

## SUSTAINABILITY

### Responsibility becomes measurable



At HOF, sustainability is not a trend or a label, but rather a claim that has to prove itself every single day: in our corporate management, in the development of energy efficient technologies and in the responsible use of resources.

At HOF, sustainability means first of all: measurable responsibility – through efficient processes, reduced emissions and a technology design that is convincing in the long term.

At the same time, true sustainability starts with the people that make it possible – with an environment that promotes long term thinking, quality and safety.

### **Made for the future – based on ESG topics and increasing requirements.**

Sustainability is not just a claim today – it is a crucial factor for the future viability of a company. Requirements from markets, supply chains and investments are changing the expectations of the industry and technologies forever, while the requirements for energy efficiency, process stability and technical future viability are increasing.

### **Integrated strategy – environment, employees and responsibility in our daily routines.**

HOF sees sustainability as an integrated approach. Environment, social aspects, corporate responsibility and the responsibility towards our employees are all linked – and have to work in everyday processes.

That is why we combine strategic orientation with specific measures, clear key figures and technological substance.

Our actions are based on clear standards and future requirements.

## Our understanding: sustainability as a complete picture

A modern sustainability approach looks not only at individual technologies, but at the bigger picture: from the use of resources and process design to the long term usability of plants and systems.

Here at HOF, we divide sustainability into clear fields of action for easier orientation:

- 1. Strategy & responsibility**
- 2. Technology & innovation**
- 3. Environment & refrigeration technologies**
- 4. Energy efficiency & processes**
- 5. Energy & environmental management**
- 6. Key figures, impact & life cycle**
- 7. Governance & compliance**
- 8. Social aspects**

**This is how we specifically implement these fields of action at HOF:**

- efficient, future proof technologies
- long lasting plant concepts
- sustainable service strategies
- responsible collaboration with people and partners
- continuous optimisation through development, investments and processes



## 1. Strategy & responsibility

HOF sees sustainability as a corporate responsibility that determines all our actions: from development and technology, resources and energy efficiency to processes, standards and relationships with people.

This includes clear targets, well founded decisions and continued development of structures and measures.

Our claim as a technical market leader: measurable sustainability that works every day.

### **Sustainability starts with the right decision.**

HOF views sustainability as a complete picture: from the long term focus, technology and development topics to energy efficiency, process stability, standards and responsibility in everyday processes.

The crucial factor here is not the individual measures, but the interaction of technical solutions, organisational structures and long term availability.

Our claim as a technical market leader:  
measurable sustainability that works every day.

### **Typical topics:**

- integrated fields of action & future viability
- well founded decisions & technology selection
- stability in everyday processes & long term availability

This creates sustainability that is reliable in terms of regulatory compliance, economically viable and effective in the long term.

## 2. Technology & innovation

### Research & development

HOF combines technological innovation with practical application: from refrigeration and plant solutions to new technologies and system solutions.

### Innovation for sustainability

The focus here is on measurable improvements: more efficient thermal systems, reduced energy consumption and optimised processes. Process analysis and refrigeration technology play just as much of a role in this as the continued development of system solutions for pharmaceutical applications.

This produces solutions that measurably improve efficiency, process stability and future reliability – and function reliably in everyday pharmaceutical applications.

### Innovation that works in practical application.



HOF combines technological innovation with practical application – always with the objective of making processes measurably more efficient, more stable and more future proof.

System solutions are developed based on experiences from actual plant projects, well founded engineering and continued optimisation.

This creates improvements that work not only “on paper”, but also prove viable in pharmaceutical environments in the long term.

### Focus on:

- refrigeration and supply solutions
- process optimisation & energy efficiency
- new technologies & system solutions

### The result:

Solutions that improve efficiency and process stability – and function reliably in pharmaceutical applications every day.

### 3. Environment & refrigeration technologies

#### Climate-friendly refrigeration technologies

HOF has a long-standing commitment to the issues of environmental protection, climate protection and greenhouse gases. That is why we offer conventional refrigeration technologies as well as a whole range of future proof solutions that use natural refrigerants for cold generation.



