

ParisTech

#Connect

#Innovate

#Share

ENERGY AND SUSTAINABLE DEVELOPMENT IN PARISTECH SCHOOLS




Quinzaine "Les études d'ingénieur en France" - Campus France Colombie

5 March 2021



GRANDES ÉCOLES AND SPECIALTIES

GRANDES ÉCOLES & SPECIALTIES

			 PSL★		 PARIS PSL★	 université PARIS-SACLAY	 PSL★
Mathematics & applications				✓			✓
Information and communication sciences and technologies				✓		✓	✓
Life sciences and engineering	✓		✓		✓	✓	
Earth sciences and environmental engineering	✓			✓			✓
Physics, optics					✓	✓	✓
Chemistry			✓		✓		
Energy		✓	✓	✓			✓
Materials science, mechanics and mechanical engineering		✓	✓	✓	✓		✓
Industrial engineering		✓		✓			✓
Transport		✓		✓			✓
Economics and social sciences, management, statistics	✓			✓			✓

ESPCI PARIS-PSL



ESPCI



PARIS

PSL



Institute for Training, Research and Innovation

Highly interdisciplinary research :
From Fundamentals to Innovation

2 articles per day
1 patent per week
1 start up per quarter.

Engineering school founded in 1882

School that trains engineers for the sectors of
research and development.

90 students per year



Awakening and Animation to Climate Transition
Sustainable development lecture
Track in sustainable development 3A
Research projects in the institute



**Awakening and Animation to Climate Transition
Non mandatory lectures**

**Hackathon Carbon Audit
Climate fresco**

What is a Green Engineer?

Organization of conferences by students on the theme.

Conferences with philosophers and economists from the PSE and the ENS.

**Semaine PSL (15h by year)
Semaine Athens (15h by year)
Awakening (30h by year)**

Awakening and Animation to Climate Transition

Student associations

PC Réveil

PC Durable

YourPSL

Bicycle repair shop

Household device repair shop

Beehives

**SUSTAINABLE DEVELOPMENT Lecture 1A 35H
(mandatory)**

*The lecture is focused on the DNA of the school: Advanced Materials and Processes
Know the essential principles of sustainable development and the circular economy
Acquire "Life Cycle" thinking and apply it to eco-design
Be aware of chemical and work-related risks; know how to limit and protect yourself from them.*

Contents:

**Sustainable development, Corporate Social Responsibility (CSR)
Circular economy, Life cycle assessment and eco-design
Life Cycle Assessment, Eco-design, Health-Safety-Environment
General, Chemical risk, Other risks**

Tutorials:

**Comparative life cycle analysis of two coffee machines (3h)
CLP/FDS/REACH in a biotech start-up (2h)**

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Track in sustainable development 3A

Choice of 4 minor courses in Physics Biology Chemistry Biotechnology

UE Analytical Chemistry

- Chemometrics
- Bioanalytics, Miniaturization and
- Mass Spectrometry
- Water treatment

UE Synthetic Chemistry and Applications

- Polymer Chemistry and Applications
- Synthetic Methods in Molecular Chemistry
- Circular economy of plastics
- Recycling
- Flow chemistry

UE Inorganic Chemistry for Catalysis and Energy

- Electrochemistry
- Inorganic Chemistry and Catalysis

UE Sustainable Energy (Conferences)

- Blue energy
- Hydrogene
- Nuclear energy
- Wind energy
- Solar energy
- Energy Storage

Research projects in the institute Training-PhD, Nexus project

Blue energy
Harvest the energy of the salt gradient.
CBI, Gulliver
Harvest the energy of waves
PMMH

selection of enzyme for catalysis
CBI

- Microfluidics
- Circular economy of plastic

Water treatment
CBI

- Desalination

Polymers

C3M, SIMM

- Circular economy of plastics
- Vitrimers
- Flow chemistry

Radiative materials for self cooling
Langevin

- Metamaterials

AGROPARISTECH





AgroParisTech **forward-looking approach** is aimed at addressing the **main global challenges of the 21st century**:

- **Feeding the population in a sustainable way**
- **Protecting natural resources**
- **Fostering innovation**
- **Developing the bioeconomy**

Sustainable Development is a major topic at AgroParisTech, relating to almost every fields of education and research.

5 Departments of Education and Research:

- Agronomy, Forestry, Water and Environmental Sciences and Technology
- Life Sciences and Health
- Sciences and Engineering for Food and Bioproducts
- Social sciences, Economics and Management
- Modelling: Mathematics, Informatics and Physics

AgroParisTech scientific expertise is structured around four main fields :

- Agricultural production and forestry
- Food and non-food transformations
- Sustainable management of natural resources and the environment
- Human health

Programmes (1):Diplôme d'Ingénieur AgroParisTech

Third year

20 specialties in 10 fields, many of them linked to sustainable development, for instance:

- Political Sciences, Ecology and Strategy
- Environmental Management of Ecosystems and Tropical Forests
- Natural Habitat Management
- Environmental Engineering: Water, Waste and Sustainable Planning
- Agricultural Development
- Sustainable and Innovative Farming Sectors

More information: <http://www2.agroparistech.fr/Cursus-Ingenieur-AgroParisTech-2111.html>

Internships and Job prospects in companies mindful of sustainable development: Veolia, Suez, Danone, l'Oréal etc.

Second year

- study tracks:
 - ✓ “Environmental engineering and management”
 - ✓ “Sustainable production, sectors, and territories”
- **core-curriculum:** engineering sciences and mathematic modelling, economic and social sciences, management
- choice of **more than 100 course-units:** Plan Ecology, Research in Agronomy and Agro-ecology, Biodiversity and Evolution, Environment and Natural Resources Economics, Sustainable Development and Governance, Urban Ecology etc.
- **Projects:** Agricultural development, Forest and Water planning, Biodiversity and Ecosystems Management (pasture and forest), Sector Analysis in Biological Agriculture, Patrimonial Management for Territories etc.

Programmes (2)

Master Programmes such as:

- Agro Sciences, Environment, Territories, Landscapes, Forest (e.g. track Wood, Forest and Sustainable Development)
- Biodiversity, Ecology and Evolution
- Economics of the Environment, Energy and Transport* (e.g. track Sustainable development and environment Economics)
- Sciences and Technologies for Agriculture, Food and Environment (e.g. track Environmental Management of Ecosystems and Tropical Forests)
- Territories and Local Development Management

** Joint programme including Ecole des Ponts ParisTech and MINES ParisTech*

Post-master programmes

Executive Master Programmes such as:

- Forestry, Nature and Society- International Management
- Public Policies and Strategy for the Environment
- Public Action for Sustainable Development of Territories and Agriculture
- Water Management
- Water for All
- Health Food and Environmental Risks Management

PhD: fields covered by AgroParisTech doctoral candidates:

- Agronomic, Forest, Water and Environmental Sciences and Technologies
- Life Sciences and Health, Nutrition, Plant and Animal Sciences
- Science and Engineering for Food and Bio products
- Social, Economic and Management Sciences applied to Agriculture, Food, Health, Forest, Water, Territories, Environment and Sustainable Development
- Mathematics, Informatics and Physics applied to Living Matter and the Environment

Research (1)

In the domain of **sustainable management of natural resources and the environment**, AgroParisTech has a wide range of activities and projects enabling it to measure:

- the environmental impact of agricultural and forestry activities,
- the treatment of water and waste, the quantitative management of water,
- the protection and valorisation of water, forest and soil resources,
- the evaluation of biogeochemical cycles,
- the preservation and maintenance of biodiversity.

