



# Planet and Processes

## Daikin Group Environmental Vision 2050

### Toward Net-Zero Greenhouse Gas Emissions

Guided by the “Daikin Environmental Vision 2050”, established in 2018, the Daikin Group, including AAF, is committed to reaching net-zero greenhouse gas emissions across our entire value chain by 2050.

#### Daikin Environmental Vision 2050

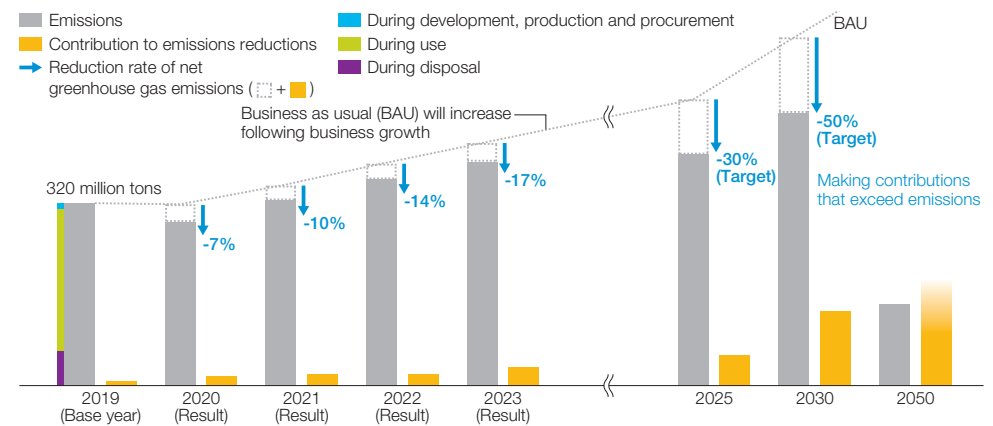


We will reduce the greenhouse gas emissions generated throughout the entire lifecycle of our products. Furthermore, we are committed to creating solutions that link society and customers as we work with stakeholders to reduce greenhouse gas emissions to net zero. Using IoT, AI, and open innovation attempts, we will meet the world's needs for air solutions by providing safe and healthy air environments whilst at the same time contributing to solving global environmental problems.

### Medium-Term Targets for Carbon Neutrality

The Daikin Group, including AAF, has set medium-term goals to reduce net greenhouse gas emissions across the value chain by 30% by 2025 and 50% by 2030, compared to the 2019 baseline. We are accelerating our efforts to achieve net-zero emissions in all factories by 2030, advancing our original target of 2050, and also plan to achieve net-zero emissions at our offices. To meet these targets, we are improving the energy efficiency of our products and significantly reducing greenhouse gas emissions at our manufacturing and development sites.

#### Reduction Targets and Results for Net Greenhouse Gas Emissions throughout the Lifecycle



#### Science Based Target

The Science Based Targets initiative certifies carbon emissions reduction targets based on scientific data. The Daikin Group, including AAF, received certification in February 2024 for its 2030 goal to reduce greenhouse gas emissions. This goal aims to limit global warming to below 1.5°C compared to pre-industrial levels.





## Environmental Management Structure

### Basic Principles and Environmental Management Structure

#### Global Environmental Management

At AAF, we promote environmental management across the organization in line with the Daikin Group's Environmental Policy. We actively participate in the Daikin Group's Environmental Conference and address environmental issues such as climate change, water conservation, and waste management in every region. Annual regional environmental conferences are held, gathering environmental managers from AAF sites worldwide to work on reducing environmental impact and conserving biodiversity at production sites. The biennial Global Environmental Conference brings together presidents, environmental managers, and environmental department heads from all AAF sites to foster cooperation and strengthen initiatives across the Daikin Group. Key themes are presented to Daikin's CEO through Daikin's Corporate Social Responsibility Committee and are reported to the Board of Directors.

In addition, we have established the Joint Environmental Committee, focusing on the filter business. This committee works on identifying issues and formulating strategies at each AAF site, contributing to AAF's overall environmental management efforts.

#### Environmental Management System

At AAF, we ensure the safety and quality of our products and services from the customer's perspective. Additionally, AAF has obtained ISO14001 certification at major sites in each region, establishing a foundation for implementing environmental management at other locations and expanding certification. Furthermore, AAF discloses any significant legal violations in its operations and reported no major violations of environmental laws in fiscal year 2024.



