MASTER **SOLAR ENERGY:**
Engineering and Economics

1. Overview of the master program
2. How to apply ?
3. Excellence scholarships
4. Questions / discussions

« Solar Academy » Master program Team

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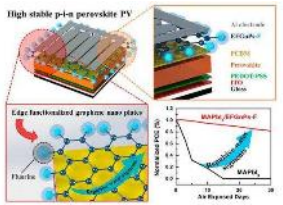
Challenges for solar energy

POWER GENERATION | **INTEGRATION AND USE** | **MITIGATING CLIMATE CHANGE**

PV – solar cells



Smart Grids and Storage

Built environment

Transportation and mobility

EUR Solar Academy

Sustainable Society

Solar energy :
1070 10^{15} kWh >> 0,133 10^{15} kWh
(Word energy use)
5.000 km^2 of PV
= 50% of built surface
= French electricity consumption.

Mixed with other zero carbon ressources

Buildings : 43% of national energy use

Urban growth and densification
2/3 world population by 2050

Cities :
60% to 80% world energy consumption
75% of GHG emission

PROGRAM :

ESBC : ENERGY FOR SOLAR BUILDINGS AND CITIES

- **Energy efficiency** and energy management in **buildings** and in **urban** environment
- Different **solar systems and technologies** (PV, thermal...)
- **Design** and **operation** of different energy systems
- **Modeling** and simulation tools

Common classes ~50%

PROGRAM:

SoLEM : SOLAR ENERGY, LAW ECONOMICS AND MANAGEMENT

- **Economic** and **prospective modeling** and predictive analyses,
- Evaluating **costs and benefits** of a **project** or of a **policy**,
- **Energy law and energy contracts**
- **New business models**

Common skills:

Technical, **economic** and **legal** bases **Research** and **Innovation**

National and **international stakes** **Pluridisciplinary international** environment

- Example : S7

	ESBC	SOLEM
UE1	Core Solar (Application)	Core Law
UE2	Core building	Core Economics
UE3	Advanced physics and transfer modelling	Quantitave Analyses
UE4	Introduction to SOLEM	Introduction to ESBC
UE5	Sustainability for energy transition	
UE6	Introduction to research	

Language classes : FLE (French as Foreign Language)

OVERALL ORGANIZATION

- 2 years – 4 semesters

Number of students:
~20 in ESBC
~10 in SOLEM

Year 1
- S7 September – January / classes at **University**
- S8 February – June / classes at **University**

Year 2
- S9 September – January / classes at **University** or **INTERNATIONAL** MOBILITY (term abroad)
- S10 February – September / 4 to 6 months **Internship** + **Master thesis** (company or research)

High « **success rate** » :
Once admitted, more than 80 % students succeed !

AND AFTER THE MASTER ?

- Energy management and sustainable development consultant
- Head of renewable energy projects
- Energy efficiency project manager
- Project manager in the field of solar energy
- Expert in a company or a local authority
- Engineer in charge of building/energy projects
- Research and development
- PhD
- …

How can health problems and social norms affect people's adoption of climate change?

UNIVERSITÉ SAVOIE MONT BLANC

Energy carrier for the mobility and buildings in an urban area: technical and economic analysis of hydrogen

PhD Grant

Energy production using solar thermal collectors

IRDL Institut de Recherche Dupuy de Lôme UMR CNRS 6027

greenyellow

Photovoltaic developpment

DASSAULT SYSTEMES

Project Manager Sustainable Development / Climate/ CSR

PLENETUDE MAÎTRISE D'ŒUVRE

HVAC Engineer

Solar Design Engineer

Laketricity

1st graduates

International perspective

- 100 % of classes in English
- Several national and international experts as teachers
- More than 12 nationalities represented in 2023-2024

Short mobility programs (1 week / 1 month)

