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Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

AHK Delegation der Deutschen Wirtschaft in Bosnien und Herzegowina
Predstavništvo njemačke privrede u Bosni i Hercegovini

Fit for Sustainable Supply Chain in Europe

A holistic and practical approach to how purchasing can systematically integrate sustainability into its strategies and practices.

IPG Masterclass

Sustainable Procurement

M3 – Sustainability Category Group Analysis

Fit for Sustainable Supply Chain in Europe

Day 2 - Morning Modules 3

9:00 - 12:00

#	Session	Time
1	**Module 3** Sustainability category group analysis	09:00 – 09:45
2	**M3 - Sprint** Sustainability category group assessment (Heat Map)	09:45 – 10:30; Coffee break 10:30 - 10:45
3	**M3 - Sprint** Sustainability optimization lever assessment for category management	10:45 – 12:00

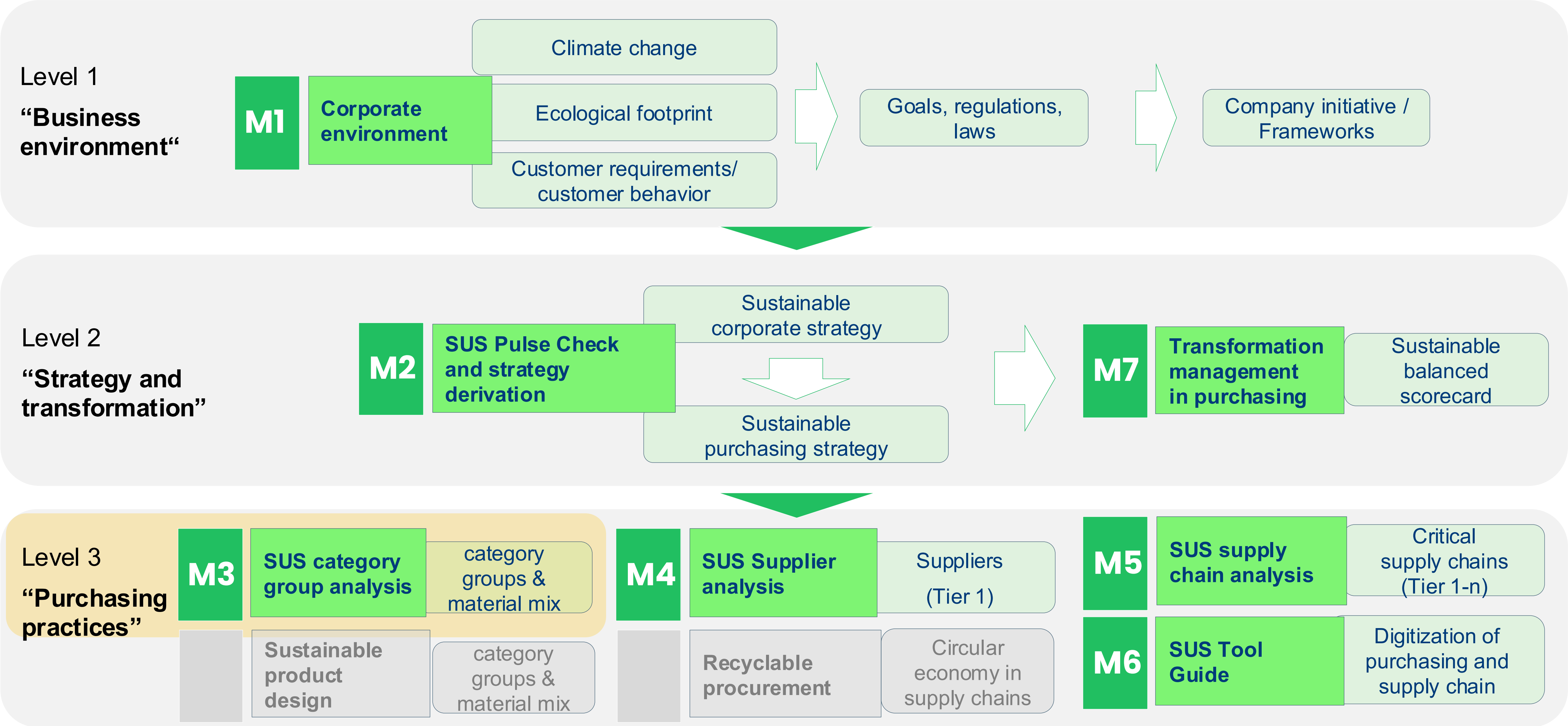
Day 2 - Afternoon Modules 4

13:00 – 15:00

#	Session	Time
4	**Module 4** Sustainability supplier analysis	13:00 – 13:45
5	**M4 - Sprint** Supplier measures for sustainability	13:45 – 14:30; Coffee break 14:00 - 14:15
6	Wrap-up session 1 & Outlook training session 2	14:30 – 15:00

Questions & comments   Coffee break   All times given are indicative and may vary.

Module interfaces | IPG´s sustainable procurement excellence training systematically addresses important interfaces between corporate level and purchasing practices



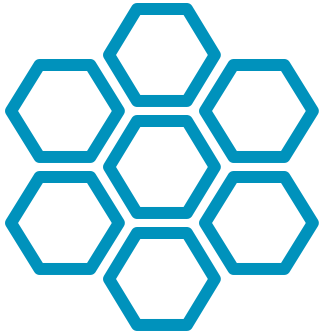
Source: IPG

Each focus area must be evaluated, the fundamentals determined, and priorities set.

SUS category group analysis	SUS Supplier analysis	SUS supply chain analysis
What we purchase	Who we buy from	What do the supply chains look like? look like