The Daikin Group Global Environmental Conference in China

## Regional Initiative: The ACT Project

AAF is actively driving sustainability initiatives globally whilst also fostering regional efforts. In this article, we highlight a key example from the European region, showcasing their strategic initiative dedicated to decarbonization.

### The ACT (Accelerate Climate Transition®) Step-by-Step Project: AAF Europe's Commitment to a Low-Carbon Future

In line with the Daikin Group's Environmental Vision 2050, AAF Europe has launched the ACT project to accelerate decarbonization across all factories, warehouses, offices, and subsidiaries in Europe.

#### The ACT Project Focuses on:

- Developing a robust decarbonization strategy.
- Setting scientifically based decarbonization targets.
- Evaluating the effectiveness of this strategy.
- Defining concrete actions to implement the decarbonization strategy.
- Monitoring measurable progress toward climate targets.
- Ensuring transparency in the process.

#### Progress and Schedule

Our efforts ensure science-based targets and transparency, in line with the Paris Agreement. Key milestones include:

- **Greenhouse Gas Emissions Assessment (Scope 1-3) :**  
Ongoing, to be completed by Q2 2025.
- **Climate Strategy Evaluation and Action Definition :**  
Scheduled for Spring / Summer 2025.
- **Implementation of Measures :** Starting in Summer 2025.

#### Conclusion

The ACT initiative by AAF Europe is a powerful tool in the transition to a low-carbon future, driving sustainability and addressing urgent climate challenges. Customers also benefit from products and services with a reduced carbon footprint, supporting a more sustainable tomorrow.





## Sustainability and Innovation

### Basic Principle

Innovation in environmental technology and energy-saving solutions is essential for a sustainable future. AAF, founded as Reed Air Filters in 1921 by Bill Reed, carries forward his vision through the development of sustainable technologies and products that balance environmental protection with economic growth.

### Collaborative Market Response within the Daikin Group

As part of the Daikin Group, AAF addresses market needs with six global development sites. For example, in Indiana, USA, we established the 3,065m<sup>2</sup> Clean Air Innovation and Research (Clean AIR) Center. AAF's commitment to innovation extends internationally through close collaboration with Nippon Muki, which manages the air filter business primarily for the Japanese market within the Daikin Group, and the Daikin Technology and Innovation Center (TIC) in Japan, where 900 engineers drive pioneering research. This collaborative effort spans the fundamental development of filter media, structures, and sensors, significantly advancing our filter technology capabilities.

### Introducing Clean AIR Center

#### Mission of the Clean AIR Center

The Clean Air Innovation and Research (Clean AIR) Center advances filter technology through detailed analysis and modeling of filter media performance. The engineers at the Clean AIR Center continuously innovate new filter media and enhance air quality through cutting-edge research. Additionally, Clean AIR Center's state-of-the-art biosafety lab conducts biological testing and assessments, ensuring filter efficiency for agricultural applications.

### Dedicated Labs and Testing Standards

The Clean AIR Center features specialized laboratories as follows:

#### Filter Testing Laboratory:

- Examine new and existing AAF filter performance.
- Testing standards: ASHRAE 52.2, ISO 16890, UL 900, etc.
- Equipped with a dedicated UL filter test room.

#### Media and Materials Laboratory:

- Analyze filter media performance.
- Develop and prototype new media rapidly, followed by evaluations in the ASHRAE test duct.

#### Biosafety Laboratory:

- Conduct biological testing (PRRS, PED, Influenza A, etc.) for agricultural clients.



Biosafety Laboratory



Clean AIR Center

## Roles and Functions of TIC

Established in November 2015, TIC serves as a core hub for technological development, consistently generating unique technologies and products that contribute to the Daikin Group's business while addressing social challenges. With around 900 engineers, it creates new value by integrating diverse expertise. In collaboration with companies and academic institutions from various industries and fields, TIC drives innovative technological advancements. The center also features facilities like Future Labs and Open Labs, designed to promote active discussions among engineers.

For the filtration business, TIC's dedicated teams focus on developing filter media and core technologies, which are essential for sustainable products. AAF's unique strength lies in its ability to develop everything from filter media to air filters.



Daikin Technology and Innovation Center (TIC)



Daikin Technology and Innovation Center (TIC) Work Area

## Advancing Filter through Group Collaboration

As a member of the Daikin Group, AAF leverages not only the research and development capabilities of Daikin's TIC but also its extensive experience in air conditioning. Being part of the world's largest air conditioning group, AAF strives to further improve efficiency and reduce environmental impact through the development of technologies that integrate air filters with air conditioning systems, rather than focusing solely on standalone air filters.



