

# PPP:

Green proof for the hydrogen value chain - Digital solutions for green hydrogen certificates

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INTERNAL – SAP and Partners Only

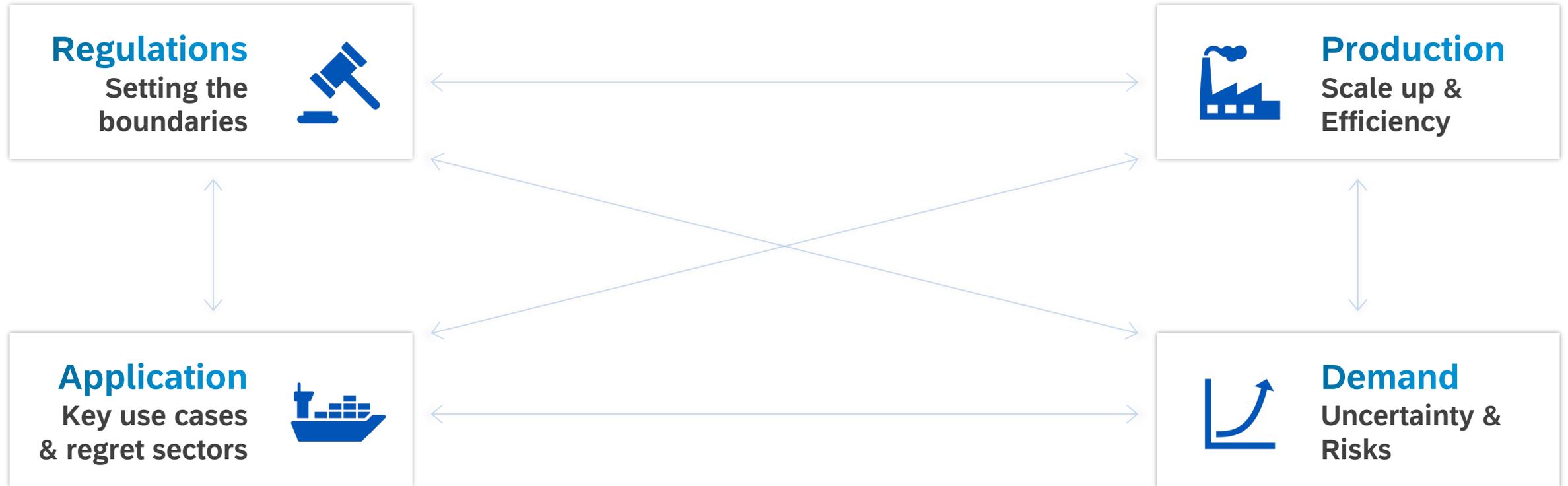


H<sub>2</sub>

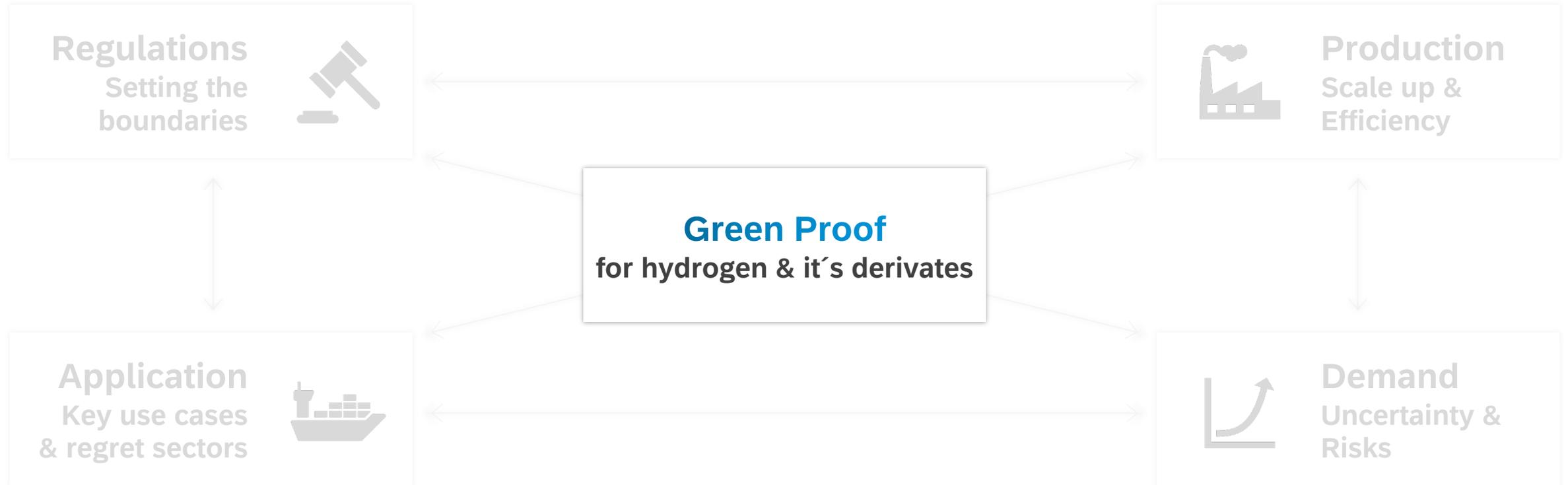
Hydrogen H<sub>2</sub>

zero emission

