Energy sustainability in smart manufacturing:

Workshop: Choosing your approach to reduce compressed air energy consumption in production

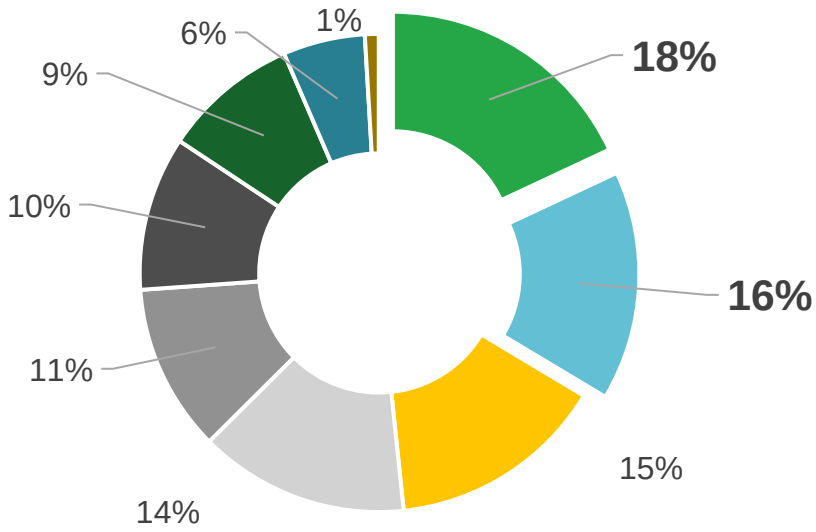
Andy Parker-Bates,
Relationship Development Manager,
FESTO UK & Ireland

Simon Meadmore,
VP of Product and Supplier Management,
Farnell Global

Yusuf Mohtaj,
Technical Support Engineer,
Farnell

What will be the top IoT Industry in 5 years?

Farnell IoT Survey 2022 - Findings



1. Industry 4.0 (18%)
2. Energy Management (16%)

- Region: Global Survey
- Duration: Jan-Mar. 2022
- Total Participants: 2445

Farnell
AN AVNET COMPANY

Save costs with our products and solutions

Motor and motor controllers

Variable speed drives

Controllers & PLCs

Temperature and process controllers

Industrial SBCs

HMIs

Power management

Sensors

- Access to all the leading brands with over 40 industrial manufactures in the offer
- Delivering all your product requirements from board level components to test equipment
- **Our inventory levels increased by 70%**

Farnell AN AVNET COMPANY

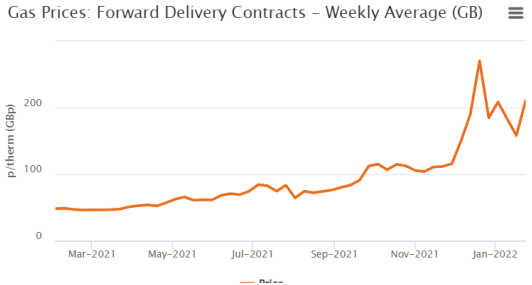
Choosing your approach to reduce compressed air energy consumption in production

Andy Parker-Bates,
Relationship Development Manager,
FESTO UK & Ireland

Focus on energy consumption in production

- **Energy prices are soaring**
- High fluctuations and fast moving energy market
- Law and governance bearing down on energy consumption
- Consumers and shareholders demanding CO_2 / energy reduction
- Corporate Social Responsibility to reduce CO_2 footprint

Pressure from shareholders and other stakeholders on boards, leaders and managers translates into pressure on the shoulders of maintenance, energy and utility managers.

