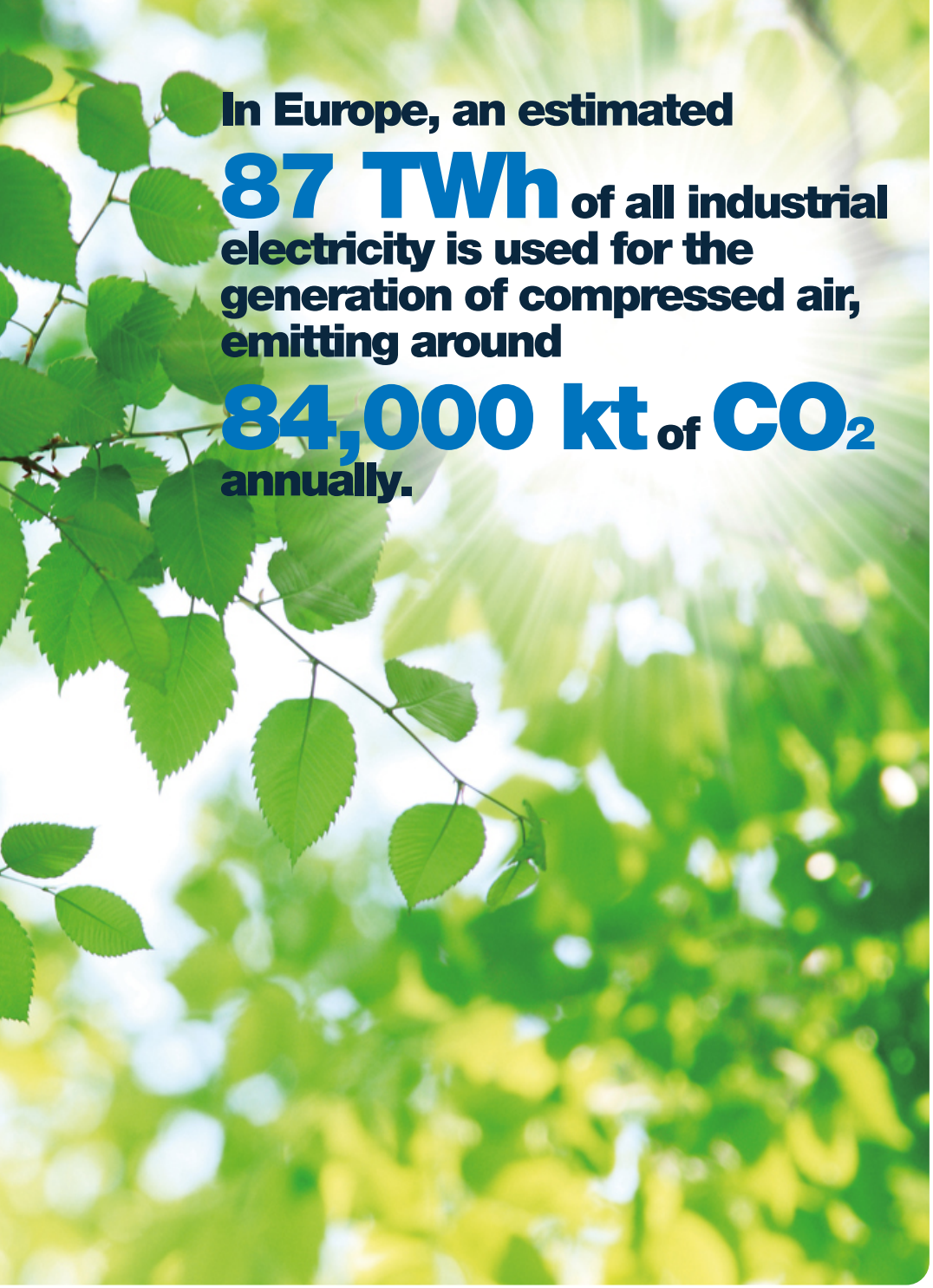
SMC

Expertise
Passion
Automation

4-BAR FACTORY

Accept the challenge

REDUCE YOUR CO_2 FOOTPRINT AND OPERATING COSTS



Compressed air is often referred to as the 4th utility in industry. However, generating compressed air is a huge burden on power and therefore impacts **operating costs as well as CO_2 emissions.**

Everyone understands the importance of making efficiency improvements **but often, advice is simply reactive**:

- **Find and fix leaks**
- **Change filter elements**
- **Switch off when not in use.**

By **reducing the delivery pressure**, it's recognised **huge savings** can be achieved. The shift to **reducing facility pressure is already taking place** at some large manufacturing plants.

Why wait to act? SMC propose the 4-bar factory to provide real change and are **here to help you and your suppliers** to make a transition to making a **reduction in power consumption possible**.