The methods used extend from **experimental approaches in the laboratory or in the field** to the search for **high-performance indicators** or **predictive modelling for risk management**.

These themes are studied from an **ecological angle**, in the broad sense of the term, but also making use of **social and economic sciences**.

In a context marked by the acceleration of global changes, the question of the adaptation of species, ecosystems, societies and modes of interaction between human society and the environment has engendered a greater need for theoretical and experimental research in these domains, to help us to understand the processes and multiple interactions involved in the responses of organisms, ecosystems and socio-ecosystems to these global changes.

Research (2)

Research units such as:

- CIRED (International Centre for Research on Environment and Development)
- ÉcoFoG (Ecology of Guiana Forests)
- Public Economics
- ÉCOSYS (Functional Ecology and Ecotoxicology of Agroecosystems)
- ESE (Ecology, Systematics and Evolution)
- G-EAU (Water management, uses and the actors involved)
- SAD-APT (Sciences for the Action and Development – Activities, Products, Territories)
- Silva
- Territories
- Etc.

<http://www2.agroparistech.fr/Research-units.html>

Research projects such as:

- **HIGHLAND** - Collective Approach of Research and Innovation for Sustainable Development in Highland (2020 – 2023 / HORIZON 2020 programme Action Marie Curie RISE): contribute to Inclusive Sustainable Development in Highlands through collective and impact-driven Research & Innovation, based on capacity building, sharing of local-global knowledge, experience, and tools
- **ADSORB** - A performing Depollution System for Runoff water preserving Biodiversity (2018-2023 / LIFE project) : implement and test a new innovate solution enabling to effectively reduce pollutants in pluvial water which are thrown out in natural habitat.
- **AgriWasteValue** (2018- 2022 / Interreg North-West Europe Programme) : transform agricultural residues from the European North-West regions into bioactive compounds in order to use them in key industrial sectors such as the cosmetic and nutraceutical fields and then in a second phase in the energy, chemical and agricultural fields.

ARTS ET MÉTIERS



Algunos datos



- Creada en 1780 por el Duque DE LA ROCHEFOUCAULT-LIANCOURT « Combinar la habilidad de la mano con la inteligencia del conocimiento»
- Formación generalista a dominante en ingenierías mecánica e industrial.
- Una sola escuela con 8 Campus y 3 institutos de investigación.
- +1100 ingenieros Arts et Métiers (**gadzart**) graduados cada año.
- Una estrategia orientada hacia la industria del futuro.

OTRAS CIFRAS



11 SITES
répartis sur toute la France dédiés à l'enseignement et à la recherche

220 DOCTORANTS
dans notre École Doctorale « Sciences des Métiers de l'Ingénieur »

1 BACHELOR DE TECHNOLOGIE

6000 ÉTUDIANTS
toutes formations confondues

15 LABORATOIRES
et équipes de recherche

11 PROGRAMMES 1 généraliste
D'INGÉNIERIE 10 en apprentiss

1100 PERSONNELS
enseignants, techniques & administratifs

7 MILLIONS €
de chiffre d'affaires
FORMATION CONTINUE

+20 MASTERS RECHERCHE

15 MILLIONS €
de chiffre d'affaires généré par des contrats avec

2000 AUDITEURS

17 MASTÈRES SPÉCIALISÉS ©

31 UNIDADES DE ESPECIALIDAD: 150 HORAS + 6 MESES DE PASANTIAS

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1. Les nouvelles énergies pour un développement durable (**Aix-en-Provence**) <https://artsetmetiers.fr/fr/les-nouvelles-energies-pour-un-developpement-durable-finrj>
2. Ingénierie des procédés et des matériaux pour le Développement Durable (**Bordeaux**) <https://artsetmetiers.fr/fr/ingenierie-des-procedes-et-des-materiaux-pour-le-developpement-durable>
3. Motorisations d'avenir, hybridation et piles à combustible (**Châlons-en-Champagne**) <https://artsetmetiers.fr/fr/MAHPC>
4. Éco-conception de biens et de services (**Institut de Chambéry**) <https://artsetmetiers.fr/fr/eco-conception-de-biens-et-de-services>
5. Bois : une ressource locale pour la construction durable (**Cluny**) <https://artsetmetiers.fr/fr/bois-une-ressource-locale-pour-la-construction-durable>
6. Efficacité énergétique pour l'usine du futur (**Lille**) <https://artsetmetiers.fr/fr/efficacite-energetique-pour-lusine-du-futur>
7. Énergie bas carbone et système énergétique efficient (**Paris**) <https://artsetmetiers.fr/fr/energie-bas-carbone-et-systeme-energetique-efficient>

