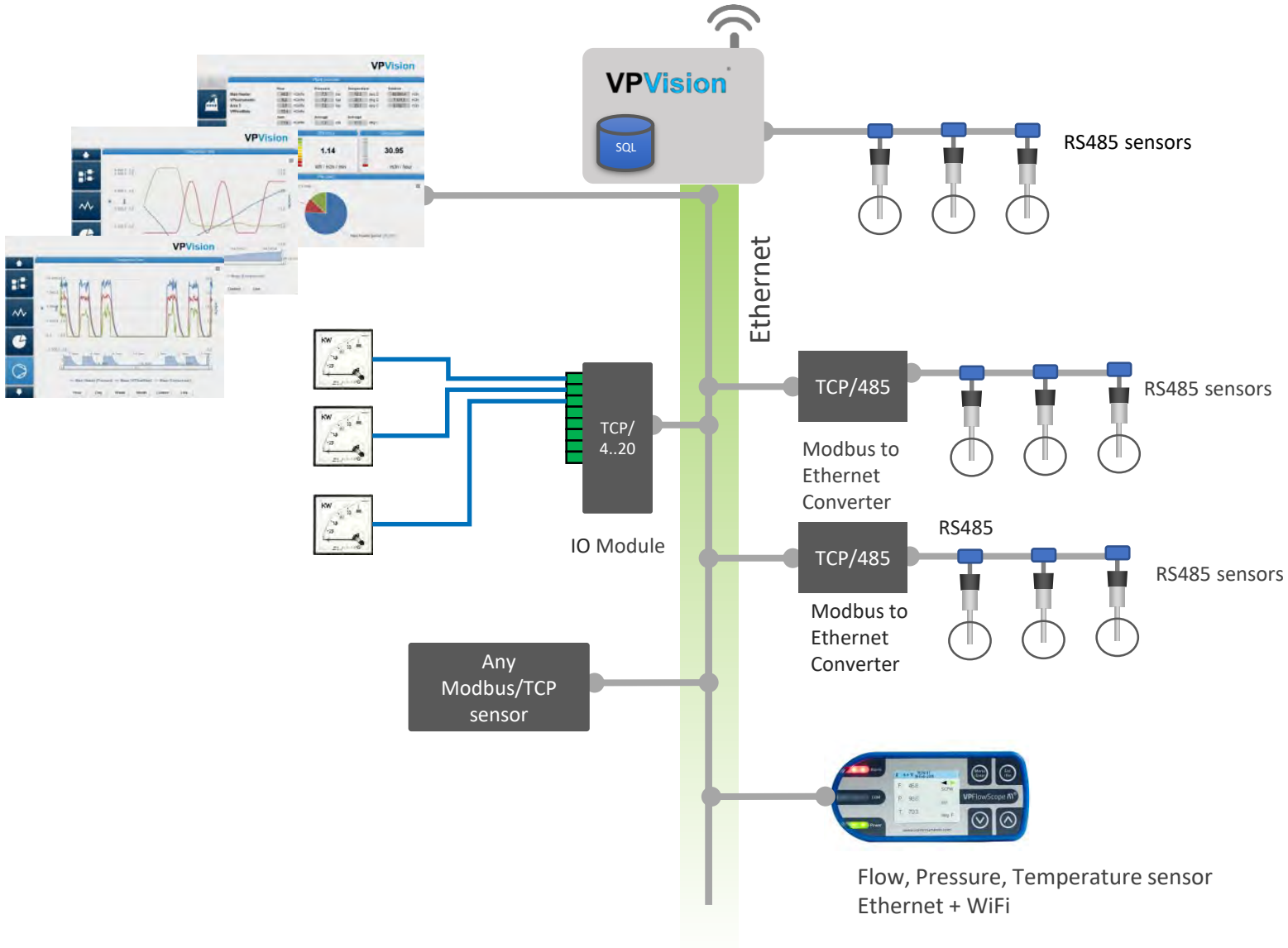
- Because you want to track efficiency, maintain savings and allocate costs.
- Because you want to save time
- Because you want to be on top of savings

Why permanent monitoring?