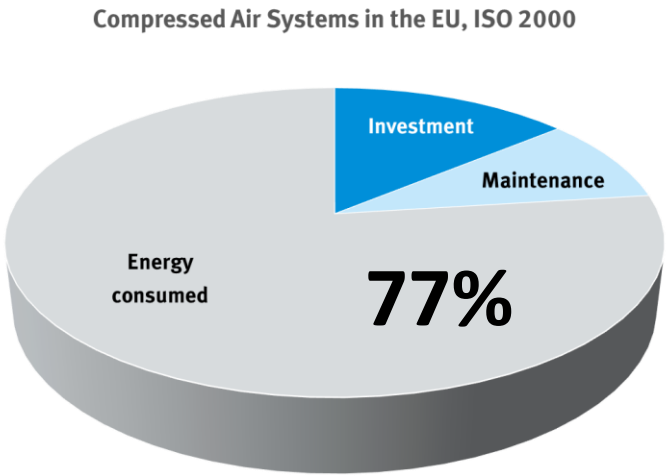


Information correct as of: March 2022

Source: Ofgem - Office of Gas and Electricity Markets

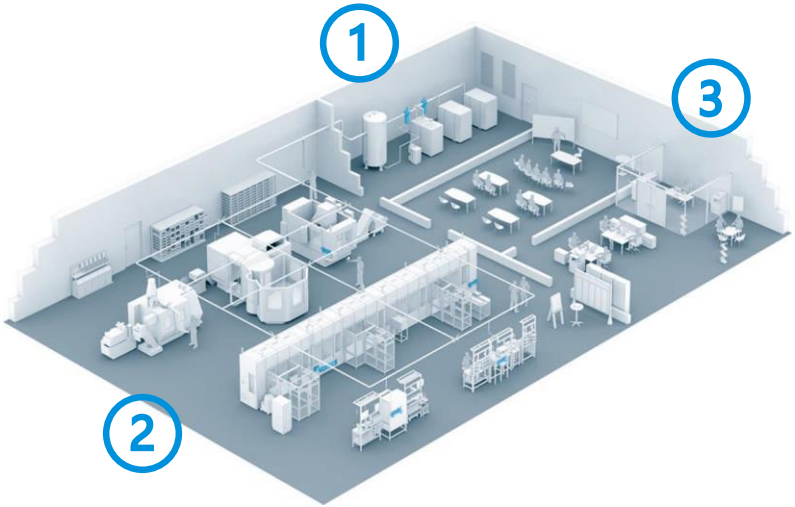
Five approaches to reduce compressed air energy consumption:

Why focus on Compressed Air?



1. Regular energy audits and improvement programmes
2. Improved specification for purchasing new machines
3. Selecting the most energy-efficient technology and more energy-efficient products
4. Develop maintenance engineering and operators' energy reduction skills
5. Utilise the latest energy management systems supported by machine learning (AI)

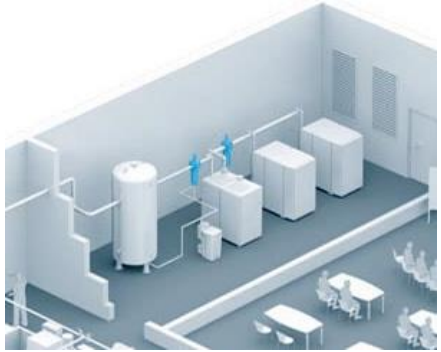
Approach 1: Energy audits and improvement programmes

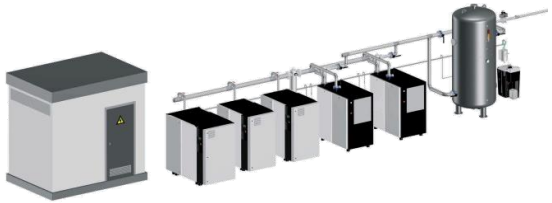


Defining the scope:

1. Compressor room
2. Production and packing areas
3. Class room or training room

Energy audits and improvement programmes





Compressor Room

1. Specification and quantity of compressors
2. Set pressure
3. Pressure drop over dryer and filters

Energy audits and improvement programmes

Production and packing areas

- **Air Quality**
  - ISO8573-1:2010
  - Energy losses due to high air quality standard
  - Inefficient working dryers and filters
  - Good quality air improves service life
- **Pressure drop**
  - Losses due to pressure drop in main pipework
  - Transport with the lowest possible drop
- **Leakage detection**
  - Average between 5% and 35% of compressed air is lost due to leakages
  - 70% of all leakage are from Fittings, Connectors & Tubing

Energy audits and improvement programme

Production and packing areas

Machine optimisation

- Reduction of air usage
- Vacuum generators
- Blowing applications
- Electric vs Pneumatic


Choose right components


Size for application


Reduce weight


Minimise friction


Recover energy

Turn off


Control and regulate


Generate vacuum as required


Reduce pressure


Minimise pressure loss


Reduce tube lengths


Reduce leakages


Permanently monitor usage

Energy audits and improvement programme

CERTIFICATE

TÜV SÜD-DLEE-0010.2021.001

For the company

FESTO SE Co.KG
Ruiter Straße 82
D-73734 Esslingen

FESTO

hereby it is certified that the Compressed-air - Energy efficiency - Assessment

FESTO ENERGY SAVING SERVICES

comply with the requirements of the TÜV SÜD Standard
„Compressed-air - Energy efficiency – Assessment in accordance with ISO 11011"
rev. 0, Edition 09/2017.

