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A Sustainable and climate-friendly Phase-out of Ozone Depleting Substances (SPODS)

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Preface

Temperatures are rising and with them the demand for cooling. Most of the refrigerators and air-conditioners worldwide are containing ozone-depleting substances or hydrofluorocarbons (HFCs) which are strong greenhouse gases. In view of the ongoing phase-out of ozone-depleting substances to save the ozone hole, an urgent question arises: How can countries avoid phasing-in HFCs as substitutes and directly “leapfrog” to ozone- and climate-friendly refrigerants?

When we started discussing the project, “A sustainable and climate-friendly phase-out of ozone-depleting substances” (SPODS), the Kigali Amendment on the phase-down of HFCs had not yet been ratified. However, it was clear that something had to be done about the increasing production and consumption of these substances, leading to rising emissions to the atmosphere. In order to anticipate and prepare actions of countries under the Kigali Amendment to the Montreal Protocol, the European Union invested 3 million Euros to set up this unique project. In cooperation with the German Federal Ministry of Economic Cooperation and Development (BMZ), SPODS combined the know-how and experience of three implementing agencies: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the United Nations Industrial Development Organization (UNIDO) and the United Nations Development Programme (UNDP).

Since 2018, SPODS supported the National Ozone Units of Colombia, Costa Rica, Cuba, Grenada, Mexico, Paraguay and Venezuela on early actions to mitigate HFCs emissions. From feasibility analysis for national production of low GWP refrigerants and developing end-of-life treatment strategies to trainings on the safe use of natural refrigerants and communication campaigns, the partner countries contributed actively and with great motivation. Despite the extraordinary times caused by the worldwide Covid-19 pandemic, the partners managed to continue their work. Where possible, events and trainings were held virtually such as this year’s Technology Roadshow. Companies



from several partner countries made videos to virtually walk participants through on-site cooling technologies using natural refrigerants.

SPODS is a showcase on how HFC mitigation can be implemented not only in the Latin American and Caribbean region but also worldwide.

We would like to thank BMZ, GIZ, UNDP and UNIDO and the National Ozone Units of the partner countries as well as all other contributors to the SPODS project for this great cooperation.

Maria Rosa Sabbatelli

Head of the Foreign Policy Instruments Regional Team
for the Americas



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About SPODS

In 2017, representatives of the National Ozone Units from Cuba, Colombia, Costa Rica, Grenada, Mexico, Paraguay and Venezuela came together to take on a common challenge: Avoiding the use of highly global warming HFCs in their refrigeration and air conditioning (RAC) sectors when phasing out ozone depleting substances (ODS).

Their activities range from ODS/HFC destruction and refrigerant grade hydrocarbon production to trainings for technicians on the safe handling of natural refrigerants and technology pilots.

The SPODS project is co-funded by the European Union and the German Federal Ministry for Economic Cooperation and Development (BMZ). SPODS has been supporting a number of Latin American and Caribbean countries with their transformation processes in fulfilling their obligations under the Montreal Protocol related to the ODS phase-out and their current HFC mitigation at the same time, in anticipation of the Kigali obligations. The objective is to help define the appropriate actions on how to reduce both the consumption of ODS and HFCs, to bring down energy demand and related GHG emissions. GIZ Proklima has implemented this programme in cooperation with UNDP and UNIDO and the National Ozone Units in the respective countries from 2017 until 2021.





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SPODS in Colombia

Colombia is making progress in the introduction of natural refrigerants and climate-friendly regeneration of refrigerant gases.

Getting ready for more natural refrigerants

The current demand for hydrocarbon refrigerants is still low in Colombia, but it is expected to grow in the short and medium term. Therefore, a technical and economic pre-feasibility study was carried out on the production of hydrocarbons. The aim of this study was to analyse the technical characteristics required for the use of propane and isobutane as refrigerants. Given the export opportunity, it is recommended to extend the study to the Latin American market and to other applications such as propellant for commercial aerosols.

For a proper disposal

A pilot project introduced the implementation of a methodology to identify, guide, recover and collect the refrigerant gases discarded at the generation source. Good cooperation between working groups formed by technicians, companies and service workshops in the RAC sector has strengthened the exchange with the collection and regeneration centers of refrigerant gases. The results will contribute to strengthening the handling and environmentally-sound management of refrigerant gases discarded at the generation source.



Pilot project

The guild Asocolflores made a great contribution by facilitating an agreement among several flower companies to promote the replacement of refrigeration systems containing ozone depleting substances by systems with natural refrigerants. New technologies were deployed for five crops. The positive results of this pilot experience will be replicated throughout the flower sector.



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Additionally, a reference document was drawn up for supermarkets to suggest initiatives to reduce HCFC and HFC emissions in RAC equipment and systems through carbon credits mechanisms. This document established a roadmap that serves as input for the development of this type of initiatives.



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SPODS in Costa Rica

Costa Rica is a great example to follow in the region; from the training of technicians to the exchange of experiences.

