



# Emission Control Solutions

SMART TAILORING  
BY PROVENTIA



# FACTS ABOUT PROVENTIA

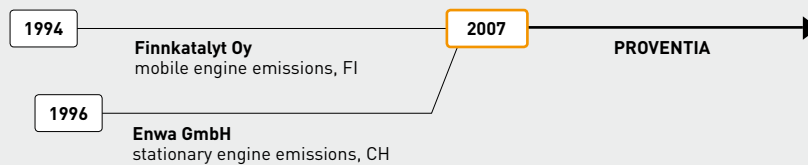
## PROVENTIA GROUP – BUSINESS UNITS & MARKETS

Proventia is an environmental technology company providing innovative customized emission control solutions for machines, vehicles, power plants and ships both in retrofit and OEM markets.

PROVENTIA GROUP	
<b>Mobile Business Unit</b>	<b>Stationary &amp; Marine Business Unit</b>
<b>OEM / Off-road Retrofit / On-road &amp; Off-road</b>	<b>Gensets, Power Plants, Marine Engines</b>

## HISTORY – MERGER OF TWO PIONEERS

Proventia's competence is based on almost 20 years of experience built up by Finnkatlyt (FI), a specialist in mobile engine emission control, and ENWA (CH), a pioneer in stationary emission control.



## OWNERS

Proventia Group is part of Head Invest, whose industrial operation comprise environmental, well-being and automation technologies.

## REFERENCES

Over 50 000 emission control systems in use in over 50 countries.

**World-class customers** AGCO Corporation, Atlas Copco, Cargotec, Caterpillar, Cummins, Karadeniz, Komatsu Forest, Konecranes, MAN, Nobina, Sandvik, Thermo King, Volvo, Wärtsilä

**Retrofit projects** Hong Kong; Seoul, Korea; California, USA; Denmark; Sweden; Germany; London

## GLOBALLY AT YOUR SERVICE

The Proventia headquarters and mobile technology center is located in Finland. Our stationary & marine technology center is located in Switzerland. US operations are lead from the Minneapolis office. Through our other offices, sales, service and manufacturing partners, our customers are served locally.

## VERIFICATIONS

Proventia products are tested and certified by CARB (US), TÜV (DE), VERT (CH), KBA (DE), VTT (FI), Teknologisk Institut (DK) **ISO 9001:2008 certified**



# Smart Tailoring

## THE PROVENTIA WAY

Proventia is an environmental technology company providing cutting-edge emission control solutions for machines, vehicles, power plants and ships. Our core competences are PM (particulate matter) and NOx (nitrogen oxides) reducing technologies that we innovatively combine with in-house product development, engineering, designing and testing services. We operate in the original equipment manufacturing (OEM) and retrofit markets.

### It couldn't fit better

New tightening emission regulations on off-road, retrofit, stationary and marine sectors mean that the emission control industry is in a period of transition. The new limitations demand flexibility and innovativeness from emission control solution providers.

Smart tailoring the Proventia way means applying available technologies and product concepts to your engines and machines innovatively, and designing and engineering emission control systems that fit perfectly to your applications, fulfilling the requirements and regulations.

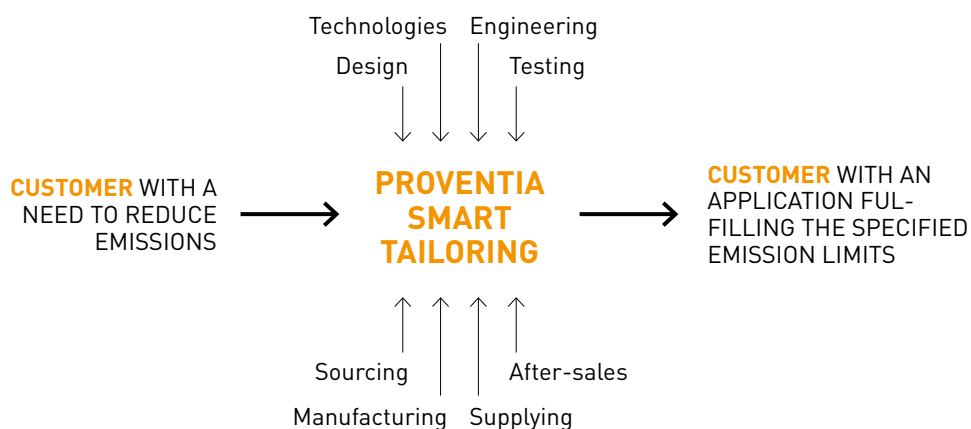
For OEMs, Proventia is an integrator who tailors and supplies exhaust systems using engine manufacturers' own emission control concepts and certified components.