## Sustainable Filter Design

### Introduction

In recent times, the push for sustainable business practices has gathered momentum. Within this effort, the filter industry is embracing innovative designs and manufacturing techniques to lessen environmental impacts. This article delves into various aspects of how filters—from material selection to system efficiency—impact the environment.

### System Integrity

The effectiveness of a filter depends not only on the performance of the media itself but also on how well the media is sealed to the frame and how the filter is installed. Bypass, leaks, and poor installation affect the efficiency of the system and increase the risk of system failure. Ensuring that filters are properly mounted with high-quality frames is critical to maintaining system integrity and efficiency.

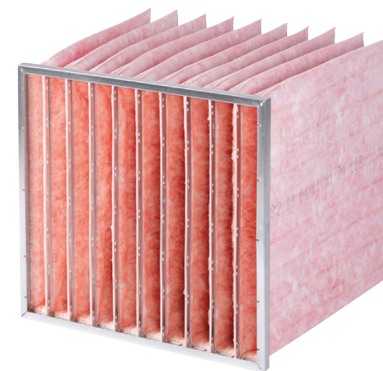
### System Economics

The initial pressure drop and lifespan of a filter significantly influence energy consumption. This impact extends beyond the filter media itself to the overall design of the filter. For instance, in bag/pocket filters like DriPak®, factors such as the pocket shape (tapered or straight stitch), frame design, and the choice of optimal media grade can all contribute to energy efficiency throughout the filter's lifespan. The MEGAcel® HEPA and ULPA filters feature a high-efficiency, ultra-low-pressure drop membrane developed by Daikin. Compared to conventional glass fiber filters, it delivers more than 50% lower pressure drop, resulting in substantial energy savings. By carefully selecting these design elements, improvements in long-term energy efficiency and cost reduction are achievable. This reduction in environmental impact also brings economic benefits to our customers.

### Material Selection

In the design of filter products, a wide range of materials—including steel, aluminum, plastic, glass, membrane, polyurethane, and adhesives—are utilized, with a strong focus on optimizing material selection from both performance and Life Cycle Assessment (LCA) perspectives. At AAF, we offer environmentally responsible options by integrating sustainable design principles, including recycling, and we are striving towards carbon neutrality.

For instance, AAF/Dinair Sweden has introduced an option for pocket filter frames made from carbon-compensated steel. This steel significantly reduces environmental impact by offsetting the carbon emissions generated during production through activities such as reforestation. The product contains at least 78% recycled steel, and by selecting this option, customers can reduce carbon emissions by 85% compared to plastic alternatives. This results in a reduction of 7.19 kg-CO<sub>2</sub> in greenhouse gas emissions per filter. AAF remains committed to advancing the development of environmentally sustainable products and services in the future.



DriPak®



MEGAcel®

## Environmentally Friendly Manufacturing

### Basic Principle

At AAF, we are committed to achieving net-zero greenhouse gas emissions at all our factories by 2030, advancing our original target of 2050. This will be accomplished by optimizing energy usage through equipment upgrades and productivity improvements, increasing energy generation through solar and wind, and introducing green electricity. A detailed roadmap is currently being developed to ensure that all objectives are met.

### Energy Usage Optimization Examples

#### Air Compressor Upgrade at the Cramlington Plant, UK

The Cramlington Plant faced inefficiencies and high costs due to outdated air compressors. By upgrading to new, energy-efficient air compressors with the latest technology, the plant achieved better compression efficiency, enhanced equipment reliability, and reduced power consumption, significantly lowering AAF's environmental footprint.

#### Before and After : Energy Efficiency and Environmental Impact

**Before** A 14-year-old system with low efficiency and hard-to-source spare parts.

**After** Enhanced energy efficiency, reliability, and durability with modern technology.

#### Key Benefits

##### Greenhouse Gas Emissions

Significant reduction of  
**11 t-CO<sub>2</sub>**  
per year

##### Cost Reduction

Annual operating costs  
reduced by approximately  
**11%**  
along with  
lower maintenance  
costs.

##### Enhanced Reliability

New technology  
features a 5-year  
parts warranty,  
minimizing downtime.



#### Reducing Compressor Air Leakage at the Columbia Plant, USA

At the Columbia Plant in the USA, air compressors, accounting for 20-25% of the plant's electricity consumption, were inspected for leaks. Typically, 20% of compressed air is lost to leaks, with an additional 10-30% wasted through unnecessary release. The detailed inspection identified 49 leak points, wasting 241 m<sup>3</sup>/h of air—equivalent to 245,572 kWh per year. Prompt corrective actions significantly reduced energy consumption and environmental impact, cutting greenhouse gas emissions by 183,155 kg.

