ENERGETICS

AMMIN/DENERG - Developing a dedicated methodology and a tool for harmonising LCA of hard to abate transport sector

Funded By	Dipartimento DENERG Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	PRUSSI MATTEO - matteo.prussi@polito.it
Contact	
Context of the research activity	The proposed PhD research will help close an important methodological gap through the enhancement of energy system modelling and the development of a robust, harmonised LCA framework adapted to the unique challenges of hard-to-abate transport sectors, particularly aviation.
Objectives	The DENERG of the Politecnico di Torino is involved in numerous research activities aimed at supporting the decarbonisation of the hard-to-abate transport sector. Through interdisciplinary expertise, DENERG promotes innovative solutions with reduced greenhouse gas emissions, contributing to the energy transition. Among these sectors, transport presents major decarbonisation challenges. The research group is developing LCA-based methodologies to assess the environmental benefits of alternative fuels and emerging technologies. Despite the critical role of LCA in guiding technology and policy choices, especially in sectors where CO2 emissions are monetised through fees or carbon markets, Europe currently lacks a dedicated and harmonised transport LCA tool. This contrasts with the U.S. landscape, where the Department of Energy's GREET model is widely adopted. This PhD research will contribute to filling this methodological gap by supporting energy system modelling and developing a robust, harmonised LCA framework tailored to the specific needs of hard-to-abate transport sectors such as aviation. The first objective of the PhD is to analyse existing LCA methodologies, particularly those applied to the road, aviation, and maritime sectors, in order to identify methodological differences and other relevant misalignments. Based on these findings, specific proposals for harmonisation must be developed. The development of a dedicated tool for performing harmonised transport LCA is the main expected outcome of the research. To support the development of this tool, the PhD candidate will conduct energy system modelling and design scenarios for technological transitions. A key focus will be the assessment of alternative fuel options, with particular

	attention to modelling innovative production pathways such as the conversion of waste streams into fuels. Another important objective of the PhD is to evaluate the feasibility and techno-economic impacts of implementing such innovative solutions. Overall, the research will contribute to defining effective strategies for reducing climate change impacts and promoting sustainable development, supporting a green recovery and helping to address the broader challenges posed by the climate crisis.

Skills and competencies for the development of the activity	The PhD candidate is expected to develop: • Competences on environmental LCA modelling. • Competences on energy modelling. • Competences on programming (e.g. Phyton). • Other relevant soft skills, such us: o Team working. o Autonomy at work. o Problem solving. o Communication skills. Basics of project management.