

Vak: Fundamentals of Modelling Energy Systems

credits: 5

Vakcode	SUVH21FMES	Werkvormen	Werkvorm 1
Naam	Fundamentals of Modelling Energy Systems	Toetsen	Numerical Modelling - Opdracht
Studiejaar	2022-2023		Scientific Content - Schriftelijk, organisatie
ECTS credits	5		ToetsCentrum
Taal	Engels		
Coördinator	F. Pierie		

Leeruitkomsten

On completion of this module the student is able to;

1. understand and apply the fundamentals of physical modelling to energy systems.
1. apply modelling techniques to design and create transparent models on energy systems and use them to simulate, analyse, and evaluate energy systems on efficiency, environmental impact and basic economics.
1. apply the Material and Energy Flow Analysis (MEFA) methodology and energy flow diagrams (Sankey) for analysing the environmental impact of energy systems.
1. understand the basics of the Life Cycle Assessment (LCA) methodology for analysing the environmental impact of energy systems and integrate LCA data in energy modelling.
1. apply methods for the validation and verification of created models.

Inhoud

In this module, students acquire the fundamentals of modelling techniques and methods, applied to energy systems. These fundamentals will be explained using three methodologies namely, Material and Energy Flow Analysis (MEFA); Life Cycle Analysis (LCA); and validation and verification of models. The students apply the learned skills in Excel based models containing the aforementioned elements.

Within this module, the focus is on relationships between individual elements within energy systems, e.g. production, storage, conversion. The students program these relationships in a model and use the model to gain understanding and find optimal solutions, with respect to energy efficiency, environmental impacts, and basic economics (e.g. CAPEX and OPEX). Within this module both theory and practice (building an actual model) are integrated to give the students a fundamental understanding of energy systems and modelling thereof. On completion of this module the student will be able to construct a well-structured and transparent model, validate the model, run scenarios in the model, and draw conclusions from the model. The knowledge gained in this module forms a foundation on which the students can expand their modelling skills by using other specialized energy models while recalling the fundamentals of modelling.

To achieve the modules learning outcomes the students attend lectures on modelling theory, perform a written exam, and make a modelling assignment.

Opgenomen in opleiding(en)

European Master in Sustainable Energy System Management

School(s)

Instituut voor Engineering