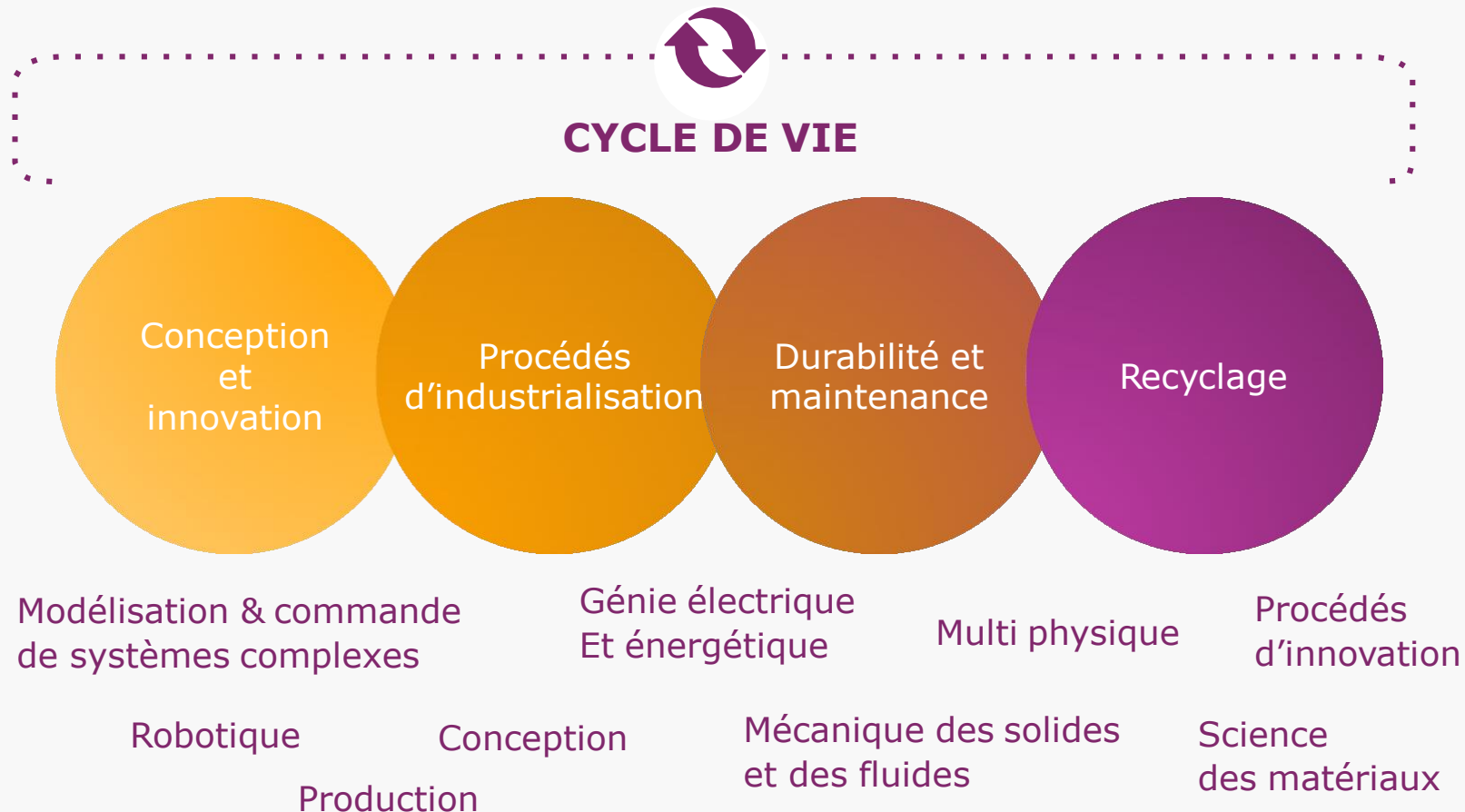
27 MASTERS DE INVESTIGACION: SEMESTRE DE MATERIAS + SEMESTRE DE PASANTIA DE INVESTIGACION

1. MR - Ingénierie des procédés et des matériaux pour le Développement Durable (**Bordeaux**) <https://artsetmetiers.fr/fr/ingenierie-des-procedes-et-des-materiaux-pour-le-developpement-durable-0>
2. MR - Énergie électrique pour le développement durable (**Lille**) <https://artsetmetiers.fr/fr/master-energie-electrique-pour-le-developpement-durable-e2d2>
3. MR - Ingénierie des machines de conversion d'énergie (**Paris**) <https://lifse.artsetmetiers.fr/ingenierie-des-machines-de-conversion-denergie>

15 LABORATORIOS DE INVESTIGACION

1. I2M - Institut de Mécanique et Ingénierie (**Bordeaux**) <http://i2m.u-bordeaux.fr/>
2. L2EP - Laboratoire d'électrotechnique et électronique de puissance (**Lille**) <http://l2ep.univ-lille1.fr/>
3. LABOMAP - Laboratoire Bourguignon Matériaux et Procédés (**Cluny**) <http://labomap.ensam.eu/>
4. LCPI - Laboratoire Conception de Produits et Innovation (**Paris**) <http://lcpi.ensam.eu>
5. LIFSE - Laboratoire d'ingénierie des fluides et des systèmes énergétiques (**Paris**) <https://lifse.artsetmetiers.fr/>

LOS INVESTIGADORES Y ESTUDIANTES TIENEN LA POSIBILIDAD DE TRABAJAR SOBRE EL CICLO DE VIDA COMPLETO DE UN PRODUCTO: DESDE LA CONCEPCION HASTA EL RECICLAJE, PASANDO POR LA PRODUCCION.



LIFSE: RECUPERACIÓN DE RESIDUOS TÉRMICOS $T < 250$ °C



Proyecto ERC SYNERGY - Sistema ciclo ORC completo 150 kW (SES36)

CHIMIE PARISTECH - PSL





ParisTech



Charles Friedel
Founder
(1896)



Nobel Price
Henri Moissan
Former Director

Eugène Schueller,
Alumni
(1909)

L'ORÉAL



Highly selected students
(50% of women)