The company comply with the Compressed-air - Energy efficiency - Assessment
„Festo Energy Saving Services" the requirements of the DIN EN ISO 11011.

The company is entitled
to use the TÜV SÜD – certification mark
„Specialist company for the assessment of compressed-air efficiency ".

Specialist company for the assessment of compressed-air efficiency
- Qualified skilled staff
- Analysis of compressed-air systems (production, transmission, needs)
- Identification and assessment of areas of potential savings

This certificate is based on test report number: 3486282
This certificate is valid to: 31.08.2024.

Dresden, den 15.09.2021

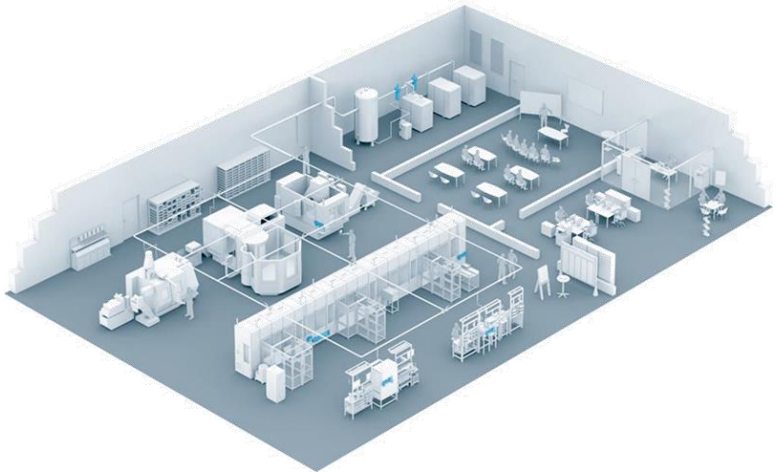
Zertifizierungsstelle
Energiesysteme
Matthias Herold

EQ3139077 TÜV SÜD Industrie Service GmbH, Westendstraße 199, 80 686 München, Deutschland

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Compressor room & Production and packing areas

- ISO 11011:2013 Compressed air – Energy efficiency



Energy audits and improvement programmes

Pros

- Clear picture of consumption of energy throughout the whole site
- Certification (ISO 11011)
- Measurable return on investment

Cons

- Snap shot - one moment in time
- Needs follow-up and action plan
- You may be frightened by the results!

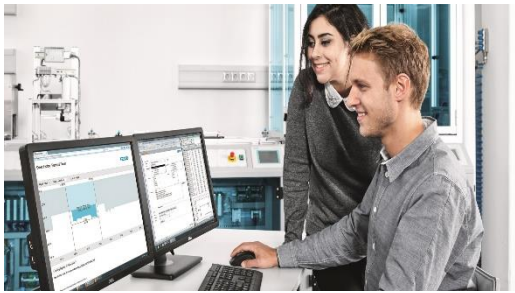
Approach 2: specifying new machines

Energy Monitoring

- Does machinery have an energy monitoring system?
- Can you easily access energy consumption data?
- What is the machine's energy consumption benchmark?
    - per operation / per hour / per week etc?

Machine design

- What pressure does the machine run at?
- Are there different pressure zones?
- Do pneumatic cylinders have reduced pressure return strokes?
- What's the best technology - pneumatic or electric?