Co-funded by the Erasmus+ Programme of the European Union

Université Européenne

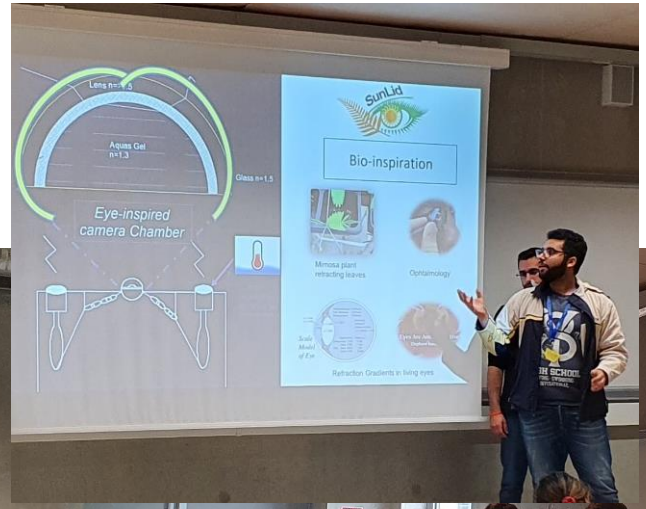
INTERNATIONAL MOBILITY - S9 (2023-2024)

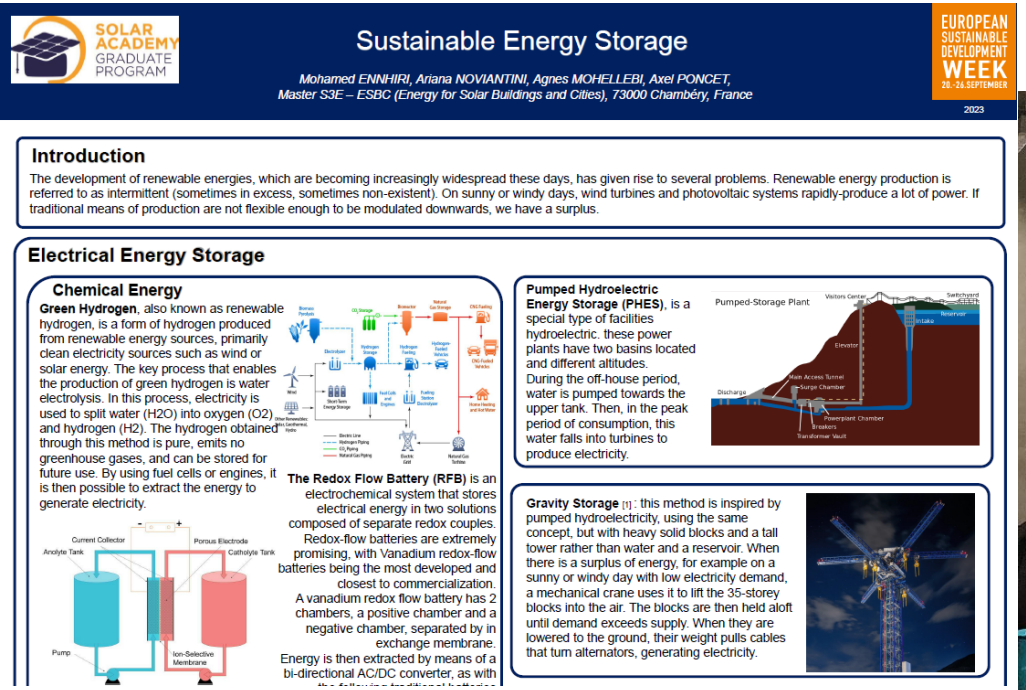
(semester abroad)

- Double Degree (ESBC) Univ. Genoa Italy
- FH Aachen University of Applied Sciences, Germany
- Universität Kassel, Germany
- Universidad de Sevilla, Spain
- Universidad de Zaragoza, Spain
- Norwegian University of Science and Technology NTNU,

Regular Classes + Events

- Thematic weeks
- Poster presentations
- Innovation challenge





SOLAR ACADEMY GRADUATE PROGRAM

Sustainable Energy Storage

Mohamed ENNHIRI, Ariana NOVIANTINI, Agnes MOHELLEBI, Axel PONCET,
Master S3E – ESBC (Energy for Solar Buildings and Cities), 73000 Chambéry, France

EUROPEAN SUSTAINABLE DEVELOPMENT WEEK 20.-26.SEPTEMBER 2023

Introduction

The development of renewable energies, which are becoming increasingly widespread these days, has given rise to several problems. Renewable energy production is referred to as intermittent (sometimes in excess, sometimes non-existent). On sunny or windy days, wind turbines and photovoltaic systems rapidly-produce a lot of power. If traditional means of production are not flexible enough to be modulated downwards, we have a surplus.