Researchers, Professors
& Associate Professors



Fostering Talents for Tomorrow's Chemistry

20%
international
students



20%
Business, management
and human skills



40%
Practical training



12 months
Mandatory internship



training by research
7 pub. per week

1 Prof for 3
students





OUR TRAINING



05/03/2021



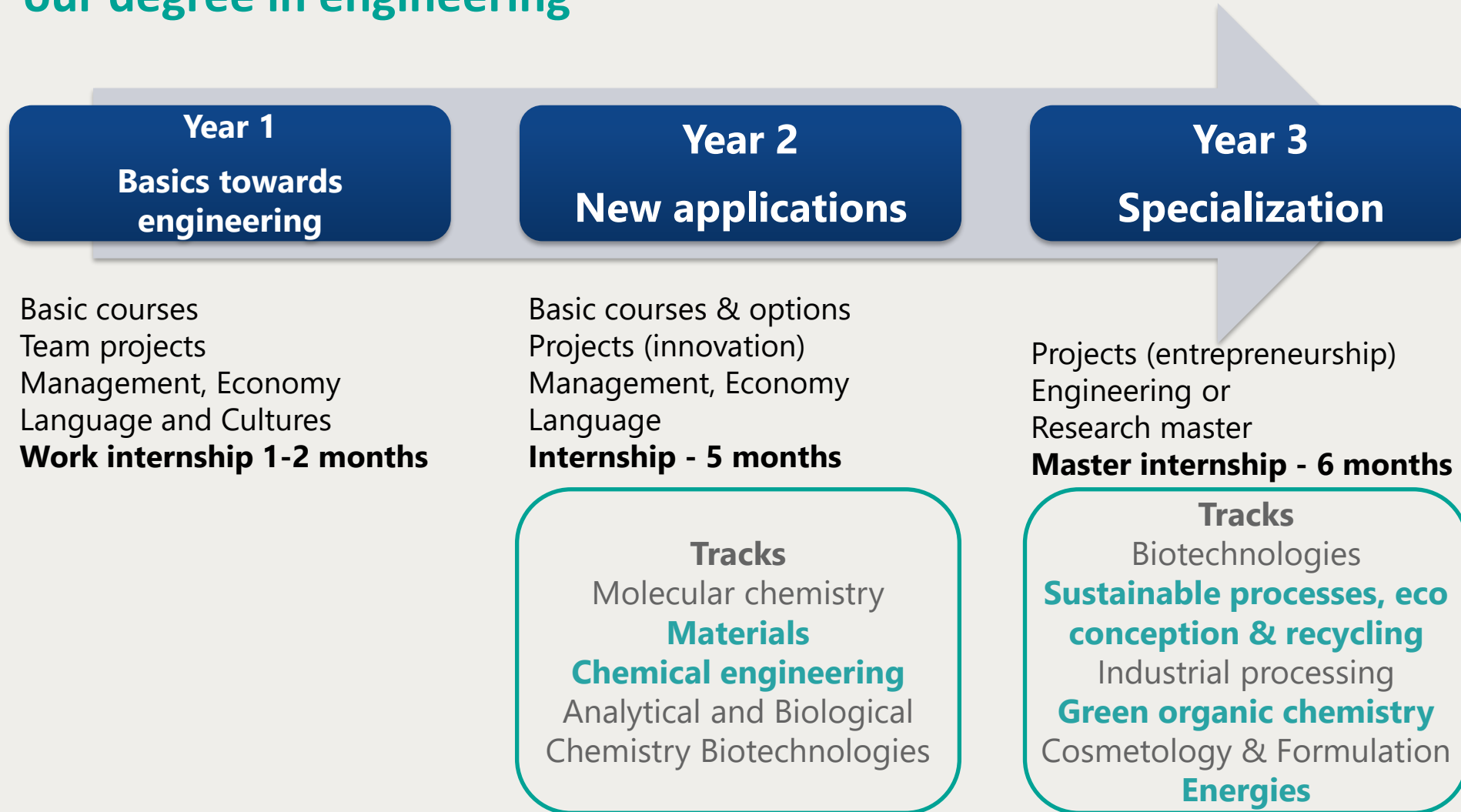
Chimie Paris



ParisTech



Sustainable development and Energy curricula within our degree in engineering



Masters of Science with



- **Material Science and engineering**
 - Materials and Engineering Sciences in Paris (EN)
 - Materials of the future, Design and Engineering (FR)
 - Microfluidics, fluid science engineering (FR)

<https://www.psl.eu/en/education/master-s-degree-materials-science-and-engineering>

- **Energy (EN)**
 - Sustainable Energy & Materials
 - Energy Efficiency
 - Decarbonation of fuels
 - Renewable Energy, grids

<https://www.psl.eu/en/education/master-s-degree-energy>





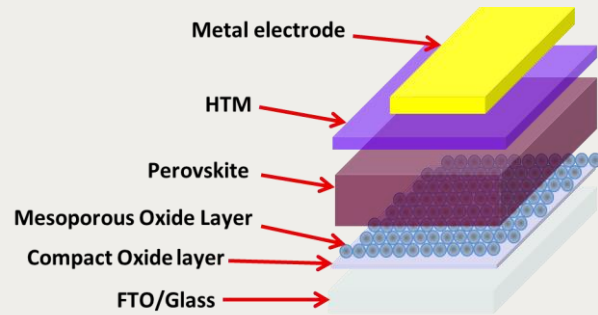
OUR RESEARCH



05/03/2021



Materials for Energy: Nanomaterials for Solar Cells



Perovskite solar cells

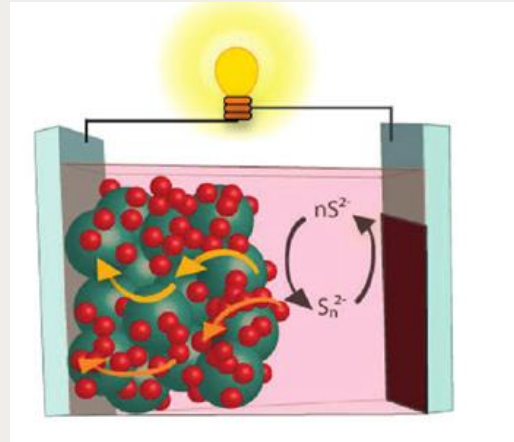
Contact thierry.pauporte@chimieparistech.psl.eu

Hybrid solar Cells :

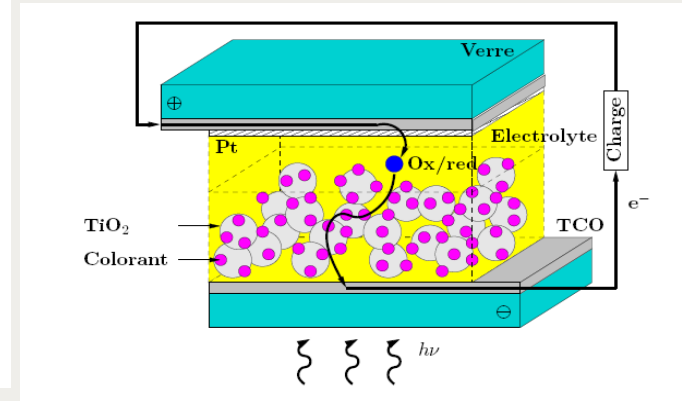
new devices to convert the energy of solar light into electricity

Modelling team:

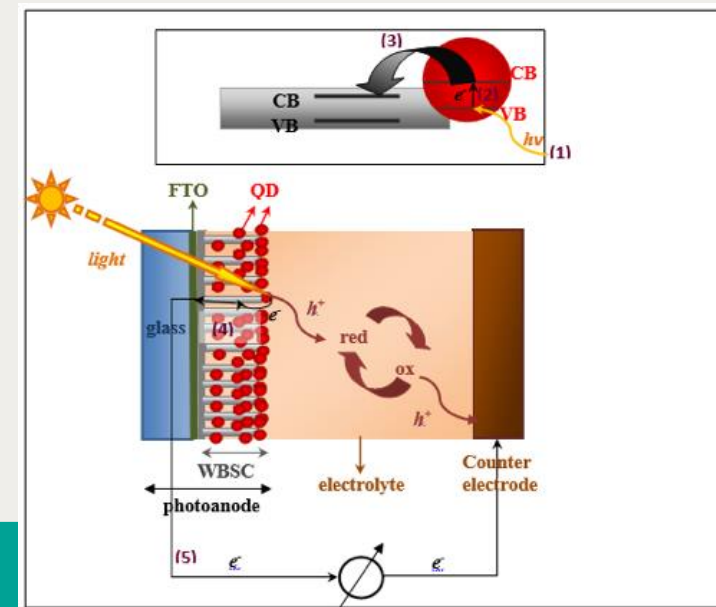
Contact carlo.adamo@chimieparistech.psl.eu