# Challenges for Green Hydrogen



# Challenges for Green Hydrogen



# Colors of Hydrogen

Production via electricity      Production via fossil fuels

Green Hydrogen

Turquoise Hydrogen

Grey Hydrogen

Pink Hydrogen

Brown Hydrogen

Yellow Hydrogen

White Hydrogen

Blue Hydrogen

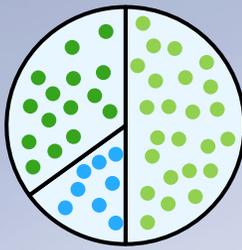
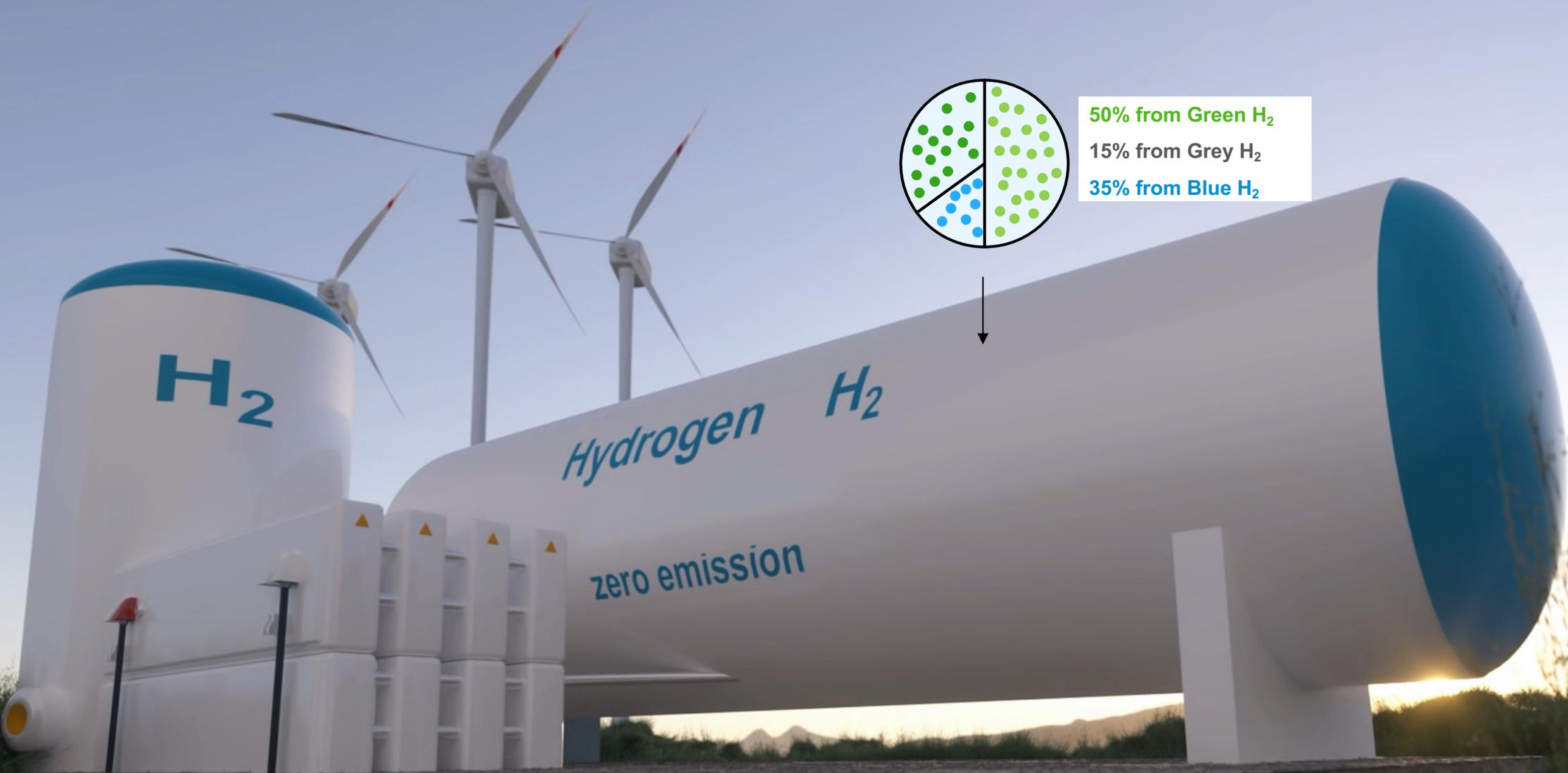
Black Hydrogen