Smart tailoring means flexibility, agility, cost-efficiency and quality in all our operations, including design, testing, sourcing and manufacturing. The key factor is to understand the customer's business and needs.

### Key components, made in-house

Regarding manufacturing, we can proudly say that we manufacture all key components ourselves. Other components are chosen from the best-suited partners, individually chosen for each phase and case. Our international network includes, for example, leading substrate manufacturers and coating suppliers.

In manufacturing, the smart tailoring concept means that skilled and qualified assembling partners guarantee top quality and top service, delivered in a timely manner.



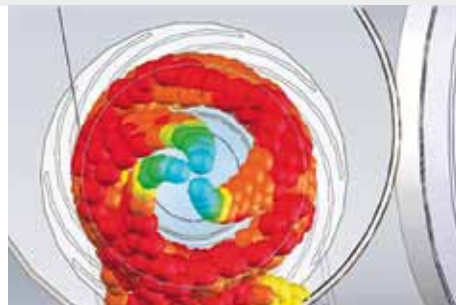


Proventia has supplied exhaust systems for Sandvik's mining machines for a good decade with success. Our long-term co-operation at every level guarantees not only efficient and durable products delivered on time but also continuous cost competitiveness improvement of the final product.

SCR systems designed by Proventia fulfill Stage III and Tier 4i regulations.



Proventia provides various engineering, designing and testing services to the AGCO Corporation. Valtra was one of the first machine manufacturers who relied on Proventia in integrating and supplying SCR systems to Stage III B / Tier 4i AGCO SISU POWER engines in its T-series tractors.



Efficient engineering tools reduce product development time and costs and create optimized systems for our customers' applications.

Proventia is a forerunner in active filter development. Proventia's portfolio includes both electrically regenerated and diesel burner technologies. CHILI® electrically heated filter technology, for instance, is the ideal solution for low-load operation applications.

# The New Era of the OEM Market

## INNOVATIVE CUSTOMIZED SOLUTIONS

Being prepared for the new emission regulations is the only way to stay competitive in the OEM market. The new emission limits demand more complicated exhaust systems, and extensive knowledge of technologies, installations and after-services are needed. Tailoring and integrating emission control systems to OEM applications and engines is a must: standard systems simply do not fit all.

### The Proventia way for OEMs

Proventia's main role in the OEM business is to enhance our customers' business by providing a full package of emission expertise. The exhaust systems are engineered in close co-operation with engine manufacturers, using their own emission control concept and certified components. The systems are then customized individually to fit the machine manufacturer's applications and operating conditions.

Hence, a machine manufacturer receives an individually tailored, tested and manufactured system that is the most suitable solution for each application and market. Our in-house engineering department is at your service with short response times. Comprehensive testing facilities and simulation tools guarantee maximum quality and durability for any operating conditions.

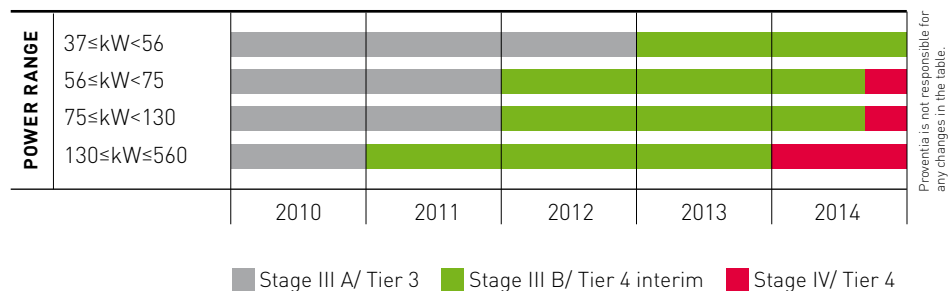
### Experienced partner is key to success

Proventia has vast experience in working with machine manufacturers. We supply exhaust after-treatment solutions to heavy-duty and light-duty applications. Our systems can be found in mining vehicles and machines, in various materials handling machines from small forklifts to big cranes, and in agricultural and forest machines. Our exhaust after-treatment systems are used in dozens of countries.



## MARKET DRIVER

### EMISSION LEGISLATION IN EU AND US, NONROAD MOBILE MACHINERY





Proventia NOxBUSTER™ DPF+SCR reduces PM and NOx emissions to the minimum and upgrades EURO 3 buses up to EEV level.