#### Energy and Emissions Reductions from Repairs

##### Energy (kWh)

**245,572**

##### Greenhouse Gas (t-CO<sub>2</sub>)

**183**

##### NO<sub>x</sub> (kg)

**163**

##### SO<sub>2</sub> (kg)

**466**

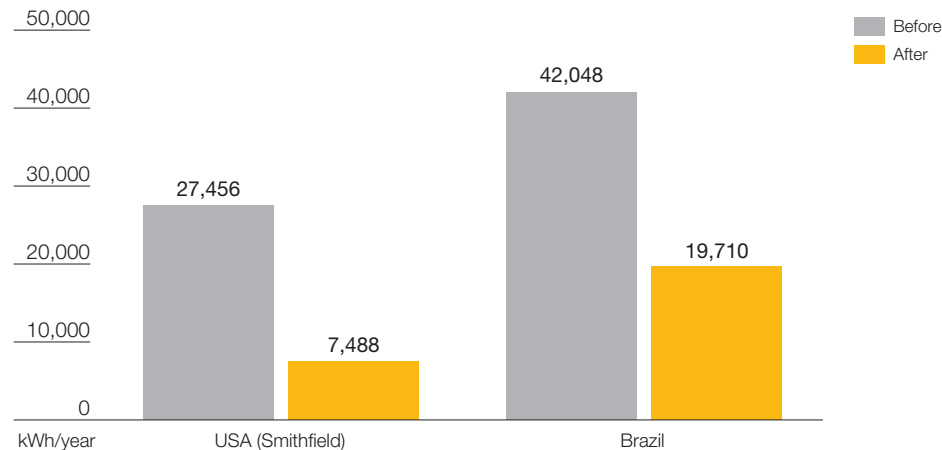


### LEDs and Sensors Installation in Factories

AAF's global bases are systematically introducing LEDs and occupancy sensors to reduce electricity consumption from lighting.

<b>Finland</b>	Achieved a complete conversion to LED lighting.
<b>UK</b>	Almost complete conversion to LED lighting, with steady progress.
<b>Brazil</b>	Successfully implemented LED lighting, achieving the targeted reduction in energy consumption.
<b>USA</b>	At the Smithfield plant, switching to LEDs reduced electricity consumption by 80%, cutting greenhouse gas emissions by 11 t-CO <sub>2</sub> /year.
<b>Malaysia</b>	Introduced motion sensors to control lighting, reducing greenhouse gas emissions by 0.7 t-CO <sub>2</sub> /year.

### Electricity Consumption Before and After LED Introduction



### Energy Production Initiative Example

#### Introduction of Solar Panels in Malaysia

At our Malaysia plant, we launched a solar power project in the parking lot, installing 15 solar-powered lampposts. This initiative now fully powers the parking lot lighting using solar energy.

#### Results of the Installation

**Zero  
Greenhouse Gas  
emissions**  
from solar power  
generation.



Greenhouse gas  
emission  
reduction of  
**600kg-CO<sub>2</sub>/year**  
due to  
the installation.



Solar-Powered Lamppost in  
Malaysia

### Introduction of Green Electricity

Since 2022, our Kausala factory in Finland has been operating on 100% renewable energy. This initiative is part of our broader efforts to promote sustainable energy, contributing to improved energy efficiency and a reduced environmental footprint.



## Green Logistics

At AAF, we are dedicated to reducing our environmental impact in our logistics process and contributing to a more sustainable future. In line with this commitment, we are taking significant steps through two key initiatives—one in Europe and one in North America—that demonstrate our ongoing efforts to promote sustainability and reduce our carbon footprint across the supply chain.

### Europe: DHL's Green Carrier Certification

AAF/Dinair is proud to participate in DHL's Green Carrier Certification program, a key step in enhancing our sustainability efforts.

The Green Carrier Certification, introduced by DHL Freight, promotes transparency in sustainable logistics. DHL Freight invests in fossil fuel-free transport, and AAF/Dinair covers any additional costs, ensuring no impact on our customers. By participating, we aim to measure and improve our sustainability performance, reduce greenhouse gas emissions in the supply chain, and align with industry-leading environmental standards.

