Master of Science

Sustainable Management and Technology

HEC – University of Lausanne
IMD Lausanne
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WORKING DRAFT

Decentralizing Carbon Accountability

A Platform for User-Centric Blockchain Emissions Accounting and Offset

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MASTER THESIS

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Executive summary

The advent of blockchain technology has raised concerns about its high energy use and carbon emissions. This is partly due to the current dominance of proof-of-work-driven Bitcoin, the first network to gain widespread adoption and media coverage. A growing research corpus has established and compared the varying environmental footprints across blockchains, resulting from different consensus mechanisms and design choices. While the recent release of the first industry ESG benchmark enables standardized comparisons between chains at an aggregate level, granular methodologies for user-level emissions accounting are still in their infancy. This thesis compares emissions attribution approaches to develop a proof-of-concept tool for user-level on-chain accounting and offsetting.

Novel to this research is the attempt to weigh responsibility factors based on balancing the principles of proportional benefit (Beneficiary Pays Principle) and direct responsibility (Polluter Pays Principle). This approach exploits the inherent transparency of blockchain data to capture the relative value, specific to each network, that users place on different blockchain functionalities.

Furthermore, a proof-of-concept tool (GreenBlocks) is built to showcase the attribution models, allowing users to estimate and offset their emissions through carbon credits. Based on the Ledger Live platform, this platform interacts seamlessly with leading blockchains and links with on-chain carbon market partners to retire offsets with maximal transparency.