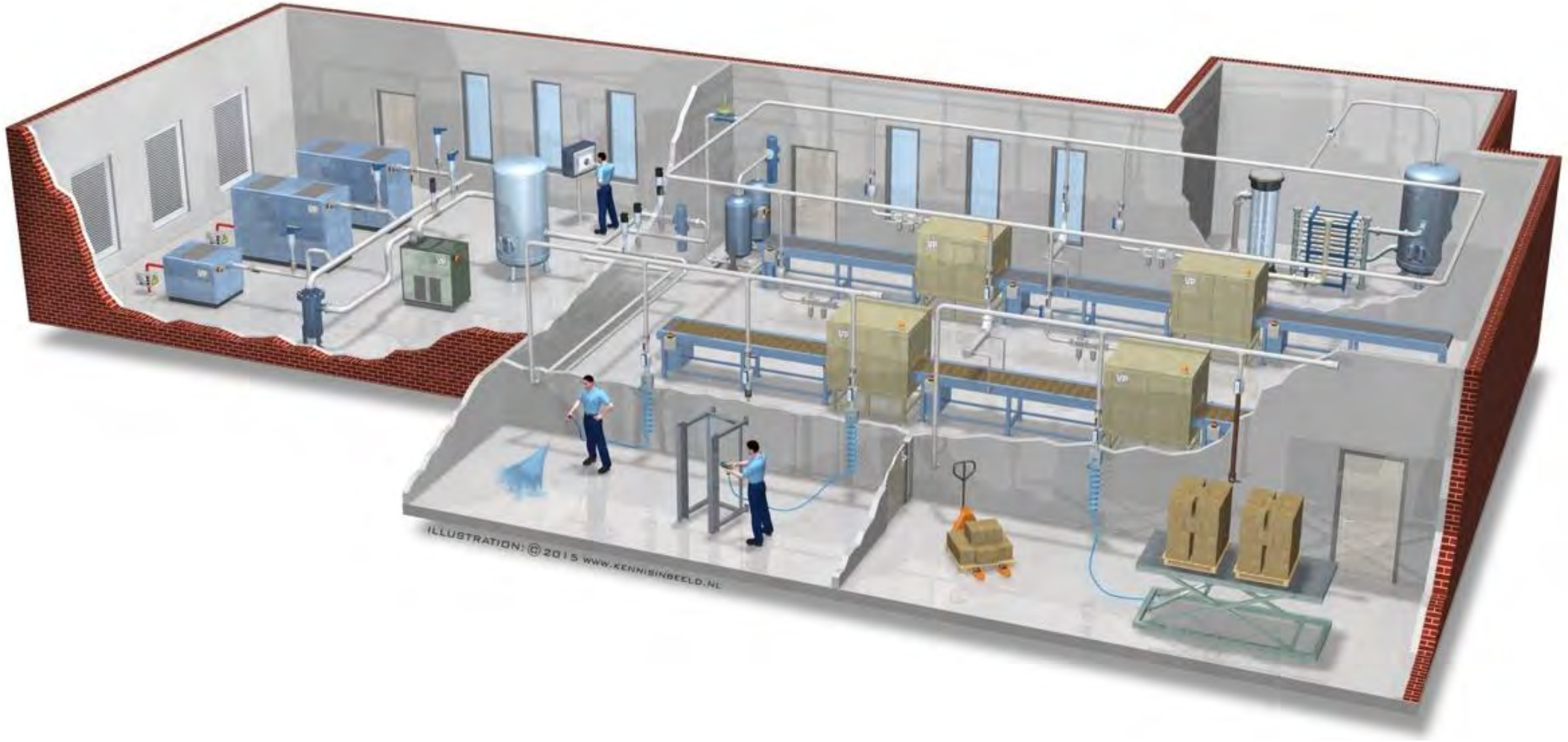
- Get to know your **factory baseline**
- Keep a permanent eye on your system:
  maintain the savings
- **Sizing of equipment** (compressors, pipework, downstream consumers)
- Monitor and **optimize the control system**
- **Maintenance** management & optimization
- Muti-site benchmarking
- Leakage management
- **Allocate costs**
- **Compliance** with energy directives (EED, ISO 50001)
- Data collection: (big) Data is key to
  be prepared for the near future



What is an energy monitoring system?



