

Submission by Colombia

Reporting Form on national and regional initiatives supporting the implementation of the Kigali Amendment to the Montreal Protocol on substances that deplete the ozone layer, in accordance with Decision XXXVII/5.

Name of the Party: COLOMBIA

1. Please list the names and locations of existing centers of excellence for sustainable refrigeration and energy efficiency testing centers in your country or region.

Yes, there are four centers with complementary expertise that could form a Regional Center of Excellence for Latin America, as outlined below:

a. Center for Research and Development in Air Conditioning and Refrigeration (CIDARE), located in Bogotá, Colombia.

A center focused on knowledge transfer, affiliated with ACAIRE (Colombian Association of Air Conditioning and Refrigeration), 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 RAC sector and Thermal Districts. The services offered are:

- 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.

Website: <https://www.cidare.org>

b. Air Conditioning and Refrigeration Research and Development Center (LPEA), located in Pereira, Colombia.

LEAP is part of the *Universidad Tecnológica de Pereira*, a public institution. It has a laboratory equipped to conduct tests to determine cooling capacity, energy efficiency (Energy Efficiency Ratio, EER) in accordance with ISO 5151:2017 and its respective national equivalents, power consumption, and the seasonal performance factor CSPF (Cooling Seasonal Performance Factor) in accordance with ISO 16358-1:2013, on room-type air conditioning units with cooling capacities up to 10.55 kW, equivalent to 36,000 BTU/h.

Tests:

- Determination of the Energy Efficiency Ratio (EER) for central split-type, packaged, precision, and ducted units with cooling capacities up to 14.07 kW, equivalent to 48,000 BTU/h.

- Determination of Sound Pressure Levels (SPL).

The LPEA also provides consulting services in energy management, ventilation projects, building thermal systems (RITE- Regulations on heating systems in buildings in Spain), air conditioning, and refrigeration, and offers training courses in air conditioning project management, cold chain, energy management, and the fundamentals of RETIQ Article 7 regulations and test methods (RETIQ - Colombia's Technical Regulation on Labeling).

Website: <https://centrodelaboratorios.utp.edu.co/facultad-de-ingenieria-mecanica/laboratorio-de-ensayos-para-equipos-acondicionadores-de-aire/>

c. The Center for Research, Development, and Quality in Refrigeration and Air Conditioning (CIRCLI), located in Medellín, Colombia.

CIRCLI is part of the *Universidad Pontificia Bolivariana* (a private institution) and 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 our users and clients.
- To develop products using new equipment and materials.
- To evaluate refrigeration systems for food, medicines, and perishable goods, and to produce patents that serve as an international benchmark.

The center has a laboratory where energy efficiency measurements can be performed on various pieces of equipment whose primary function is to generate cold. The goal is to investigate 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 center 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.

Website: <https://www.upb.edu.co/es/investigacion/nuestro-sistema/centros/centro-circli>

d. 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 provided by the institution.

Its structure is organized at the national level under the Vocational Training Department and is implemented locally across 118 training centers nationwide. It is organized operationally through lines of action and mission-driven strategies. And its structure has several levels, as described below:

- **Executive and National Level:** Reports to SENA's Vocational Training Department. Its function is to formulate policies, allocate budgets, and align research projects with the needs of the national and regional productive sector. **Training Center Level:** Center Deputy Director + SENNOVA Facilitator + Research Groups and Incubators. (In this

particular case, the SENA Center for Electricity, Electronics, and Telecommunications (CEET) in Bogotá)**Program Lines:** Research and Technological Development Line (Promotes applied research in training centers and the development of technologies that solve problems in the productive sector) + Research Training Line (Integrates research-based learning into the curriculum, developing scientific competencies through comprehensive vocational training programs) + Innovation and Technological Development for Businesses Line (Focused on technology transfer, modernizing processes, and supporting innovation in the Colombian business sector)

- **Strategies and Infrastructure:** Specialized Laboratories (regeneration center: Website: <https://electricidadelectronicaytelecomu.blogspot.com/p/servicios-tecnologicos.html>)

Website: <https://www.sena.edu.co/es-co/formacion/paginas/tecnologia-innovacion.aspx>

SENNOVA Portal: <http://sennova.senaedu.edu.co/>

2. Are there plans to establish a center of excellence for sustainable refrigeration or energy efficiency testing centers in your country or region?

