



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION



ACTIVITY REPORT 2020

ACCORDING TO THE SUSTAINABLE DEVELOPMENT GOALS

. Introduction

The IIR is the only international organisation covering all refrigeration uses and technologies such as refrigeration for food and health, air conditioning, cryogenics, heat pumps or heat recovery. Its purpose is to disseminate information, contribute to the intensification of scientific and technical exchanges and encourage research and development towards sustainability in this sector. The goal is to deploy these technologies to the world for the benefit of humankind, as well as to improve existing technologies to address the threats of environmental damage and resource depletion.

The structure of the IIR ensures the quality and neutrality of its actions. It is essentially composed of two entities:

- The Executive Committee (EC) composed of delegates from its 59 member states (developed or developing countries), from all continents. The EC, which is extended every four years in the form of a general conference, validates the budgets allocated, the activity reports and ensures the elections of the Presidents and the General Director.
- The Science and Technology Council (STC), composed of the presidents of five sections and ten commissions, covering the different refrigeration applications and technologies:

Section A: Cryogenics and liquefied gases

Commission A1 : Cryophysics, cryoengineering

Commission A2 : Liquefaction and separation of gases

Section B: Thermodynamics, equipment, and systems

Commission B1 : Thermodynamics and transfer processes

Commission B2 : Refrigerating equipment

Section C: Biology and food technology

Commission C1 : Cryobiology, cryomedicine and health products

Commission C2 : Food science and engineering

Section D: Storage and transport

Commission D1 : Refrigerated storage

Commission D2 : Refrigerated transport

Section E: Air conditioning, heat pumps, energy recovery

Commission E1 : Air conditioning

Commission E2 : Heat pumps, energy recovery

Each of these commissions comprises from 20 to 50 members. Each one has its own area of expertise, which it puts at the disposal of the IIR, to write or review publications, organise conferences, launch studies, collect data, participate in projects.

The main actions of the IIR include:

- Data collection, especially the FRIDOC database, with more than 100,000 referenced documents on all the areas of refrigeration.
- Scientific publications, such as the International Journal of Refrigeration (IJR), the most prestigious scientific journal of the refrigeration sector, but also technical and techno-economic journal.
- Conferences, workshops, congresses, seminars organised by the IIR or with its participation.



These actions, undertaken in particular in the framework of working groups and research, training and assessment projects, make it possible to achieve the objectives set out below. They are conducted by the IIR network, composed of experts from its commissions, delegates, corporate and individual members, alone or in partnership with United Nations agencies and programs, other intergovernmental organisations, industry, or engineers' associations, at international, regional or national level.

1. ACHIEVEMENTS

The IIR's work is intrinsically linked to the Sustainable Development Goals (SDGs) because refrigeration is present in most past, present, and future areas of human activity and is absolutely necessary for life. Today, it accounts for nearly 20% of the world's electricity, a figure that is constantly increasing: the IIR's Informatory Note on «The role of refrigeration in the world economy» illustrates its importance in all areas.

1.1. BY SUSTAINABLE DEVELOPMENT GOAL (SDGs)

The IIR has defined its strategic axes of action according to the main sustainable development goals and strives to carry out its actions in an ever more efficient way. The IIR's actions can be grouped according to the Sustainable Development Goals as follows:

1.1.1. OBJECTIVES 1, 2,3: ERADICATING POVERTY AND HUNGER, ACHIEVE GOOD HEALTH AND WELL-BEING



Food security in each country is largely dependent on food losses throughout the food production and marketing chain. These losses are particularly important during the storage and transportation of foodstuffs in the case of developing countries. According to the latest available data, these losses are three times higher in these countries compared to developed countries and represent 20% of the available food quantity. These figures are to be compared with those of refrigeration capacity for warehousing, transport and domestic equipment, which is on average 10 times lower in developing countries.



In addition, maintaining food or health products (medicines, vaccines ...) at an appropriate temperature is an absolute necessity for human health, preventing bacterial diseases and deaths. Here again, the situation of developing countries that do not have adequate refrigeration equipment is a major source of health problems. Refrigeration is also increasingly used in surgery (cryosurgery), for diagnoses (scanners), for transplants and analyses (tissue, gametes banks ...).



Air conditioning is a necessity for maintaining good health, or even survival, in hot climates or during heat waves.