Instead of refrigerants with a high impact on the climate, such as R404A/R507A, these plants use hydrocarbons like ethane or propene, liquid nitrogen or, in the case of our innovative HOF CryoBlizzard cold air machine, even air as a refrigerant.

For decades, HOF has been developing solutions that reduce emissions and remove the dependency on F-gases. This creates a future proof basis, independent of regulatory developments and with long term planning and investment reliability for your company.

#### **Fewer emissions. More future viability.**

The future of refrigeration technology is clear: natural refrigerants, high efficiency and intelligent load control.

#### ***Natural refrigerants – true alternatives***

- **HOF CryoBlizzard (air):**  
GWP 0, low pressure, energy recovery process, modular and highly efficient
- **HOF CAR6 (low GWP ≤ 6):**  
hydrocarbons ethane/propene – tried and tested for years, flexible, stable and extremely efficient
- **HOF LN<sub>2</sub> refrigeration:**  
for extreme temperature ranges and energy optimised freeze/thaw processes

Since 2007, HOF has been successfully using ethane and propene cascade systems – modular, redundant and safe (e.g ATEX / gas warning system).

#### **The result:**

high efficiency, stable processes and true future viability – without depending of F-gases

## **HOF CryoBlizzard (air)** **GWP 0 – efficient and future proof.**

HOF CryoBlizzard is an innovative air-based refrigeration technology and a particularly future proof alternative in the context of increasing requirements for climate protection and efficiency. The energy recovery process enables targeted re-use of energy and reduces losses, which becomes directly evident in operation. At the same time, the system runs with lower pressure and without the conventional F-gases.



This enables us to design refrigeration technology that is stable in the long term and compliant with all regulations – depending on the process, infrastructure and targets.

### **Strengths:**

- GWP 0 (air)
- energy recovery & energy efficiency
- modular & future proof

## **HOF CAR6 (low GWP ≤ 6)** **Tried and tested, efficient, flexible.**

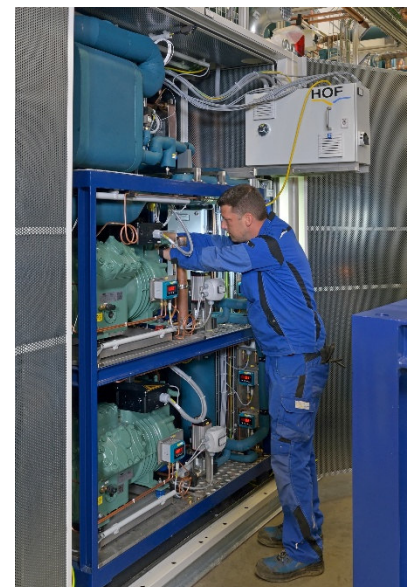
HOF CAR6 is based on hydrocarbons (e.g. ethane/propene) and combines very high energy efficiency with an extremely low global warming potential (low GWP ≤ 6).

This is not just a theoretical approach for HOF: The corresponding cascade systems have been in use for many years and have proven successful across a range of different applications.

Depending on the configuration, this can lead to redundant modular systems that ensure stability and operational reliability in the long term.

### **Strengths:**

- very high efficiency
- low GWP ≤ 6
- flexible design & proven in practical application



## **HOF LN<sub>2</sub> refrigeration (liquid nitrogen)** **For extreme temperatures and process requirements.**

Plants with liquid nitrogen offer maximum temperature flexibility and immediately available refrigeration capacity.

They are ideal where extreme temperature ranges are required or where processes require fast, stable temperature profiles. HOF LN<sub>2</sub> systems can also be an interesting alternative when the focus is on future proof conditions or clear independence from regulatory developments.

Correct integration into the overall process is crucial – including the media supply, infrastructure and operating concept.