Yes, it is in the interest of Colombia's NOU to establish a Regional Thematic Center joining the function of different centers to coordinate the activities of each of the centers as a service network for the entire region.

It should be noted that, Colombia has implemented initiatives related to some activities offered by a Thematic Center. For instance: ACAIRE has launched training initiatives for several ozone units in the region. It offers a comprehensive academic program in which engineers from across Latin America participate.

GIZ, through its Proklima program, has expressed interest in establishing Colombia as a regional hub for training in natural refrigerants. To this end, and in coordination with SENA, steps have been taken to identify the main barriers and define solutions to overcome them. Likewise, Proklima recently conducted a survey with the NOUs in the region to assess potential demand in the event of the launch of training programs in the country, yielding highly positive results.

With UNDP support, CIDARE has received technical assistance through the provision of a mobile CO₂ training unit and has developed several consultancies for project preparation.

3. Describe the policies implemented in your country/region that support the creation and operation of such centers of excellence for sustainable refrigeration and energy efficiency testing centers.

To establish a Research and Development (R&D) Center in Colombia, it must be legally incorporated, have a scientific staff in place, and be accredited by the Ministry of Science, Technology, and Innovation (MinCiencias).

The Colombian regulatory framework allows for the creation of autonomous centers (with legal personality) or dependent centers (affiliated with entities or universities).

Key steps and requirements for establishing an R&D Center:

- **Bylaws and Constitution:** The center must be formally established through a private document or public deed if it is autonomous, or through an administrative act/internal bylaw if it is dependent.

- **Human Capital and Research:** It is mandatory to demonstrate the participation of at least one research group categorized as A1, A, or B by MinCiencias.
- **Infrastructure:** The center must have physical facilities, technological equipment, and demonstrate financial stability (including funding projections) to execute projects.
- **Prior Experience:** The center must have been in operation for at least two (2) years before applying for official recognition.

Policies to support these centers include:

- **R&D Tax Benefits:** Companies that invest in or establish R&D centers in the country are eligible for income tax deductions and tax credits.
- **Project Funding:** You can apply for co-financing calls and submit eligible projects through the Ministry of Science, Technology, and Innovation.

4. Describe the specific activities and functions of existing/planned centers of excellence for sustainable refrigeration and energy efficiency testing centers.

See answer 1.

5. Share the main lessons learned, including best practices and challenges encountered in establishing or operating centers of excellence for sustainable refrigeration and energy efficiency testing centers.

Among the principal challenges identified, several structural issues merit particular attention. First, ensuring financial sustainability remains a critical concern, as the demand for services provided by the center is not constant, thereby requiring stable and permanent cash flow to guarantee continuity. Second, the retention of highly qualified personnel poses difficulties, given that professionals often encounter more competitive salary opportunities within the productive sector, which can undermine institutional stability. Third, the innovation component faces limitations, largely due to the characteristics of the region, which is predominantly composed of consumer countries with limited manufacturing capacity. This structural condition, coupled with the complexities associated with patent development, restricts the potential for advancing innovation at the desired scale. Addressing these challenges will be essential to strengthen the long-term viability and impact of the center.

As a key lesson learned, the importance of establishing clear coordination mechanisms, roles, and responsibilities from the early stages, as well as effective communication channels among the various stakeholders involved, is highlighted.

Likewise, coordination among training institutions, ozone units, and international partners will be a key element in strengthening the technical and operational sustainability of the centers, allowing for the optimization of resources, expansion of regional coverage, and a more effective response to the sector's needs.

6. Provide any supporting documentation (e.g., policy documents, reports, links to websites, etc.)

Ministry of Science, Technology, and Innovation (MinCiencias):
<https://minciencias.gov.co/ministerio/sobre-minciencias>

Colombia's Technical Regulation on Labeling:

<https://www.minenergia.gov.co/es/misional/energia-electrica-2/reglamentos-tecnicos/reglamento-t%C3%A9cnico-de-etiquetado-retiq/>

7. Any other information: NA