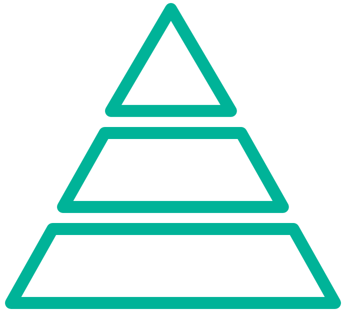
Source: based on Positive Purchasing

We use product group management to develop and implement sustainable product group strategies.



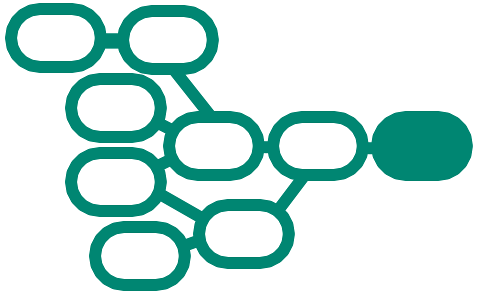
Product group management

Development/updating and implementation of product group strategies with a focus on sustainability



Supplier management

Segmentation, classification, and intervention of suppliers with a focus on sustainability



Supply chain management

Full transparency across the supply chain, identification and management of risks with a focus on sustainability

What we buy

Who we buy from

What do the supply chains look like

Product group management as a strategic starting point for sustainability in purchasing significantly determines the focus of supplier and supply chain management.

Source: based on Positive Purchasing

The assessment of the initial situation for each category group, including a "hot spot" analysis, forms the starting point

What we purchase

- Products
- Services
- Materials used
- Processes involved
- Where do these materials come from?
- Emissions generated throughout the entire life cycle
- Who provides the service?
- How sustainable is it?

hot spots?

Simpler

Who we buy from

- Current suppliers
- Future suppliers
- Where are they located?
- What happens there?
- Emissions generated?
- How do they treat their employees?
- How sustainable are they?

Hot spots?

Accessible

What do the supply chains look like

- What happens in the supply chain?
- Geographies involved
- Suppliers involved ("upstream suppliers")
- How is logistics organized?
- Variability and how easily can the structures be changed?
- Emissions generated?
- How are people treated?

Hot spots?