Currently, the program is being piloted in Sweden, with plans for expansion to other regions. We are committed to continuous improvement through this initiative by investing in eco-friendly vehicle technologies, optimizing routes to reduce fuel consumption, and adopting energy-efficient practices in our facilities. All these efforts contributing to a greener and more sustainable future for our global operations.



### North America: C.H. Robinson's Emissions IQ™

AAF is joining forces with C.H. Robinson to advance sustainability in our North American supply chain. This collaboration leverages Emissions IQ™, a powerful technology developed by C.H. Robinson to measure and analyze carbon emissions across various transportation modes, helping us better understand and reduce our environmental impact.

Emissions IQ™ provides us with critical insights, allowing AAF to map and track Scope 3 emissions from transportation. Using this tool, we can identify opportunities to minimize fuel consumption, optimize supply chain efficiency, and reduce our carbon footprint. The costs associated with these improvements are fully absorbed by AAF, ensuring no added burden for our customers.

As part of this initiative, AAF has achieved significant reductions, cutting over 600 t-CO<sub>2</sub> in greenhouse gas emissions, alongside a 5% year-over-year reduction in emission intensity between the fourth quarter of fiscal year 2023 and the fourth quarter of fiscal year 2024\*. Emission intensity, which measures emissions per unit of output, plays a crucial role in minimizing our environmental footprint. By reducing intensity, we substantially lower our overall impact.

Between the fourth quarters of 2023 and 2024, we increased our utilization of the SmartWay program—designed to improve transportation efficiency—from 40% to 44%, reflecting our ongoing progress in enhancing logistics performance. This improvement underscores our ongoing commitment to sustainability. Our efforts, however, are just beginning, and we are dedicated to continuing our progress in emissions reduction in the years ahead.

\*The data tracking system was fully migrated to C.H. Robinson in Q4 FY23.

**600+ t-CO<sub>2</sub>**  
Emissions Reduced

**5%**  
Emission Intensity  
Reduction

**44%**  
SmartWay Volume



## AAF Technology Tools Driving Enhanced Sustainability

AAF is dedicated to improving air quality and sustainability worldwide. We take pride in delivering environmentally friendly solutions through our innovative technology tools. Here are some examples of our latest technology tools that enhance sustainability by reducing Total Cost of Ownership (TCO) and minimizing environmental impact.

### What is TCO?

Total Cost of Ownership (TCO) encompasses a comprehensive assessment of all expenses involved in acquiring, operating, and maintaining a product or system throughout its lifespan. This includes initial purchase costs, ongoing operational expenses, and maintenance fees.

### How Reducing TCO Helps the Environment

Reducing TCO not only lowers expenses but also significantly reduces environmental impact. Specifically, lowering energy consumption reduces greenhouse gas emissions, longer product lifespans result in less waste, and decreased maintenance costs provide benefits for both the environment and the company's financial health.

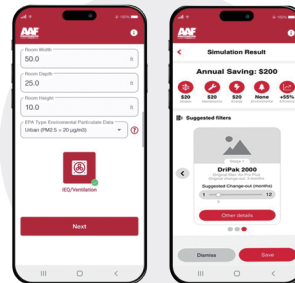


### Introduction to AAF Technology Tools



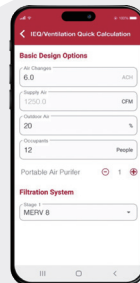
#### VisionAir® TCO

VisionAir® TCO is a cloud-based software designed for commercial building owners and facility managers. Users can leverage the tool's real-time performance information, Total Cost of Ownership (TCO) analysis, and comparison reports to make data-driven decisions that improve air quality and reduce costs.



#### VisionAir® Clean

VisionAir® Clean is a specialized software for cleanrooms that helps users to reduce energy consumption through efficient filtration solutions. The program includes features such as air change rate selection, Total Cost of Ownership (TCO) calculations, and built-in design templates. Users can run simulations for multiple rooms, generate detailed reports on recovery time and air change rate optimization, and access a technical library of industry standards.



#### VisionAir® IEQ

VisionAir® IEQ, part of the VisionAir® Clean app, is a software designed to optimize Air Change per Hour (ACH) rates and identify reductions in particulate matter (PM) levels across various particle sizes in spaces like schools, offices, and commercial buildings. VisionAir® IEQ allows users compare scenarios— with and without air purifiers— to visualize the health benefits of enhanced air filtration and identify the most effective clean air solutions for their environment.