4-BAR FACTORY

Accept the challenge

REDUCE YOUR CO_2 FOOTPRINT AND OPERATING COSTS

The need to act

SMC's shared commitment to CO_2 reduction

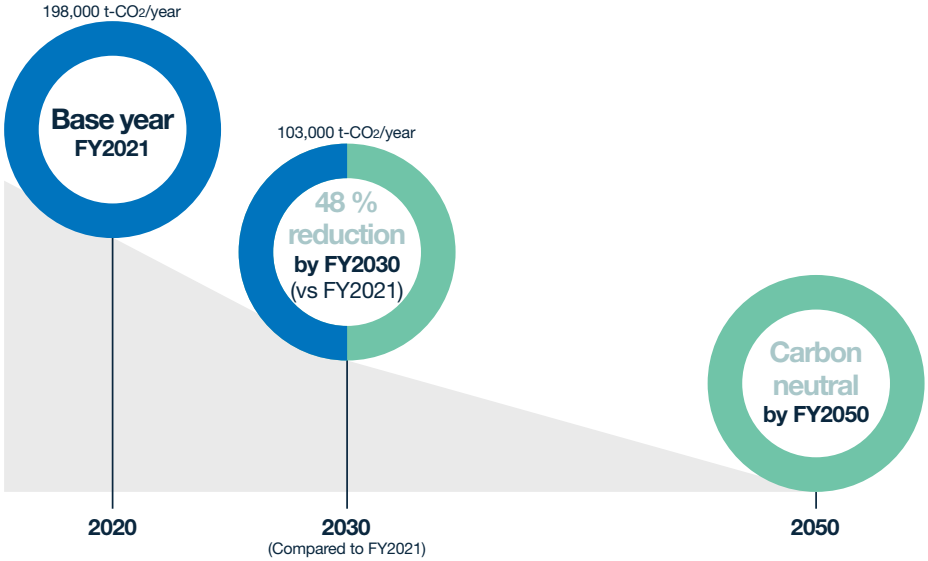
We're all responsible in contributing to Europe's ambitious 2030 Greenhouse gas reduction targets compared to 1990 levels.

At SMC we identified **action on climate change & environmental issues** as 1 of our 4 key **Sustainable Development Goals (SDGs)**.

We're already working towards out own commitment of a **48 % reduction of Green House Gas (GHG) emissions over 9 years by 2030**. For example, we're:

- Switching to greener energy suppliers
- Introduction of solar power
- Recovering solar surplus for compressed air storage
- Adopting LED lighting
- Utilising heat recovery
- Reviewing our own production processes.

...SMC is committed to be entirely carbon neutral by 2050



Case study

SMC is promoting various initiatives to reduce GHG emissions through own activities. We have completed an assessment of mass production manufacturing facilities, sales, and major distribution sites and identified measures to reduce the amount of GHG emissions.

Contributors to inefficiency

Several **common factors** are often identified to **impact on compressed air efficiency** in the factory:

- **Remove causes of pressure drops for supply**
- **Improve isolation**
- **Prevent inappropriate use**
- **Remedy leaks**
- **Reduce pressure**
- **Ensure the right air quality**
- Recover energy
- Improve compressor utilisation.

Almost all these improvements relate to a **reduction on compressor duty**.

With compressors set to maintain a factory pressure, any air consumption will naturally increase the compressor's duty. The higher the pressure, the higher the consumption. **When we reduce consumption pressures, we reduce air volume consumption and reduce compressor duty.**

However, it's common for eradicating leaks to be prioritised as a "quick fix".

Case study

SMC France worked with a leading packaging machinery supplier. Their case erector uses compressed air for both high speed pneumatic cylinder operation and vacuum generation. Minor component changes were made to an existing design to allow for a reduced supply pressure to indicate improvements.

Data collected showed that air consumption was reduced by 33 % when the supply pressure was regulated to 4 bar. Reducing demands on the compressor.

There was no compromise to the machine cycle rate or productivity.

Act rather than react

There is lots of established advice relating to saving compressed air and therefore saving energy and reducing CO_2.

SMC propose the **4-bar factory to drastically reduce energy costs** and **shift thinking on compressed air** systems.

Although useful, the most common and obvious recommendations generally relate to simply limiting inherited problems associated with an established plant.