One of the most difficult

Source: based on Positive Purchasing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Sustainability
Category Group Analysis
Part 1: Material criticality assessment (Heat Map)


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Sustainability
Category Group Analysis
Part 2: Category optimization levers for sustainability


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Sustainability priorities when purchasing services


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Good practice examples

Day 2 - Morning Modules 3

9:00 - 12:00

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Sustainability category group analysis
Part 1: Material criticality assessment (Heat Map)

2 | **M3 - Sprint** | 09:45 – 10:30
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10:30 - 10:45 (Coffee break)

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Sustainability optimization lever assessment for category management

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Supplier measures for sustainability
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Sustainability Category Group Analysis

Part 1: Material criticality assessment (Heat Map)

Sustainability in the procurement process – Overview

In order to make the procurement function sustainable, it is first necessary to lay the **organizational groundwork**, set strategic **guidelines**, and then integrate sustainability aspects into key **processes**.

Sustainability aspects are also anchored in many strategic, tactical, and operational procurement processes.

Procurement processes with a focus on sustainability

Strategic processes	Procurement strategy and guidelines	Demand management	Product group strategies / management	Procurement market analysis	Supplier portfolio management	Make or buy	Supply chain analysis
Tactical processes	Requirements specification	Tenders (RfX)	Negotiations	Contract management	Supplier management		
Operational processes	Requirements	Order	Order confirmation / tracking	Delivery / Goods receipt	Invoice verification	Complaint management	
Performance & basic processes	Data management & analysis	Compliance Monitoring	Performance management	Reporting & Controlling	Catalog management	Technologies/ System Management	

Source: Based on the Bavarian State Office for the Environment

♻ = Embedding sustainability in processes

Embedding sustainability at the strategic level drives sustainability goals forward at all process levels

In order to make the procurement function sustainable, it is first necessary to set the **organizational course**, establish strategic **guidelines**, and then integrate sustainability aspects into key **processes**.

Sustainability must be anchored in strategic, tactical, and operational procurement processes

Strategic processes

- Integration of sustainability criteria into selected **product group strategies**
- Optimization of demand **planning** to avoid unnecessary quantities
- Identification of sustainable products/materials through **procurement market analyses**
- Evaluation of ownership models (**make or buy**)

Tactical processes

- Simplification of **specifications** and consideration of sustainability criteria
- Consideration of sustainability aspects in **award decisions** (tenders)
- Calculation of **life cycle costs** (LCC)
- Integration of sustainability aspects into **supplier contracts**

Operational processes

- Consideration of sustainability aspects in **requirements**
- Placing **orders** with suppliers who have good sustainability performance ratings
- Offering **supply chain finance** programs with better terms for sustainable suppliers

Performance & CIP

- Definition, **collection**, and **reporting** of sustainability-related **performance indicators**
- Creation and adoption of **guidelines** and **codes of conduct** for sustainable procurement
- **Training** of purchasers, stakeholders, and suppliers on sustainability issues

Source: Based on the Bavarian State Office for the Environment

= Embedding sustainability in processes

The way companies use product group management is changing.

The maturity level and intended benefits of product group management determine which goals purchasing focuses on and how well or how easily sustainability goals can be integrated.