Electrical Energy Storage

Chemical Energy

Green Hydrogen, also known as renewable hydrogen, is a form of hydrogen produced from renewable energy sources, primarily clean electricity sources such as wind or solar energy. The key process that enables the production of green hydrogen is water electrolysis. In this process, electricity is used to split water (H2O) into oxygen (O2) and hydrogen (H2). The hydrogen obtained through this method is pure, emits no greenhouse gases, and can be stored for future use. By using fuel cells or engines, it is then possible to extract the energy to generate electricity.

The Redox Flow Battery (RFB) is an electrochemical system that stores electrical energy in two solutions composed of separate redox couples. Redox-flow batteries are extremely promising, with Vanadium redox-flow batteries being the most developed and closest to commercialization. A vanadium redox flow battery has 2 chambers, a positive chamber and a negative chamber, separated by in exchange membrane. Energy is then extracted by means of a bi-directional AC/DC converter, as with

Pumped Hydroelectric Energy Storage (PHES), is a special type of facilities hydroelectric. these power plants have two basins located and different altitudes. During the off-house period, water is pumped towards the upper tank. Then, in the peak period of consumption, this water falls into turbines to produce electricity.

Gravity Storage [1] : this method is inspired by pumped hydroelectricity, using the same concept, but with heavy solid blocks and a tall tower rather than water and a reservoir. When there is a surplus of energy, for example on a sunny or windy day with low electricity demand, a mechanical crane uses it to lift the 35-storey blocks into the air. The blocks are then held aloft until demand exceeds supply. When they are lowered to the ground, their weight pulls cables that turn alternators, generating electricity.

Regular Classes + Events

Research projects

« Solar trip »

João Carlos Villela Dutra
Ahmed Yassine Jedir

Promes, 2-3/05 2024

POSSIBILITIES OF EXCESS PV PRODUCTION DONATION TO MITIGATE ENERGY POVERTY
MASTER S3E

Joao Carlos Villela Dutra[1], Ahmed Yassine Jedir[2]
[1]Solar Academy, Chambéry, France
[2]Université Savoie Mont Blanc, Chambéry, France

Abstract

Energy poverty (EP) or fuel poverty has been defined by the International Energy Agency as the lack of access to electricity and reliance on fossil fuels to cook, especially kerosene, ethanol and plant oil (International Energy Agency et al, 2010). It can be also seen as the scarcity of adequate, reliable, safe and affordable sources of energy to meet the energy needs of a household. It basically concerns space heating, cooling systems, water heating, lightning, cooking and the refrigeration system.

For this study, in order to define energy poverty, the qualitative approach was chosen. There are two ways that

heating methods to make their dwellings warmer. The use of ovens and space heaters powered by fossil fuels not only increases the risk of fire, injury and pollute the environment, but also compromises one's respiratory system and impacts their cognition function (Sonal Jessel et al, 2019).

To this day, it is not possible to define quantity indicators for fuel poverty since each country has its particularities, especially different policies and energy providers. However, it is not the lack of knowledge when it comes to EP that is problematic, but rather the absence of a systematic and quantifiable way to monitor EP across the European continent (BOUZAROVSKI et al, 2019).

