

SOFTWARE ARCHITECTURE / DIGITALIZATION-FRIENDLY DESIGN

Leon Bachmann
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INTERNAL – SAP and Partners Only

Our approach to drive sustainability impact

Holistic Steering and Reporting

Complexity of voluntary & regulatory frameworks

Zero Emissions with Climate Action

Scope 1,2,3 transparency on
company and product level

Zero Waste with Circular Economy

Data & insights on **material flow**
and **traceability**

Zero Inequality with Social Responsibility

Transparency on **supply chain**
risks

SAP's Hydrogen Strategy

Holistic Steering and Reporting

Complexity of voluntary & regulatory frameworks

Zero Emissions
with Climate Action



Green Hydrogen



Chain of Custody



Sustainability Footprint



Certification Process



Business Networks

Green Proof for the Hydrogen Value Chain

General requirements for Digital Solutions for Green Hydrogen Certificates

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



SAP

A Public Private Partnership funded by **German Federal Ministry for Economic Affairs and Climate Action (BMWK)** through the International Hydrogen Ramp-Up Programme (H2UPPP).



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3 Phased approach

Certification Analysis Phase I

- In **depth analysis** of certification schemes to **derive** and summarize **requirements**

Software Requirements Phase II

- Summary of **requirements for the software** derived out of the certification analysis

Digital Solutions Phase III

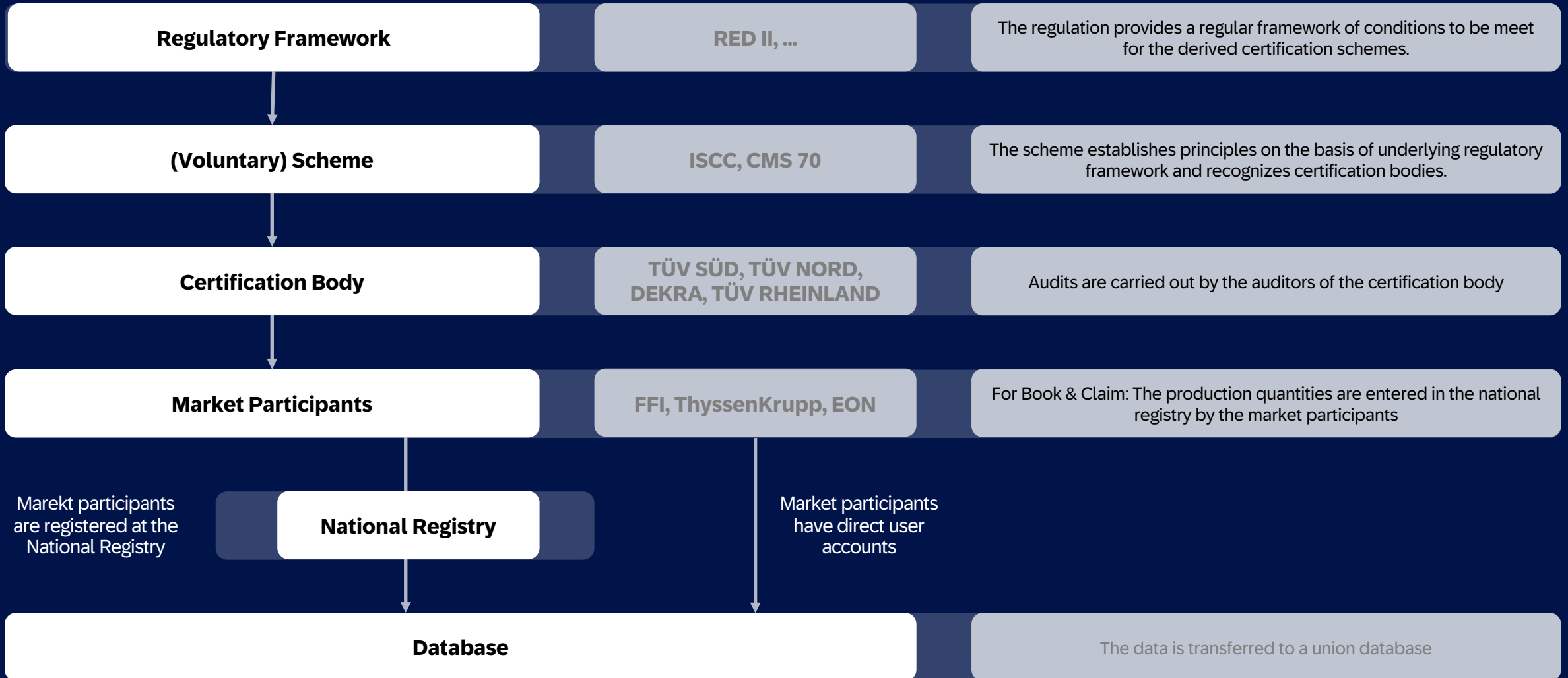
- **Proposals for generic software solutions** that serve the requirements and speed up market developments

