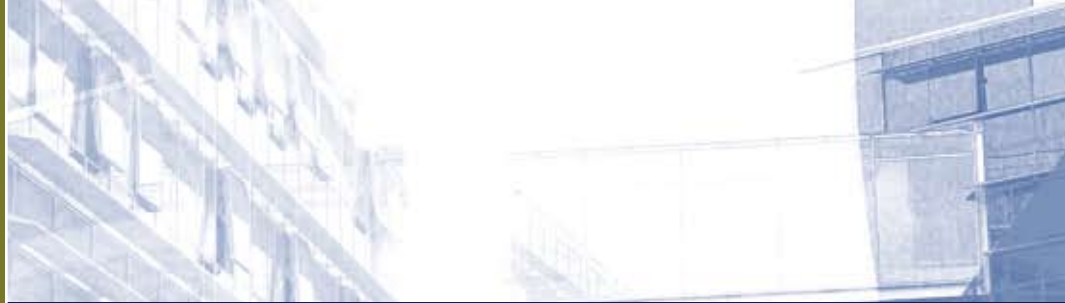


EMNantes



GSE

Energy Systems Engineering



ECOLE DES MINES DE NANTES

The GSE option



Created in 1997, the GSE option is a highly successful and attractive program. It offers exciting challenges and career opportunities due to increasingly strict environmental requirements (greenhouse gas reduction, etc.) and decreasing availability and rising costs of fossil fuels. Driven by the need for sustainable development there has been real scientific and technological progress even though it may seem too slow. Improvements are being made, both as regards machine energy efficiency and the design and management of energy systems. The option trains engineers who can meet these challenges thanks to their ability to manage complex technical and financial projects, with a sustainable development approach.

> Career Opportunities

The GSE option has wide-ranging applications, and trains engineers who can work on any system where energy conversion occurs.

- **Vehicle engines**
- **Thermal and electric power plants**
- **Energy and environmental diagnosis**
- **Cogeneration systems**
- **Air conditioning systems**
- **Wind and solar energy facilities**
- **Waste-to-energy sites**

Whatever their size, these are complex systems with complicated interactions. Engineers who design or operate them must deal with regulation and control problems, along with crucial environmental, regulatory and financial issues.

> Jobs for Tomorrow and the Future

GSE engineers work both on the design and the operation of facilities. The principal positions are:

- Design and process engineer for energy producers and power plant operators;
- Project engineer or business engineer for engineering companies and original equipment manufacturers.
- Designer and developer of new products for power conversion equipment manufacturers.
- Renewable energy and sustainable development policy makers.



Bernard Lemoult,
Program Head.

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“Our option helps protect the environment for the future. Wherever energy conversion takes place, GSE engineers always seek to ensure maximum output with the least possible pollution.”



> The Program

Energy engineers need to know the fundamentals of energy systems (heat transfer, thermodynamics and fluid mechanics) and have an advanced knowledge of physics to understand reactions and orders of magnitude.

They also need a strong grounding in:

- **Energy engineering,**
- **Sustainable development approach in industry and public policy,**
- **Energy and environmental diagnosis,**
- **Renewable energy systems,**
- **Simulation and process control,**
- **Financial issues, laws and regulations.**

Emphasis is also placed on project management using “active” teaching methods, such as team or individual projects, which represent half the program, plus industrial visits and lectures by visiting speakers.



> Beyond Borders

There are double degree programs with Universidad Politecnico de Madrid - ETSII (Spain), Chalmers (Sweden), Ecole Polytechnique de Montréal (Canada), Universidad de Los Andes (Colombia) and Shanghai Jiao Tong University (China).



> Double degrees



“As if he already had two or three years of experience”

Georges de Pelsemaeker, Valeo

“CO₂ is 1400 times less harmful than a traditional gas when used as a refrigerant in automobile air conditioning systems! But the entire system has to be modified to withstand the new pressure, which increases from 23 to 160 bars, including the compressor, exchanger, expansion valve and evaporator. Roman Bonamy began working on this project during his graduate project in 2006, developing the specifications for developing the test bench. He coordinated the work between several research sites and customers in an international context. Finally, he developed a calculation tool and a database for a theoretical performance model.

He needed no close mentoring, and did the work of a young engineer, as if he already had two or three years of experience. After three months, he had already obtained results. I appreciated his thoroughness and curiosity. He never left out a single detail. He perfectly understood the challenges and identified the people who could help him in our organization, which is admittedly quite complicated. Valeo has 70,000 employees working in 11 different fields! Today, the project is in the implementation phase.”

> Research

Even though the job market in industry is extremely favourable for recent graduates, some 10% of our graduates have moved into research and obtained a PhD. Others have gone on to do master's degrees in management or in a technical specialty.



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