Where to measure



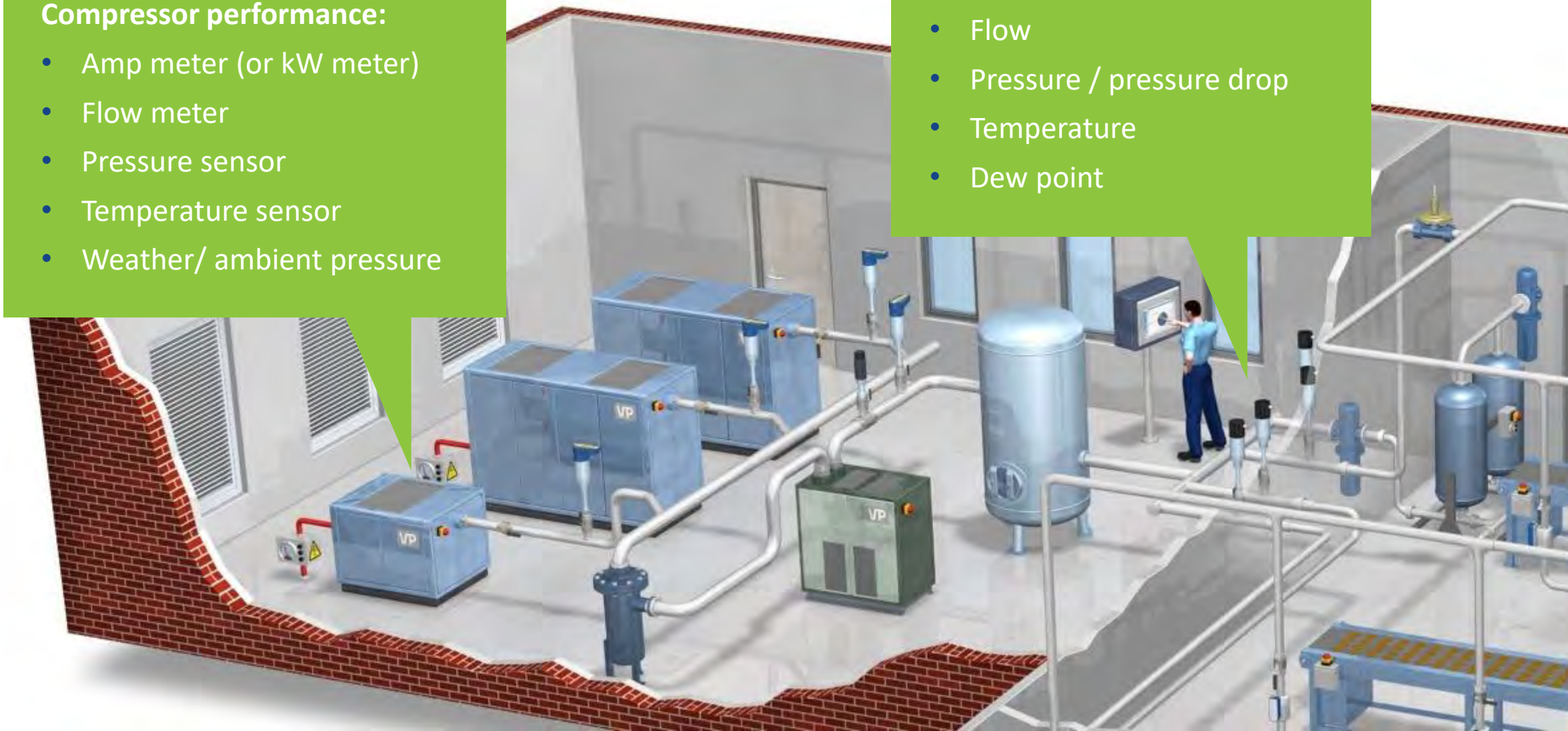
Where to measure

Compressor performance:

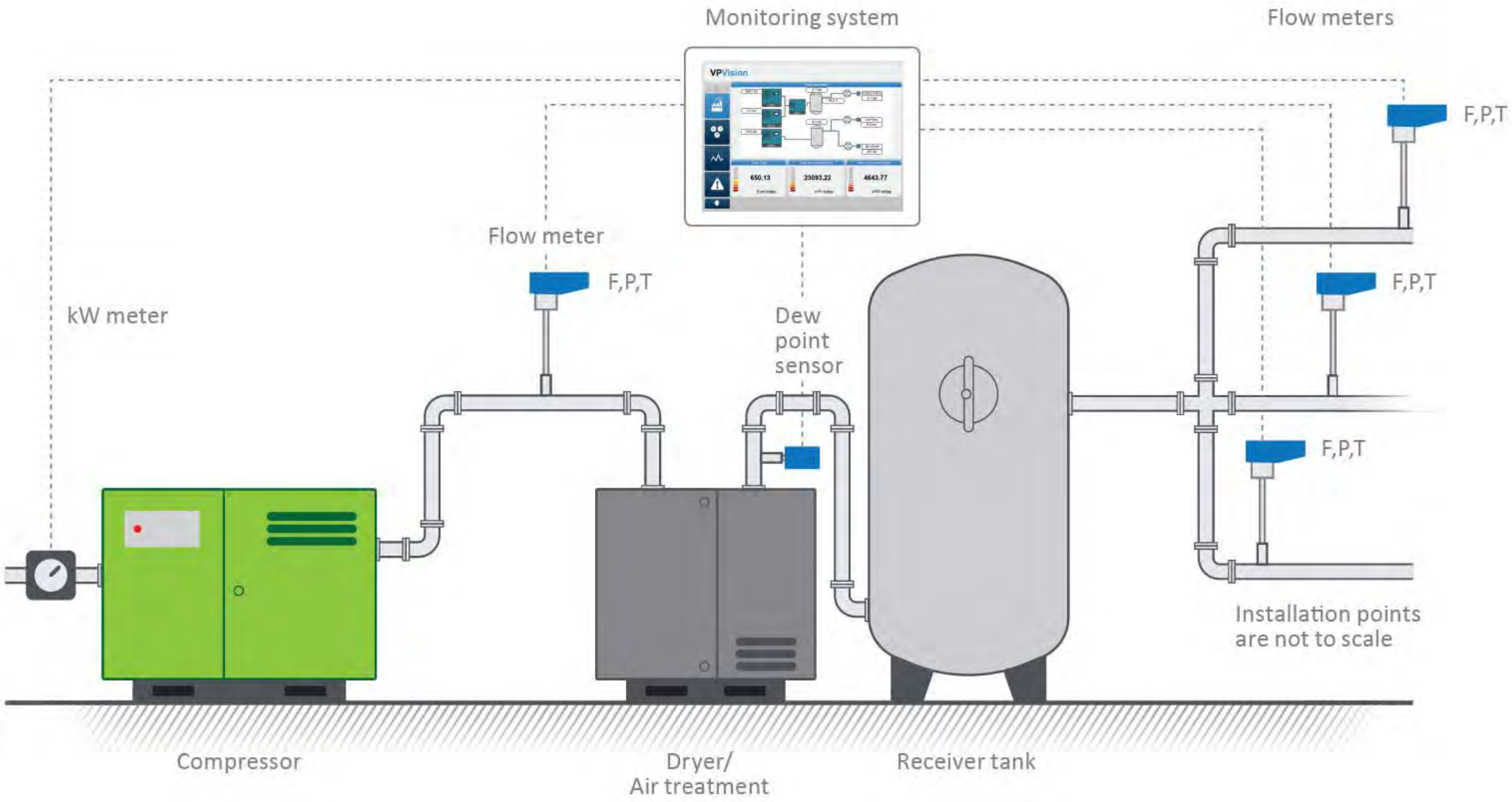
- Amp meter (or kW meter)
- Flow meter
- Pressure sensor
- Temperature sensor
- Weather/ ambient pressure