FICHTNER

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Basic Framework



Certification Actors

Regulatory Framework

Legal mechanism to set rules about sustainability criteria

Accreditation Body

Ensures that the **certification body** has competence, impartiality, and consistent operation to perform assessment activities.

Union Database (UDB)

Centrally stored data to enhance transparency and traceability



(Voluntary) Certification Scheme

- Describes objects to be certified
- Identifies specified requirements
- Provides methodology for performing assessment



Scheme Owner

Develops and maintains a specific **certification scheme**



Certification Body

Performs assessment to demonstrate that requirements specified in the **certification scheme** have been fulfilled



Auditors

Conduct site-specific Audits and shares the result with the **certification body** and **scheme owner**

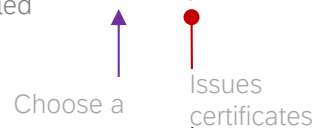
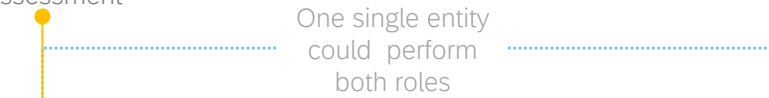


Market Participants



National Registry

Centralized registry at country level that (in some cases) issues Proof of Sustainability (PoS)



Requirements derived from the Report from Fichtner

Product Footprint

- **ISO 14067** or **ISO 14040**
- **Scope 1** and **2** emissions

Different per scheme:

- Carbon Footprint
- Additionally CH₄, N₂O, HFCs, PFCs, SF₆

Tracking Model

Different per scheme:

- **Book & Claim**
- **Mass balancing**
- **Physical segregation**
- **Controlled blending**

Energy Sourcing

- Consumption declaration that indicates share of energies for multiple energy sources
- **PPA's** or **guarantees of origin** for renewable energy
- Time stamp and bidding zone for the energy source

Production

- Details about **production device**, technology, operation and modifications
- **Metering data** of hydrogen output and energy inputs
- Details for **production batches**: amount, start and end dates, age, bidding zone, and associated audit evidence
- Proof of CO₂ source (if applicable)

Other Data

- Data and emissions from waste, co-products, and effluents processing
- Upstream emissions from purchased goods
- **Emission factors** and conversion factors sources