### **Strengths:**

- high temperature flexibility
- immediate refrigeration performance
- suitable for complex processes

## 4. Energy efficiency & processes

Sustainability is in the detail – especially during operation. Energy intensive processes like freeze drying in particular require planning that is not only technically viable, but also remains efficient and stable during everyday use.

That is why HOF consistently optimises processes in terms of efficiency and reliability, with an eye on real operating conditions, load cycles and economic requirements.

- cold air processes with energy recovery
- load management systems
- modular central refrigeration unit with storage systems
- optimised start-up to reduce power dissipation
- energy saving motors (IE3/IE4)
- heat recovery for efficient use of dissipated heat

### **The result:**

lower energy losses, stable processes – and refrigeration technology that remains economically viable and future proof in the long term

### **Energy efficient processes**

Optimised for stability, consumption and operation

Sustainability becomes evident especially during operation. That is why HOF consistently optimises processes in terms of efficiency and stability, with an eye on real operating conditions, load cycles and economic requirements. The focus is on system solutions that reduce energy losses, provide intelligent plant control and ensure process stability in the long term.

This results in plant solutions that are not only energy efficient, but also function reliably in day-to-day pharmaceutical applications.

### **Examples (depending on the application):**

- cold air processes with energy recovery
- load management systems & storage solutions
- heat recovery
- energy efficient motors (IE3/IE4)

## 5. Energy & environmental management

### Using resources efficiently – from production to operation

HOF works with an internationally recognised energy management system based on DIN EN ISO 50001 and continuously optimises processes to reduce the use of electricity, heat and materials.

This ensures systematic recording, analysis and evaluation of energy consumption figures. Efficiency increases arise in particular from energy related measures on buildings and from structural optimisations. Closed coolant systems additionally reduce the consumption of fresh water.



### TÜV certified

The energy management system was certified by the TÜV Hessen inspection association for the first time in October 2024.

The subsequent monitoring audit confirmed clear progress and a very positive development of the system.

This creates measurable improvements that save resources and make operation more stable and more efficient in the long term.

### Systematic recording. Analysis. Optimisation.

HOF works with an energy management system and continuously optimises processes to reduce the use of electricity, heat and materials. Energy consumption figures are recorded systematically, assessed and specifically improved with technical and organisational measures.

The focus here is not on individual measures, but on consistent, continuous optimisation – as the basis for measurable efficiency and sustainable company development.

### Focal points:

- consumption recording & analysis
- efficiency measures & load optimisation
- resource protection during operation

## 6. Key figures, impact & life cycle

### **Tangible savings**

Sustainability has to be measurable – and it is reflected not in individual measures, but in the long term impact. That is why HOF considers not only technologies, but also specific key figures, consumption developments and the entire life cycle of plants and systems.

It becomes evident which measures actually improve efficiency, save resources and make operation more stable in the long term. Between 2022 and 2024, the energy consumption of both factories was reduced by more than 430,000 kWh in total.

HOF also uses solar energy generated in-house to further reduce the external energy consumption and to decrease dependence on fossil fuels.

### **Durability & life cycle**

#### **Plants that are here to stay. Service that supports.**

HOF plants are designed for an exceptionally long service life. High vertical integration, precision workmanship and our Service+ extend the service life significantly and reduce the use of resources. Strengthening rather than replacing.

With targeted modernisation, we integrate new technologies into existing plants – sustainable, economically viable and future proof.



## **Tangible savings**

More than 430,000 kWh reduction (2022–2024).

Sustainability has to be measurable. Between 2022 and 2024, the energy consumption of both factories was reduced by more than 430,000 kWh in total. These key figures show that efficiency is not just a target, but is also achieved through specific day-to-day measures.

In addition, HOF uses solar energy generated in-house to further reduce the external energy consumption and to decrease dependence on fossil fuels.

### **Result:**

- measurable energy savings
- continued optimisation
- additional contribution from solar power



## **Durability & life cycle**

### **Long service life saves resources.**

The most sustainable plant is one that can run reliably in the long term. HOF plants are designed for an exceptionally long service life – with high vertical integration, a practical design and a clear focus on operational safety.