Minimal

Lifecycle CO2e

High



50% from Green H<sub>2</sub>  
15% from Grey H<sub>2</sub>  
35% from Blue H<sub>2</sub>

H<sub>2</sub>

Hydrogen H<sub>2</sub>

zero emission

# 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



# 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



# Certification Actors

## Regulatory Framework

Legal mechanism to set rules about sustainability criteria



recognizes



## (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**

One single entity could perform both roles

## Accreditation Body

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



accredits



## Certification Body

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



Employees/recognizes



## Auditors

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

Choose a

## Market Participants



Issues certificates

## Union Database (UDB)

Centrally stored data to enhance transparency and traceability

hold direct user accounts in

registered at



## National Registry

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

# Requirements for hydrogen software derived from Fichtner report

## Product Footprint

- Derived from **ISO 14067** or **RED II**
- **Focus on direct emissions**

### Different per scheme:

- Carbon Footprint
- Additionally CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>

## Chain of Custody Model

### Different per scheme:

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

## Energy Sourcing

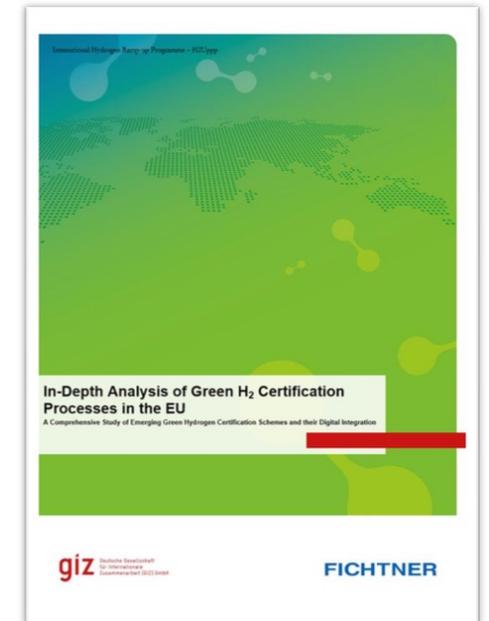
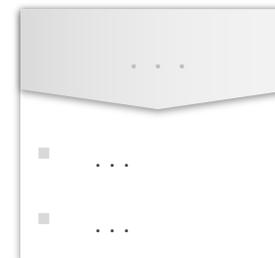
- Consumption declaration that indicates share of energies for multiple energy sources
- **PPA's** or **guarantees of origin** for renewable energy
- Time stamp and bidding zone for the energy source