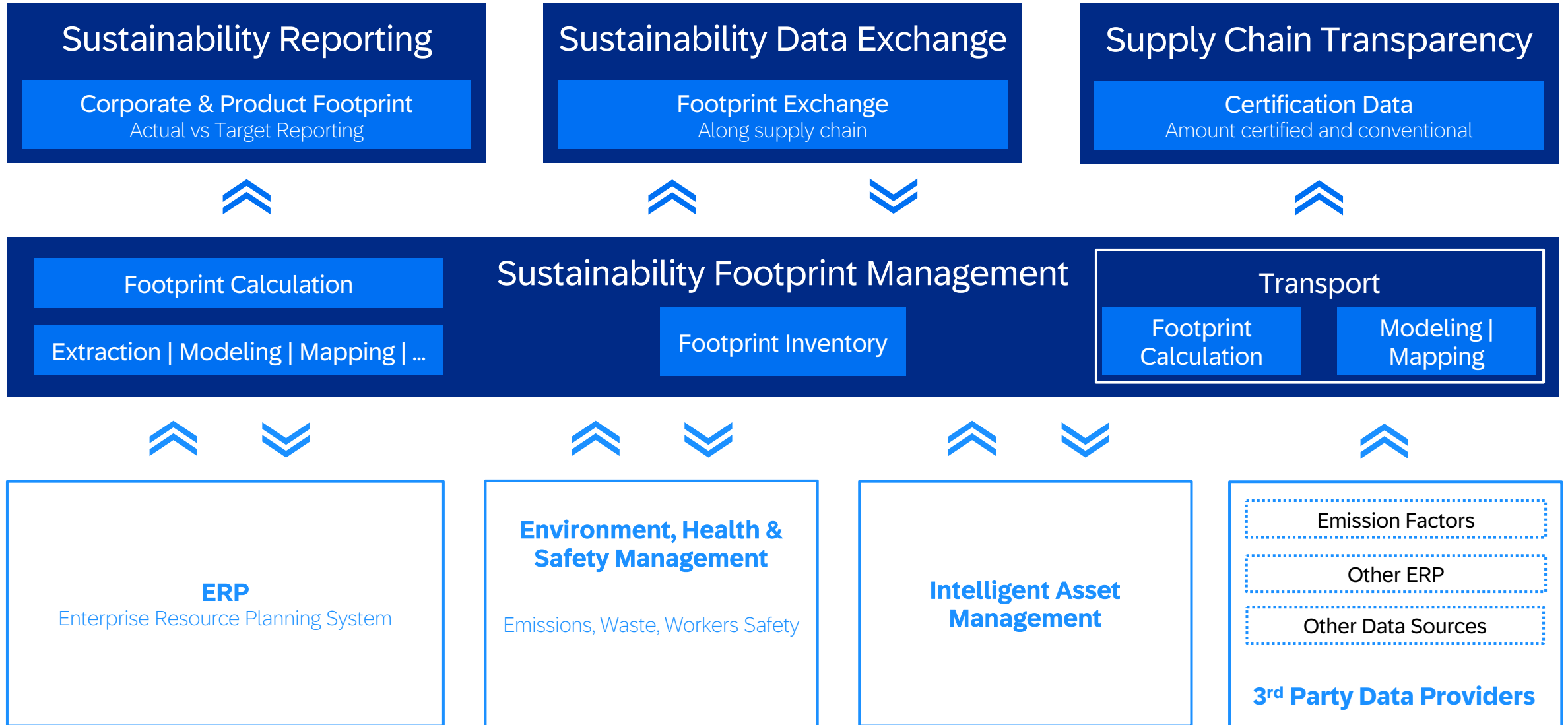
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Business Architecture



