Climate-friendly room air-conditioners on hydrocarbon technology and new standards for natural refrigerants in China

Background

Still today, most room air-conditioning systems worldwide contain HCFC-22 as refrigerant. In China, with 260 million tonnes of CO_2-equivalent emissions per year, they are the main source of ozone- and climate-damaging HCFC-emissions. The air-conditioning sector is a fast growing sector in China with a huge impact on the global market as the majority of the world market is produced here. The predominant replacement options for HCFC-22 are hydrofluorocarbons (HFCs) which are ozone-friendly but contribute to global warming. Alternative, environmental-friendly technologies are urgently needed to avoid negative climate impacts. The natural refrigerant propane (R290) is ozone-friendly, has a negligible climate impact and also leads to energy savings due to its specific properties. China's industry is interested in introducing this new technology, but has some concerns regarding R290 due to its flammability. Furthermore, a regulatory framework with suitable standards for this technology is also still lacking.
Projections show that the global demand for air-conditioning will rise over the next decades, especially in developing countries. Currently about 105 million units per year are sold worldwide. More than one billion already installed units are serviced and refilled every year. A technology transition to climate-friendly refrigerants in the Chinese air-conditioning market would therefore also have an important positive impact on the global situation.

Project Description

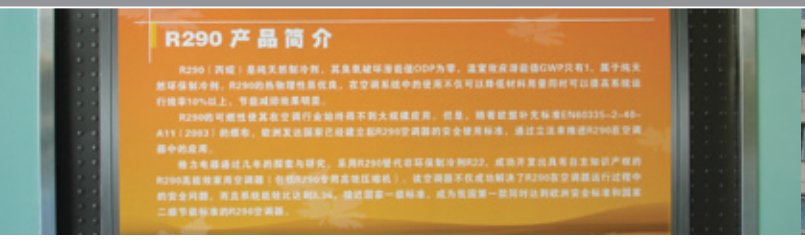
The project converted one production line of room air-conditioning systems of the Chinese manufacturer Gree Electric Appliances Inc. to use R290 instead of HCFCs and HFCs, thereby establishing a best-practice model. Gree is the biggest manufacturer of room air-conditioners worldwide with 35 million units manufactured per year. The newly designed units fully comply with European safety regulations.
The project also included comprehensive training for production and service technicians; this covered the responsible and safe handling of flammable refrigerants as well as maintenance of the equipment. In cooperation with technical institutions, training material has been produced and distributed. Several workshops facilitated an exchange of experience on the conversion process, with other companies also being invited to participate. Two other manufacturers of room air-conditioners (Haier and TCL) are also supported through provision of core technology elements such as hydrocarbon filling stations and technical assistance.
The project was implemented by GIZ Proklima under the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) in cooperation with the Chinese Ministry for Environmental Protection/Foreign Economic Cooperation Office (MEP/FECO) and the Chinese Household Electrical Appliances Association (CHEAA).
Within the immediately linked GIZ Proklima project on related standards, the Chinese Government and industry association were advised on how to develop and implement a climate-friendly sector-policy, including safety

On behalf of

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany



standards and related norms. The consultation process has been done in close collaboration with MEP/FECO, CHEAA, and relevant industry and policy stakeholders. This project encompasses three elements:

1. General advise on international standards on the application of natural refrigerants in room air-conditioning.
2. Development of a draft standard, based on elements of regulations and standards of other countries, but also acknowledging distinct Chinese elements. Intensive consultations with industry and policy stakeholders ensure that their views are reflected in the text and that the stakeholders support the standard development.
3. A final text for submission to the national standard commission and action plan on how to introduce natural refrigerants in close cooperation with MEP/FECO and CHEEA in the Chinese market.

Project Impact

Every sold unit of the new air-conditioners will permanently and sustainably reduce direct emissions of ozone-depleting HCFCs and climate-damaging HFCs.
For a production line with a capacity of 180,000 units per year a calculated amount of 500,000 tonnes CO_2e per year will be avoided compared to the previous R-22 units over the lifetime of the units.
Due to the specific properties of propane and a new system design, the new technology is about 15% more energy-efficient, which reduces indirect emissions of greenhouse gases and saves electricity costs for the consumer.
Through the technical assistance and safety training provided by the project, an innovative technology was introduced to the world market. Building on the acquired knowledge and experience in the project, the manufacturer Gree has developed additional equipment using R290 such as a portable room air conditioner and a humidifier. Other air-conditioning manufacturers in China and elsewhere are following suit and replicate the results of the project. The company Midea, which is among the top five producers in China, decided to start the manufacture of compressors specifically for hydrocarbon technology. This will lead to a wider diffusion of the hydrocarbon technology worldwide. A new standard on the use of hydrocarbons has been approved in China which will allow more companies to enter into this market with their units. Following the successful introduction by Gree, China has decided to convert 18 of 32 production lines to hydrocarbon technology under the Montreal Protocol's phase-out of HCFC.

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Programme Proklima

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany
T + 49 61 96 79 - 1022
F + 49 61 96 79 - 80 1022
E proklima@giz.de
I www.giz.de/proklima

Title Pilot production of climate-friendly room air conditioners and related standards in China
Country People's Republic of China
Sector AC industry
Objective Pilot conversion of room AC production in China from halogenated to natural refrigerants
Target Group Chinese manufacturer Gree Electric Appliances Inc., other manufacturers of air conditioners in China and in partner countries, the Chinese Household Electrical Appliances Association (CHEAA); Chinese Refrigeration and Air Conditioning Association (CRAA); technical institutes in China; technical committees of international environmental agreements
Project Executing Organization BMU (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
Implementing Partner Organization GIZ; Chinese Ministry of Environmental Protection/Foreign Economic Cooperation Office (MEP/FECO); Chinese Household Electrical Appliances Association (CHEAA)
Project Approval October 2008
Project Duration Until October 2012
Project Budget EUR 3,166,456
Funds The project is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety within the framework of the International Climate Initiative based on a decision of the German Federal Parliament.
Impact on the Ozone Layer and Climate Protection
One production line will produce 180,000 HCFC-free units per year. The replacement of the HCFC refrigerant will prevent about 1 million tonnes CO_2e of direct and indirect emissions during the lifecycle of the units produced in one year.
Contact Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Programme Proklima, Dag-Hammarskjöld-Weg 1-5, 65760 Eschborn, Germany
Email: bernhard.siegele@giz.de