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## TANGLED THREADS OF OPPORTUNITY: A CO<sub>2</sub> VALORISATION ROADMAP FOR REGIONAL DECARBONISATION

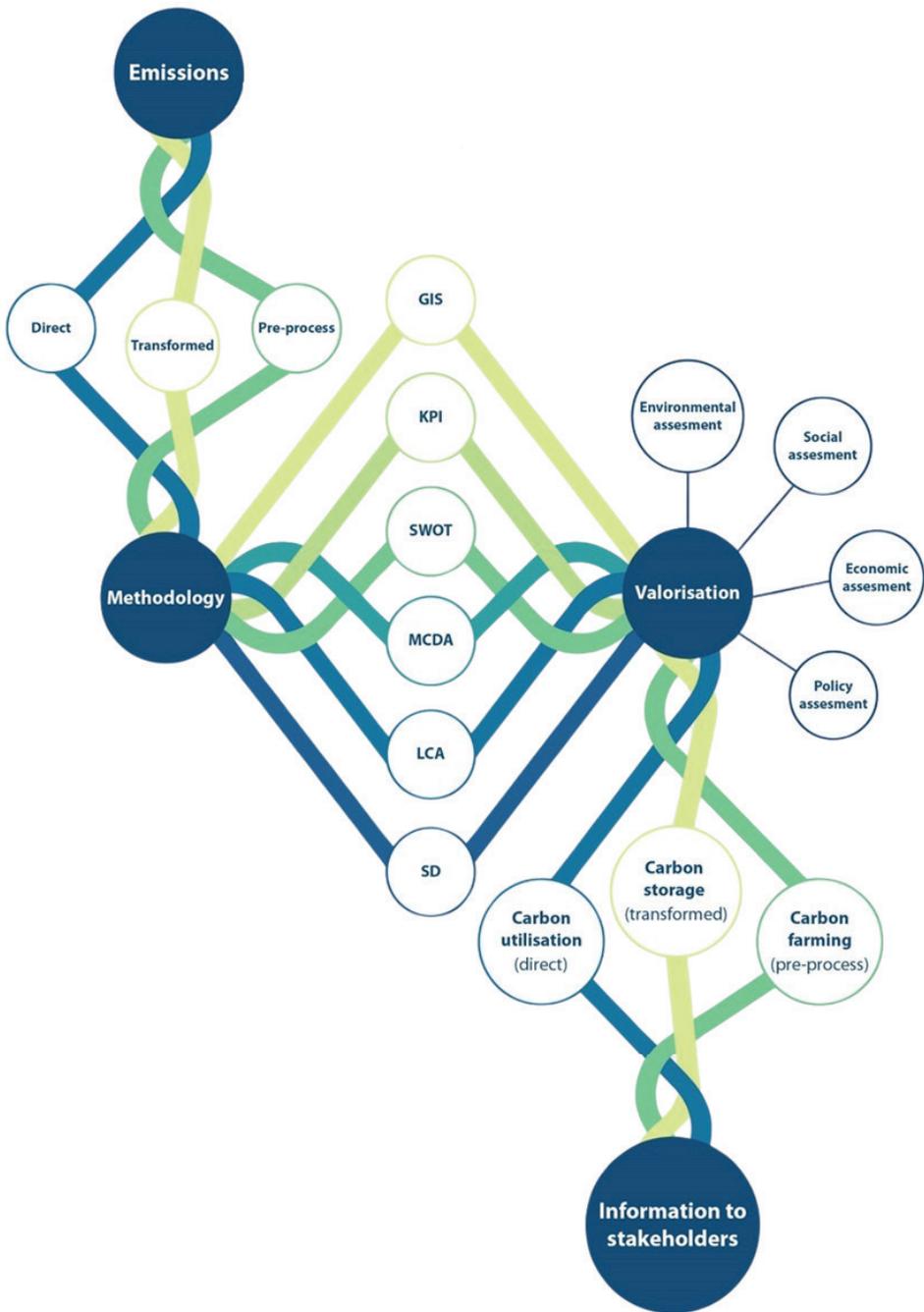
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**Abstract** – The study aims to develop a roadmap for effective carbon dioxide (CO<sub>2</sub>) valorisation in Latvia. The study adopts an innovative "tangle of threads" methodology, integrating multiple approaches to evaluate CO<sub>2</sub> valorisation pathways. The work considered the entire route of CO<sub>2</sub> valorisation and offered a roadmap for decision-makers for effective CO<sub>2</sub> valorisation in the regions of Latvia and is based on a consecutive multi-modelling approach, combining literature review, Geographic Information Systems, Key Performance Indicator analysis method, SWOT analysis, multi-criteria decision analysis, life cycle assessment, economic analysis, system dynamic modelling and social life cycle assessment. Five key valorisation scenarios were analysed during the research, including algae ponds, food and beverage production, methanol, ethanol, and cement production. Algal biomass production and food and beverage sectors demonstrated the highest sustainability and minimal environmental impact. The research concluded that CO<sub>2</sub> valorisation is viable for achieving Latvia's regional decarbonisation goals.

**Keywords** – *Carbon capture and utilisation; decarbonisation; regional development; sustainability*



The tangle of threads methodology of the study