DIGITAL SOLUTION(S) FOR GH2 CERTIFICATION

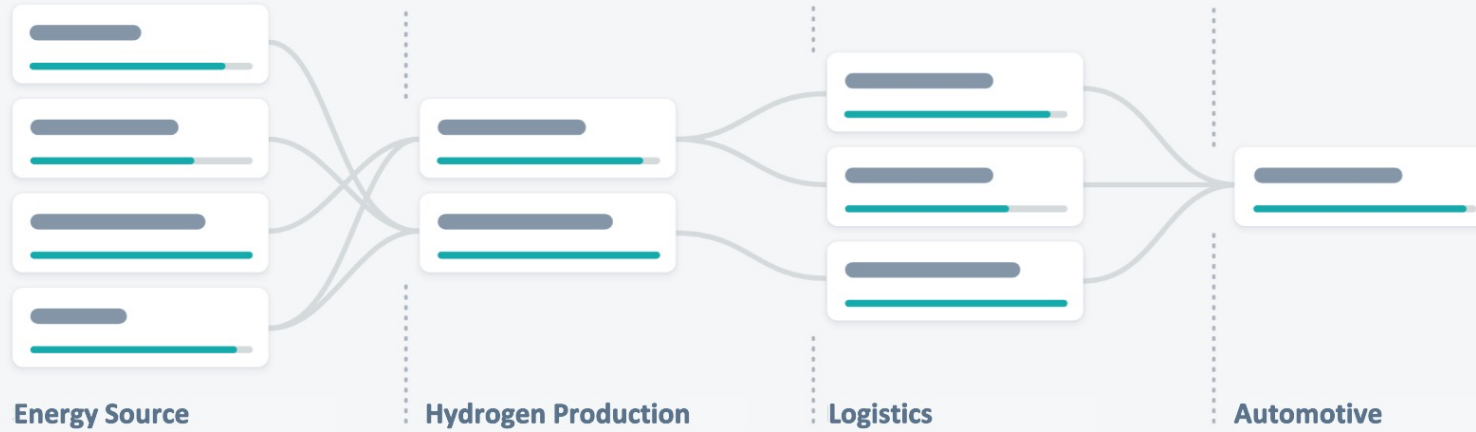
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