Demand side:

- Flow
- Pressure / pressure drop
- Temperature
- Dew point



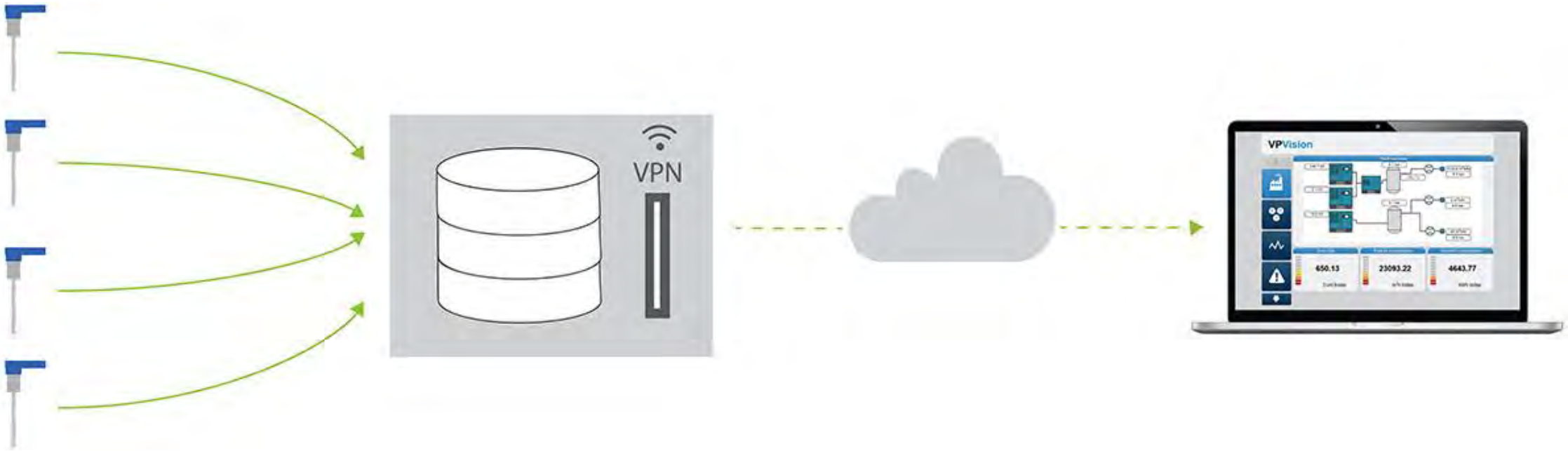
How to monitor a compressed air system



Remote energy monitoring

Continuous access: anywhere and anytime (even during a COVID-19 event)