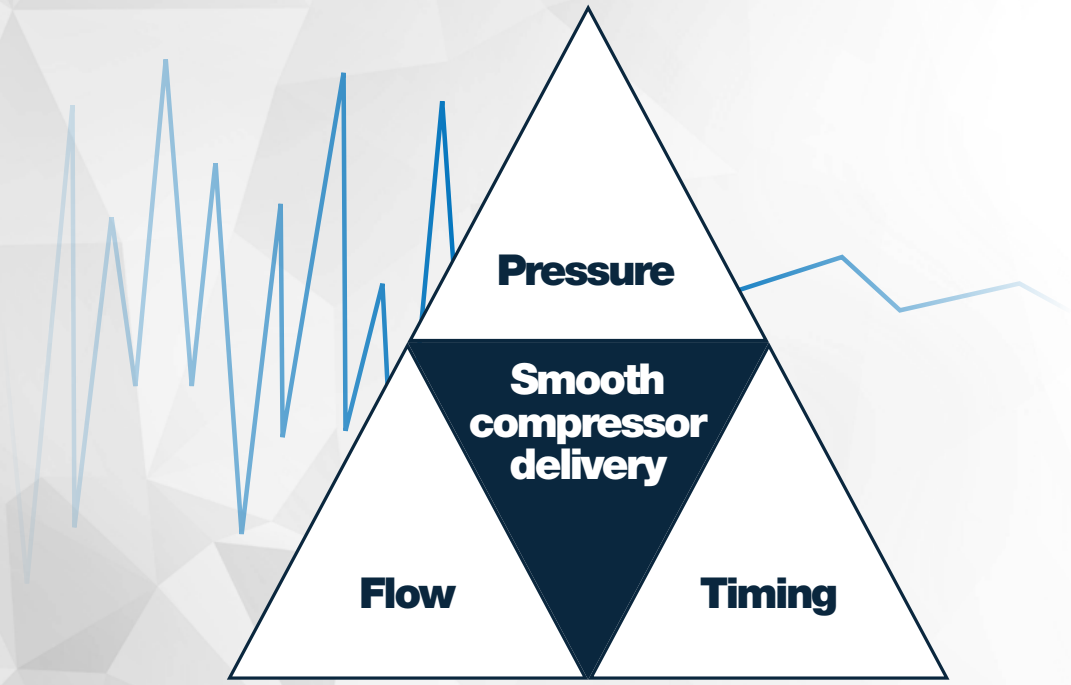
Looking beyond air leaks

Leaks are often in places that are difficult to access such as inside guarded machinery or on high up distribution pipe networks.

As factory machinery and infrastructure ages removing leaks is largely unachievable.

Leak rates may be high but often do not represent a huge contribution in energy consumption.

Why lower pressure?



Removing artificial demand

Reducing the supply pressure is not feasible without first a full **review of the local demands** on the compressor. A system to **handle surges in flow demand** is critical.

By capturing and reviewing pressure and flow data during operation it's possible to identify areas for improvement.

PROBLEM

Large localised consumption for short periods result in dramatic drops in pressure impacting the compressor duty. Supply pressure is often artificially high to compensate.

SOLUTION

After analysing the demand side pressure, flow and timestamp, it's possible to fit locally controlled air storage to smooth the delivery and reduce the pressure locally.

Case study

SMC Australia implemented local storage and controls serving filling machinery in a large chilled dairy plant.

No changes were made to the machinery but after improvements to the local supply the average supply pressure was reduced from 6.2 to 5 bar and average flow consumption by 14 %.

Benefits of reducing delivery pressure

For every 1 bar reduction in delivery pressure, an average of 6 to 8 % less specific power is consumed.

The advice from compressor suppliers is to keep the working pressure as low as possible.

Reducing the delivery pressure by 1 bar across industry can offer estimated CO_2 emission reductions of around 6,700 kt in Europe alone.

Why are pressures so high?

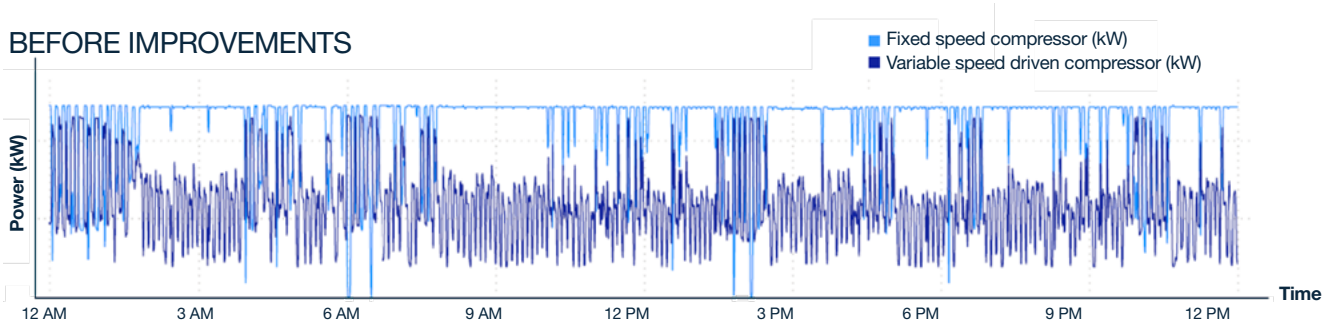
SMC see common, but avoidable reasons for higher delivery pressures.

- Historical settings
- Supply side pressure drops
- Erratic air demands.

Reduce pressure to reduce power consumption

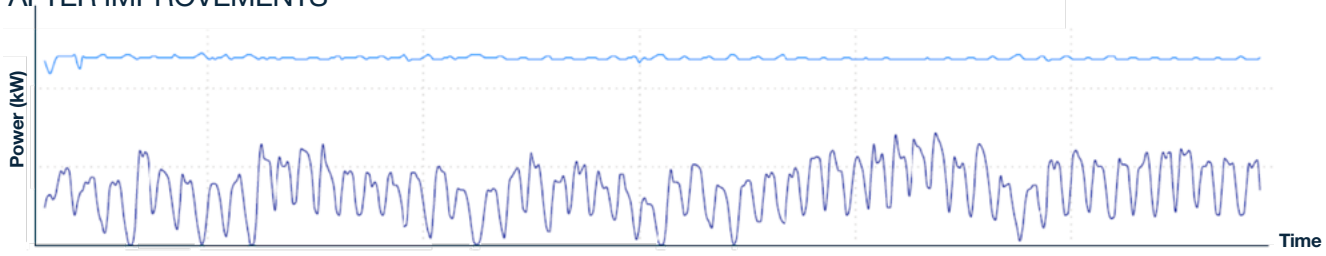
It's accepted that by **reducing the output pressure**, we can **reduce the workload** of the compressor and therefore **save in power consumed**. Actual reductions can differ depending on many variables, so **SMC measured before and after improvements**:

BEFORE IMPROVEMENTS



Average of total power consumption (kW) 170

AFTER IMPROVEMENTS



Average of total power consumption (kW) 154

Case study

By implementing changes proposed by SMC Australia to improve air supply to existing machinery around a plant, a customer lowering the supply by just 0.2 bar brought down the average power consumption of the 2 factory compressors by more than 9 %.

