The STEEM program equips you with real-world technical expertise on environmental issues and renewable energy sources, along with an in-depth understanding of the economic, social and geopolitical challenges to their development.

You will have access to an exceptional concentration of high-level research facilities including:
- IPVF, Photovoltaic Institute of Ile-de-France, a partnership between École Polytechnique, the CNRS and global industry leaders including Total, EDF and Air Liquide
- Institut Pierre-Simon Laplace (IPSL) environmental science research network, with strong ties to the UN Intergovernmental Panel on Climate Change, and its on-site Sirta observatory
- Research laboratories, start-ups, business incubator, fab lab and experimental facilities
- EDF R&D center, a unique research environment on renewable energy sources, intermittency and smart grid management

The program is part of the European Master RENE funded by KIC InnoEnergy.

**Career outcomes:**
Engineer position in a variety of sectors including industry, start-ups or public organizations concerned by energy transition, energy management and environment or PhD opportunities.

**Industrial partners:**
Total, EDF, Saint Gobain, Air Liquide, Schneider, GE and many small companies and start-ups.

<table>
<thead>
<tr>
<th>Academic requirement</th>
<th>Application fee</th>
<th>Annual tuition fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor's degree in Engineering Science, Mechanical Engineering or Physics</td>
<td>€80</td>
<td>€12,000</td>
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Scholarships and financial aid are available for the best applicants. Please consult our website for further information: [http://portail.polytechnique.edu/graduatedegree](http://portail.polytechnique.edu/graduatedegree)
YEAR 1

Refresher in physics

PERIOD 1 - 3 ELECTIVE COURSES TO BE CHOSEN AMONG
- Continental Hydrology and Water Resources
- Mechanics for Wind Energy
- Energy and Environment
- Photovoltaics Solar Energy
- Power Electrical Engineering for Renewable Energy

PERIOD 2 - 3 ELECTIVE COURSES TO BE CHOSEN AMONG
- Meteorology and Environment
- Fluid Structure Interactions
- Material Science for Energy
- Valuing and Managing Natural Resources
- Technology-Based Entrepreneurship and New Business Creation
- Sustainable Strategy & Business Model

ONE ELECTIVE ADVANCED COURSE TO BE CHOSEN AMONG
- Projects in Solar and Wind Energy: Resource and Performance Analysis
- Laboratory Course in Photovoltaic
- Experimental Work in Environmental Physics
- Creation of a Tech Start-up

ONE MANAGEMENT COURSE
- Energy Industry Value Chain

ONE MATHEMATICAL TRAINING
- Refresher in Mathematics and a Project on Numerical Modeling

4 to 5-month research or industrial internship

YEAR 2

ONE MANAGEMENT COURSE
- Designing Projects and Managing Operations in the Energy Industry

SIX ELECTIVES SCIENTIFIC COURSES TO BE CHOSEN
1. Atmospheric and oceanic environments in the energy context
   - Energetics and Dynamics of the Earth System
   - Hydro, Wind and Marine Resources
   - Greenhouse Gases (GHG) Challenges and Observations
   - Introduction to Atmospheric Composition: From Processes to Modeling and Air Quality Regulations
   - Climate Change and Energy Transition

2. Renewable energies - scientific bases
   - Thin Film Photovoltaics
   - Polymers for Photovoltaics
   - Photovoltaic Technology in Industry
   - Wind Power
   - Fluid-Structure Couplings in Offshore Wind and Marine Renewable Energies
   - Laboratory Projects in Hydro, Wind and Marine Resources for Renewable Energy
   - Nature-Based Solutions to Substitute Fossil Resources and Address Global Change

3. Vectors, storage and networks for energy
   - Chemical Storage of Energy
   - Renewable Thermal Energy
   - Stochastic Optimization and Management of Energies
   - Smart Grid for Renewable Energy
   - Advanced Experimental Smart Grid
   - Energy Economics with a Geographic Focus
   - The Economics of Energy and Sustainable Development

One team management project

6-month research or industrial internship

Program directors
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