- ✓ *Implementing solar energy in vernacular Buildings : pluridisciplinary approaches*
- ✓ *Solar deployment in urban and mid-mountain areas*
- ✓ *Coupling between air/water heat pump and photovoltaic installation*
- ✓ *GDPR and Power Purchase Agreement*

OUR STUDENTS

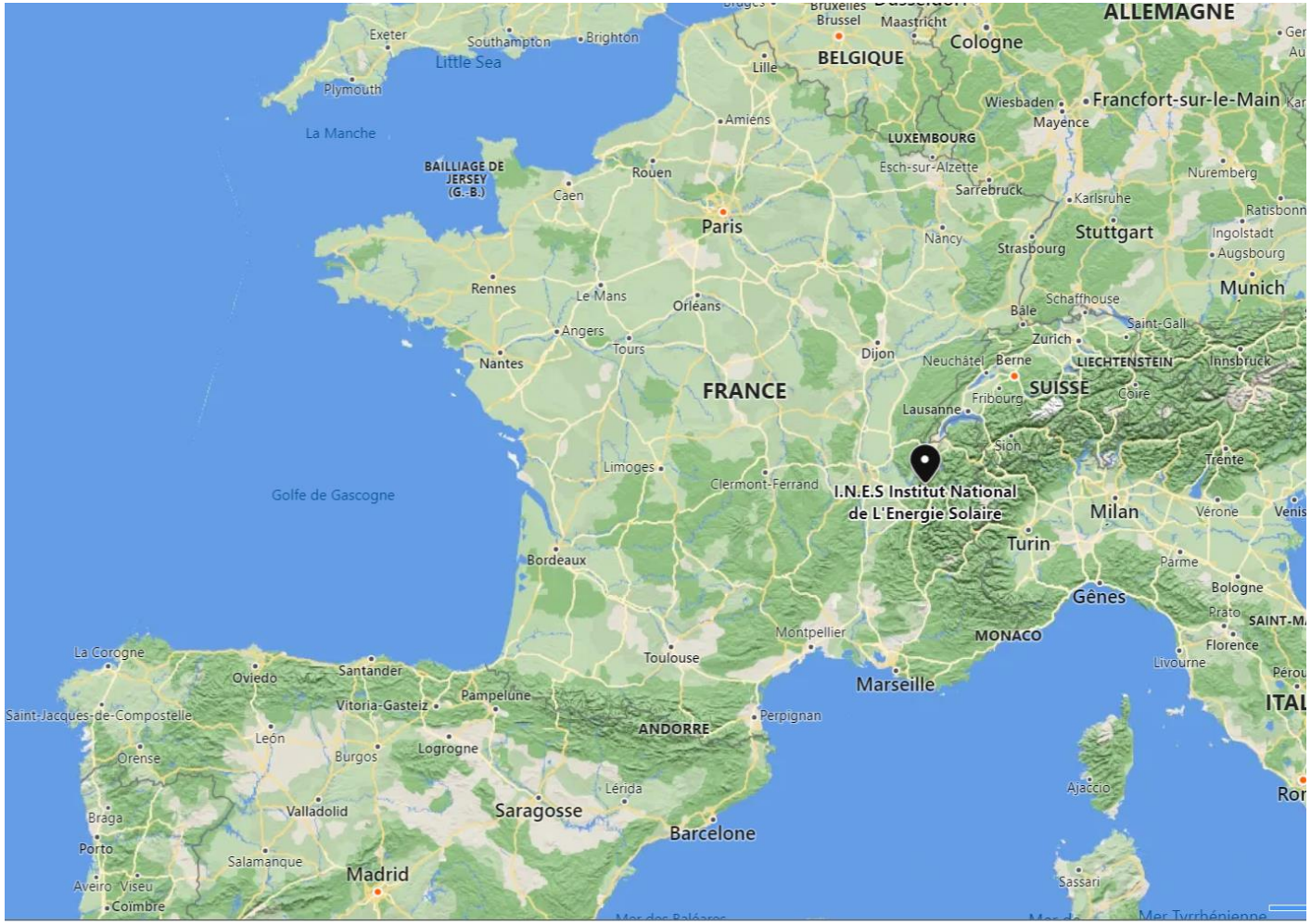
International group:
Algeria, Argentina, Ecuador, Egypt, France, Indonesia, Iran, Lebanon, Morocco, Nepal, Pakistan, Russia, Tunisia, Senegal, Soudan, Zimbabwe ..

Plurisciplinary group

Bachelors in:
- Energy engineering,
- Mechanical Engineering,
- Physics,
- Civil Engineering,
- Electrical Engineering,
- Chemical Engineering
- Economics,
- Urban and Territorial planning,
- Law
- Management

…

WHERE WE ARE ?