Together on the journey

Resistance to the change to 4 bar

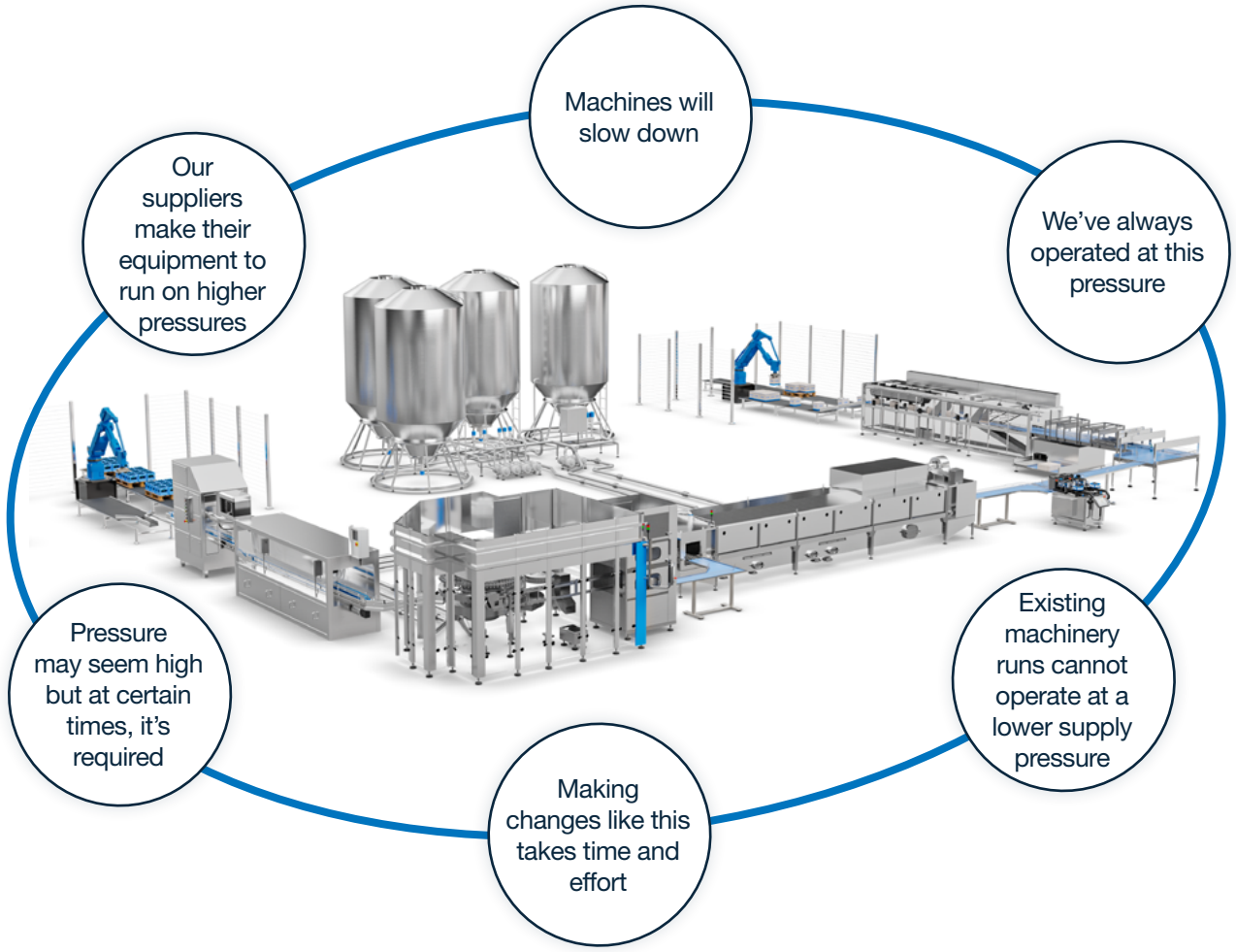
If you want to **accept the challenge** of reducing site operating pressure, **SMC is here to help** and will:

- Work with you to **access existing equipment** and make proposals for improvements
- **Work together** with you and your suppliers to ensure that new or upgraded machinery can operate at lower pressures
- **Review the effectiveness** of your existing air delivery system
- Assist in the development of design specifications to ensure new **machinery is futureproofed** for the 4-bar factory.

A **reduction in pressure** often also means changing established rules and a **shift in mindset**.