Specifying new machines

Pros

- Future proof
- Live monitoring 'out of the box'
- Lower energy consumption, built-in

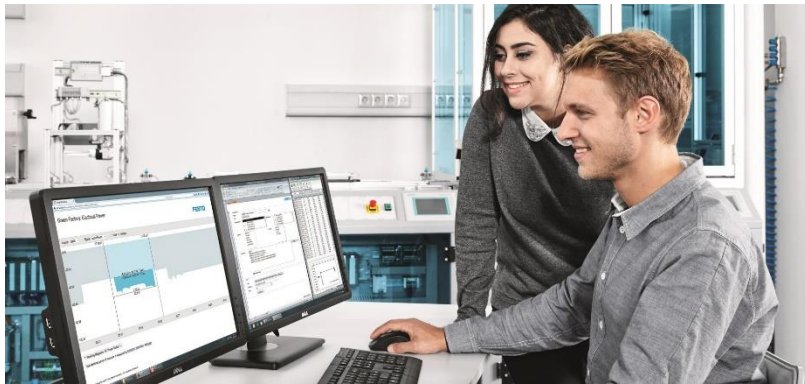
Cons

- Increase of price of machine
- Increased installation time
- Requires greater commissioning expertise

Approach 3: Product selection

Selecting more energy-efficient product solutions and choosing the most energy-efficient technology

- **Use engineering software tools**
- **Don't oversize**
- **Select the most energy efficient technology – pneumatic, electric / hybrid**



Product selection

Selecting more energy-efficient product solutions and choosing the most energy-efficient technology?

Intelligent products provide energy consumption monitoring and control for your machines.

Digitised: intelligent pneumatic valve technology

Integrated pneumatics, sensors, electronics and software

Flexible control of force and pressure

E.g.: Motion Terminal – A world first

Intelligent air preparation

Live energy monitoring direct to PLC (fieldbus connection)

Blocks air flow when production has stopped and reduces system pressure

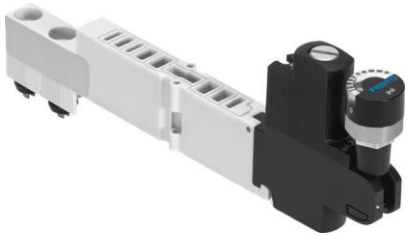
E.g.: MSE6-C2M & E2M

Product selection

Many machine builders do not consider the energy saving benefits of products like these . . .

