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DEVELOPMENT OF A SOCIAL LIFE CYCLE ASSESSMENT INDICATOR FRAMEWORK FOR CO_2 MARINE TRANSPORT IN CCS VALUE CHAIN

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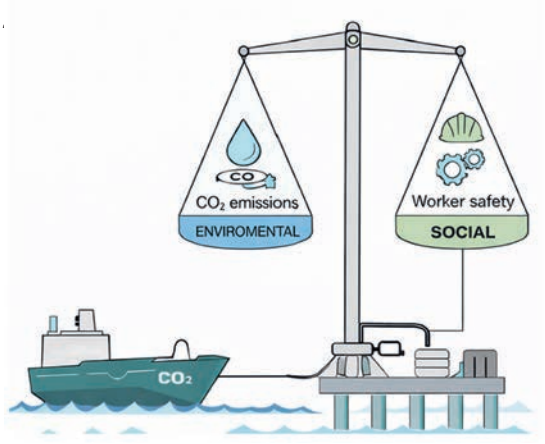
Abstract – Carbon Capture and Storage (CCS) is increasingly recognised as an essential component of climate mitigation strategies, particularly for industrial sectors with limited decarbonisation alternatives. As CCS systems evolve towards larger scale and transboundary deployment, the sustainability of CO_2 transport infrastructure becomes a critical consideration. While marine transportation of CO_2 is gaining attention as a flexible and scalable transport option, existing studies have largely focused on technical performance and economic aspects, with comparatively limited attention to structured social sustainability assessment. This study presents the development of an indicator-based Social Life Cycle Assessment (S-LCA) framework that focuses on the structuring and operationalisation of social sustainability indicators for CO_2 marine transportation within emerging CCS value chains, rather than on impact interpretation or performance evaluation. The framework is operationalised through a multi tab Excel-based inventory that enables systematic organisation of sustainability information across several analytical layers. The framework organises social sustainability assessment through defined categories, impact subcategories and indicators assigned to each CO_2 marine transport value chain participant. The proposed indicator set addresses key social sustainability themes relevant to CO_2 marine transport, such as occupational health and safety, working conditions, employment quality, local community safety perception, access to information, emergency preparedness, and transparency and governance practices.

Keywords – Decarbonized transport systems; maritime CO_2 logistics; stakeholder indicators; social sustainability assessment



Conceptual illustration of the relationship between environmental performance and social aspects in offshore CO_2 transport and storage activities

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