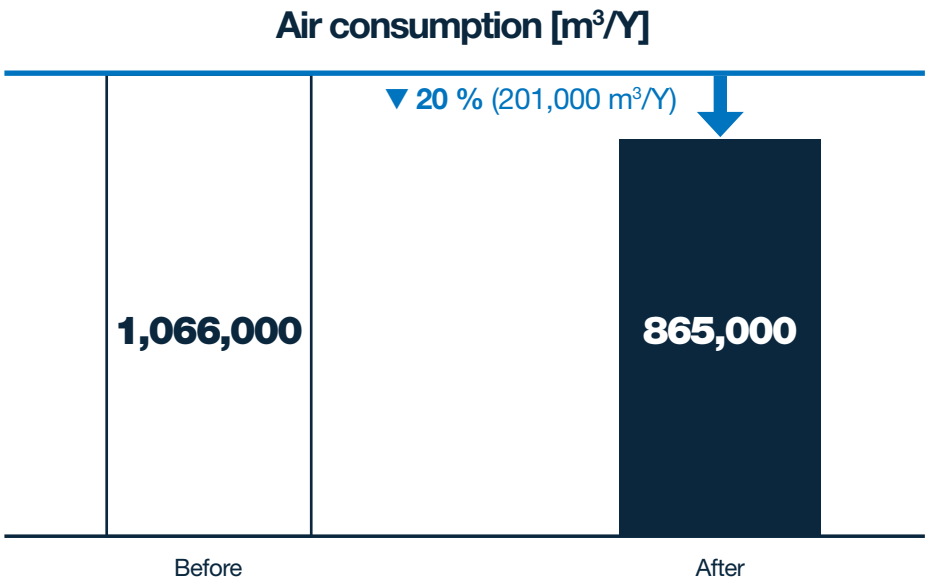
We understand this **cannot happen overnight**. At SMC, we're prepared to **help you at every stage** on this journey.

"If you change nothing, nothing will change"



SMC: leading by example

Reducing pressure in SMC's own factories has already begun!



SMC Shimotsuma facility

Shimotsuma facility in Japan is split over 2 factories with total floorspace of 72,167 m². It's an example of an established production plant and SMC is in the process of reducing the pressure of the 2-story building 1 of factory 1 in a phased approach.

Building 1 – BEFORE

- 157 process and assembly machines
- Supply (before) 6 bar
- Varying supplies from 3 to >5.5 bar
- Target to reduce machine supplies to 4 bar.

Building 1 – AFTER

- 93 1st and 2nd floor machines operating at 4 bar
- Annual air consumption reduced from 1,066,000 m³ to 865,000 m³ – 20 % reduction
- Power reduced by 20 Mwh per year
- CO_2 emissions reduced by 12 t per year.

The first steps to 4-bar factory

“If you cannot measure it, you cannot improve it.”

Reducing pressure in the factory begins gradually with a first phase involving an **assessment of the existing situation**:

- What pressures are demanded by which machines?
- Which areas use the most air in operation and when?
- What are equipment air demands in an idle state?

SMC’s **local experts** offer **onsite support** to work with you and your suppliers.

Case study

SMC UK worked with a large consumer goods maker to improve control of existing machinery around the factory when idle. Improvements reduced their CO_2 emissions by an estimated 29 %.

1

Analysis of factory running data

Gather and use of plant data to evaluate compressor delivery profile.

2

Machinery assessment

Running data acquisition to identify large air users and check for supply requirements.

3

Flow and pressure stabilisation

Provide solutions to reduce local pressures to the lowest level without a need to redesign.

4

Lower pressures locally

Re-assess machinery in operation to confirm savings with maintained output capacity.

5

Improve idle supply losses

Implement changes to prevent air lost through idle times and leakage loads.

Making 4-bar factory standard

With existing machinery proven to operate at lower pressures, the **second phase** is to define a new standard allowing optimisation of new and upgraded equipment.

SMC can help you to rewrite the rulebook for a **more efficient** plant.

We expect most pneumatic machinery can operate at 4 bar. Without intervention, suppliers design for historical supply pressures.

In operations where pressure reduction has previously been **judged impossible**, SMC can propose a **possible solution**.

Case study

SMC Netherlands helped a machine builder to upgrade their design to operate at 4 bar rather than 6. Suitable actuators were selected that could be integrated into an existing space to provide run at the desired pressure. At the same time 23 % air savings were achieved.

End user, machine designer and SMC

Agree targets
Allow for monitoring and connectivity.

Select products
Consideration of power source including pneumatic, vacuum and motor driven.

Integrate
Ensure products run seamlessly in any existing machinery.

Evaluate
Assess efficiency and productivity has been optimised.

Futureproof designs
Allow for monitoring and connectivity.

Pressure, flow and running cost reductions

Lowering delivery pressure with confidence

- **Plant air distribution is optimised**
- **Linear compressor delivery**
- **Factory demands are well managed (idle/leaks)**
- **Air is used at the lowest pressure possible**
- **Air is delivered at the lowest pressure possible.**

Lowering the delivery pressure to the factory is the **final phase** with the goal of **reducing compressor demands**.

By first **reducing local pressures, air demands on any compressors are reduced**. Ideally once a **new "normal"** consumption is established, the local **compressor discharge pressure can be assessed** for reduction to its **lowest practical level**.

Compressor suppliers can help review a delivery reduction plan once local set pressures are successfully lowered.

PDCA

Plan

Decide targets for initial pressure reduction.
Review plan with compressor suppliers.

Do

Reduce delivery pressure by incremental amount.

Check

Check productivity and performance in all areas.
Evaluate air and energy consumption.