This not only reduces downtime, but also the consumption of resources over the entire service life.

Strengthening rather than replacing: With targeted modernisation, we integrate new technologies into existing plants – sustainable, economically viable and future proof.

### **Focal points:**

- long service life & stable operating concepts
- modernising/upgrading instead of replacing
- Service+ to contribute to life cycle reliability

## 7. Governance & compliance

In the pharmaceutical environment, traceable processes, clear responsibilities and documented standards are the basic requirements for quality, safety and reliability. This is not only about formal requirements, but also about structures that make projects manageable – from planning, implementation and documentation to actual operation.

HOF focuses on current standards, typical industry requirements and relevant regulatory conditions – as a basis for long term stability and reliable project implementation.

Clear technical and organisational processes are just as much a part of this as reliable cooperation with partners, clear documentation and responsible handling of risks.

This is how we create transparency, reduce interface problems and support collaboration that remains reliable even with complex requirements.



### **Governance & compliance** **Clearly structured. Responsibly implemented.**

In the pharmaceutical environment in particular, clear processes, documented structures and a high level of reliability are crucial. That is why we focus on clear standards – not as an obligation, but as a quality principle, to create the basis for safety, quality and long term stability.

#### **Focus on:**

- standards, processes & documentation
- long term stability & quality
- responsibility in the pharmaceutical environment

This generates compliance that is not only fulfilled, but strengthens quality and reliability every single day.

## 8. Social aspects

### Responsibility for people

Sustainability also means: responsibility for employees, cooperation and long term relationships.  
At HOF, sustainable structures count – not only on paper.

To us, social sustainability means: an environment where people can work safely, can develop and are ready to take on long term responsibility – within the company and when interacting with customers and partners.



#### This includes:

Health support and company activities to strengthen the team, as well as health and safety, clear processes and respect for one another.  
Development perspectives, qualification and reliable collaboration at eye level are equally important.

This creates social sustainability that fosters stability – in the team, in projects and in long term partnerships.

### Health support & prevention

Health and fitness do not just happen – they need an environment that offers support in the long term. HOF uses measures that strengthen the team on a daily basis, reduce strain and support long term fitness for work.

#### Focus on:

strength, prevention, long term fitness

### Qualification & development on a daily basis

At HOF, sustainability also means: building knowledge, promoting competence and developing responsibility. Experience, training and practically oriented development create structures that ensure quality – today and in the future.

#### Focus on:

education, building competence, future viability

## **Health and safety & responsibility in projects**

At HOF, safety is a firm component of our day-to-day work – in production, assembly and customer service. Clear processes, diligence and a sense of responsibility create stability in the team and reliability in projects.

### **Focus on:**

safety, clear processes, responsibility

## **Working together at eye level – in-house and with customers**

Long term cooperations are based on respect, clarity and reliability. HOF stands for communication at eye level – in the team, with customers and with all stakeholders in a project. This creates solutions that work in the long term.

### **Focus on:**

cooperation, clarity, reliability



## Your benefits with HOF at a glance

### Strategic & cooperative

- Advice at eye level – technically sound and practical
- Future proof technology decisions – with regulatory and economic viability
- The bigger picture – process, plant, infrastructure and operation
- Planning reliability – from the concept phase to implementation

### Technological & measurable

- sustainable refrigeration technologies (HOF CryoBlizzard, HOF CAR6, HOF LN<sub>2</sub>)
- GWP 0–6: high future viability
- energy efficient process with energy recovery
- high vertical integration & long service life
- modernisation, upgrades and repair options
- potential for reducing the CO<sub>2</sub> footprint during operation
- regional added value & short distances
- Service+ for operational reliability over decades



### HOF Sonderanlagenbau GmbH

Freeze Drying Systems | Loading and Unloading Systems |  
Freeze-Thaw Units | Waterbath and Debottling Systems | Service+

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