

# Greener Reefers

## Background

Global trade by sea is of immense importance as 90% of global freight is carried by ship. Shipping is responsible for around 3% of global greenhouse gas (GHG) emissions (IMO, 2020), which is why shipping containers, especially refrigerated or reefer containers for short, play a central role in mitigating GHG emissions.

In 2019, the number of reefer containers (twenty-foot equivalent units) already amounted to around 3.2 million, with a projected growth factor of around 8% annually, which means that the number of reefer containers will likely more than double up to the year 2030.

Reefer containers are responsible for a significant amount of indirect GHG emissions from electricity consumption, as they are often connected to the power supply 24 hours a day, even on land, or are operated by diesel generators. In addition, direct GHG emissions are caused by the predominant use of climate damaging, synthetic HFC refrigerants and related leakages.

Therefore, there is a considerable potential for the reduction of GHG emissions by increasing energy efficiency, improving operation and controls, reducing refrigerant leakages through improved design, maintenance, and substitution with sustainable, environmentally and climate-friendly refrigerants (lowest TEWI, ultra-low GWP and without TFA impact on the aquatic system).

## Political context

The project supports the implementation of international agreements, first and foremost the Kigali Amendment to the Montreal Protocol, which regulates the phase-down of HFCs.

Further guiding agreements are the Paris Agreement with the Nationally Determined Contributions (NDCs) and the International Maritime Organization's (IMO) GHG reduction strategy for ships.

Additionally, the project contributes demonstrably to achieving the sustainable development goals (SDGs) of the Agenda 2030, namely SDG 7 Affordable and Clean Energy, 8 Decent Work and Economic Growth, 13 Climate Action, as well as 9 Industry, Innovation and Infrastructure.

## Objective

The project will develop emission-reduction strategies for conventional reefer containers, demonstrate the application of sustainable, environmentally and climate-friendly, natural refrigerants and disseminate the results and mitigation potential on an international level.

## Challenges

The most challenging barriers to a more sustainable reefer industry, that are addressed under this project, are the following:



Lack of data on direct and indirect emissions of reefer containers such as leakage rates and energy consumption;



Lacking competences and certification of technicians servicing and repairing reefer containers;



Limited availability of green reefer technologies and high initial investment costs;



Absence of national standards on refrigerated containers.

Supported by:



## Approach

The Greener Reefers project aims at a systematic and comprehensive analysis of the negative impact of refrigerated containers on the climate. The project seeks to evaluate and demonstrate environmentally and climate-friendly technology solutions, create conducive framework conditions (standards), demonstrate mitigation measures (reduction of leakage and reduced energy consumption), develop global mitigation scenarios and up-scaling strategies, and promote international exchange. The activities fall under the following outputs:



### Status quo analysis

The status quo of the refrigerated container industry's emissions and technologies is analysed scientifically in detail in order to confirm the sector's mitigation potential and to identify targeted measures based on the results of this analysis.



### Capacity building for emission reduction and safe handling of natural refrigerants

Training technicians in the operation and servicing of conventional reefer technology will reduce leakage and increase energy efficiency. Training in safe handling of climate friendly refrigerants will reduce direct emissions in the future.



### Preparation of enabling environment for environmentally and climate-friendly solutions

The technological and economic feasibility of sustainable, environmentally, and climate-friendly reefer containers will be demonstrated by pilot projects. Enabling policies and standards will be prepared and promoted on national and international levels.



### Raising international awareness and fostering exchange

Best practices and mitigation scenarios as well as up-scaling strategies will be prepared and disseminated internationally through events and publications.

Project name	Greener Reefers
Commissioned by	German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV)
Target Countries	Costa Rica, South Africa
Target Group	Political decision makers, shipping lines, port terminals, technicians, research and training institutions
Implementing Partners	Ministries of Environment, Ministries of Transport, reefer industry and shipping lines, research and training institutions
Duration	April 2023 until April 2026
Budget	EUR 2,900,000

**Published by:**  
Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

**Registered offices**  
Bonn and Eschborn, Germany

Dag-Hammarskjöld-Weg 1-5  
65760 Eschborn  
E: [info@giz.de](mailto:info@giz.de)  
I: [www.giz.de](http://www.giz.de)

**Responsible:**  
Philipp Denzinger ([Philipp.Denzinger@giz.de](mailto:Philipp.Denzinger@giz.de))

**Photo credits**  
© GIZ, Philipp Denzinger

**On behalf of**  
IG II 1 Fundamental Aspects of Chemicals Safety and Chemicals Law  
Eschborn, 2023

Supported by:

