4. Activities and specific functions of existing or planned centres of excellence and testing centres

Armenia

The International Regional Centre of Excellence for Training and Certification located in Shirakatsy Lyceum in Yerevanis adequately equipped to demonstrate existing and emerging technologies to provide and ensure the development of certified academic programmes for the refrigeration servicing and manufacturing/assembling sectors, with special emphasis on the energy efficiency of proposed solutions.

Burkina Faso

The planned centres of excellence will notably:

- Strengthen the capacities of technicians from both formal and informal training systems;
- Contribute to the certification of refrigeration and air-conditioning technicians;
- Serve as national centres of excellence for sustainable cooling and good servicing practices;
- Support the dissemination of environmentally friendly and energy-efficient technologies.

China

Core functions and activities of Hefei General Machinery & Electrical Products Inspection

Institute (GMPI):

(1) Full-spectrum testing, covering residential, commercial, and industrial refrigeration and air-conditioning products;

(2) Global climate simulation, operating the world's only freely adjustable atmospheric pressure laboratory and the largest multi-split system and air-source heat pump laboratories; and

(3) International certification services, acting as an authorized laboratory of the Air-Conditioning, Heating, and Refrigeration Institute, serving Asia-Pacific exports to North America and Latin America, and as an authorized Keymark laboratory, serving exports to the European Union.

Colombia

1 *Center for Research and Development in Air Conditioning and Refrigeration (CIDARE), is in Bogotá.*

The center is focused on knowledge transfer, affiliated with the Colombian Association of Air Conditioning and Refrigeration (ACAIRE), providing information to meet the needs of organizations through project development, technology management, and innovation management, with the aim of delivering solutions in science, technology, and innovation to stakeholders in the refrigeration and air-conditioning sector and thermal districts. offers the following services:

- Training services on RAC and Thermal Districts topics,
- Technology transfer as intermediary services between the supply and demand for knowledge;

- Project structuring/consulting with technical expertise or capacity, supported by methodologies, standards, processes, and a professional team aligned with the objectives of each project.
- R&D&I Management Consulting: enhancing the coordination and execution of financial management processes, organizational training and intervention, innovation, and knowledge transfer.
- Supplier Network: a multi-stage consulting process to initiate and develop relationships with suppliers of goods and services that a company needs for its daily operations.

2 *Air conditioning and refrigeration research and development center (LPEA) is in Pereria.*

The institution conducts tests to tests to determine cooling capacity and the energy efficiency ratio in accordance with International Organization for Standardization standard 5151:2017 and its respective national equivalents, power consumption, and the cooling seasonal performance factor in accordance with International Organization for Standardization standard 16358-1:2013, on room-type air-conditioning units with cooling capacities of up to 10.55 kilowatts, equivalent to 36,000 British thermal units per hour. Tests include determination of the energy efficiency ratio for central split-type, packaged, precision, and ducted units with cooling capacities of up to 14.07 kilowatts, equivalent to 48,000 British thermal units per hour, and determination of sound pressure levels. The centre also provides consulting services in energy management, ventilation projects, building thermal systems, air conditioning, and refrigeration, and offers training courses in air-conditioning project management, the cold chain, energy management, and the fundamentals of Article 7 of Colombia's Technical Regulation on Labelling (RETIQ) and its test methods.

3 *Centre for Research, Development, and Quality in Refrigeration and Air Conditioning (CIRCLI) is located in Medellín, Colombia.*

The center has the following objectives:

- To serve as a benchmark of excellence in the generation of advanced knowledge, offering creative and innovative solutions, adopting a multidisciplinary approach, and through the training of qualified professionals and activities aimed at strengthening relationships of trust with users and clients;
- To develop products using new equipment and materials; and
- To evaluate refrigeration systems for food, medicines, and perishable goods, and to produce patents that serve as an international benchmark.

The centre has a laboratory where energy efficiency measurements can be performed on various pieces of equipment whose primary function is to generate cold, with the goal of investigating the significant impact that refrigeration and air-conditioning technologies have on quality of life, health conditions, and the environment. It aims to promote the use of refrigeration and air-conditioning systems that are simple in design and manufacture, energy-efficient, and environmentally friendly for the refrigeration, air-conditioning, and cold-chain industries. This centre also carries out training, research, and technology transfer activities, seeking to integrate efforts and resources among the university, businesses, and the government to establish the necessary scientific and infrastructure foundations for developing innovation strategies and technological solutions.

4 *System for Research, Innovation, and Technological Development (SENNOVA), located in Bogotá, Colombia.*

This system is part of the Servicio Nacional de Aprendizaje (SENA), the Colombian government's vocational training agency. Through this system, SENA implements its policy of contributing to the country's science and technology sector, strengthening local capacities in productivity, competitiveness, knowledge generation, and the relevance of the comprehensive vocational training it provides. Its structure is organized at the national level under the Vocational Training Department and is implemented locally across 118 training centres nationwide, operating through lines of action and mission-driven strategies.

At the executive and national level, the system reports to SENA's vocational training department, whose function is to formulate policies, allocate budgets, and align research projects with the needs of the national and regional productive sector.

At the training-centre level, the structure comprises the Centre Deputy Director, SENNOVA Facilitator, and research groups and incubators (in this particular case, SENA's Centre for Electricity, Electronics, and Telecommunications in Bogotá).

The program lines comprise the Research and Technological Development Line, which promotes applied research in training centres and the development of technologies that solve problems in the productive sector; the Research Training Line, which integrates research-based learning into the curriculum, developing scientific competencies through comprehensive vocational training programmes; and the Innovation and Technological Development for Businesses Line, which focuses on technology transfer, modernizing processes, and supporting innovation in the Colombian business sector.

Ecuador

Centro de Perfeccionamiento en el Uso de Refrigerantes (CEPUR), Escuela Politécnica Nacional (EPN), Quito:

- Serves as Ecuador's principal training centre for the refrigeration and air-conditioning sector;
- Provides continuous technical education and hands-on training for technicians;
- Delivers courses on refrigerant management, leak prevention, and recovery and recycling practices;
- Supports the implementation of national competency-based training programmes;
- Provides laboratory facilities for practical instruction and technical demonstrations;
- Strengthens national capacities related to sustainable cooling technologies and energy-efficient servicing practices.

Refrigerant Regeneration Pilot Centre, Escuela Superior Politécnica del Litoral (ESPOL), Guayaquil:

- Serves as Ecuador's first facility dedicated to refrigerant regeneration and reuse;
- Demonstrates environmentally sound refrigerant management practices;
- Receives, analyses, regenerates, and prepares recovered refrigerants for reuse;
- Provides practical training on refrigerant recovery and regeneration processes;

- Supports the implementation of circular-economy approaches within the refrigeration and air-conditioning sector;
- Functions as a technical demonstration platform for industry, technicians, students, and government stakeholders;
- Promotes the reduction of refrigerant emissions through proper recovery, regeneration, and reuse practices.

Jordan

The Sustainable Cooling Training Centre has been established to provide hands-on training for technicians working in the refrigeration and air-conditioning sector, using mainly household refrigerators and air-conditioning units as training equipment. The Energy Labelling Testing Laboratories perform energy efficiency testing, compliance verification, product performance evaluation, and energy labelling support, and also support regulatory authorities and manufacturers in ensuring compliance with national and international energy efficiency requirements.

Kenya

The National Industrial Training Authority (NITA), Mombasa, is the lead provider of training in refrigeration and air conditioning, among other training areas such as apparel technology and information technology, for engineering companies, State corporations, and county governments.

Liberia

Existing and planned centres of excellence for sustainable cooling and energy efficiency testing in Liberia are intended to serve as hubs for research and technology development, training and human capacity development, technology demonstration, standards development, policy support, and public awareness and community outreach. Liberia is still in the early stages of developing specialized cooling and energy efficiency testing infrastructure, but several institutions, policies, and regional partnerships already support these functions.

Mali

The specific activities and functions of the existing centres of excellence are primarily the theoretical and practical training of students. At the university and graduate-school level, the centres also engage in research and development, including scientific publications.

Nigeria

Activities and functions of the testing centre for energy efficiency include:

- Testing refrigeration and air-conditioning appliances for compliance before they are imported into Nigeria;
- Conducting random testing of appliances in the market and reporting on non-compliance based on the Minimum Energy Performance Standards;
- Providing baseline data as part of the monitoring and evaluation programme;
- Informing and educating the public on the energy performance of various refrigeration and air-conditioning models to assist with purchasing and decision-making.

Qatar

Advanced research and technology development

These centres focus on pioneering new cooling methods and high-efficiency prototypes. Qatar University functions as a research hub for targeted cooling and aerodynamic design; its activities include the use of three-dimensional modelling and wind tunnels to create micro-climate bubbles and the development of unpatented technologies that reduce energy consumption by 40 per cent. The GORD Academy focuses on the development and implementation of the Synergia 9-in-1 system, whose function is to provide hybrid cooling and ventilation solutions that adapt to weather conditions across diverse settings, from clean rooms to outdoor entertainment venues.

Operational utility and large-scale implementation

These centres focus on the commercial and urban delivery of sustainable cooling through infrastructure. Qatar Cool serves as a leading provider for major residential and commercial districts such as The Pearl and West Bay, and its primary activity is the delivery of cost-effective, centralized cooling services to high-density mixed-use developments. The EMCO District Cooling Plant operates centralized cooling grids, feeding chilled water through a network of insulated pipes to high-energy-demand areas, supporting sustainable urban growth at airports and university campuses.

Specialized and clinical cooling services

These centres provide critical cooling functions for essential public infrastructure. The West Energy Centre acts as the specialized cooling supplier for the Hamad Medical Corporation healthcare cluster, ensuring high-reliability, energy-efficient climate control for hospitals, surgical specialty centres, and emergency facilities.

Diverse application and knowledge-sharing

A key activity across these centres is the expansion of cooling technology beyond traditional buildings. Both the Qatar University and GORD Academy technologies are applied in non-traditional cooling roles, such as supporting local desert farms for summer crop cultivation and cooling open-air venues such as Katara Plaza. A specific function of the research at Qatar University is the promotion of unpatented technology, facilitating the adoption of sustainable cooling practices by other countries and businesses globally.

Slovak Republic

Since Slovakia does not currently have a formally designated centre of excellence for sustainable cooling, the following information relates to existing professional and technical capacities that support similar objectives. The Slovak Association for Cooling, Air Conditioning and Heat Pumps (SZ CHKT) and the associated certification body provide, in particular: training and professional preparation for persons working with refrigeration, air-conditioning, and heat pump equipment; examinations and certification related to fluorinated greenhouse gases; certification of companies handling fluorinated greenhouse gases; professional information and guidance for the refrigeration, air-conditioning, and heat pump sector; support for compliance with national and European Union requirements related to fluorinated greenhouse gases; activities contributing to the safe handling of refrigerants, leakage prevention, and proper servicing practices; and support for professional awareness regarding new technical and regulatory requirements, including alternative refrigerants. SZ CHKT also publishes information on training, examinations, certification, and reporting related to fluorinated greenhouse gases, heat pumps, and products

containing fluorinated greenhouse gases. These functions are relevant to the implementation of the Kigali Amendment because they help ensure that technicians and companies have the knowledge and qualifications necessary for the responsible management of refrigerants and for the transition to more climate-friendly cooling technologies.

Somalia

Planned activities for the National Ozone Office under the Ministry of Environment and Climate Change include:

(1) Technical training and capacity building, with centres of excellence serving as national hubs for skills development in the refrigeration and air-conditioning sector, including the development and delivery of competency-based training programmes for technicians, engineers, and policymakers; "train-the-trainer" programmes to scale national expertise; certification schemes aligned with international standards, such as the safe handling of low-global-warming-potential refrigerants; and hands-on training using real-world equipment for the installation, servicing, and maintenance of energy-efficient cooling systems; and

(2) Testing, certification, and energy efficiency verification, a core function of testing centres that includes the establishment of laboratories for performance testing of cooling equipment, verification of Minimum Energy Performance Standards and labelling schemes, quality assurance and compliance with international standards, and the development of testing protocols under Stage I of the Kigali Implementation Plan for the refrigeration, air-conditioning, and cold-chain technologies in Somalia.

South Africa

The functions of the centres listed above are as follows:

- Regional centre of excellence (Africa) — the Africa Centre of Excellence for Sustainable Cooling and Cold Chain: cooling research and development, testing, and training.
- Research centre — the Council for Scientific and Industrial Research: energy systems, testing, and modelling.
- National institute — the South African National Energy Development Institute: energy efficiency programmes.
- University centre — the University of Johannesburg: industrial energy-efficient technology.
- National testing laboratory — the South African Bureau of Standards Appliance Laboratory: appliance energy efficiency testing.

Türkiye

Türkiye does not currently have a formally designated centre of excellence for sustainable cooling. The existing capacity therefore mainly consists of public testing and conformity-assessment infrastructure and company-based research, development, and testing facilities relevant to refrigeration, heating, ventilation and air-conditioning, heat pumps, heat exchangers, data-centre cooling, and energy efficiency. The Turkish Standards Institution provides national laboratory capacity for testing, calibration, certification, conformity assessment, and standards implementation, including energy-related product testing, and forms an important public-sector basis for strengthening Türkiye's sustainable cooling and heating, ventilation, and air-conditioning testing ecosystem.