Since 2002, Proventia has supplied tens of thousands of purifiers worldwide with excellent results and a high degree of satisfaction: Hong Kong; Seoul, Korea; Copenhagen, Denmark; Germany, Sweden; California, USA; London, UK.



PROAIR® DPF products efficiently reduce PM emissions.

Proventia retrofit devices have been installed to off-road machines such as forklifts, cranes and terminal tractors to reduce the emissions in emission-regulated areas such as ports.

# Back on Track

## PROVENTIA RETROFIT SOLUTIONS

The demand for cleaner city air, together with tightening local emission regulations, is the basis for Proventia's retrofit solutions.

We provide emission control systems for diesel engines already in use, enabling emission reduction and improving the quality of city air at reasonable cost. Our long experience in retrofitting projects in major Asian, American and European cities has established us as a reliable partner in retrofitting projects globally.

In retrofitting projects, smart tailoring is tuning our solutions and product platforms to local requirements and operating environments.

### Responsible retrofitting services

Proventia offers install-ready retrofit delivery kits that are easily tailorable to whole fleets. Our retrofit product portfolio also includes muffler replacement filters to on-road vehicle makes and models. For the most demanding requirements, we combine our DPF and SCR know-how to

create effective retrofit devices that reduce both PM and NOx. Adding diesel oxidation catalyst technology (DOC) reduces HC and CO to the minimum.

The Proventia way in retrofits also means a network of qualified local partners that provide full support, including filter servicing.

### Retrofit & Low Emission Zones

Many cities worldwide have implemented Low Emission Zones (LEZ). They require diesel machines to meet a certain level of exhaust emission before they are allowed to drive inside the zone. Retrofitting can also be based on reducing road charges on highways. On off-road sector, retrofits can be demanded on emission-regulated areas such as ports.

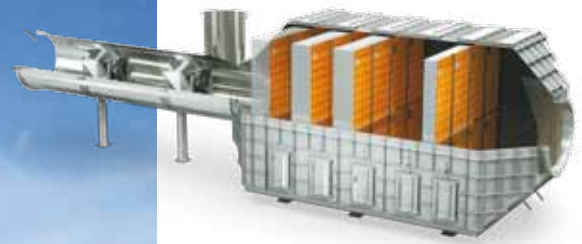
Proventia's retrofit product portfolio includes technologies for efficient PM, NOx, HC and CO reduction. The systems can be applied not only to on-road vehicles but also to off-road machinery.



### MARKET DRIVER

To improve air quality, many cities have implemented Low Emission Zones (LEZ). Retrofitting polluting vehicles will reduce the emission to the required level and allow them to enter the Low Emission Zones

Proventia's user-friendly control systems make monitoring and reporting easy.



Proventia has supplied a NOxBUSTER SCR system to the power plant of Fantoni in Italy, running with Wärtsilä 17 MW engine. The NOx reduction target in this project was ambitiously 98%.



Proventia has designed and supplied exhaust emission control technology for Turkish Karadeniz Powership Co. Ltd. for their floating power plants, so-called power ships.



The AT-IV Active DPF/SCR for diesel generators brings Tier IV compliance in a compact package reducing both NOx and PM to the required level.

# Clean Energy!

## PROVENTIA'S STATIONARY AND MARINE SOLUTIONS

As the economy develops, ever more efficient power generating engines are needed, and more ships are required for transportation. At the same time continuously tightening environmental regulations on land and at sea set a challenge to the power and shipping industries. A flexible emission control provider who understands the customer's business is the key asset when the operators in the power and shipping industries secure their competitiveness.

Proventia offers leading emission control solutions to stationary and marine applications. Smartly tailored, each customer will have a system designed and supplied fitted to their applications and specifications, and fulfilling the local demands and directives. Most importantly, Proventia emission control solutions don't have an impact on the application performance.

### Emission control solution provider

Proventia's solution for stationary and marine engines is the fully tailorable NOxBUSTER™ system. It is a flexible and economical solution for NOx, PM, CO and HC reduction from diesel generators to power plants and for ships and vessels.

Proventia's product concept for diesel generators is an all-in-one emission control package, which incorporates diesel particulate filters (DPF) for PM reduction and selective catalytic reduction (SCR) for NOx reduction.

For power plants, Proventia offers a full project lifecycle support including customized system design, engineering and turn-key supply.