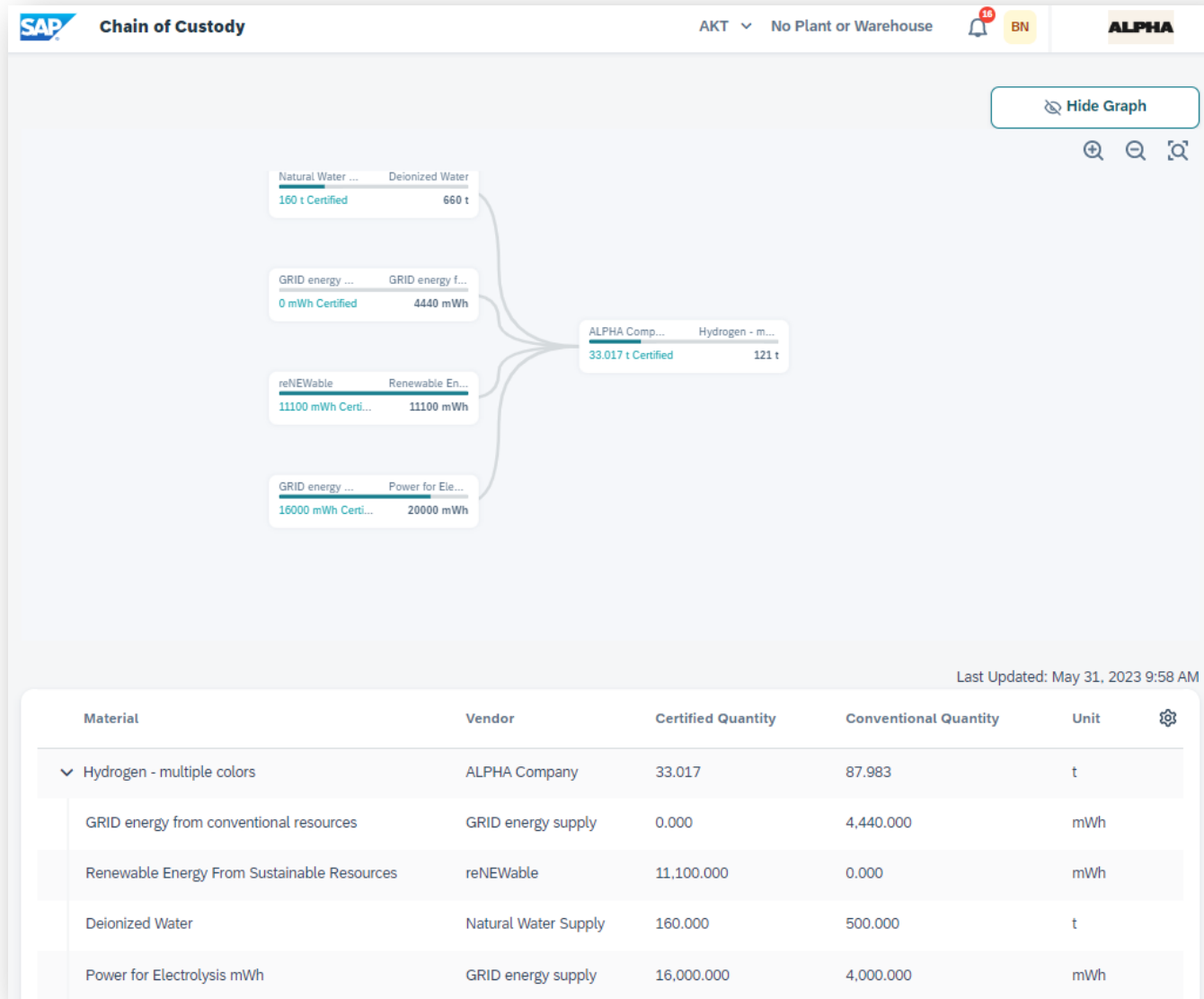
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Chain of Custody