Company-based facilities also support relevant testing functions: Martek conducts commercial refrigeration tests, including temperature, performance, and energy consumption testing in line with standards such as International Organization for Standardization standard 23953; the Systemair Türkiye 365 Performance Center tests data-centre cooling units and air-handling units, including thermal, leakage, fan, and factory acceptance tests; Daikin's research and development laboratories conduct performance, capacity, seasonal efficiency, cooling and heating, airflow, and water-side tests for air-conditioning, heat pump, and fan-coil products; and Friterm's laboratories conduct performance and capacity tests for heat exchangers and heating, ventilation, air-conditioning, and refrigeration equipment, including prototype validation and air- and fluid-side measurements.

Tuvalu

Proposed centres are expected to establish local appliance testing capabilities, develop training programmes for refrigeration and air-conditioning technicians, and support building energy performance assessments. Their functions may include supporting regional Minimum Energy Performance Standards enforcement, conducting pre-compliance screening tests, providing certification support and technical advice, and serving as centres for innovation and applied research in sustainable cooling and energy efficiency.

United Kingdom

The Centre of Excellence approach supported under the Sustainable Cooling and Cold Chain Solutions programme is designed to deliver capacity building, technical assistance, and demonstration activities that directly support implementation of the Kigali Amendment through strengthened technical capability, support for compliance with regulatory frameworks, and creation of an enabling environment for market adoption of energy-efficient and low-global-warming-potential cooling solutions.

Training programme:

- Capacity building, including targeted training and technical assistance for technicians, farmers, policymakers and other stakeholders provide practical skills and foundation knowledge on cold chains. An example of past courses can be found at this link: ACES announces first courses of 2026. A list of upcoming training courses can be found at this link: Course Finder - the Clean Cooling Academy.
- Specialised technical training through delivery of targeted training models on advanced system management, including telemetry and remote monitoring, equipping technicians and operators with the skills to monitor system performance in real time, detect faults early and maintain reliable operation of cooling systems: ACES Launches Telemetry and Remote Monitoring Course.
- The train-the-trainer programme is one example where ACES aims to build impact of training and skills creation and disseminate skills and knowledge. More information on the train-the-trainer course can be found at this link: Train the Trainer Programme secured accreditation.

Testing and demonstration facilities:

- Equipment testing capabilities at ACES, including an Environmental Test Chamber. •

- Demonstrating technologies in the ACES Demonstration Hall, and through community engagement in SPOKE programmes. More about the capabilities of the ACES demonstration hall can be found at this link: ACES Demo Hall.
- Generating and applying analytical tools (e.g. virtual cold chain modelling and return-on-investment tools) to inform government decision-making, policy development and investment planning for sustainable cooling transitions.
- Testing and validating delivery and business models (e.g. through pilot and demonstration approaches) to generate evidence on effective approaches. The TBYB approach is one example of a business model being tested through the programme to unlock finance for communities to sustain cold chain solutions. A case study of the TBYB pilot with Lari Horticultural Cooperative can be found at this link: Lari Case Study. More information relating to finance and business models can be found at this link: Ustawi Afrika has become the second ACES SPOKE.

Wider operational support and capacity building:

- Recent F-gas certification/registration ensures that technicians meet recognised competency standards for the safe handling, installation, servicing and disposal of refrigeration and air-conditioning equipment, reducing leakage of HFCs. Read more about ACES becoming F-gas registered at this link: ACES has become officially F-Gas Registered.
- Development and application of operational frameworks, including standard operating procedures, risk management and maintenance systems, which support the effective and consistent operation of centres of excellence and enable replication in new contexts. •
- Disseminating knowledge, tools and best practices through digital platforms and networks, supporting wider access to training, resources and learning beyond physical centres.
- Regulatory and enforcement training including for customs and enforcement agencies to strengthen monitoring and control of refrigerant imports, including identifying non-compliance or prohibited substances and supporting safe handling practices: ACES trains customs and enforcement officers.

Collectively, these activities position centres of excellence as a practical delivery platform that can link policy, technical capacity, and market development, supporting reduced emissions and sustained implementation of the Kigali Amendment.

Zimbabwe

- Training and certification of refrigeration technicians on natural and low-global-warming-potential refrigerants;
- Research and innovation on sustainable cooling technologies;
- Testing of cooling appliances to verify compliance with Minimum Energy Performance Standards.