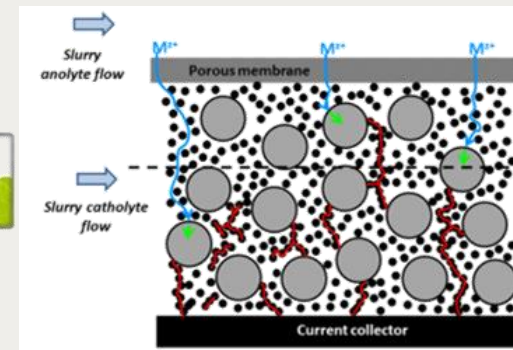
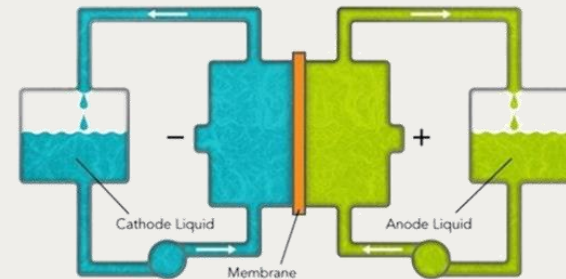
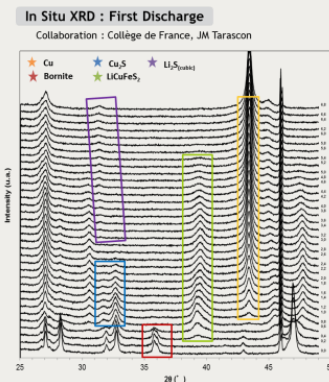
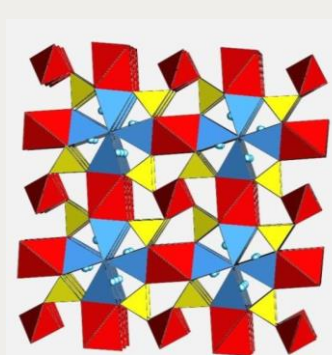
Quantum dots solar cells



Dye Sensitized Solar Cells



Energy: Electrochemical Storage



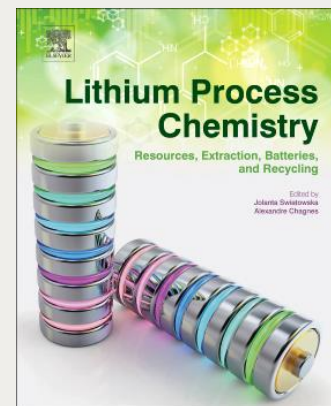
Positive electrode materials lithium

Contact: philippe.barboux@chimieparistech.psl.eu

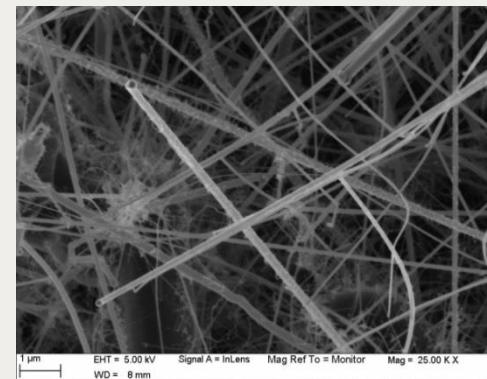
Slurry systems (redox flow/zinc air)



Recycling



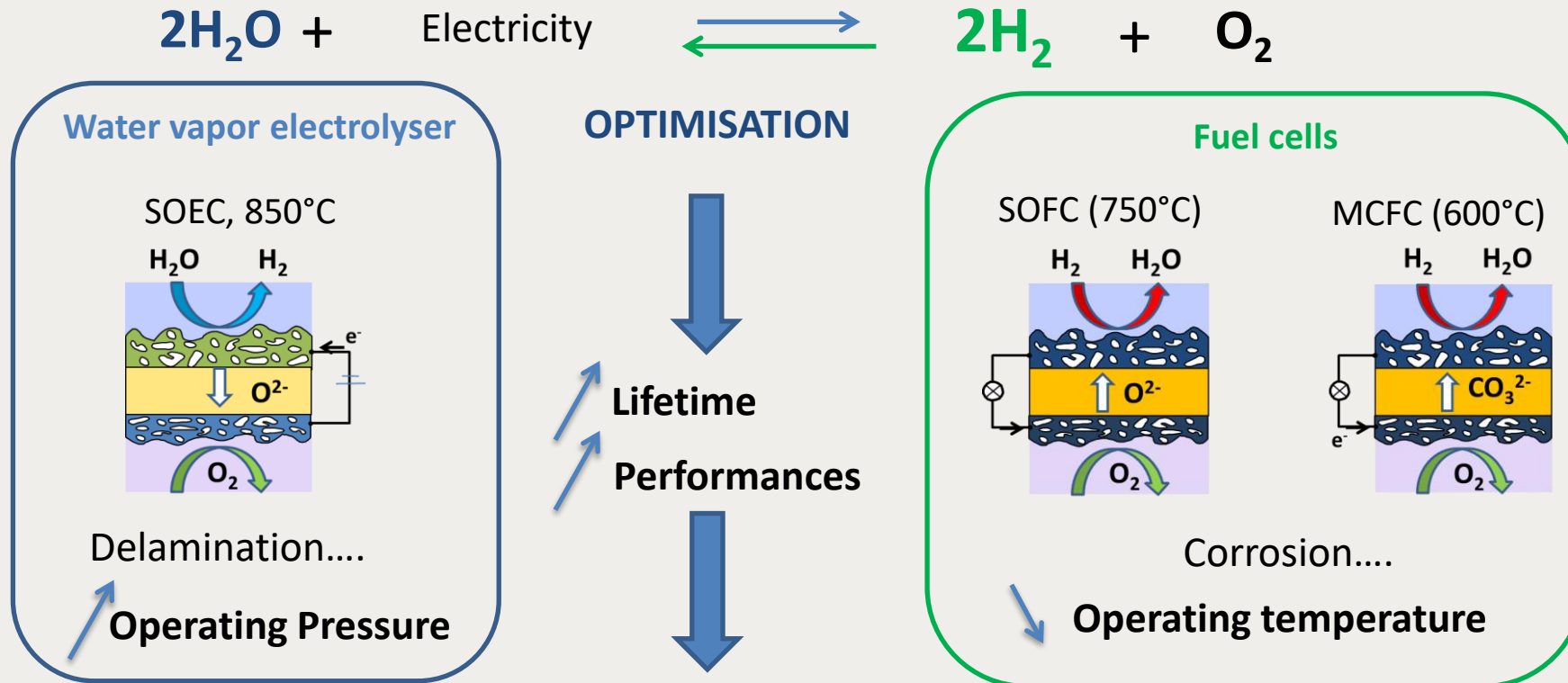
Contact: jolanta.swiatowska@chimieparistech.psl.eu



Negative electrodes / Silicon nanowires

Energy: Hydrogen Technology

High temperature devices (based on *Molten Carbonate* or/and *Solid Oxide* electrolyte):

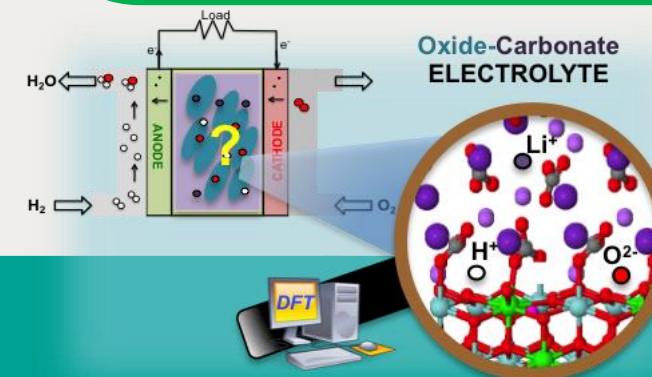


New materials, Thin oxide layers, New concepts

Contact: armelle.ringuede@chimieparistech.psl.eu

Modelling team:

Contact carlo.adamo@chimieparistech.psl.eu



Energy: Photovoltaic – IPVF



8,000
M² BUILDING

€66
MILLION
6 YEARS R&D
BUDGET



ANR



Founding Members



HORIBA

RIBER

Ambition

Perform upstream research with a strong industrial foothold and operate a world-class experimental platform to:

- ❖ Radically improve the performances of PV cells,
- ❖ Give birth to disruptive PV-based technologies.