Totalling flow meter

Pulse valve



Pressure reducing sub-base

Energy reducing vacuum generator

Product selection

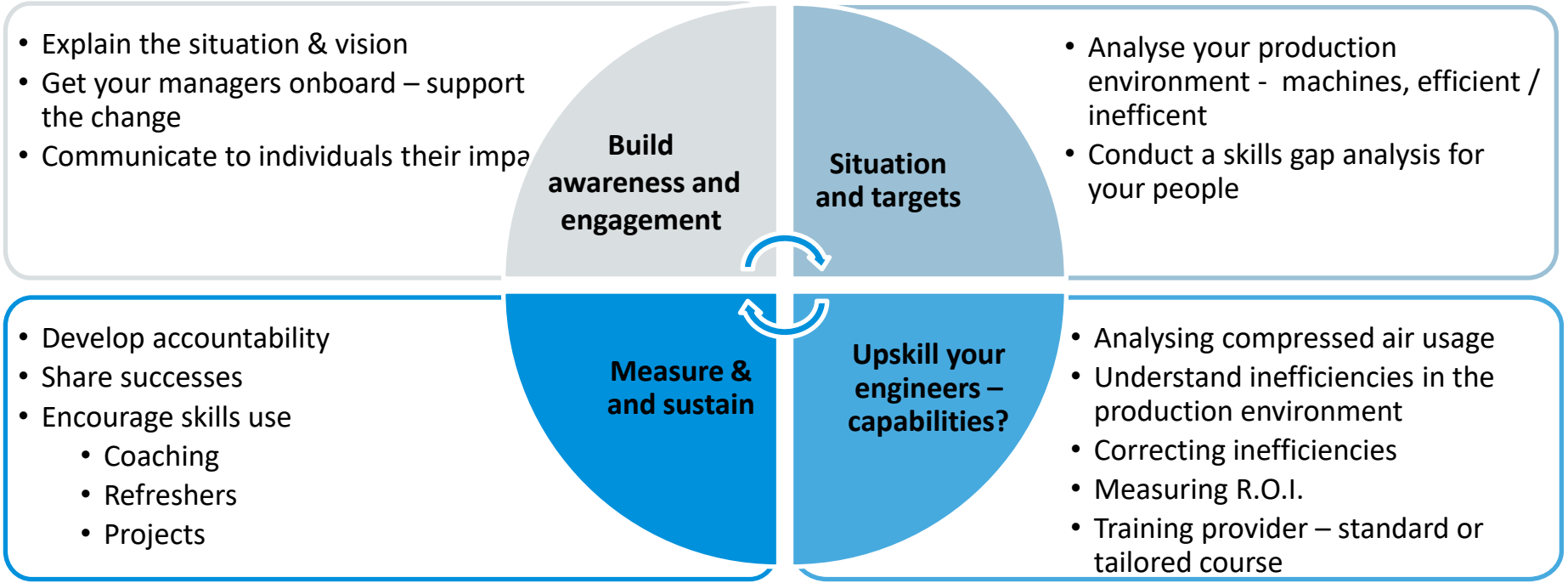
Pros

- Retrofit older machines to introduce modern technology
- Reduce energy cost on non-optimised machines
- Free and easily accessible software tools

Cons

- Can be difficult to implement in older machines and controls architecture
- Machine warranties
- Machine certification (CE, Safety etc)

Approach 4: Developing the energy skills of people



Developing the energy skills of people

Pros

- Develops a sustainable long term capability in your workforce
- Builds engagement through an understanding of the impact individuals can have towards targets
- Can deliver a high ROI in the longer term

Cons

- Knowledge can walk out of the door
- Not a quick fix – requires commitment
  - Resistance to change
- Requires training time away from the production environment & employee engagement

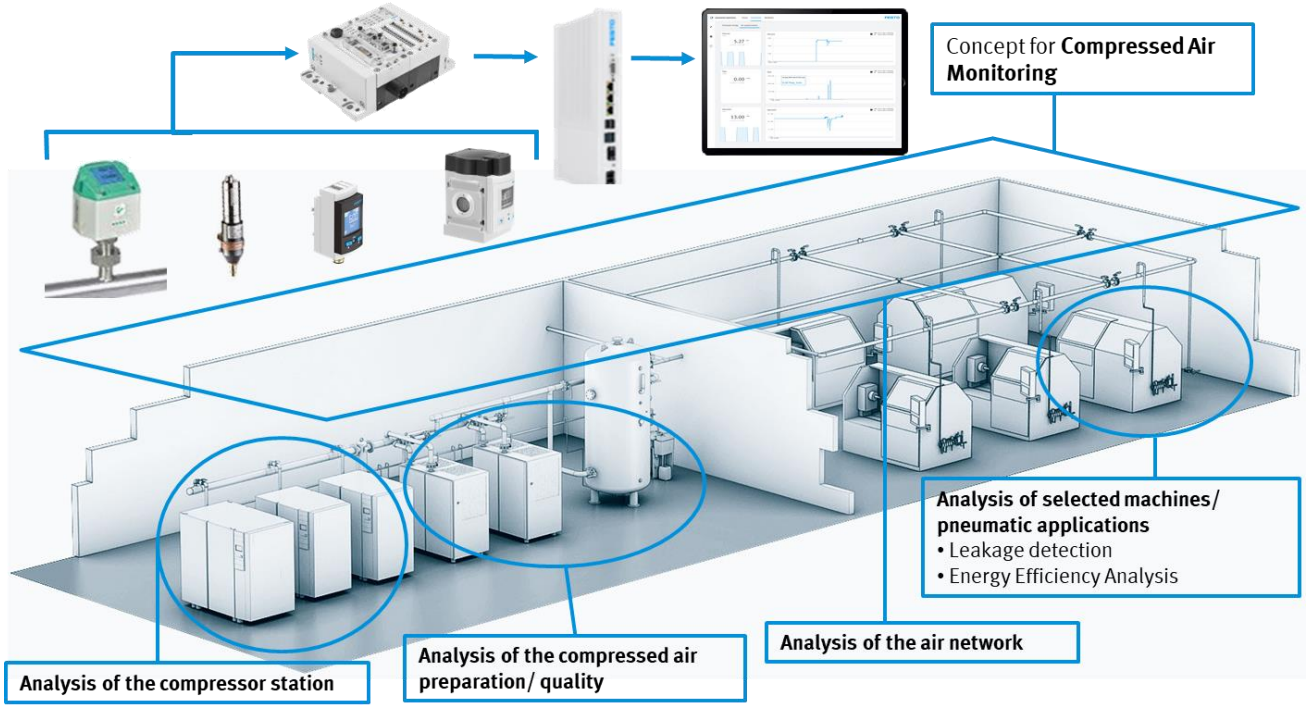
Approach 5: Utilising the latest energy management systems supported by machine learning (AI)