Act

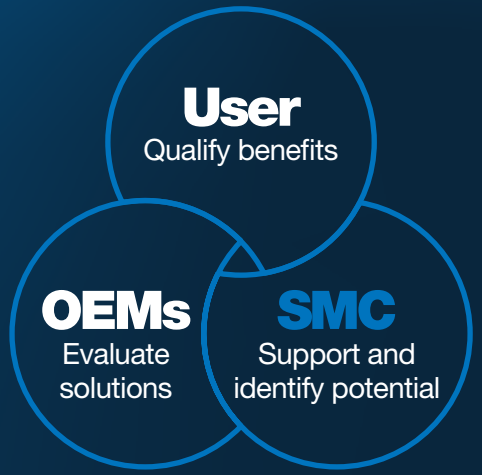
If reduction goals are not met, consider additional measures.
Monitor ongoing usage.
Review additional pressure reduction.

SMC and a working partnership

As **experts in pneumatics**, you can **count on SMC** to **collaborate** in the **development of solutions** for new and upgraded machinery.

Feasible solutions for a **sustainable** and **profitable future** factory

- SMC are experts in identifying efficiency improvements for machinery
- Our global network can support OEM's wherever they are located
- The anticipated reductions in air consumption alone can help shift thinking in the design of production equipment
- We can help evaluate equipment by "before and after testing" in development phase to allow customers to see the benefits.