Scientists



150 researchers involved

- 100 hosted in the new building in Paris-Saclay
- ~25 directly hired by IPVF

Free space ready to welcome guests scientists & start-ups



R&D facilities

> 70 state-of-the art tools, owned and operated by IPVF

- Analytical
- Material & Device Process

Up-time available for contract research

Contact: jf.guillemoles@cirs.fr

OUR LINK WITH BUSINESSES



ParisTech



An industrial chair with



- **Objective**
 - Contribute to the implementation of a **circular economy model**, respectful of the principles of sustainable development and beneficial to citizens, manufacturers, recycling actors and territories.
- **Missions**
 - Develop new quality secondary materials
 - Defining new business models for recycling
 - Training the actors of tomorrow

Chaire
Mines Urbaines

ecosystem
recycler c'est protéger

FONDATION
ParisTech

Arts et Métiers
Institute of Technology



PSL



Chimie Paris Innov



our incubator *cofunded by the European Union*

- 700 000€ project
- Started in 2018



ENERGO, Ferrosan, LOMA, KOYA...

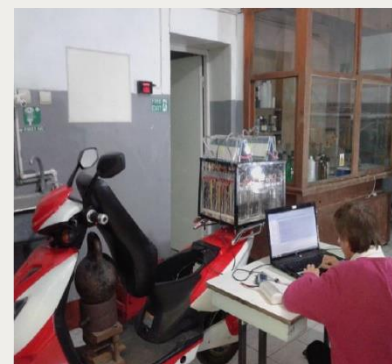


Augmented Wood, and next generation of Human-to-Machine Interfaces



Plasma catalysis technology for methanation of CO₂

European patent [EP15202925.2] 2015



Zinc-Air

Cheap and Safe Batteries for Electrical Vehicles & Stationary Electricity Storage

Link with businesses

- Our graduates work in a wide diversity of businesses in Energy and sustainable development



- Some are sponsors of our graduates



ÉCOLE DES PONTS PARISTECH



La universidad del desarrollo sostenible

- A public engineering school recognised for the excellence of its graduate studies
- Founded in 1747
- Ecole des Ponts ParisTech is a school of the Ministry of the Ecological Transition
- Ecole des Ponts ParisTech serves the missions of the French Ministry in the fields of sustainable development, climate, energy transition and biodiversity.
- 65% of research publications directly match with 13 out of the 17 Sustainable Development Goals defined by the United Nations

desarrollo sostenible en la formación en ingeniería

Individualized learning agreements

A common high level of scientific knowledge scientific background
mathematics – physics mechanics

6 departments of studies

Civil and structural engineering

- City, environment, transport
- Mechanical engineering and materials
- Applied mathematics and computer science
- Industrial engineering
- Economic science, management, finance

70 learning outcomes in sustainable development, in all majors

- Sustainability of Buildings, Infrastructures, Networks, Territories, Cities and Mobility
- Digital and Societal Transformation of the Industry
- Corporate and Sustainable Development Economics and Finance
- Human and Environmental Risks

A common set of core courses related to sustainable development

Programas y cursos

- Master in Transport and Sustainable Development
- Master in Energy Transition and Territories
- Master in Management and Engineering of Environmental Services



- Green Finance (1 semester)



Postmasters in:

- Sustainable building and real estate
- Management of Energy Projects
- Energy and Large size projects
- Smart mobility