The actions of the IIR on these topics over the year 2020 were as follows:

- The publication of an Informatory Note on “The role of refrigeration in worldwide nutrition”,
- The publication of another Informatory Note on “Whole body cryotherapy”,
- The preparation, in cooperation with UN Environment, of an Informatory Note on the cold chain for vaccines, considering the challenges of developing vaccines against COVID-19 that can be stored at variable and sometimes very low temperatures,
- The dedication of the “World Refrigeration Day” on 26 June to the role of refrigeration for health, with the development of brochures and the organisation of webinars,
- The organisation of an international conference in Nantes (France) on the cold chain for food and health products, on site and by videoconference.

1. 1. 2. GOAL 7: CLEAN ENERGY AT AFFORDABLE COST



Refrigeration technologies are increasingly used to produce energy. Heat pumps are cooling appliances designed to use the heat produced or, when they are reversible, both for producing heat and cold for air conditioning. They consume electricity but can turn it into energy with a coefficient of performance greater than 3 and in this case, can be considered as a renewable energy. Their use is therefore constantly growing. Natural gas is the cleanest fossil fuel and its use is expected to continue to grow in the coming decades. The liquefaction of the gas allows it to be transported more flexibly than via a gas pipeline. Liquefied natural gas already accounts for more than 10% of gas consumption and is expected to account for almost 90% of the growth of long-distance gas trade by 2040.

Liquefied hydrogen is presented as an energy of the future and major national plans are being drawn up to develop it.

Renewable energies can also provide cooling: solar cooling, evaporative cooling even if these technologies are still little used.

However, solar refrigeration, which today is mainly produced from photovoltaic panels, is likely to develop rapidly and very significantly in hot countries.

The actions of the IIR in these areas during the year 2020 have been:

- The publication of a new Informatory Note on Solar Cooling,
- The signature of a partnership with the International Solar Alliance (ISA), the launch of a group of experts with ISA for the evaluation of solar cooling projects, the participation in several webinars with ISA and the setting up of projects in Africa,
- The publication of a technical guide on solar cooling,
- The participation in the steering of a Clim'Eco action set up by the French Refrigeration Association (AFF) with the support of the French Ministry for the Environment, aiming to implement energy-efficient air conditioning in the French overseas departments,
- The completion of a project funded by the European Commission on energy-efficient supermarkets (Supersmart),
- The extension of the European project on energy storage through cryogenics: CryoHub,
- The completion of a project funded by the United Nations Industrial Development Organisation



1. 1. 3. GOAL 13: MEASURES TO COMBAT CLIMATE CHANGE



Refrigeration accounts for 7.8% of global greenhouse gas emissions, 63% of which are due to direct emissions (leakage) of fluorocarbons (CFCs, HCFCs and HFCs) used as refrigerants and 37% to the production of electrical energy. necessary for the operation of the installations. These emissions are growing because of the growing needs for refrigeration. It was therefore normal for the IIR to make a special, intense effort to reduce these emissions by first providing the necessary analytical tools and disseminating information on the environmental impact of refrigeration, then improving energy efficiency and by using renewable energies (see 2), by limiting refrigerant leakage and modifying current technologies to use refrigerants that are less harmful to the environment or that do not contain refrigerants.

Concerning refrigerants, the actions of the IIR in 2020 have been:

- The continued promotion of training tools for refrigeration technicians so that they can safely use refrigerants with a low greenhouse effect: The Real Alternative for Life programme was the subject of webinars,
- The organisation of the Gustav Lorentzen International Conference on natural working fluids, online,
- The participation in the European Commission's consultation on the regulation of fluorinated gases (F-gas).

The IIR also continued to promote other technologies likely to provide a response to the environmental challenges of the many applications of refrigeration, in particular with the organisation of an international online conference on the Rankine cycle in 2020 and the creation of a file on nanofluids on the IIR website.

1. 1. 4. GOALS 4 AND 5: QUALITY EDUCATION AND GENDER EQUALITY

The IIR has posted a series of courses on its website, totalling 37 by the end of 2020, and has continued to promote courses on the training of technicians and their certification to use low-greenhouse-effect refrigerants, with a workshop held at the meeting of the parties to the Montreal Protocol in November 2020. 29 teaching programmes from our partners in the 5 continents are also offered.

The IIR continued to support the employment of young people in the refrigeration sector through two online meetings between students and professionals organised during the Chillventa trade fair in October and the Gustav Lorentzen conference in December 2020.

The IIR also organised a workshop on women in refrigeration with the Indian Refrigeration Association (ISHRAE) in October 2020.