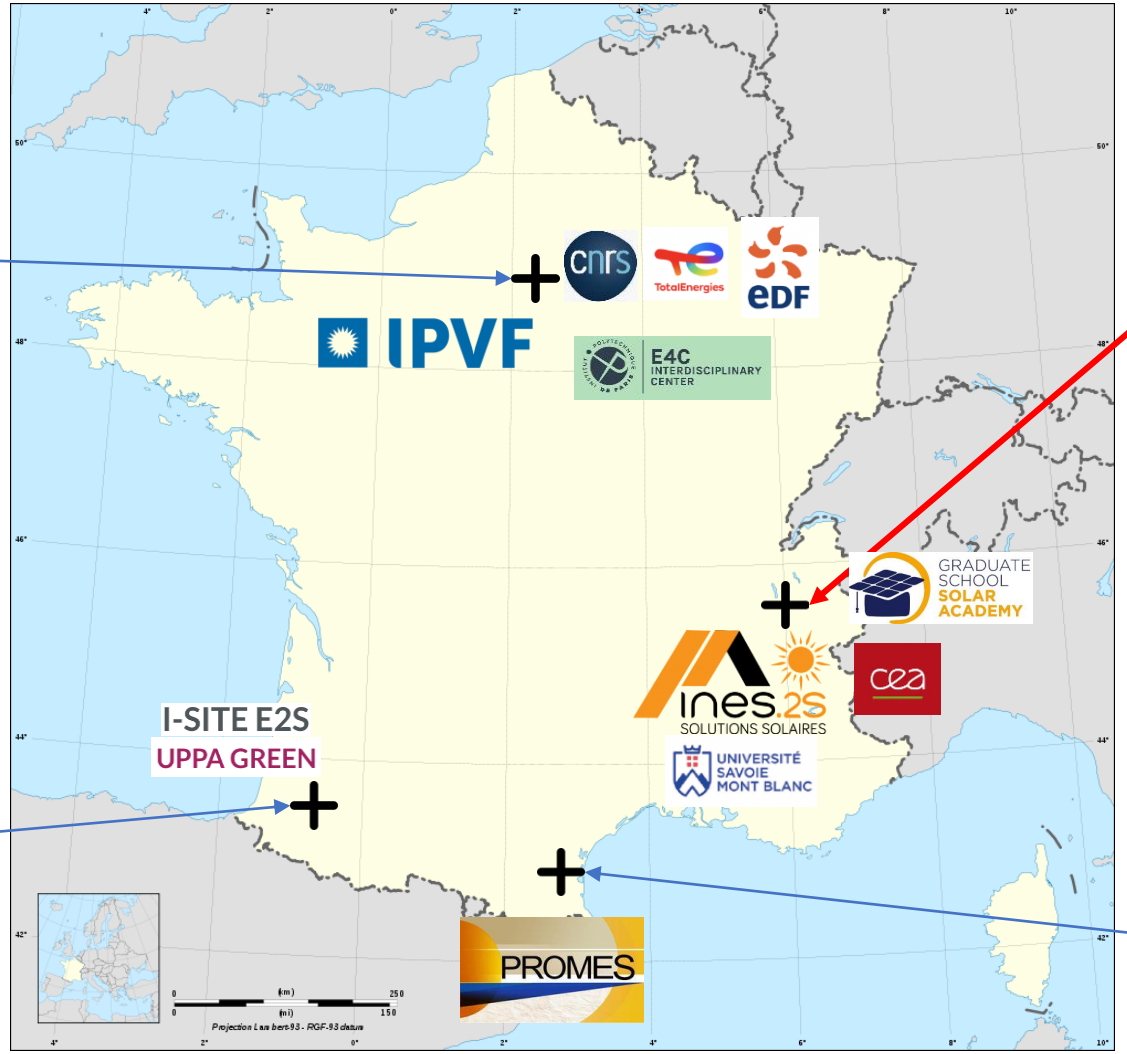


Université Savoie Mont Blanc
Le Bourget-du-lac campus
Close to Chambéry

Graduate Schools, ITE , I-Site on « Energy »

Material Science – future PV

Ile de France



Solar Integration from building to cities

Unique experimental platefrom

Energy and Environnement

Solar Concentrated Power

APPLICATIONS

CAMPUS FRANCE/"ETUDES EN FRANCE"

(https://www.campusfrance.org/en)

Foreign students – You are not a national / student of the EEA or Switzerland and you wish to study at the University of Savoie Mont Blanc.