PhD Ecole des Ponts

Specific focus in public action and sustainable development



École des Ponts
ParisTech

Relaciones con industrias



Transportation,
environment,
urban services



Consulting



Energy



Construction



Industry



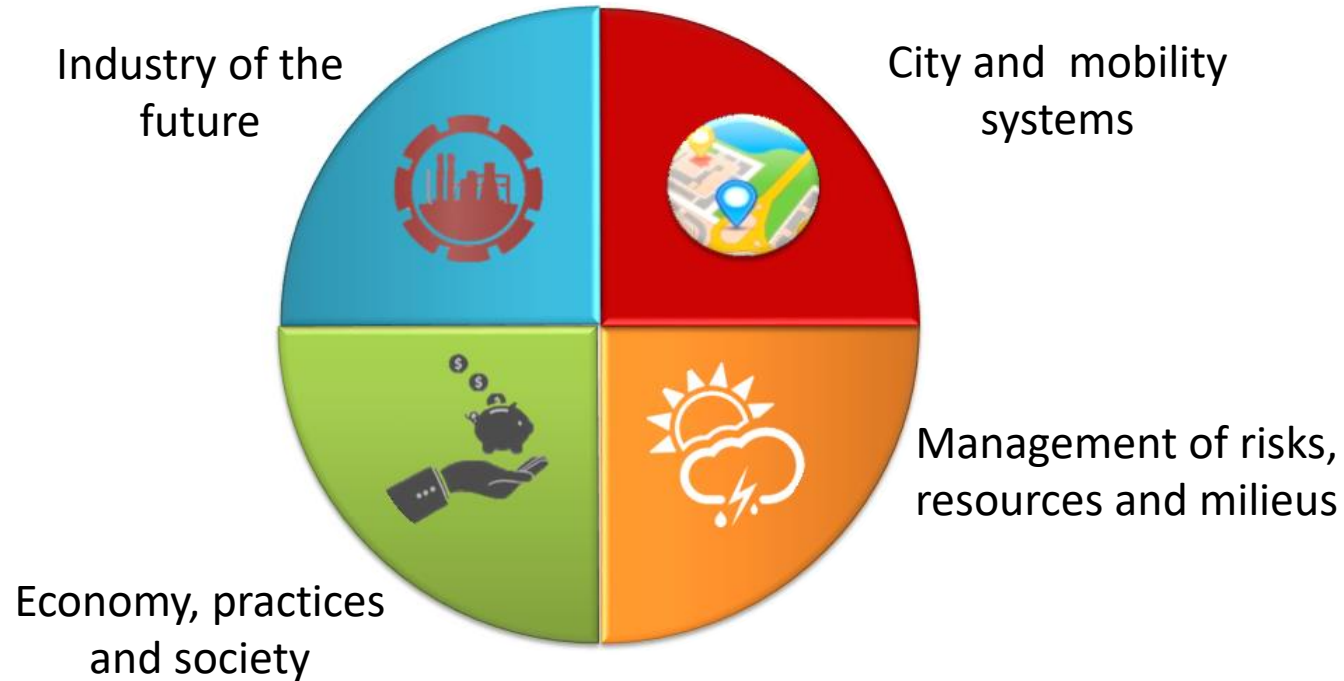
Finance

Investigacion para la transicion ecologica y digital

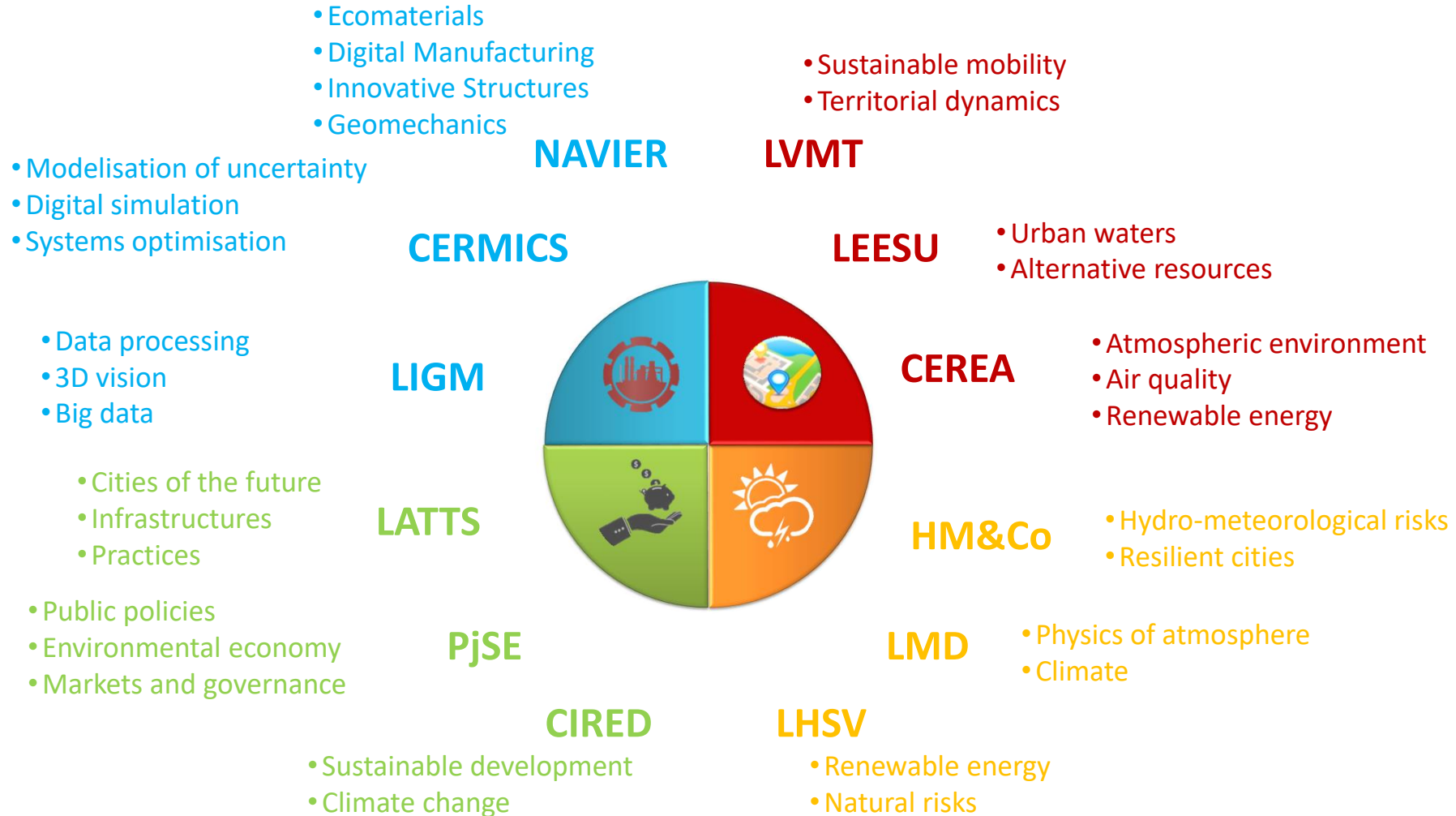
16
academic
and
research
chairs
supported
by Industry



A challenge-based approach to address 4 socio-economic issues of sustainable development



Investigacion para la transicion ecologica y digital



Research for the ecological and digital transition

- Renewable Energy



- Onshore and offshore marine energy
- Wind farms and solar
- Smart grids



ADEME



Agence de l'Environnement
et de la Maîtrise de l'Énergie



Research for the ecological and digital transition

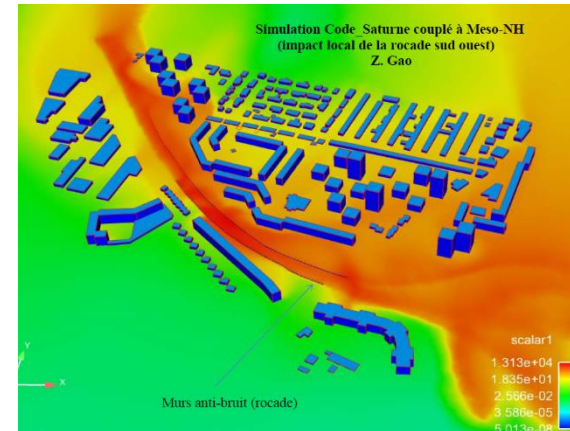
- Resilient Cities: mobility, water, air.



- Smart & Sustainable
Mobility



- Extreme rains



- Air Quality



MINES PARISTECH - PSL





1st
University in
France for its
links with
industry

35%
International
students

1/3
International
teachers

- ✓ Founded in 1783 and evolving strongly over the centuries
- ✓ Reporting to the Ministry of Industry and Finance
- ✓ We are part of *Paris Sciences et Lettres* Research University
- ✓ We are founding members of ParisTech.