Ships and vessels often have very limited space available. Smartly tailored, Proventia's emission control equipment can be fitted even to the most limited spaces, and not only for reducing emissions, but also noise.

### SCR, DPF, DOC & Control systems

Proventia's full technology portfolio is available to all our customers. Our long SCR expertise combined to DPF, DOC and control system know-how make our solutions extremely reliable. Clear and user-friendly control systems make monitoring and reporting easy.

Proventia solutions can be designed and applied to new installations and to retrofits. With Swiss-Finnish accuracy and quality, Proventia creates solutions that meet requirements to the smallest detail.



### MARKET DRIVER

- Tightening regional emission regulations in power industry
- Demand for environmentally friendly energy production
- The International Maritime Organization's (IMO) Tier 3 directive: NOx reduction technology for ships in 2016

# Technologies

## RELIABLE AND SAFE SOLUTION TO ANY APPLICATION

There is a wide range of different technologies for reducing harmful pollutants from exhaust gas. The challenge is to apply the optimal technologies to each engine, application, fuel and operational environment.

Proventia excels in specifying, choosing and using the best and the most-suitable technologies and components to meet the emission regulations in the most cost-

efficient way, and by doing so, ensuring a reliable easy-to-use emission control solution for each application.

Our main technologies are SCR, active and passive DPF, and DOC, all individually and combined. Our strong control system know-how guarantees safe and reliable operations and makes the systems simple to use and easy to maintain.



Latest design tools refine the product and its design and reduce manufacturing costs.

### OUR TECHNOLOGIES



#### SCR

Selective catalytic reduction. NO<sub>x</sub> reduction up to 99%. Uses AdBlue® and a catalyst to convert NO<sub>x</sub> into nitrogen (N<sub>2</sub>) and water. Proventia NOxBUSTER™



#### Passive DPF

Passive diesel particulate filter. PM reduction >90%. A wall-flow filter collects the particulate matter. Proventia PROAIR®



#### Active DPF

Active diesel particulate filter. PM reduction >90%. Regeneration is independent of the exhaust gas temperature. Proventia CHILI® electrically regenerated filter



#### DOC & pDPF

Diesel oxidation catalyst and partial diesel particulate filter. HC & CO reduction 80–90%. PM reduction up to 70%. Uses catalysts to promote oxidation of CO and HC as well as the SOF portion of diesel particulates. Proventia PROCAT™



#### CONTROL SYSTEMS

Intelligent, user-friendly control systems. Enable easy system monitoring and reporting. Proventia PROCARE™ & GCU



Extensive field testing is an important part of our product development. To ensure the operational reliability of our products, we gather field data that will help us to understand the operating conditions of the applications.

# Research & Development

## ADDED VALUE FOR THE CUSTOMERS



Advanced flow and pressure simulation tools result in quicker, efficient product development and improved function of the product.

At Proventia, we invest significantly in R&D; we want to offer our customers the latest knowledge and technologies. Our own product development results in ready-made products and product concepts for retrofit applications. On the other hand, we provide customer-specific product and technology development. Our own technology research forms the foundation of the product development for both retrofit and OEM customers.

Our R&D processes are fine-tuned for effective integration to a customer's product development processes. As a consequence our key asset is quick response times in product development process.

We use sophisticated design tools for the mechanical design of the exhaust systems, and also for flow and pressure simulation. We also have specialists in noise and temperature management in our team.

### **Proventia engine & emission laboratory**

Our own high-performance engine and emission laboratory equipped with the latest emission measuring equipment is fully at our customers' service. Extensive testing ensures the quality, durability and reliable performance of our emission control solutions.

### **Proventia services**

Proventia is your emission control partner who takes care of your emission control problems from A to Z. We provide full project lifecycle support to our customers, including consultation on emission issues, on-site testing, training and support. We also provide filter element servicing and spare part supply. Smartly tailored and well supported – that is our policy.



Our own engine & emission laboratory is at the heart of our R&D; today we work to comply with tomorrow's emission limits, such as Tier 4 Final.

**PROVENTIA GROUP**

**FINLAND**

Tietotie 1, FI-90460 Oulunsalo, Finland  
Tel. +358 (0)207 810 200 | Fax +358 (0)207 810 201

**SWITZERLAND**

Kronastrasse 12, CH-8404 Winterthur, Switzerland  
Tel. +41 52 264 50 60 | Fax +41 52 264 50 65

**USA**

809 Meander Court, Medina, MN 55340, USA  
Tel. +1 800 609 7686

[www.proventia.com](http://www.proventia.com)