Empowering technicians in the RAC industry

The first factor to ensure proper installation and maintenance of RAC equipment with hydrocarbon refrigerants is to have well-trained technicians. Therefore, six trainings were carried out. The sessions tackled particularly the topics of air conditioning with R-290 and domestic refrigeration with R-600a. 98 trainers and technicians from 11 countries in the region were trained in 2018 and 2019. A further course „Use of hydrocarbon refrigerants and service operations of refrigeration and air conditioning equipment with hydrocarbon refrigerants (R-290 and R-600a)“ was organised in 2021. The course aimed at training 150 RAC technicians.

A cool demonstration project

Additionally, Costa Rica facilitated a demonstration project that involved hotels and institutions from the public sector. The project supported the installation and energy-consumption monitoring of R-290 air conditioners.

Exchange on Green Cooling

Costa Rica welcomed policy makers from 18 countries during the 2019 Green Refrigeration and Air Conditioning Technology Road-



show. The event facilitated the exchange between policy makers and the RAC industry from Latin-American countries on Green Cooling technologies, regulations and standards.

Read more!

The project contributed with several studies and publications on various topics such as refrigerant leakages, air conditioners with R-290, refrigeration with R-290 for dairy companies and the destruction of refrigerant gases.

Sustainable Refrigeration in Costa Rica: The use of low global warming potential refrigerants (LGWP)

In order to celebrate the International Day for the Preservation of the Ozone Layer (September 16, 2020), a virtual conference was held together with UNDP. Almost 500 participants registered for the conference, which focused on the use of low global warming potential refrigerants (LGWP). For two weeks, participants shared new information on sustainable refrigeration and air conditioning with national and international experts. The conference also promoted the use of low global warming potential refrigerants, new technologies, and a system developed in Costa Rica to destroy non-reusable refrigerant gases.



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SPODS in Cuba

Cuba takes steps to analyze and implement new Green Cooling technologies.

Sustainable alternatives

A big step was the adoption of the R-290 refrigerant to manufacture chillers. Thanks to the cooperation of Cuba's Ozone Unit and with the support of an international consultant, the factory FrioClima has received technical assistance for the adoption of low-GWP refrigerants to manufacture chillers and air conditioning units.

The aim of this activity is to create awareness about the safety of this new equipment. Consultation has been carried out with potential customers, and there has been progress in the evaluation of designs, needs and requirements to adopt this low-GWP alternative.

Eagerness to introduce new technologies in the country

In order to assess the implementation of Green Cooling technology in Cuba online workshops and a study on possible Thermal Districts were organised. The Ministry of Tourism is the first client to carry out the pre-feasibility study.

Green Cooling for supermarkets

Aiming at supporting the adoption of low-GWP and high-energy-efficiency refrigeration and air conditioning systems in supermarkets, an assessment was carried out on the technologies currently in use. The analysis also looked at the applicability of Green Cooling technologies in local conditions and the capabilities and requirements for national use. The activity included the review of the original designs, a seminar on the use of CO₂ as a refrigerant, and visits to candidate supermarkets.

Possible production of natural refrigerants in Cuba

The assessment of an existing production plant and the development of a handbook for the safe use of hydrocarbons as refrigerants are expected to facilitate the national use of natural refrigerants in Cuba. The ongoing study focuses on the diagnosis and identification of the plant requirements to start producing refrigerant-grade hydrocarbon. Promotional activities have been carried out to use hydrocarbons as refrigerants in Cuba.



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SPODS in Grenada

One of the main objectives of the SPODS activities in Grenada was to improve communication.

Do good and talk about it!

As a first milestone in the continued efforts to promote energy efficiency and the use of low global warming potential (GWP) refrigerants, the National Ozone Unit (NOU) launched a Green Cooling Communication Strategy. The aim was to generate awareness and to make information material available to end users and the general public. This should lead to an increasing use of environmentally friendly and energy efficient refrigeration and air-conditioning (RAC) technologies. The communication activities accompanied by special trainings aim at increasing the capacity of RAC technicians to adequately handle new and emerging Green Cooling technologies and to perform good and safe refrigeration practices. Further, the strategy will facilitate the implementation of the National Cooling Action Plan (NCAP) and the linkages to Grenada's Nationally Determined Contributions (NDCs).

The first of its kind

The National Ozone Unit (NOU) of Grenada in collaboration with GIZ Proklima successfully hosted a Virtual Green Cooling Technology Road Show as part of the activities held to commemorate the World Ozone Day on September 16th, 2020. This event was the "first of its kind" in the Caribbean region and featured six of the leading refrigera-

tion and air-conditioning companies in Grenada. It was streamed live on the local Government Information Service (GIS) television channel and on major social media platforms with a world-wide audience of over 6000 viewers. Participants received insightful presentations from each of the companies on the Green Cooling technologies offered to their customers and clients and could further interact virtually with the exhibitors. Many of the companies highlighted the huge energy savings achieved from replacement of conventional AC units with the higher energy efficient inverter type units.



