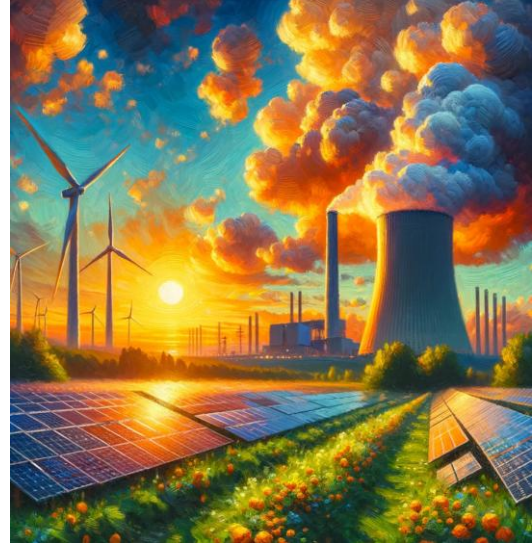


ENERGY TECHNOLOGIES

From thermodynamics to society

Energy technologies are technical objects enabling the capture, conversion and utilisation of energy. They are crucial to address the environmental, social and economic challenges of sustainability. The laws of thermodynamics help explain their operation and the estimation of their ultimate efficiencies.

However, the ability of energy technologies to tackle current issues does not depend only on their technical performances, but also on their potential to transform industries, markets, and society. It is therefore essential to understand the diffusion process of such innovations, and what unexpected effects or adverse consequences they trigger.



This interdisciplinary module, combining physics and management studies, offers a hands-on experience of the crucial dynamics driving today's energy transition.

Content

- Derive ultimate conversion efficiencies (Carnot, Curzon Ahlborn) from basic principles
- Material efficiency, resource exhaustion and Hubbert's peak theory
- Rebound effect (Jevon's paradox)
- From idea to market, the non-linear path of innovation diffusion
- Focus on the end of pipe: user acceptance and influence

Learning objectives

- Know how to apply the first and second law to derive conversion efficiencies
- Know usual efficiency indicators and their domains of relevance
- Know toy models for material resource exhaustion and their limitations
- Understand contributions to the rebound effect and how to quantify them
- Treat, plot, fit and interpret numerical data
- Identify the multiple levels of innovation diffusion
- Analyze sources of resistance, adoption and improvement to technological innovation

Terms of evaluation

Presentation, participation, involvement