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## Opening of a Post-Doctoral Researcher position (12 months)

### 'Modeling liquid desiccant cycles for building comfort'

**PROJECT FULL TITLE:** Sustainable Air Conditioning Using Desiccant Membrane System

**Project acronym:** SOL-COOL-DRY

**Project reference number/submission ID:** ERANETMED\_ENERG-11-138

#### **Context:**

Hybrid sustainable air-conditioning displacement ventilation (DV) system is proposed and uses a novel liquid desiccant (LD) cycle with porous membrane material (DM) for indoor dehumidification using ceiling mounted layout and a tower bed for desiccant regeneration. It is intended to totally power the proposed air conditioning system by renewable energy. The cooling capacity of the system is constrained by its upper limit  $100 \text{ W/m}^2$ . To increase the load capacity of the integrated system, the proposed system will be integrated with a ductless personalized ventilator (PV) to bring fresh cool air from the floor level to the breathing level of the occupant. The PV will also improve the breathing air quality and would reduce the required energy to operate the system especially in the absence of any natural heat sink.

Conventional liquid desiccant cycles dehumidify the air before supplying it to the indoor space, while the proposed cycle absorbs the humidity directly from indoor space using a ceiling permeable membranes acting as a dehumidifier cooled ceiling panel. In order to reduce the sensible load that might be added to the indoor space and to increase the potential of the desiccant to absorb moisture, the liquid desiccant is cooled using the available heat sink, before it enters the space to be dehumidified. An integrated mathematical model of the solar-regenerated-desiccant membrane with the DV space model and the personalized ductless ventilator (PV) will be developed to study the feasibility and efficiency of the proposed cycle. Experiments will be conducted to validate the models of the dehumidifier permeable membrane, tower-bed desiccant regenerator, personalized ventilator and the integrated models. The current system will be compared to the conventional technology to determine system energy performance and life cycle costs in the presence\absence of the ductless personalized ventilator.

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**Work to be done at CETHIL by the post-doc:**

Full-system model

- Integrated Mathematical Model for the assessment of system performances and selection of best operating conditions
- Validation of the full model
- **Optimization and investigations tasks** : Use the validated model to predict performance of the system utilization for different case studies in project partner countries
- Develop training material and recommend best practices for sustainable air conditioning

**Position availability:** The position is as available currently, and the call for candidates will be open until the position is filled.

**Administrative framework and location:** The candidate will be hired by University Lyon 1. The work is to take place in Lyon (France), at the Centre for Energy and Thermal Sciences (CETHIL) in the “Thermique du Bâtiment dans son Environnement” group. The laboratory is located in the National Institute of Applied Sciences (INSA) on the Campus La Doua – LyonTech of Université de Lyon ( [www.universite-lyon.fr](http://www.universite-lyon.fr) ).

**Net salary:** around 2000€/month, according to the University scale.

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**Please send your resume, publication record and the name of two references by email to Prof. Virgone.**