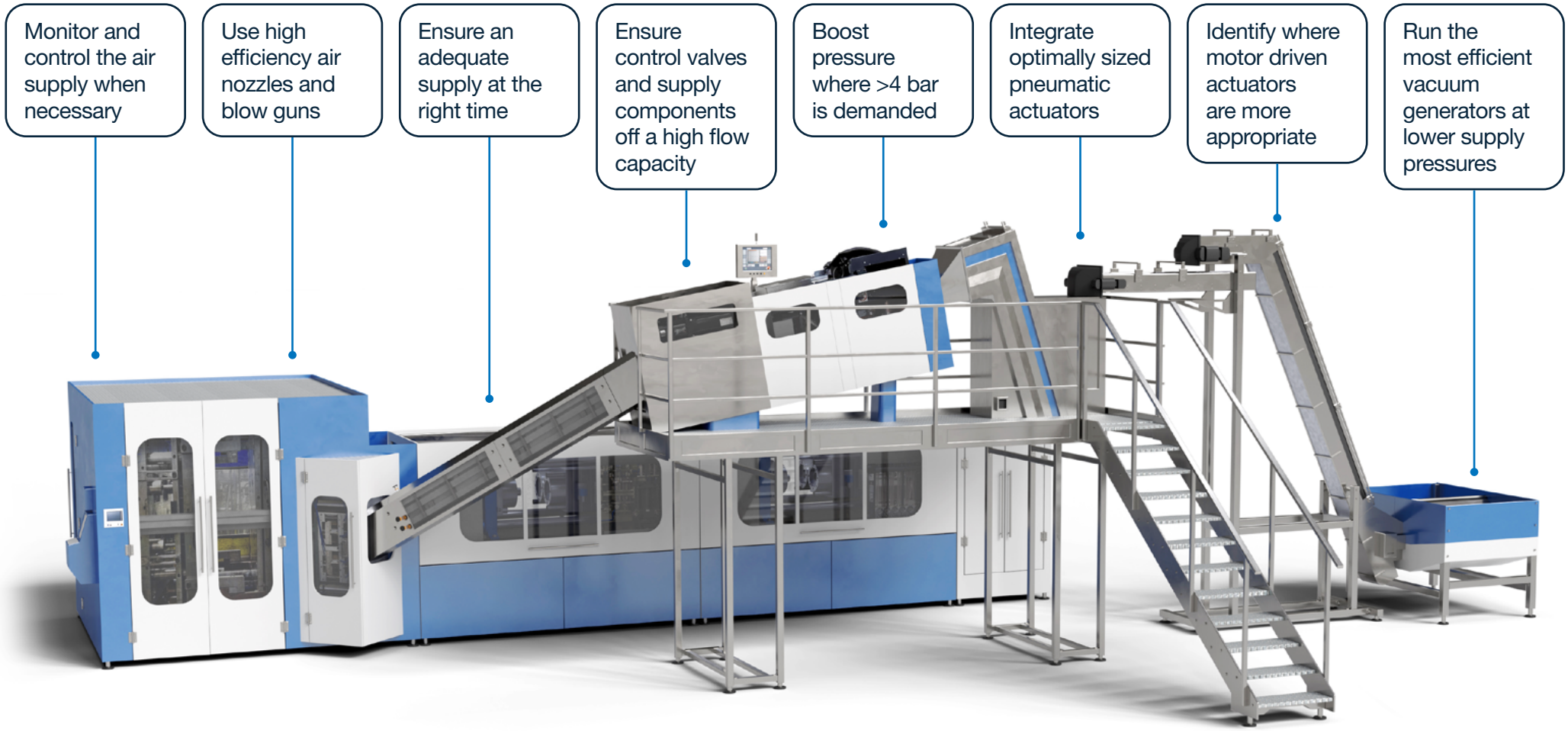


Solutions to make the difference

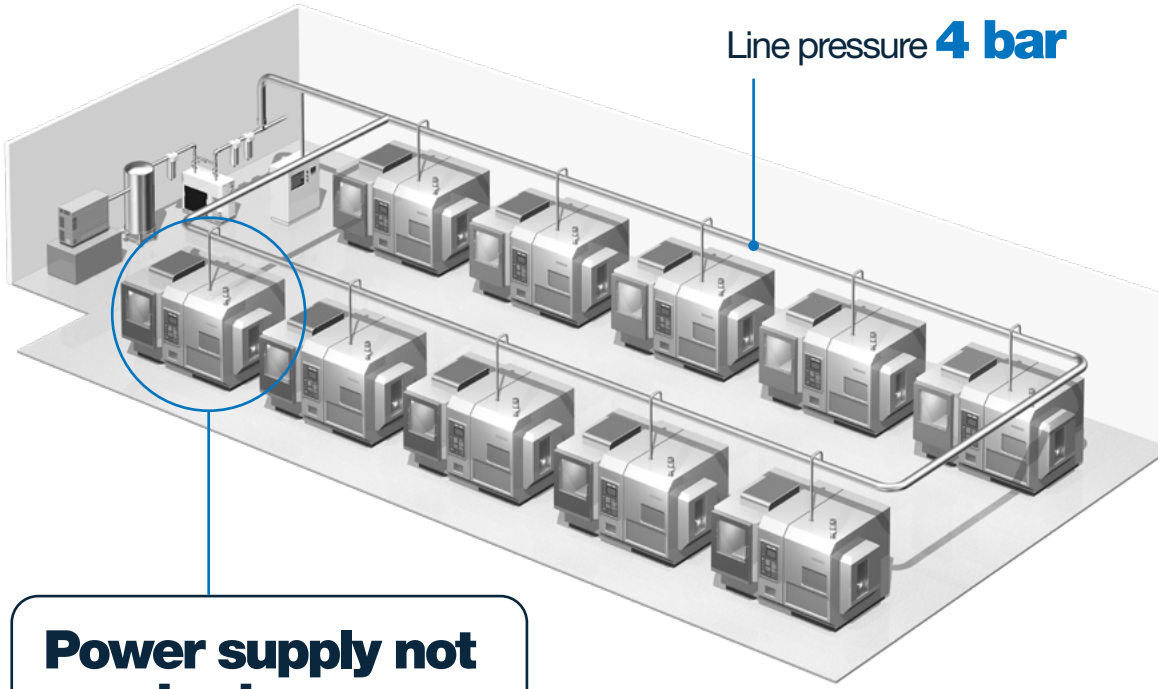
The 4-bar machine

Futureproof the design

Running efficiently at a low supply pressure is something that should be **factored from the moment the machinery is designed.**

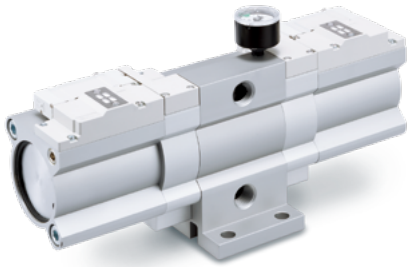


Right pressure, right place



Power supply not required

Local pressure increase
6 bar



SMC's latest range of pressure boosters provide up to 40 % CO_2 emissions reduction.

We understand that **sometimes higher pressures are necessary. Let us help** identify how **this demand can be better managed.**

In some application, there are requirements for **higher pressures**, but these instances air volume is often small and for short periods. SMC offers a range of highly efficient pressure boosters that can **locally increase the supply pressure** by up to 4 times.

Case study

SMC Japan helped a dairy plant **reduce supply pressure** in their facility **by 1-bar** saving > € 4,000 annually. Previously, pressures were maintained at a higher level throughout the site because of sanitary valve control demands. SMC's boosters are used locally for 4 process lines to ensure sanitary valves function normally.

Designed for lower pressures

SMC's current products have been developed with future pressure trends as a design principle.

At SMC, we believe the future for the modern factory includes the lowering of compressed air supply pressures. We've already considered this when offering solutions today.

Here are just a few examples:

ZL series vacuum generators optimised for a supply as low as 3.5 bar.

JSB series angle seat valves developed for operating with a supply of 3 bar.

"Same size" **CQE series actuators** with greater output force, meaning the operating pressure can be reduced.

KN high efficiency air nozzles that allow for pressure reduction without impacting blow performance.

Tools to assist

As a compressed air user, relating usage to **CO_2 footprint** can be complicated.

Tools to efficiently select:

- Pneumatic actuators
- Air tanks
- Pressure boosters
- Control valves
- Air filter and regulators
- Supply pipe systems.