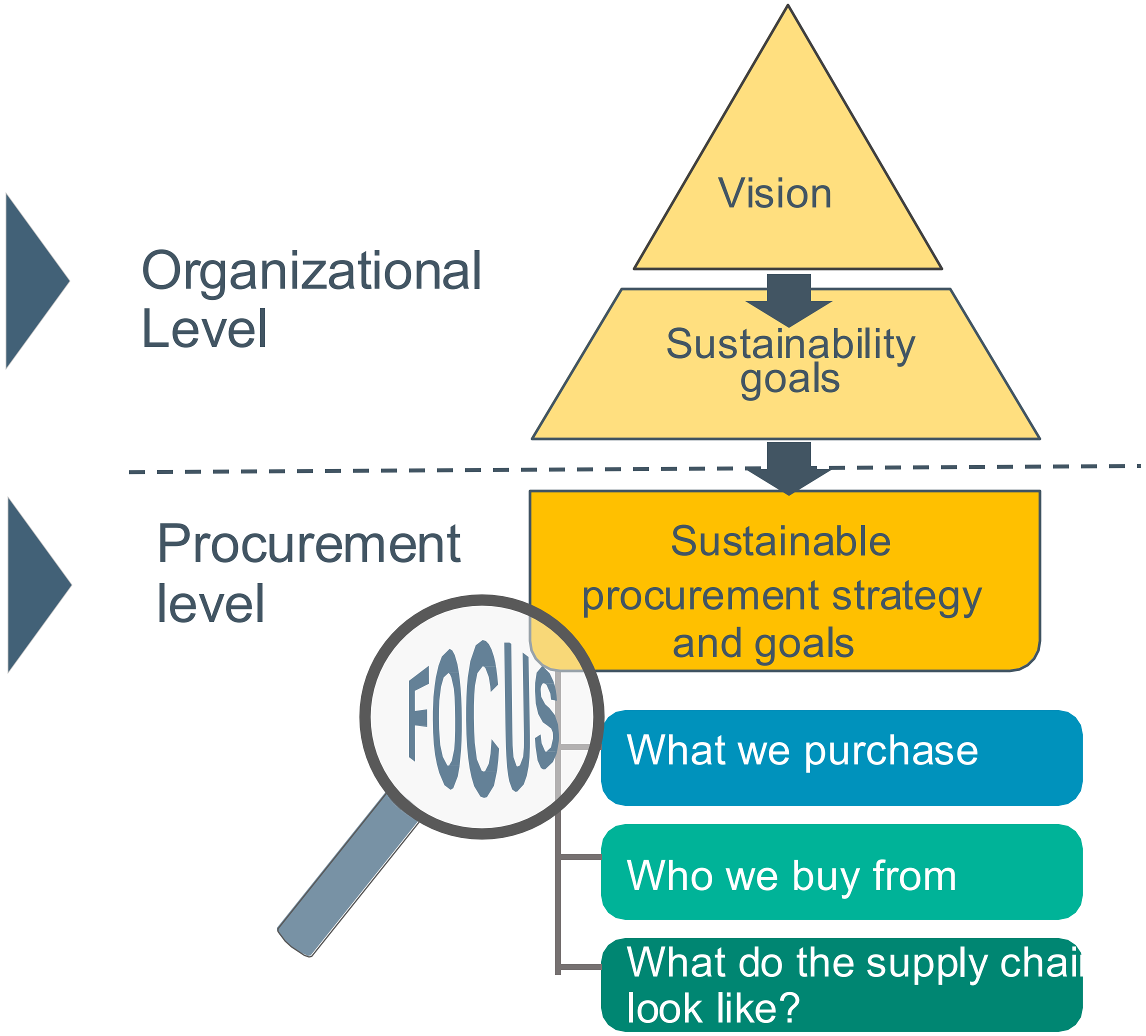
Source: based on Positive Purchasing

Sustainable WGM requires a clear focus that is aligned with the company's goals.

What do we want to achieve?

