الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي
جامعة قسنطينة 1 – الإخوة منتوري
كليـــــــــة العلوم الد قيـقة

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Constantine 1 University – Frères Mentouri
Faculty of Exact Sciences

ANNONCE DE SOUTENANCE

Conformément à la décision n° **109** du **26 Novembre 2025** autorisant la soutenance d'une thèse de doctorat, le Vice-doyennat chargé de la post-graduation, de la recherche scientifique et des relations extérieures, a n n o n c e la soutenance publique d'une thèse de doctorat le :

Mardi 27 Janvier 2026 à 16H00

Lieu : Salle de conférences sise au Campus Chaab erssas - Constantine 1 – Frères M e n t o u r i .
F i l i è r e : PHYSIQUE
Spécialité : Energies Renouvelables

Doctorante : **LAHMER Yousra**

Sur le thème : « Dimensionnement et modélisation d'un système hybride pour la production d'é l e c t r i c i t é » .

Devant le jury :

	Nom et prénoms	Grade	Etablissement d'appartenance
Président	DJEZZAR Mahfoud	Professeur	Université Constantine1, Frères Mentouri
Directrice de thèse	**CHAKER Abla**	**Professeure**	**Université Constantine1, Frères Mentouri**
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Abstract

The integration of renewable energy systems in the built environment represents a strategic solution to the growing energy demands of cities. This thesis aims to design, model and evaluate a hybrid photovoltaic system with pumped hydro storage (PHS) in a high-rise residential building under Mediterranean climate conditions.

The system studied is dimensioned on the basis of actual energy consumption data and local climatic conditions in the city of Oran, Algeria. A mathematical model is developed using Fortran, integrating energy losses and a smart energy management strategy. The results show that the photovoltaic system generates 210 MWh annually, covering 40% of the building's electricity needs. The integration of hydraulic storage improves this coverage by 15%, raising the self-sufficiency rate to 46%, thereby reducing dependence on the public grid, particularly during peak consumption periods. Additionally, the storage system handles around 50% to 70% of peak evening consumption, with 60% efficiency.

In economic terms, the system has a payback period of 8.5 years in the most favorable scenario, and a net present value of €94 904. The environmental impact of the photovoltaic-pumped hydro storage system (PV-PHS) is also significant; it reduces CO_2 emissions, with up to 81 tones avoided per year compared with a conventional natural gas-based system.

This study highlights the potential of PV-PHS hybrid systems to enhance the integration of renewable energies in urban environments. It highlights their ability to improve energy self-sufficiency and reduce carbon footprints, thus contributing to the transition towards more sustainable solutions.