Tools to show improvement gains with:

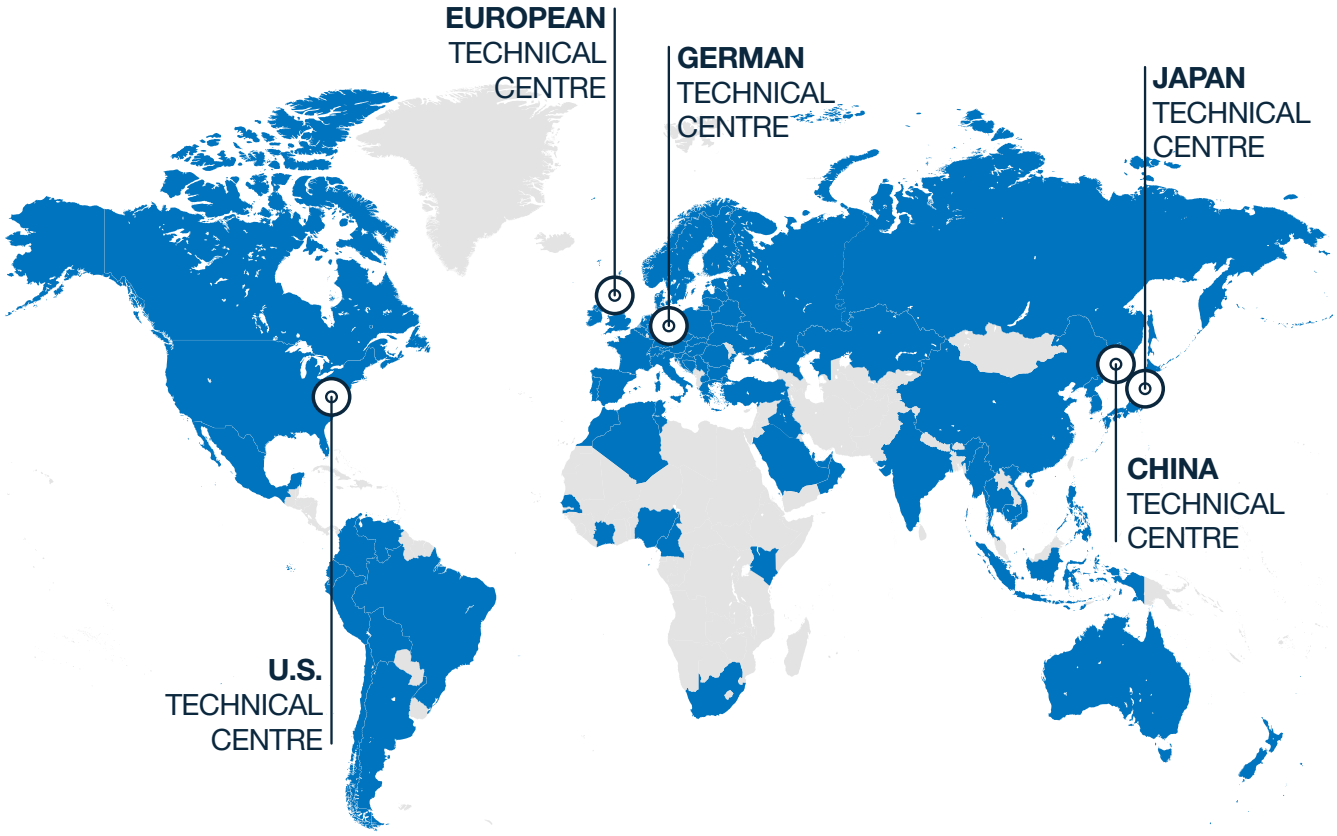
- Isolation
- Pressure reduction in control
- Efficient vacuum
- Low power consuming valves
- Better controlled air blow.

SMC has a range of tools to help you to access your CO_2 footprint before and after improvements.

Our support network

SMC's worldwide commitment

One of the things we do best at SMC is **being close to our customers**. Local support, on a global scale.



With **support** in over **500 locations** across **80 countries** and regions **worldwide**, your **local SMC energy specialists** are on hand to **help** work to a 4-bar factory.

- **Local factory support**
- **Design engineering support**
- **OEM machine supplier support**
- **Compressed air energy savings assessments**
- **Machine analysis assessments**
- **Improvement activity reports**
- **Onsite & online training classes**

SMC Business Continuity Plan

Sustainable growth also means ensuring uninterrupted operations

We are committed to ensuring that SMC is prepared for any emergency and that our business activities will not stop in the event of such circumstances. SMC aims to fulfil our product supply responsibilities and maintain our customers' trust by contributing to both sustainable growth and the expansion of technological innovations.

SMC, as a comprehensive manufacturer of automatic control equipment that supports automation, is able to promptly provider products that meet our customers' needs anywhere in the world.

Production BCP
Ensure customer order fulfilment

Reliable delivery for you thanks to our 9 global logistic centres and 38 production sites worldwide, 10 of which are located in Europe. Moreover, flexibility to rapidly respond to any sudden change in the manufacturing environment.

Finance BCP
Safe & Solid financial base

In the event of an emergency, SMC can provide a safe and solid financial base (with cash, deposits, and equity capital) that will sufficiently cover the working capital and funds needed to rebuild buildings and the equipment required for business continuity. This is done to provide peace of mind to our customers and workers alike.

Information security BCP
Vital data kept safe

Strengthen information security for protection against computer viruses and cyberattacks, plus the installation of data centres to establish a disaster recovery system. Your information is safe with us.

Engineering BCP
Consistent technical support

2,100 engineers at our 5 technical centres around the globe (2 in Europe – Germany and UK).

Sales BCP
Consistent sales support

7,000 sales engineers worldwide ready to recommend the best solution for you. Over 80 global locations to make sure that wherever you are, we are there too.

Discover more

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