## Introduction to AAF Technology Tools



### VisionAir®360

The VisionAir® 360 app was specifically designed for AAF to help our team deliver personalized IAQ solutions to customers. Team members use the app to capture images of customers' air handling units and filters, assess the equipment's current condition, and generate detailed audit reports based on the collected data. Finally, Total Cost of Ownership (TCO) simulations are performed to provide customers with cost-effective recommendations, helping them control energy usage and reduce environmental impact.



### VisionAir® SAAF

VisionAir® SAAF is software designed to simplify the control of airborne gaseous contaminants. It can be integrated with existing equipment, tailoring solutions that provide precise configuration of clean air products for specific industries. The software includes an extensive contaminant library and 10 different types of chemical media, allowing users to fine-tune key variables and quickly create personalized submittal packages.

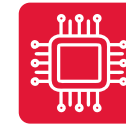
## Successful TCO and Environmental Impact Reduction with AAF Technology Tools and Products



### Healthcare

Cancer Treatment Center  
in Arizona, USA

50% energy reduction resulting in greenhouse gas saving of 19 t-CO<sub>2</sub>, using MEGAcel® filters.



### Microelectronic

Cleanrooms at a Global  
Semiconductor Company

Energy savings of \$340K+ anticipated over 5 years, amounting to a 1,250 t-CO<sub>2</sub> greenhouse gas emission reduction, using AstroFan™ FFU and MEGAcel® filters.



### Lifescience

Cleanrooms at a US Medical  
Device Manufacturer's Facility

Filter failure reduced to 0%, achieving significant energy savings, leading the company to replace all existing glass HEPA filters with MEGAcel® filters.



### Commercial & Public Buildings

LEED-Gold Certified  
Convention Center, USA

Filter lifetime doubled, contributing to the customer's green building practices, using PerfectPleat® SC M8 and VariCel® MERV 13 filters.



### Transportation

Global Manufacturer of Large  
Diesel Engines and Parts

50% decrease in AHU energy consumption, resulting in a 72 t-CO<sub>2</sub> greenhouse gas emission reduction, using MEGAcel® filters.



### Food & Beverage

World's Leading  
Producer of Food Products

Filter life extended from two weeks to five weeks — 2.5 times longer than the previous service life, using DriPak® 2000 filters, with a cost benefit of \$48,895 per year.



## AAF Supporting Energy Decarbonization

With the global energy landscape rapidly shifting, the pressure to reduce greenhouse gas emissions in oil and gas production, as well as gas turbine power generation, has never been more urgent. Achieving a cleaner, more sustainable future requires more than a shift to renewable sources; it demands significant improvements in operational efficiency. For decades, AAF has been at the forefront, providing innovative solutions to support our customers' decarbonization efforts. Filter upgrades can be easily implemented by customers with a relatively low capital investment, which in return, can deliver quick gains and savings toward net-zero strategies. Through products like Optimize™ and N-hance®, AAF has continually enhanced gas turbine efficiency, minimized fuel consumption, and reduced greenhouse gas emissions. Our longstanding commitment to sustainability has made us a trusted partner in the pursuit of cleaner, more efficient energy operations.



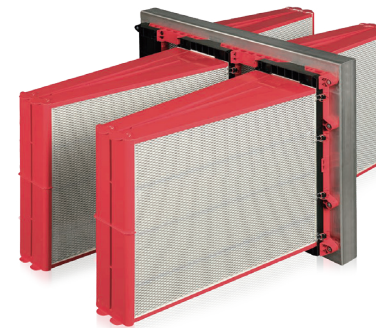
Optimize™ is a service that helps gas turbine users optimize their air inlet systems, improving airflow, temperature control, and contaminant management. This enhances turbine performance, reduces fuel consumption and operational costs, and supports the transition to cleaner operations, ultimately lowering the total cost of ownership.

Over  
**150 GTs**  
Optimized.

**8.2M GJ**  
fuel saving  
per year.

**480,000**  
t-CO<sub>2</sub> GHG\*  
emissions  
reductions  
per year.

\*GHG = greenhouse gas



**N-hance®**  
Performance Filtration

N-hance® Performance Filtration is a custom-engineered filter designed for offshore environments. It optimizes turbine performance, reduces costs, and minimizes environmental impact, promoting sustainability in the energy sector. With 80% of the addressable market in North Sea offshore operations choosing N-hance®, it sets a benchmark for both performance and sustainability.

**Typical example for 1 representative GT installation:**

**22,000**  
GJ  
fuel saving  
per year.

**2,000**  
t-CO<sub>2</sub> GHG\*  
emissions  
reductions  
per year.

\*GHG = greenhouse gas