Festo Automation Experience

Continuous monitoring and analysis of relevant data for anomaly detection to optimise production

Festo AX – The automation industry needs AI

Predictive energy – Continuous energy consumption monitoring and anomaly detection to optimise energy usage



Energy efficiency audit

Implementation

Predictive energy monitoring

Overview - Festo AX Architecture

Festo AX Solutions

Predictive **quality** | Predictive **energy** | Predictive **maintenance**

Festo AX Brain

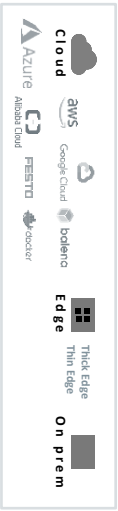
Dashboards	APIs	Notifications
AI Training Engine	Rule Engine	Model Management
Data Storage		

Festo AX Field

AI Scoring Engine	Streaming Analytics	Event API

Festo AX Connectivity

MQTT	OPC UA	CI	ENGP
S7	Modbus	FINS	...



Energy management systems and A.I.

Pros

- Cloud based access
- Unmanned survey/operation
- Data driven decisions
- Model can also help improving maintenance and quality

Cons

- Programming
- Knowledge level required
- Data storage and security

Advantage of a blended approach to energy saving

Energy approach achieves 20% savings for Unilever

- Combined audit and skills approach
- £140,000 pa could be saved

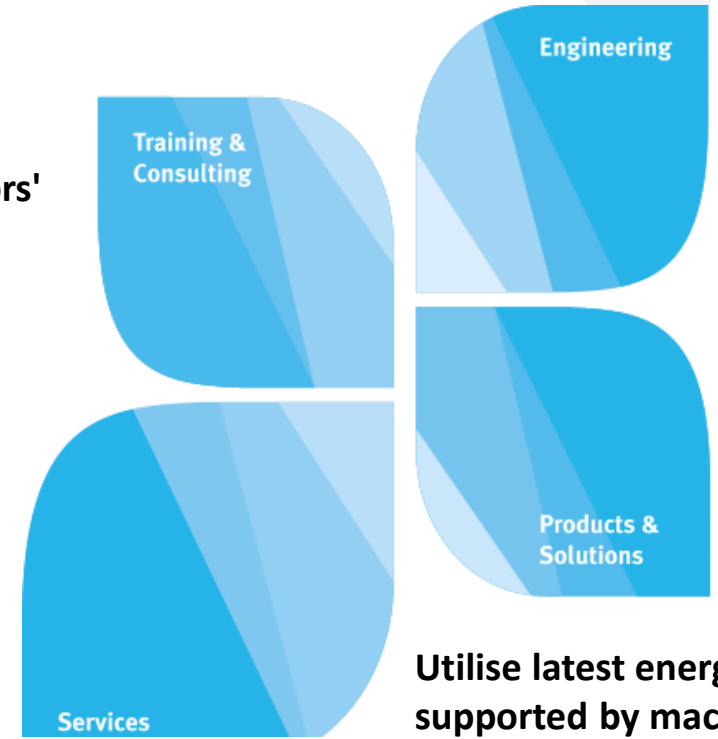
"What I particularly like about the Festo approach to energy efficiency is that it's a one stop solution that achieves fast results. An energy audit and factory assessment, setting up meters and energy measurements, workshops with managers and engineers, and a final report can all be completed within a week."

Richard Diamond, Service & Engineering Leader, Unilever

How can Festo help you to reduce your compressed air energy consumption?

FESTO

Develop maintenance engineering and operators' energy reduction skills



Improved specification for purchasing new machines

Selecting the most energy-efficient technology and more energy-efficient products

Regular energy audits and improvement programmes

Utilise latest energy management systems supported by machine learning (AI)

Thank you for your time

Simon Meadmore
VP of Product and Supplier Management,
Farnell Global

Andy Parker-Bates,
Relationship Development Manager,
FESTO UK & Ireland

Yusuf Mohtaj,
Technical Support Engineer,
Farnell

Scan to access to our technical resources

Farnell AN AVNET COMPANY