## Production

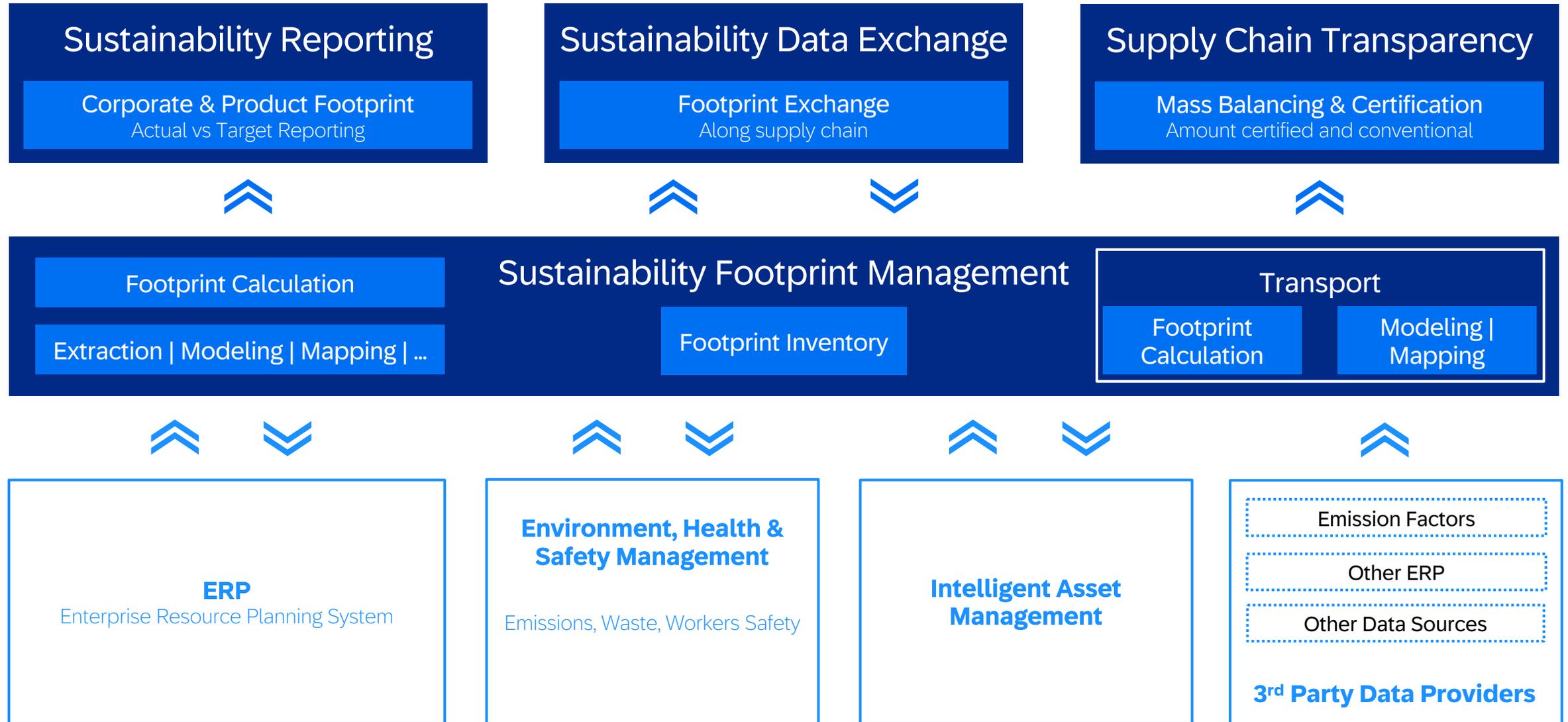
- Details about **production device**, technology, operation and modifications
- **Metering data** of hydrogen output and energy inputs
- Details for **production batches**: amount, start and end dates, age, bidding zone, and associated audit evidence
- Proof of CO<sub>2</sub> source (if applicable)