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SPODS in Mexico

From studies to trainings and pilot projects, Mexico has achieved a great deal.

A multitude of possibilities

The first step at the beginning of the project was to analyse the current state. The “National Diagnosis for the Mitigation of Hydrofluorocarbon (HFC) Emissions” included mitigation actions identified by F-Gas users and an analysis of existing policies to implement the new measures. It also presented a monitoring, reporting and verification proposal. Implementing 9 out of the 11 proposed measures would achieve an estimated mitigation of 6.63 Mt CO₂e by 2030.

From production...

The work of the SPODS project in Mexico covers the entire life cycle of natural refrigerants, starting with production. A study has shed more light precisely on the matter since it determined the technical and economic feasibility of purifying propane and isobutane to achieve the required refrigerant grade in Mexico.



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...to the safe use and technical application

In order to be able to use natural refrigerants, it is essential to be trained in their handling and safe use. Thus, the SPODS team developed a manual on the subject, which will be disseminated in training centers and e-learning platforms around the country. Additionally, a study was carried out to design the proposal of a specialized hydrocarbon training center in the country.

...to the end of service life

It is also important to adhere to the correct protocol to dispose waste. SPODS produced a “Diagnosis for the management of waste from end-of-life RAC equipment” as well as four good practice guides to manage disposed equipment.

A good investment

There must be the right financing options in place to implement a sustainable refrigeration program successfully. The necessary aspects to be taken into account were explained in the course “Calculation, analysis and bankable models for investments in commercial refrigeration” targeting government and private companies such as supermarket chains. The course was carried out in cooperation with the National Association of Supermarkets and Department Stores of the country (ANTAD).

Identification of pilot projects to promote the use of natural refrigerants at the national level

The project produced an analysis of the barriers introducing high-capacity hydrocarbon-based RAC equipment in Mexico. It also identified the possible commercialization opportunities in the mid and long term.

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SPODS in Paraguay

Paraguay advances in its commitments to the Kigali Amendment.

Setting up the right course

A regulatory framework was developed to allow the commercialization and use of low Global Warming Potential (GWP) refrigerants. The framework encompasses technologies and refrigerants containing natural gases, as well as the requirements for certification in labor skills for the refrigeration and air conditioning sector.



Training technicians is a key measure

Basic, intermediate and advanced level seminars were held on good practices for the safe use of flammable substances in refrigeration and air conditioning equipment. 283 technicians working in the RAC sector throughout the country successfully participated in the virtual training. It is worth highlighting the participation of women in a guild mostly populated by males.



Takeaways from international experts

Energy efficiency and the use of low-GWP alternative substances like ammonia and CO₂ were promoted during various seminars with international experts. Another training was about the development of a business model for the Center for Recovery, Recycling and Storage of ODS and HFC Refrigerant Gases.

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Industrial Reconversion Fund Venezuela

SPODS in Venezuela

Venezuela has achieved a great deal by strengthening and developing technical and regulatory capabilities, as well as promoting natural alternatives in air conditioning and refrigeration equipment.

“Zero Leaks”

Venezuela adopted a national program called “Zero Leaks,” aimed at large end users such as supermarkets since they are the sector with the highest gas leakage figures. Within this program, seven supermarkets and one food processing plant were identified. The conditions and components were determined regarding the maintenance of their refrigeration systems. The objective is to strengthen their capacities to prevent and correct leaks by applying a methodology based on the use of Good Refrigeration Practices (GRP).

Safe use of refrigerants guaranteed

The SPODS partners in Venezuela developed a training program on Good Refrigeration Practices (GRP) and the safe handling of hydrocarbons, carbon dioxide and ammonia. Their technical trainings focus on technologies based on natural refrigerants which are currently being implemented.

Venezuela strengthens national capacities

The Venezuelan Industrial and Technological Reconversion Fund Foundation (FONDOIN) participated in the “Third Venacor Congress, Exhibition and Conference on Refrigeration, Air Conditioning and

Ventilation Technology” in order to foster the adoption of low global warming potential (GWP) refrigerants. The event, which was held in Caracas in November 2019, served to present equipment and technical as well as educational material for sectors involved in cold chains. Additionally, the “Proposed Standards on HC Refrigerant Quality, Labeling / Packaging and Safe Use in Commercial Refrigeration Appliances” as well as the “Draft COVENIN technical standard on the safe use of flammable refrigerants” (including hydrocarbons) were introduced.

A strategy to manage RAC equipment at the end of service life

Another success was the technical and legal assessment of regulations, general practices and infrastructure to manage ODS waste. One relevant result was the “Draft technical regulation on collection, recycling and end-of-life treatment (destruction) of refrigerants (including ODS and HFCs)”.

First large-scale pilot project

Finally, there was the start of the first large-scale pilot project of a chilled water system for cold air supply in some areas of a health center. The project will use propane (R290) as refrigerant and will have a capacity of 10TRF. Interestingly enough, the study considered the identification of maintenance and retrofit activities to replace a chiller with chlorodifluoromethane (HCFC-22).



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