- Safe, secure, dedicated connection
- VPN or 3G/4G network
- Multiple sites



Benefits

Air auditors, dealers, service providers

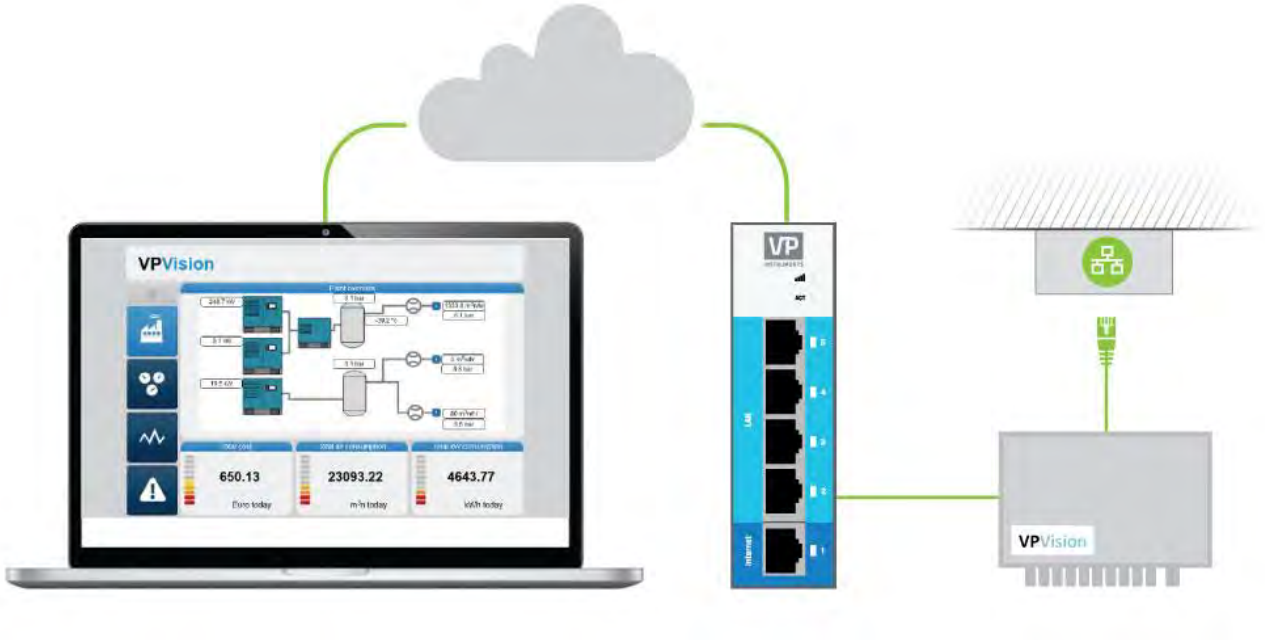
- Provide service from home/office
- Save on costly on-site visits
- Quick first support to your customer
- Remote data readout, support and updates