## Other Data

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



# Software Architecture for Sustainability

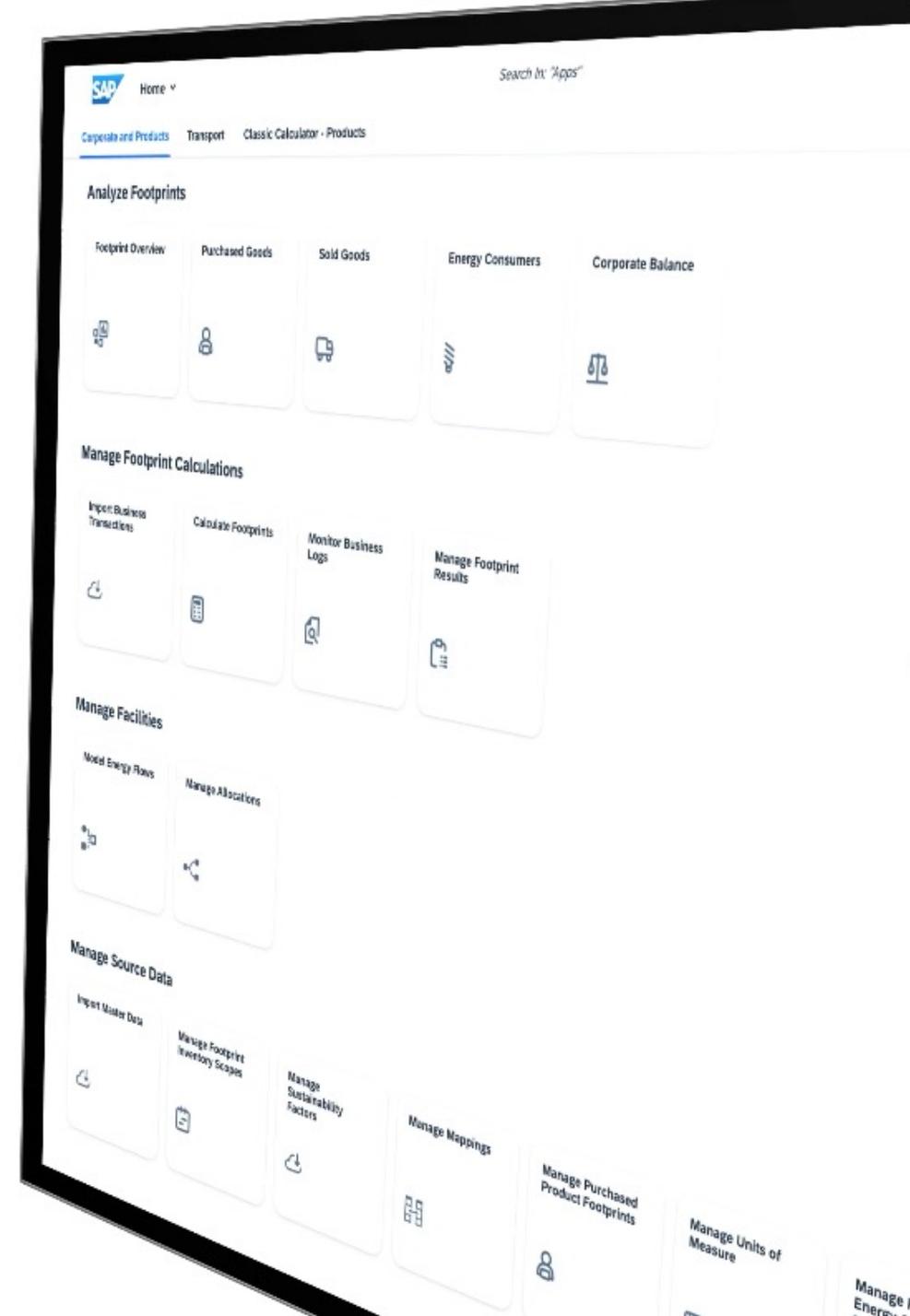


# SAP Green Token

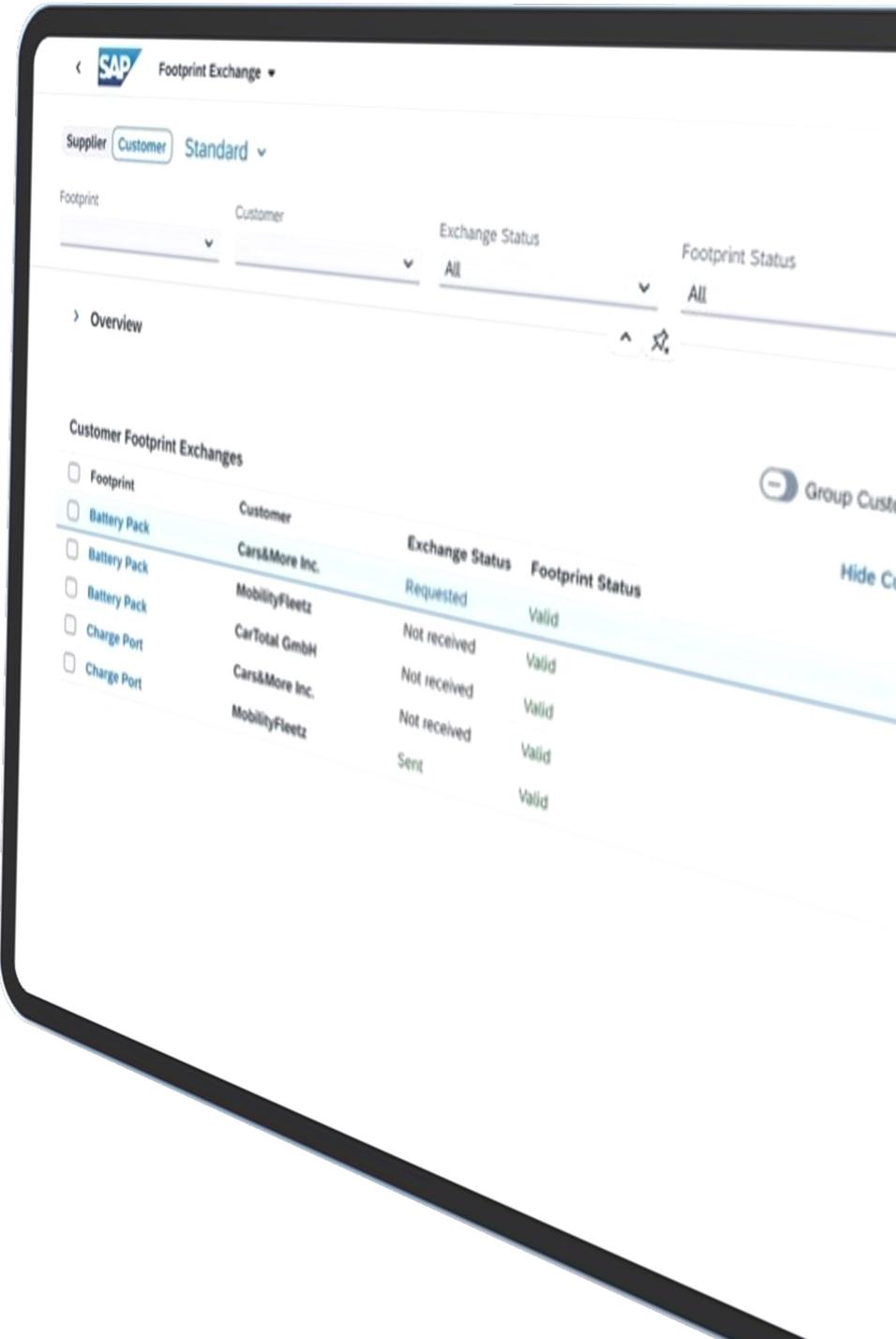




# SAP Sustainability Footprint Management



# SAP Sustainability Data Exchange



Supplier **Customer** Standard ▾

Reset Filter

Footprint Customer Exchange Status Footprint Status  
 ▾ ▾ All ▾ All ▾

> Overview

Group Customer by Footprint

Customer Footprint Exchanges

[Hide Customer Exchange](#)

<input type="checkbox"/> Footprint	Customer	Exchange Status	Footprint Status
<input type="checkbox"/> Battery Pack	Cars&More Inc.	Requested	Valid
<input type="checkbox"/> Battery Pack	MobilityFleetz	Not received	Valid
<input type="checkbox"/> Battery Pack	CarTotal GmbH	Not received	Valid
<input type="checkbox"/> Charge Port	Cars&More Inc.	Not received	Valid
<input type="checkbox"/> Charge Port	MobilityFleetz	Sent	Valid

Customer Exchange

Cars&More Inc

▾ Product Carbon Footprint

Footprint  
**Battery Pack**

Footprint Status  
 Valid

Validity Period  
 Jan 1, 2023 - Dec 31, 2023

CO<sub>2</sub> Fossil Greenhouse Gas Emissions  
**4270 kg CO<sub>2</sub>e**

Primary Data Share	2562 kg CO <sub>2</sub> e (60%)
Secondary Data Share	1708 kg CO <sub>2</sub> e (40%)

CO<sub>2</sub> Origin  
**45 kg CO<sub>2</sub>e**

Biogenic Carbon Content	530 kg CO <sub>2</sub> e (11%)
Fossil Greenhouse Gas Emissions	4270 kg CO <sub>2</sub> e (89%)