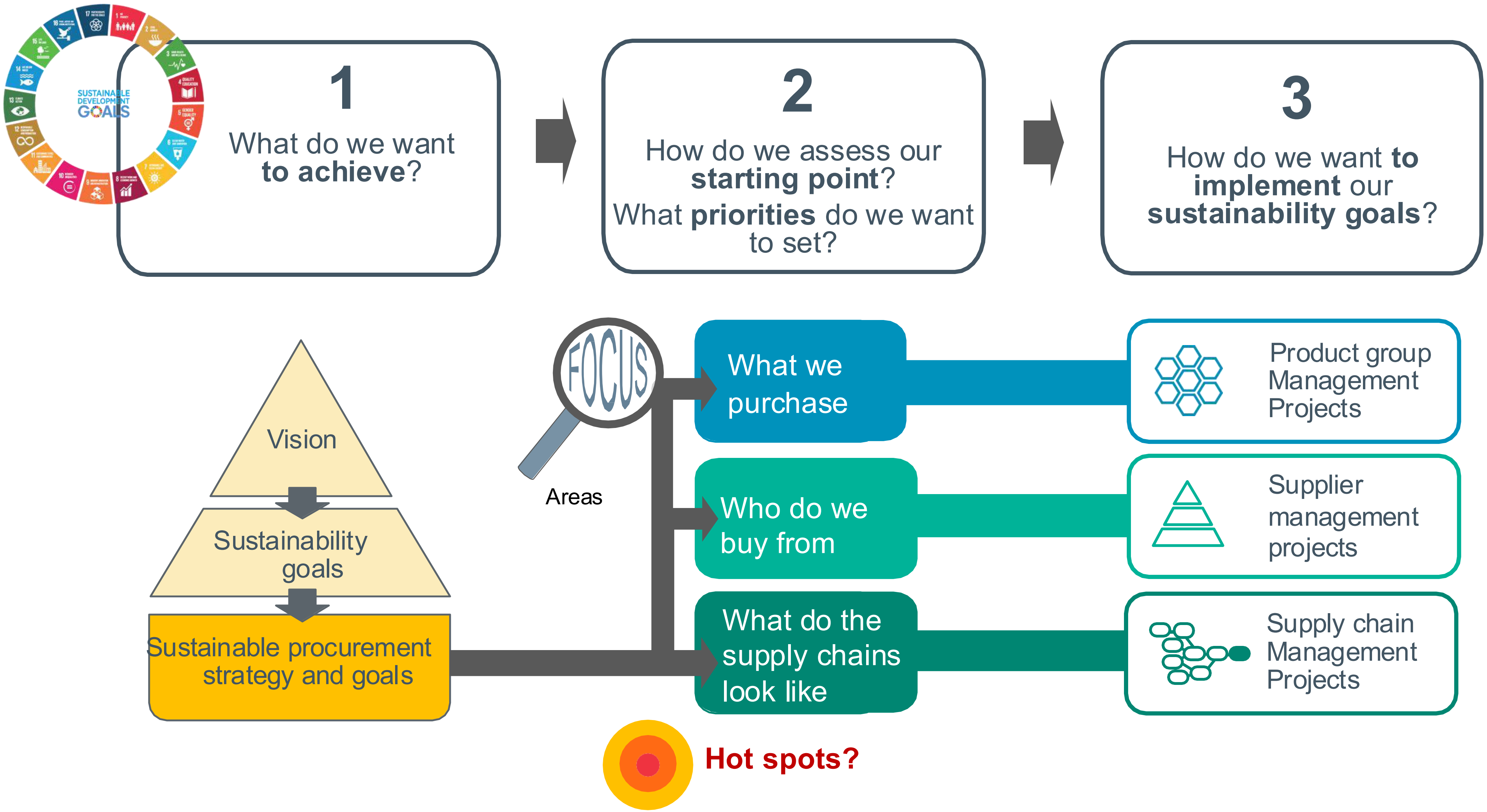
Sustainable Development Goals (SDG)

- Compliance with regulations
- Reduce risk
- Satisfy stakeholders
- Achieve goals, e.g., SDGs
- Gain new competitive advantages
- ...



Source: based on Positive Purchasing

Three important steps toward sustainable procurement – Identifying hotspots is important for prioritization



Source: based on Positive Purchasing

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hot spots?

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Hot spots?

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- How are people treated?

One of the most difficult

Source: based on Positive Purchasing

A consistent perspective that covers the entire life cycle is considered a key success factor (1/2)

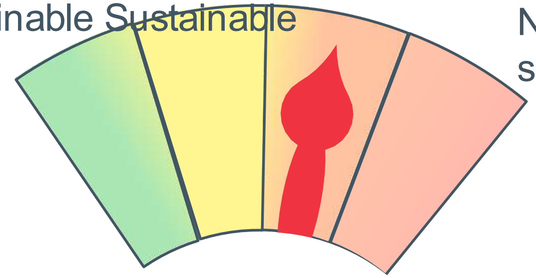
LCA

Design: *Design*

Supply side: *original sources* → *Supply chains and inbound logistics*

Our organization: *Acquisition* → *Consumption or use and/or processing by us*

Customer: *Outbound logistics and downstream chain* → *Consumption or use* → *End of life*



Question: **How sustainable is each WS stage or each procurement object per WS stage...** (material, component, part, module, product or service)**?**

...in relation to

- Use of resources
- Emissions
- Waste
- Pollution
- Processes involved
- People (forced labor, child labor, working conditions, etc.)
- Social issues and communities we affect
- Data

* Life Cycle Assessment (LCA)

Source: based on Positive Purchasing

A consistent perspective that covers the entire life cycle is considered a key success factor (2/2).

Cradle-to-gate (C2G)

"From cradle to factory gate":
A cradle-to-gate analysis takes into account the environmental impact of the production of the building material. This begins with the extraction of the raw materials and **ends with the delivery of the finished products to** the manufacturer's factory **gate.**

VS.

Cradle-to-cradle (C2C)

"From cradle to cradle": meaning "from origin to origin"; an **approach to a consistent and comprehensive circular economy**

doka **Example**

* Life Cycle Assessment (LCA)

Source: based on Positive Purchasing

On the path to "procurement-driven sustainability reengineering" of procurement objects

LCA

Illustrative

1 *What design options do we have?*

2 *What materials do we use ?*

3 *Which original sources of materials do we use?*

4 *How do we purchase the parts that make up the procurement object?*

5 *What does the supply chain and procurement logistics look like?*

6 *What does our manufacturing process look like?*
How are the various materials processed?

7 *How well does the product?*
What quality do we deliver?

8 *How and for how long is the product used?*

9 *How is the product disposed of?*

Hot spots help identify where to focus

* Life Cycle Assessment (LCA)

Source: IPG Research

Procedure for analyzing sustainability – overview of 5 steps (Part of the process at level 3 "Develop WG strategy")

Example

	1	2	3	4	5
Procedural steps within the WG Strategy	Determine risk category for the CG (heat map)	Perform risk analysis of the CG in the CFT	Prioritize CG risks, especially in terms of impact influence	Derive measures for own WG in CFT	Summarize SUS risks and measures for committee approval
Existing documents	**Risk tool WG assessment (xls file)**	**Risk assessment** (slide 1)	**Risk assessment diagram** (slide 2)	**Measures slide** (slide 3)	**Summary** (Slide 4)
Time	**When introducing a new WG**	**In the analysis phase**	**In the analysis phase**	**In the strategy phase**	**Pre-approval phase**

Note: Support from SUS representative

CFT = Cross-functional team

Note: Including specifications for sourcing

Source: IPG

1. Analyze risks
2. Develop category group strategy
3. Implement measures
4. Measure & report
5. Manage complaints

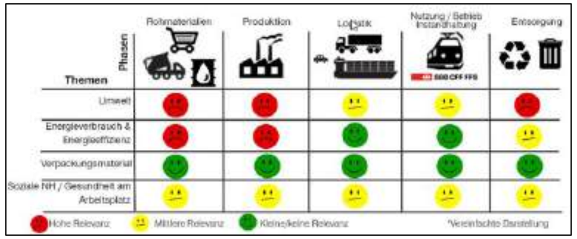
Step 1 – Determine risk category for the category group (HeatMap). category group. "______________________________"

Heat map/category group risk classification (prioritization)

