THE UNIVERSITY OF DOUALA − CAMEROON
ADVANCED TEACHERS TRAINING COLLEGE FOR TECHNICAL EDUCATION (ENSET)
THERMAL AND ENVIRONMENTAL RESEARCH LABORATORY (LATE)

Head: Alexis Kemajou
Secretary: Koumi Ngoh
Author: Alexis Kemajou

POB 1872 Douala Cameroon
E-mail: kemajoualexis@yahoo.fr
Tel: (327) 77 76 74 80
E-mail : laboenergy@yahoo.fr

Brief presentation of the laboratory

Energy efficiency in buildings and industries while respecting the environment and standards of thermal comfort. Seeking renewable energy sources as to contribute to the reduction of energy crisis in building and industries. Present the realities of industrial ecology in Cameroon and energy in particular.

Staff

− 1 associate professor.
− 4 lecturers.
− 8 doctorate students and 4 Diplome d'Etude Approfondies (DEA) students.

Objectives

1. To further research on the dynamic behaviour of buildings in the hot climate and contribute to putting in place energy standards.
2. To further knowledge in energy production by using renewable energy sources and bio fuels.
3. Diffuse the principles and methods of industrial ecology in developing countries and Cameroon in particular.

Research orientation

− Thermal science for buildings: thermal comfort in buildings.
− Renewable energies: bio fuel, solar energy and bio energy.
− Energy efficiency in buildings and industries.
− Environmental management – waste − Clean Mechanism of Development (CDM) − industrial ecology.
− Commercial and industrial refrigeration.
− Refrigerated preservation of perishable foodstuffs (animal and vegetable).
− Drying and storing of meat, fish and farm crops.
− Study of efficient techniques for the conservation of food stuffs in the hot tropical zone by respecting the cold chain.
− Develop other systems of producing cold noble for the environment.

Articles

− Design of software for cooling load calculation in air-conditioning.
− Design of software for refrigeration load calculation.
− Published two source books in refrigeration and air conditioning system in sub Saharan Africa.
− Research publications: 12 articles published in international research journals.

External scientific collaboration

- 2ie – Département Energie pour le développement Rural – Ouagadougou (Department of Energy for Rural Development).
- ENSP – LAEN Yaoundé Cameroun (National Polytechnics – Energy Laboratory).
- International Institute of Refrigeration (IIR/IIF) – Member of the E1 commission (Air Conditioning) and E2 (Heat pump and energy recuperation) of the I.I.F Paris.
- Calls for collaboration with others laboratories working in the same research orientations.

Source of financing

− Consulting and design engineering for companies and industries by members of the Laboratory: design and realisation of food driers, with heat pump machine.
– Energy Audits in buildings and industries, organization of vocational trainings.
− Design and construction of small and medium bio diesel processors.
− Design and construction of refrigeration systems (commercial and domestic use).

Results obtained

Support for development

− Bio fuels: Production of bio diesel to supply the diesel engines of electricity power generation in rural areas.
− Putting in place of a "Tropical Cooling Well" for the refreshment of buildings in the tropical climate zone through underground air duct.

With industries

− Development of energy efficiency program with industries in Douala.
− Putting in place of an experimental site for the production of biogas with the help of HYSACAM Company.
− Vocational training on recovery, recycling and regeneration of CFC's refrigerants prohibited by the Protocol of Montreal.

Experimental materials

− An experimental (scale model) direct expansion air handling units with a duct system (round and rectangular) in galvanised steel sheets.
− Scale model of reversible heat pumps.
− Direct Digital Control (DDC) unit controller.
− A complete numerical data acquisition system comprising the DAQ card, transmitter, resistance and thermocouple temperature sensors, humidity, pressure and velocity sensors.
− A tool set for fiberglass and galvanised steel sheet duct construction.
− A refrigerant recovery, recycling, regeneration and destruction machine.
− Mercury and digital thermometer, hygrometer, scale balance, manometers.
− A Pitot Tube for dynamic and static pressure measurement.
− Biogas production system from household waste and a digital biogas analyzer.
− A test bench for pressure drop (due to line friction, fitting and valves) in refrigerant lines.
− Test bench of refrigeration cycle and refrigeration troubleshooting.