4
locations

MINES PARISTECH EDUCATION AND RESEARCH

5 departments

- ✓ Energy and process engineering
- ✓ Earth sciences and environment
- ✓ Mathematics and complex systems
- ✓ Materials and mechanics
- ✓ Economy, management and society

18 research labs

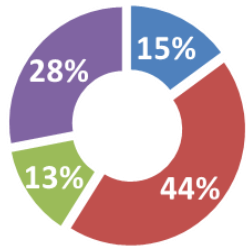
- Energies of the future
- Transport and mobility
- New materials
- Health and environment
- Innovation and competitiveness
- Center for Geosciences

Figures : 2400 persons

- ✓ 1,027 permanent staff including 234 research academics
- ✓ 385 PhD students
- ✓ 1,163 graduate students

ENERGY & SUSTAINABLE DEVELOPMENT

OUR TRAINING



- Diplôme d'ingénieur
- International Masters
- PhD
- Advanced Masters programs

Cycle ingénieur – Engineering cycle



- Strong background in fundamental courses,
 - ✓ Mathematics, physics, mechanics ...
- with a multidisciplinary approach:
 - ✓ Social sciences, Languages, Sports, Economics and Management
- and the possibility to customize your curriculum with 17 fields of specialization:
 - ✓ Earth and Environmental Sciences
 - ✓ Machines and energy
 - ✓ Nuclear energy and risk
 - ✓ Geosciences (GESOCIENCES) and Geostatistics and applied probabilities
 - ✓ Processes and Energy (P&E)

ISUPFERE

- Engineer apprenticeship cycle
 - ✓ Open to people under 26, holding a BAC + 2 diploma.
 - ✓ 3 years program based on a strong interaction between training at school and in business
- Aim of the program

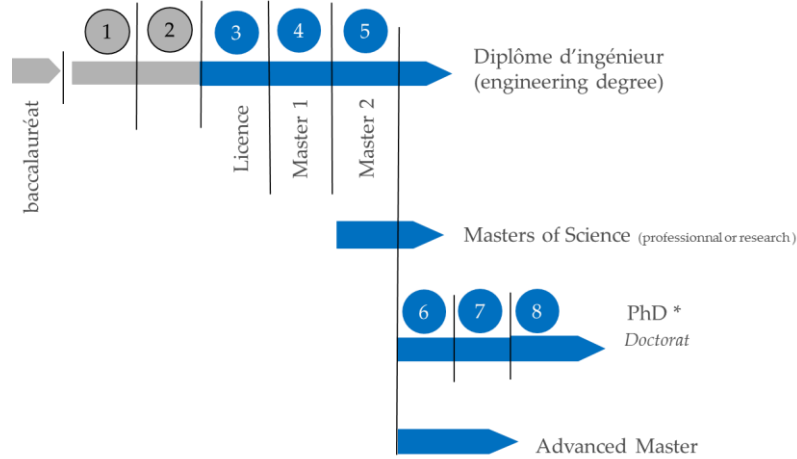
Train engineers capable of designing, installing, operating and maintaining energy installations including renewable energies in the building and industrial sectors.

Master in Energy

- Two years programs
- Tracks
- Set up within University PSL

ENERGY & SUSTAINABLE DEVELOPMENT

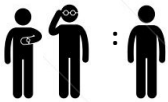
OUR TRAINING



800
lecturers from
corporate
world



Student/prof
ratio



9 to 21
months in
internship



Advanced Master programs



- MS ENR : Renewable energy
- MS GAZ: Gas engineering and management
- MS ALEF : International Energy Management
- MS ENVIM: International Environmental Management
 - ✓ ENVIM Europe
 - ✓ ENVIM International
 - ✓ ENVIM Asia

Phd – doctoral studies

- Energy and processes
- Engineering geology
- Geostatistics
- Hydrology and quantitative hydrogeology
- Techniques and economics of underground mining



ParisTech training collaborations

- Masters in collaboration with other ParisTech Schools:
 - TRADD: Transport and sustainable development
 - MVE: Mobility and electric vehicles

ENERGY & SUSTAINABLE DEVELOPMENT

OUR RESEARCH



Energy and process engineering

The climate is the main subject, they work on energy systems (in the broad sense, from component to energy networks).

Research centers

160 faculty members

Research centers and groups

Centre for Energy Efficiency of Systems ([CES](#))

Centre Thermodynamics of Processes ([CTP](#))

Observation, Impact, Energy Center ([O.I.E.](#))

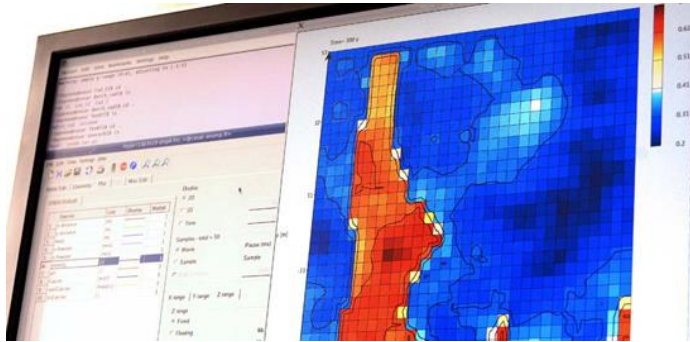
Centre for Processes, Renewable Energies and Energy Systems ([PERSEE](#))

Our research topics

- ✓ Thermodynamic properties of fluids for machines and industry Efficiency of energy systems
- ✓ CO2 capture Integration of renewable energies into the networks
- ✓ Energy transport and storage
- ✓ Biogas
- ✓ Hydrogen
- ✓ Circular economy: transition to an industrial eco-park

ENERGY & SUSTAINABLE DEVELOPMENT

OUR RESEARCH



Earth Sciences and Environnement

Research centers

117
faculty
members

Research centers and groups

Centre for Geosciences ([GEOSCIENCES](#))
Higher Institute for Environmental Engineering
and Management ([ISIGE](#))

Research topics

Geosciences intends to provide the necessary knowledge on the major issues relating to the management of natural resources, the role that the subsoil can play in the energy transition, environmental protection and sustainable development.

- ✓ supply of primary resources,
- ✓ anthropization (underground storage, polluted environments)
- ✓ impact of climate change (water resources, natural risks).

ISIGE is dedicated to the environment and Sustainable Development. Its ambition is to be a driving force behind the ecological transition and to promote demanding environmental innovation.

- ✓ Territorial and social ecology
- ✓ Governance of transitions
- ✓ LCA and industrial ecosystems
- ✓ Learning transitions

ENERGY & SUSTAINABLE DEVELOPMENT

OUR LINKS WITH INDUSTRY



200 industrial partners

1000 /year Research contracts
30 M

Our industrial partners



ENERGY & SUSTAINABLE DEVELOPMENT

OUR LINKS WITH INDUSTRY



27
industrial
chairs

Industrial chairs

Energy and processes

Eco-design of buildings and infrastructures (CES) - 3rd edition

New energy strategies (completed)

CO2 capture, transport and storage (completed)

Mathematics and systems

Urban Logistics Chair (CAOR) - 2nd edition

Prospective modeling for sustainable development (CMA) - 2nd edition

Automated driving -Drive for all (CAOR)

Economy, management and society

OCP - Economics of Commodities (CERNA) - 2nd edition

Urban Mines (CGS) - 2nd edition

Gas economy (CERNA)

Geosciences

ANR ISR-U Chair Uranium mining by in situ recovery (Geosciences)

Mineral Industry and Territories Chair (Geosciences)

MINAUMET Chair (Geosciences)

CONTACT POINTS



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