Application November 2024 / Early 2025 (depending on country – check relevant deadlines) !

Mon Master

French students or students from the European Economic Area

Application in spring 2025

Application:
- academic file (topics + grades + CV)
- motivation (personal statement + interview in English, spring 2025)

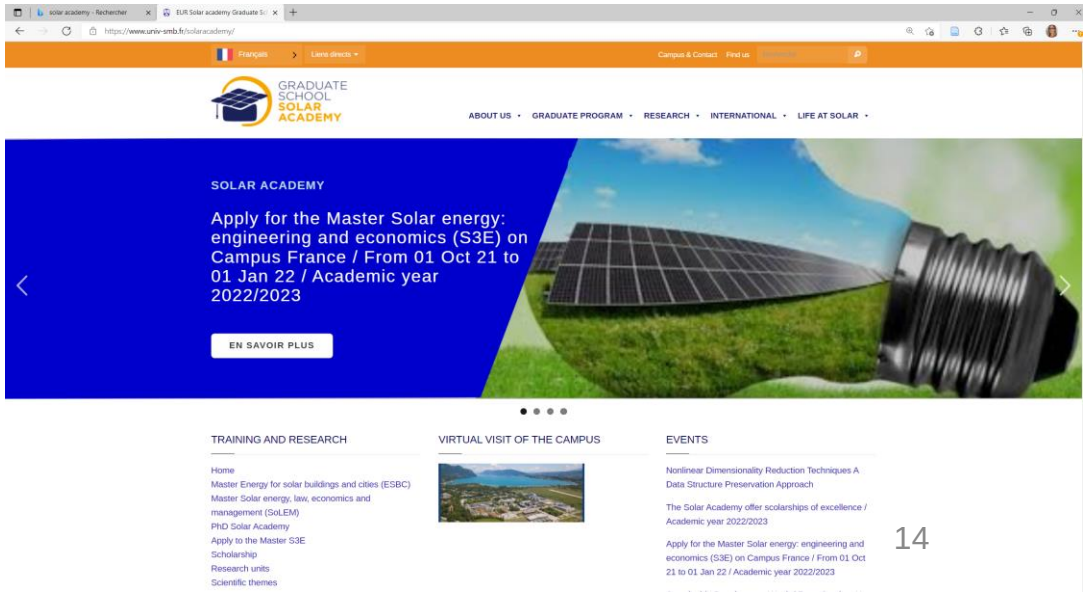
Registration fees 2024-2025 : ~340 €/year

All nationalities

English
- necessary level = B2 (grades in English class, international mobility, scolarity in English…)
- No specific score/test in English required

French: no requirements

check our website



EXCELLENCE SCHOLARSHIPS 2024/2025

SOLAR ACADEMY

Who can apply?

- All students applying for Solar Energy Master, both curricula:
  - ESBC (Energy for Solar Buildings and Cities)
  - SoLEM (Solar energy, Law, Economics and Management)

How to apply?

- All the necessary documents (Application form + required documents, pdf format, in English or French) can be downloaded from this website (starting in **May 2025).**

Conditions / Deadlines

- Interviews
- Applications will be selected based on academic results and motivation
- Scholarship amount: 2000€ per semester for the academic year 2024-2025
- Awarded for one year M1 / one semester M2
- Results of the application will be given at the end of June at latest

~TOP 25 - 30 % of students

Some **bilateral programs** (Check with the French ambassy / Campus France agency in your country)

Living costs in France (Chambéry):
- Around 800 €/month

SOLAR ACADEMY GRADUATE PROGRAM

QUESTIONS ?

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