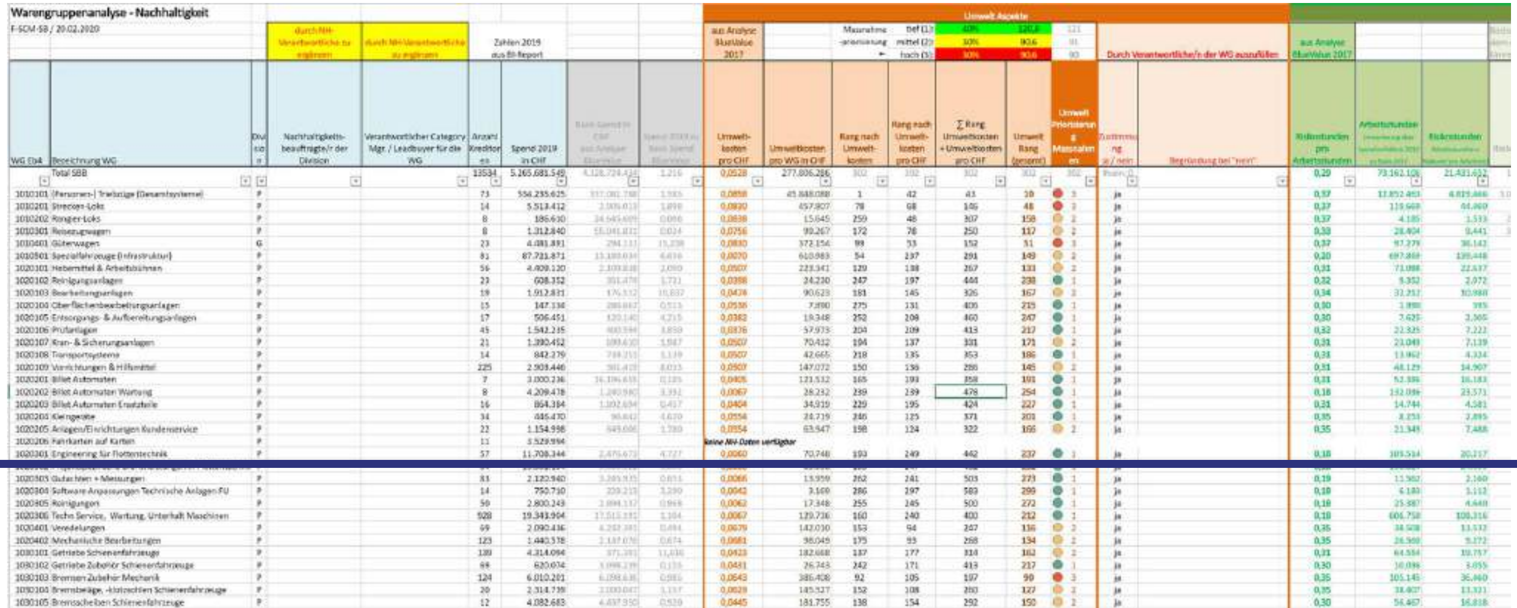
Example

Heat map

→ Risk analysis of critical category groups using a "heat map" (initiated, to create a basis for focusing.



→ Evaluation of SUS opportunities and risks in all category group strategies initiated.



Example: "Material Heat Map"

