

Digital data ecosystems for the verification of corporate carbon emission reporting

Decarbonization accelerated by verified carbon information

The **relevance of sustainability and decarbonization measurements for companies** have increased substantially over the recent years. This also becomes evident from the fact that the European Union as well as Germany increasingly enact or draft up political instruments and regulation to reduce corporate carbon emissions. One building block of these instruments is the **mandatory reporting** of carbon information, e.g., due to requirements in annual reports, environmental due diligence, or mandatory participation in emission trading systems. In addition, **voluntary standards** on corporate carbon accounting have emerged. By reporting detailed carbon information, companies also expect to create new profits from products with a low carbon

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footprint. However, in particular for companies, the multiplicity of different reports and standards as well as new requirements are associated with substantially increasing effort and expenses for the underlying **measurement, reporting, and verification (MRV)** processes of corporate carbon emissions. Against this background, these MRV processes need a digital booster by **applying suitable digital technologies and creating data ecosystems** in different use cases from carbon allowances to carbon footprints and carbon reporting. **Digitally verified primary data and carbon allocations** are the foundation of digitalizing these MRV processes and, thereby, enabling **reliable data sharing** along an entire value chain.

Digital measurement, reporting, and verification (MRV)

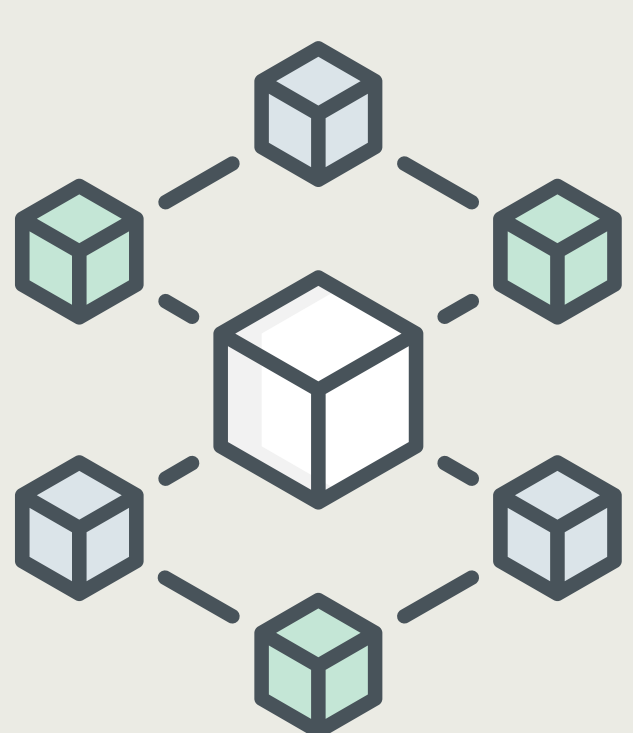
Digital Measurement: To allocate the environmental impact of their activities, companies have to collect primary data. However, currently this **primary data** is not fully collected, stored, and transferred in a digital and automated manner. Consequently, all these data management processes are still **subject to error and manipulation**. Research analyzes how **data ecosystems** may foster digital and efficient data collection and sharing along entire value chains.

Digital Reporting: With the current **annual focus** of reporting carbon information, companies lack the real-time data to **actively monitor and steer decarbonization measures**. To be able to communicate specific product carbon footprints, the data does not only have to be collected and processed **close to real-time** but also on the product and process level. This requires research on more sophisticated data management process, data architectures, and interfaces between business units.

Digital Verification: There exist several digital technology solutions that may reduce the **uncertainty with respect to the veracity of carbon information**. By providing **data protection** and **data sovereignty** and **avoid double counting** or **double spending**, these digital technologies may **reduce the transaction costs** of the increasing number of necessary verification processes. Their design and deployment is subject of our research.

Digital technologies enable companies to use and process verifiable carbon emission data and facilitate carbon-adaptive (process) management

Blockchain



Decentralized, visible, chronological and immutable transactions

Self-Sovereign IDs



One identity across all areas

Zero-Knowledge-Proofs



Proving the correctness of a statement without disclosing additional information

Artificial Intelligence



Predictions, plausibility and validity checks

