



Module Title	Pathways to net zero GHG emissions in the energy and chemical sectors
Code	MCCf133
Degree Programme	Master of Science – Circular Innovation and Sustainability
ECTS Credits	3
Workload	90 hours <ul style="list-style-type: none"> • 14 hours contact teaching • 70 hours self-study • ~6 hours excursion
Module Coordinator	Name: Prof. Dr. Michael Hans-Peter Studer Phone: +41 (0) 31 910 29 36 Email: michael.studer1@bfh.ch Address: BFH – HAFL, Länggasse 85, 3052 Zollikofen
Lecturers	None
Entry Requirements	None
Learning Outcomes and Competences	After completing the module, students will be able to: <ul style="list-style-type: none"> • describe the current energy and raw material system in Switzerland; • summarize and evaluate the possible renewable technologies for the energy services heat, mobility and power; • discuss technologies for carbon capture and storage and negative emissions; • discuss possible pathways to net zero GHG emissions in the Swiss energy system; • name the available renewable carbon sources and possible pathways to net zero GHG emissions for the chemical industry.
Module Content	Our current energy system and also the chemical industry is highly dependent on finite and climate damaging fossil raw materials. For the transition to a circular economy, these fossil raw materials must be replaced by renewable sources and feedstocks. In this module, the characteristics of today's energy system in terms of energy demand and sources will be presented. Based on this, the potential renewable technologies for each energy service (heat, mobility, power) will be discussed. Additionally, students get an overview about carbon capture and storage and negative emissions technologies which are part of all published pathways to net zero GHG emissions. The course finishes with a discussion of the opportunities that exist today to defossilize the plastics and chemical industry.
Teaching / Learning Methods	<ul style="list-style-type: none"> • Screencasts • Flipped classroom • Reading and presenting scientific papers • Excursion

Assessment of Learning Outcome	Written exam (100 %)
Conditions of assessment repetition	<p>In case of failure, students can either:</p> <ul style="list-style-type: none"> • Repeat the competence assessment at next re-examination period (as defined in the “Assessment of Learning Outcome”). • Retake the full module next time it is offered. <p>NB: in MSc CIS, failed modules can only be repeated once!</p>
Format	2 lessons per week over 7 weeks + ~6h excursion
Attendance & Compulsory session	Not compulsory
Timing of the module	Spring semester
Venue	On-site
Location	Bern
Bibliography	<ul style="list-style-type: none"> • Brethauer, S. and Studer, M. H.-P. (2021). <i>Towards Net Zero Greenhouse Gas Emissions in the Energy and Chemical Sectors in Switzerland and Beyond - A Review</i>. CHIMIA. 75(9). p.788. doi:10.2533/chimia.2021.788
Language	English
Links to other modules	<ul style="list-style-type: none"> • MCCf143 Pathways to net zero GHG emissions in the mobility sector • MCCF153 Pathways to net zero GHG emissions in the food sector
Last Update	May 2023