Energy Source	Hydrogen Production	Logistics	Automotive
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

Green Hydrogen and Green Token by SAP



Input

Available: 740 t | Certified: 740 t | Conventional: 0 t

Deionized Water 100 t

Certified Ratio: 100 t / 0 t 100% 100 %

Available: 1,280,000 mWh | Certified: 384,000 mWh | Conventional: 896,000 mWh

Power for Electrolysis mWh 20,000 mWh

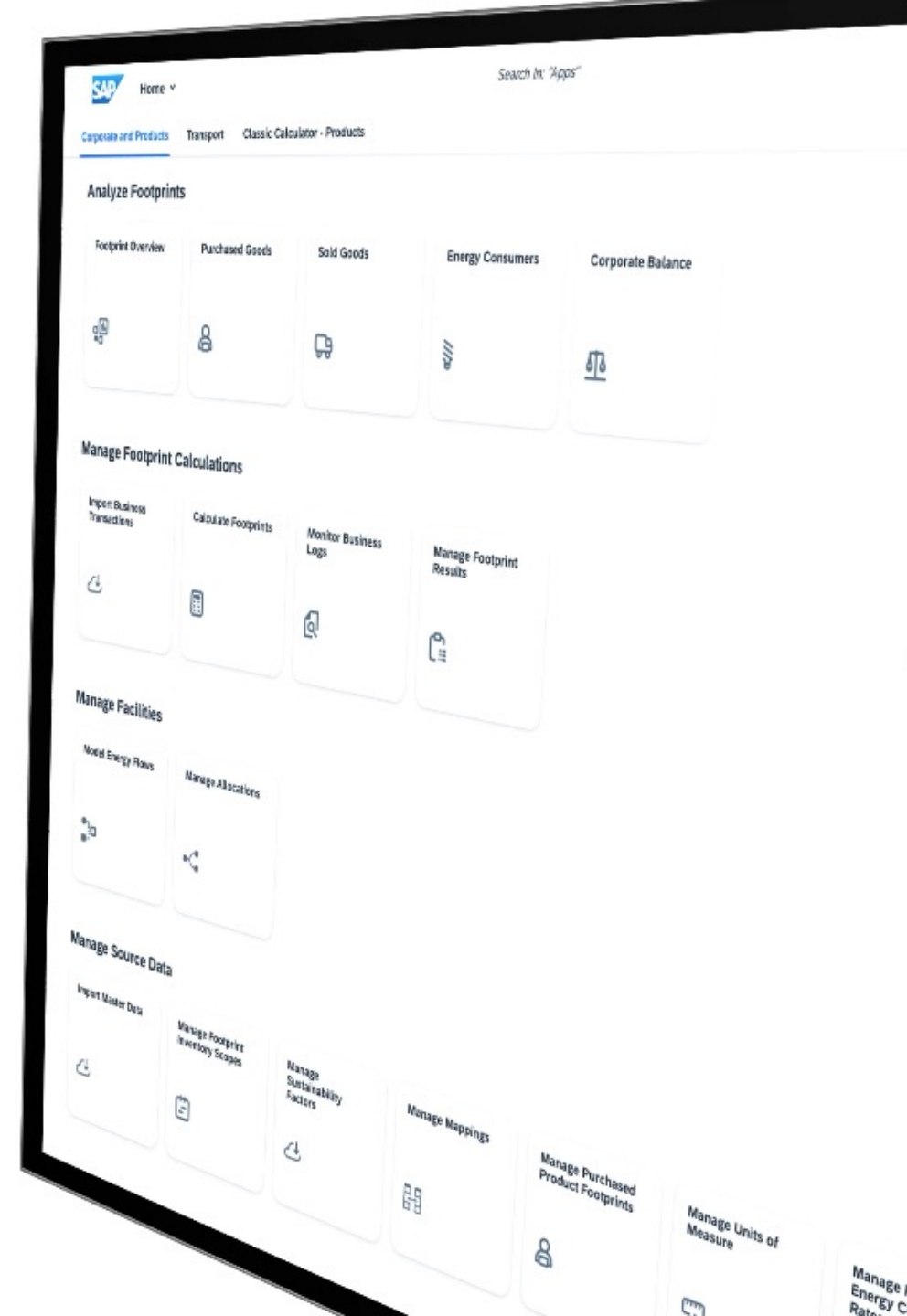
Certified Ratio: 15,000 mWh / 5,000 mWh 75% 75 %