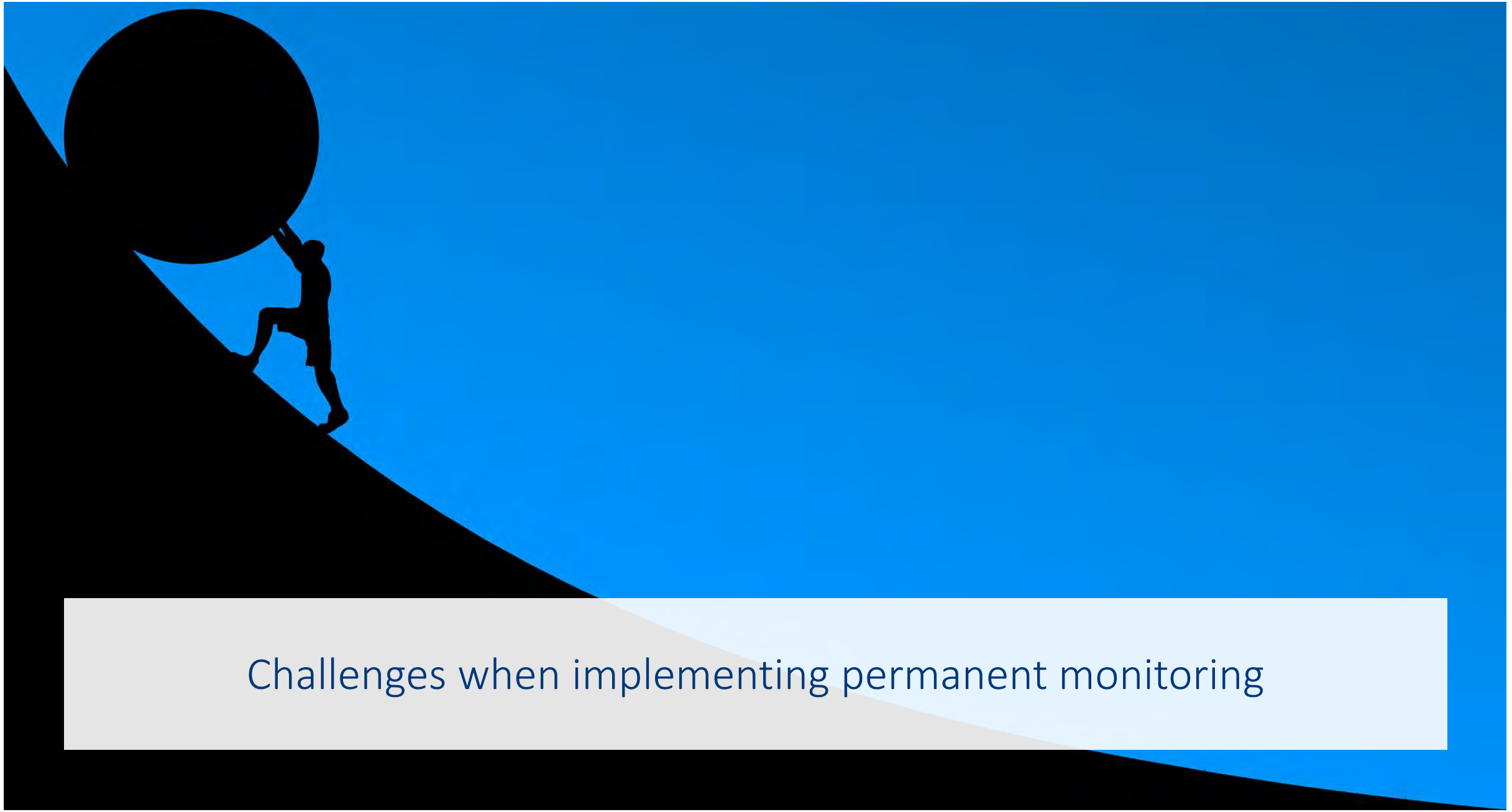
Industrial manufacturers

- Get remote support and analysis from external consultant
- 24/7 connection
- Get latest software update

Remote energy monitoring solutions

- On premise monitoring system with VPN router
- Sensor with Ethernet output with VPN Router
- Cloud monitoring solutions with cloud connector box
- Rental instrumentation with reports by solution provider





Challenges when implementing permanent monitoring

Challenges

People:

It’s all about habits and behavioral change

- Lack of interest
- Lack of engagement
- Other priorities
- Lack of experience

Challenges

Financial

- Return on investment is unclear
- Maintenance budget ←→ energy savings
- Conflicting incentives/ objectives:
    - Buyer: Low CAPEX
    - Energy Manager: Low energy costs
    - Maintenance Manager: Low maintenance costs

Best Practice: “Holistic approach”

Challenges

Technical

- Old compressed air system (poor air quality)
- Installation challenges (short pipe runs)
- Electrical/ signals: No data infrastructure
- Many tools available, make the right choice

Example project: Glass

Solution

- VPVision with 20 flow meters
- Supply and demand side
- Combined with existing energy management system

Savings:

- Leakage in machines
- Optimization of oven cooling
- Compressor inlet filter maintenance

ROI:

- 1 year
- Total > 200,000 Euro / year

‘Thanks to individual efficiency monitoring on each turbo compressor, we can optimize our maintenance schedule’.

How to start: Decide on main KPI’s

1. Define your goals and KPI’s

Efficiency	Leakage rate	Cost per X
Air flow at main header	Leakage flow	Total amount of compressed air
Compressor power consumption	Average flow	Production output (# products)

How to start?

2. Perform an initial audit

Identify current state

- Compressors' kW
- Compressed air consumption, pressure and temperature (dry side, main header)
- Pressure downstream
- Suspicious areas / consumers
- Leave the audit equipment in place!

How to start?

3. Analyze audit results

How much can you save:

- What are the top 3 issues?
- What is the savings potential?
- What will be the ROI?
- How to maintain savings?

How to start?

4. Install permanent monitoring system

Maximize and maintain your energy savings

- Leave audit equipment (sensors) in place
- Install monitoring software/ hardware
- Configure alarms, KPI's and make them available
- Expand to other areas: based on facts and generated ROI