1. 1. 5. GOALS 8 AND 9: DECENT WORK AND ECONOMIC GROWTH, INDUSTRY, INNOVATION AND INFRASTRUCTURE



The IIR continues to promote new technologies and innovations in the field of refrigeration. In this context, the IIR organised an online conference on the Rankine cycle in July 2020 with the UK and sponsored the annual Ibero-American Cytetf conference in November and the Serbian conference in December 2020, also online due to the COVID-19 pandemic. This pandemic led to the postponement of several conferences to 2021.

Also, despite the difficult circumstances, the IIR was keen to participate in trade fairs with our partners: Acrex in India, with ISHRAE in February 2020, and online with an exhibition with Shecco in September, Chillventa in October, Refcold in November.



The IIR has totally modified its information system and launched a new, more efficient website in April 2020. Thanks to this, visitors can now access richer and more accessible information and in particular thematic files that are better promoted (new file on nanofluids, for example).

Finally, the IIR has continued its terminology work, in partnership with various European, American and Asian associations so that the same terms are used for the same purposes: Five basic common terms, with their definitions in English, have been defined and promoted.

1. 1. 6. GOAL 17: PARTNERSHIPS FOR GLOBAL GOALS

The IIR's long-standing relations with the various United Nations bodies (FAO, UNIDO, UNEP, UNESCO, WHO, World Bank, etc.) have been accelerated in 2020 due to the global priority given to the cold chain for food and health.



World Refrigeration Day on 26 June 2020 was organised by the IIR, UN Environment, ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) and EPEE (European Partnership for Energy and Environment) in the form of a world seminar, but also with events in various other countries with the support of the IIR. The theme was food and health.

The IIR participated in several seminars organised by the Cool Coalition led by UN Environment. The project on energy efficiency of supermarkets in hot countries with UNIDO was successfully completed. Several contacts were made with the World Bank to set up sustainable cold chain projects in Africa and South Asia.

In addition, a partnership agreement was signed with the International Solar Alliance (ISA) to develop the use of solar energy in cold storage facilities for food and health products. The IIR has agreed to set up and co-lead the ISA expert committee responsible for validating future projects. Several projects are being set up with ISA.

Relations with the national refrigeration associations continued, notably with the establishment of service agreements with the French and Japanese associations.

2. THE IIR HAS ADAPTED ITS ACTIONS TO IMPROVE ITS EFFICIENCY IN THE CONTEXT OF THE SDGS

2.1. Overhaul of the IIR website

The IIR website has been completely redesigned. The new website has been operational since April 2020 and various improvements are gradually being made using its new functionalities. The new site has been simplified and is now adapted to all consultation formats, including mobile phones and tablets. Registration for IIR services can all be done online, and downloads have been made easier.



2. 2. Improved visibility of the IIR

The IIR has been present on LinkedIn and Twitter since 2016 and on Facebook since 2017. The number of its subscribers on these three media is growing steadily. About once a week, the IIR sends a Newsflash in French and English to its entire network, in addition to other information sent through more traditional channels such as the Newsletter or e-mailing campaigns.



The new visual identity of the IIR has been implemented on all its communication media.

2. 3. Services provided to a larger number of people

The overhaul of the IIR site has been an opportunity to provide more access to visitors, while at the same time ensuring access to the most complete and up-to-date documents for paying members as well as for members and services proposed by IIR member countries. In addition, agreements have been made with the French and Japanese refrigeration associations to provide their members with several IIR members-only online services at greatly reduced rates; this policy is being extended to other national associations.

2. 4. Commissions and working groups

Following the 2019 congress, new commission members have been appointed as of January 1, 2020, for a period of four years. Several commission meetings have been held online in 2020, despite the postponement of many conferences. The working groups have continued their actions, including writing and proofreading of Informatory Notes. A new arrangement has been set up to ensure the confidentiality of certain exchanges and data and to guarantee neutrality when, for example, representatives of competing companies participate in the same group (e.g., the group on the safety of refrigeration facilities).

2. 5. A renewed team

One person was recruited in 2020 to write documents and news. Several trainees came to assist the IIR in the drafting of Informatory Notes, which has been and will also be an important task of the IIR in 2021.

CONCLUSION

The IIR has clearly set its strategy and actions within the framework of the sustainable development of the refrigeration sector. In concrete terms, this has resulted in new agreements with various international bodies and the drafting of documents of general interest to promote the role of refrigeration in this perspective. In view of the COVID-19 pandemic, it has not been possible to maintain all the events scheduled for 2020, but a special effort has been made to maintain conferences and seminars using online tools as much as possible. Numerous actions are underway, particularly in terms of publications, which should be completed in 2021. Finally, the IIR has greatly improved the ways in which it disseminates its work, notably by setting up a new website, with new services for its members and the world community as a whole.

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