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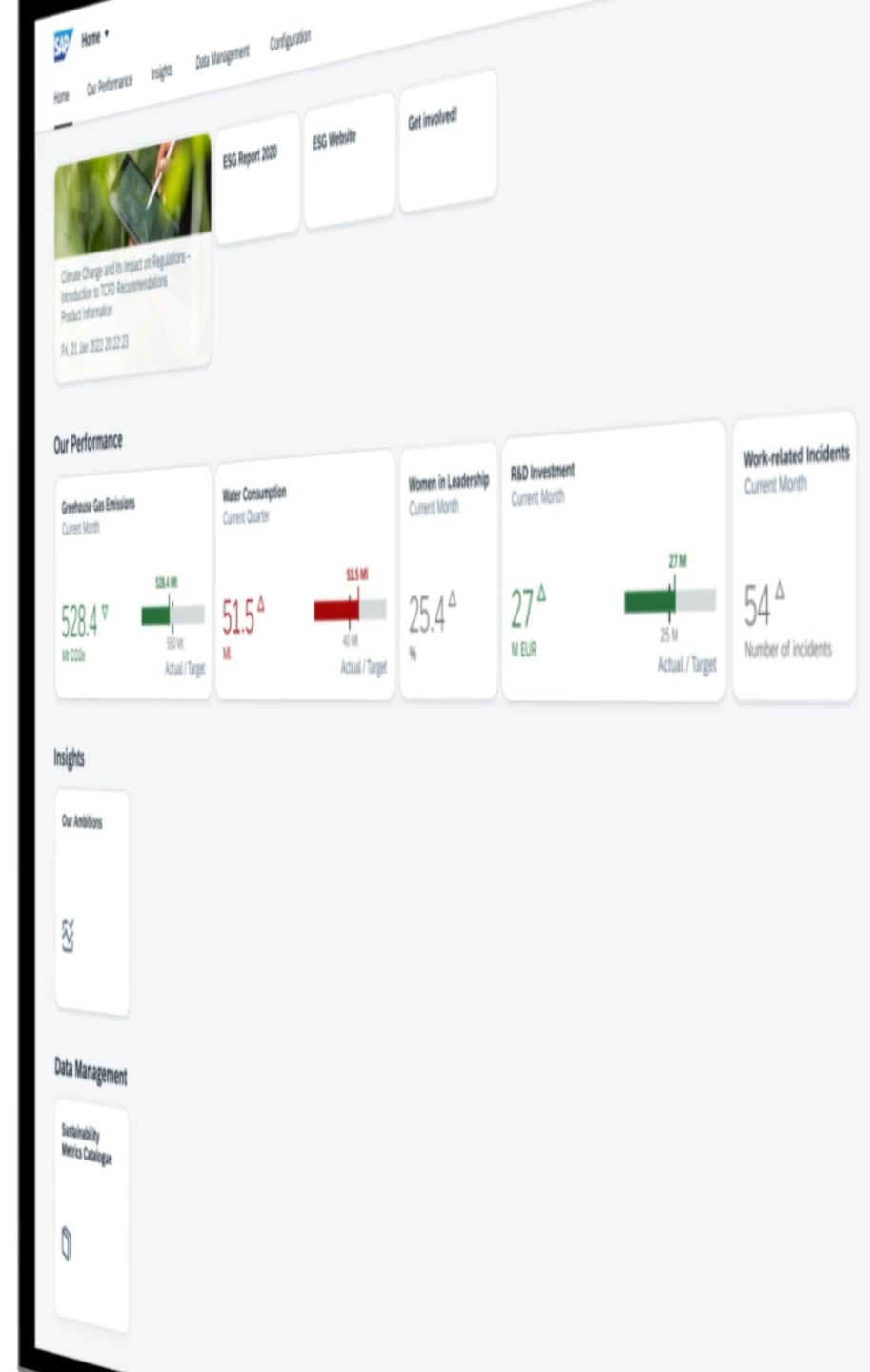
Output Preview

Product	Total	Unit	Certified / Conventional
Hydrogen - multiple colors	10	t	9.583 t 0.417 t

SAP Sustainability Footprint Management



SAP Sustainability Control Tower



Announcing

SAP Sustainability Data Exchange



Green Hydrogen and SAP Sustainability Data Exchange

The screenshot displays the SAP Data Requests interface. On the left, a table lists data requests with columns for Request, id, Company, and Status. On the right, the 'Incoming Data Request' section provides a detailed overview for the 'Transmission' material, including reporting period, CO2 emissions, and origin data.

Request	id	Company	Status
Transmission	TRANSM123	OEM A	Completed
Oil Pan	OILP343434	Supplier 20	Requested

Incoming Data Request

Completed

Timeline • only shared with [OEM A](#)

← [Supplier 2](#) provided the following data • Jan 19, 2023 5:24 PM

Overview

Reporting Period
01/01/2023 – 03/31/2023

CO₂ Fossil Greenhouse Gas Emissions 110 kg CO₂

- 11 kg CO₂e (10 %) Primary Data Share
- 99 kg CO₂e (90 %) Secondary Data Share

CO₂ Origin 134 kg CO₂

- 24 kg CO₂e (18 %) Secondary Data Share
- 110 kg CO₂e (82 %) Fossil Greenhouse Gas Emissions

▼ About

▼ Details Product Carbon Footprint

Supplier 2 provided the **Product Carbon Footprint** for the material [Transmission](#) • Jan 19, 2023 5:24 PM

→ [OEM A](#) requested the **Product Carbon Footprint** for the material [Transmission](#) • Jan 19, 2023 5:23 PM