▾ Customer Process

Exchange Status  
 Requested

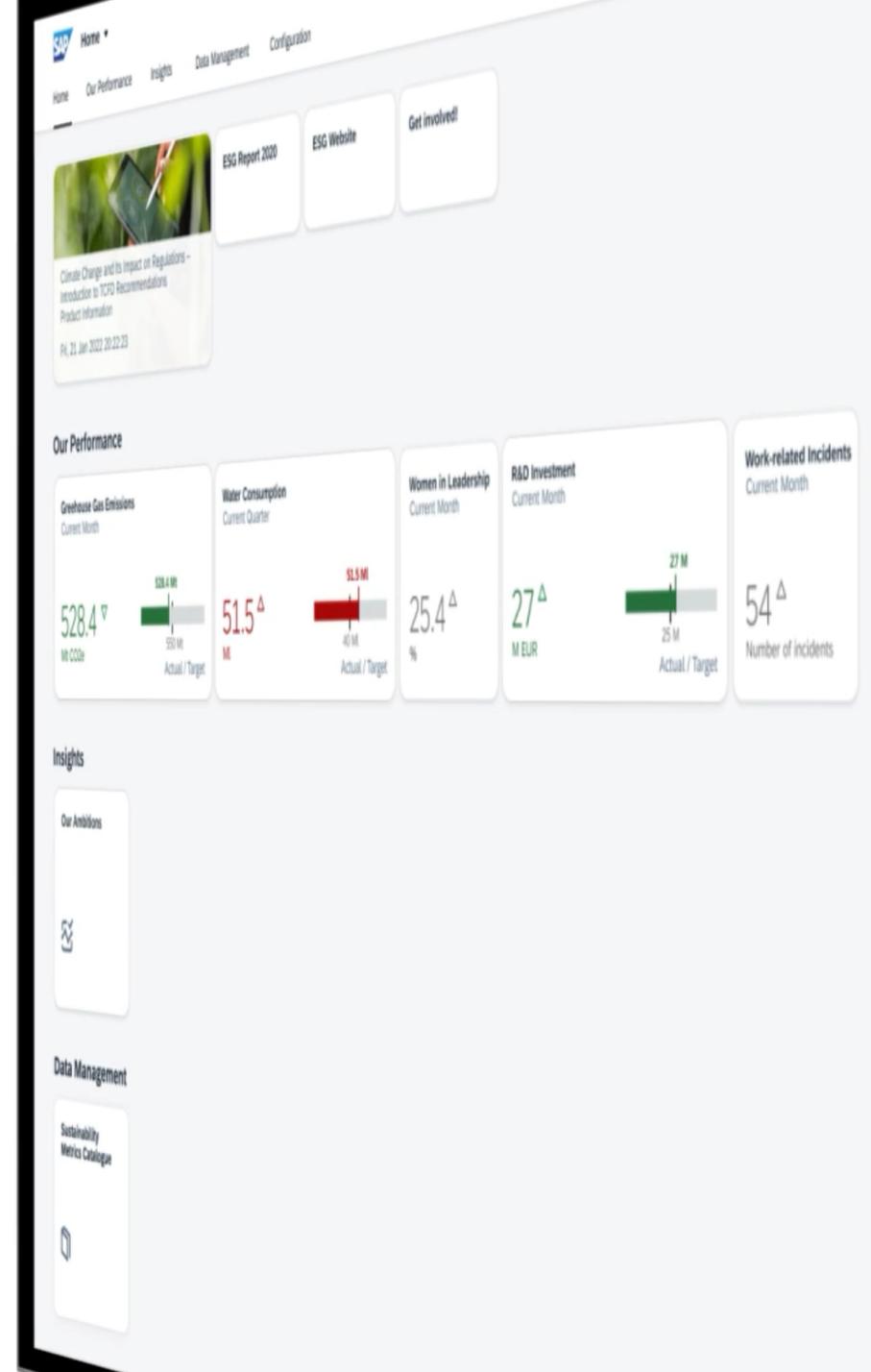
# Green Hydrogen and SAP Sustainability Data Exchange



SAP Sustainability Data Exchange is open for everyone across complex supply chains:

- ✓ Cloud-based solution with open APIs
- ✓ Independent of company size
- ✓ Industry agnostic
- ✓ Interoperability:  
Communicate and exchange data with different systems and programs

# SAP Sustainability Control Tower



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