Efficiency	Leakage rate	Cost per X
Air flow at main header	Leakage flow	Total amount of compressed air
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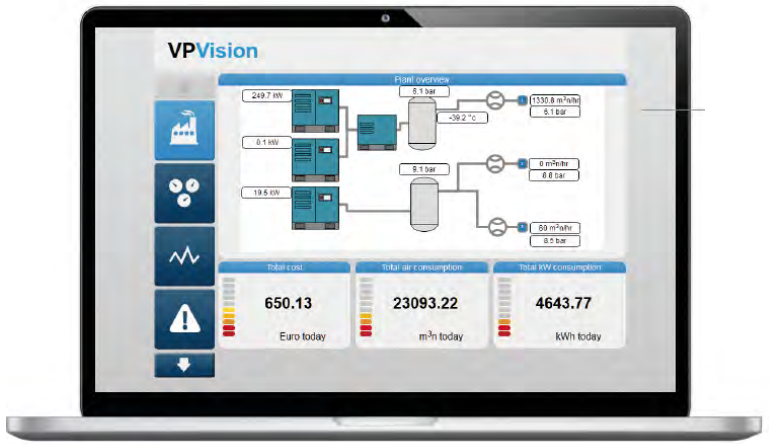
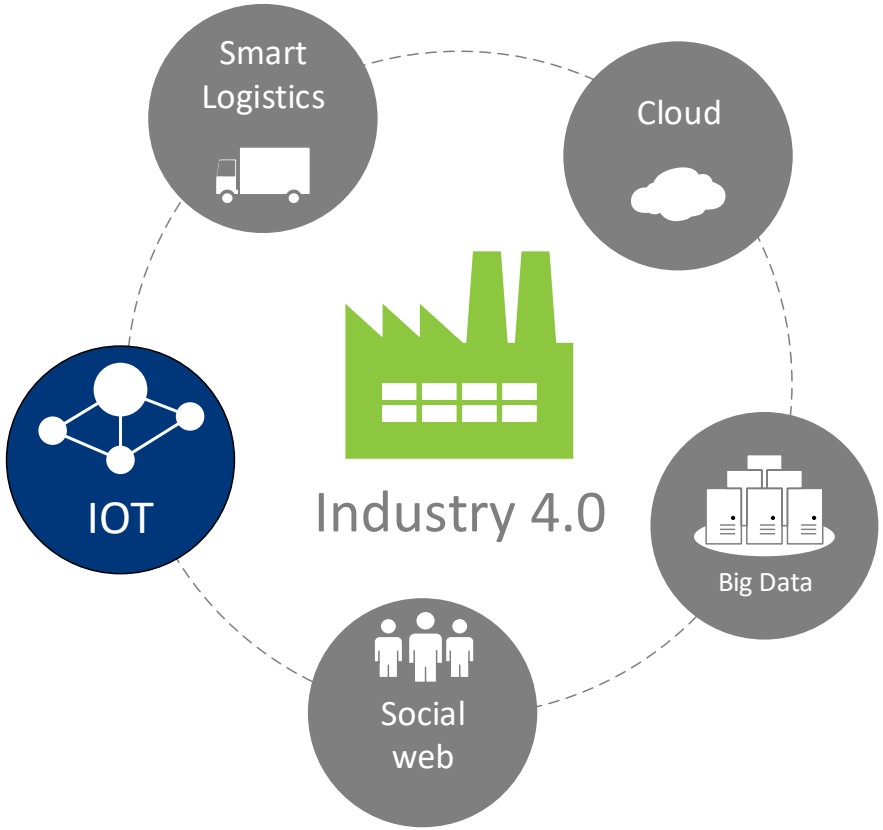


(Future) trends

- Permanent monitoring will be standard
- Big Data and advanced analysis: changing roles
- Sensors become smarter
- Cloud-based solutions for monitoring and control
- Deep learning / Artificial intelligence

Be prepared:
Start NOW with collecting data



(Future) trends

Cloud based monitoring:

- Scalable and flexible solutions grow with your needs
- Predictive maintenance based on algorithms
- Cloud based control of equipment
- Remote access and support of external consultants
- A.I. / Deep Learning will be used for in-depth analysis
- Data is a key asset

Conclusions

Why permanent monitoring:

- Get to know your factory baseline and fingerprint
- Permanent monitoring is key to continuous savings
- It is all about people and behavioral change
- Set the right KPI's and management policy
- Take it step by step, fund the next step from your savings
- Start now, as data is key

… Invest in an efficient plant, and a better future!

THANK YOU!

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