Best Practice

Best Practice

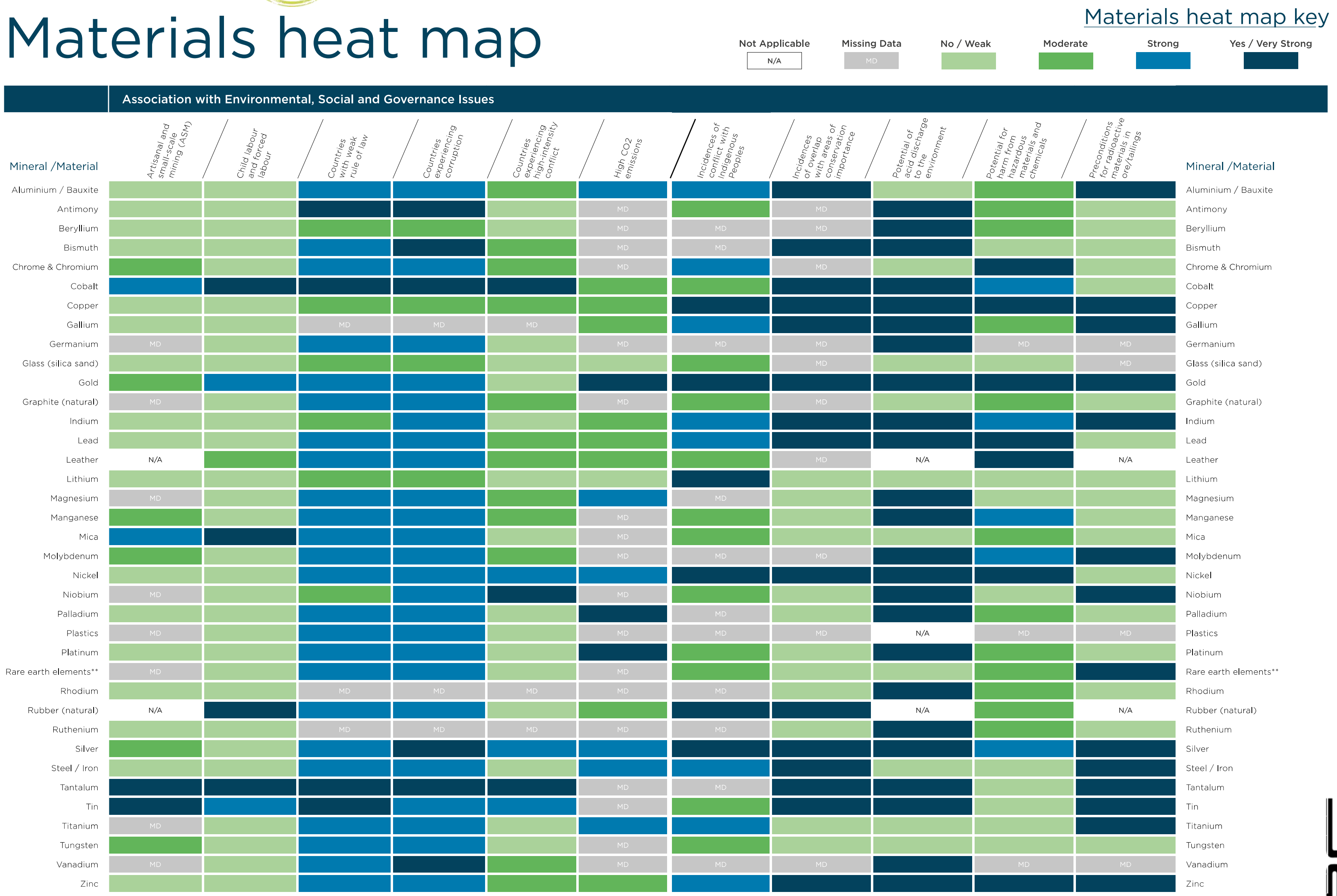
VOLKSWAGEN

Mercedes-Benz

1. Analyze risks | 2. Develop a WG strategy | 3. Implement measures | 4. Measure & report | 5. Manage complaints

- The color coding of materials based on individual criteria enables a heat map and awareness of the importance of materials for the industry, as well as quick identification of problem areas, either by topic or by material.
- Where sufficiently detailed information is available, **materials** have been **rated on a four-point scale from "weak" to "very strong" in terms of their connection to ESG issues**.

The "hot spots" in this heat map indicate potential problems in the production of a material, but are not a definitive measure of risk or impact.



Source: IPG Research

Example: "Material Heat Map"

Best practice

VOLKSWAGEN

Best Practice

Mercedes-Benz

1. Analyze risks
2. Develop a WG strategy
3. Implement measures
4. Measure & report
5. Manage complaints

Material heat map key

Not Applicable	Missing Data	No / Weak	Moderate	Strong	Yes / Very Strong
N/A	MD				

Sustainability focus

Association with Environmental, Social and Governance Issues

Mineral /Material	Mining	Child labor/forced labor	Countries with weak legislation	Countries with corruption	Countries with intense conflicts	CO2 emissions	Conflicts with indigenous peoples	Conflicts with nature conservation	Danger from acid runoff into the environment	Hazardous substances, chemicals	Danger from radioactive material	Mineral /Material
Aluminium / Bauxite												Aluminium / Bauxite
Antimony						MD		MD				Antimony
Beryllium						MD	MD	MD				Beryllium
Bismuth						MD	MD					Bismuth
Chrome & Chromium						MD		MD				Chrome & Chromium
Cobalt												Cobalt
Copper												Copper
Gallium			MD	MD	MD							Gallium
Germanium	MD					MD	MD	MD		MD	MD	Germanium
Glass (silica sand)								MD			MD	Glass (silica sand)
Gold												Gold
Graphite (natural)	MD					MD		MD				Graphite (natural)
Indium												Indium
Lead												Lead
Leather	N/A							MD	N/A		N/A	Leather
Lithium												Lithium
Magnesium	MD						MD					Magnesium
Manganese						MD						Manganese
Mica						MD						Mica
Molybdenum						MD	MD	MD				Molybdenum
Nickel												Nickel
Niobium	MD					MD						Niobium

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Source: IPG Research

Good Practice Beispiel

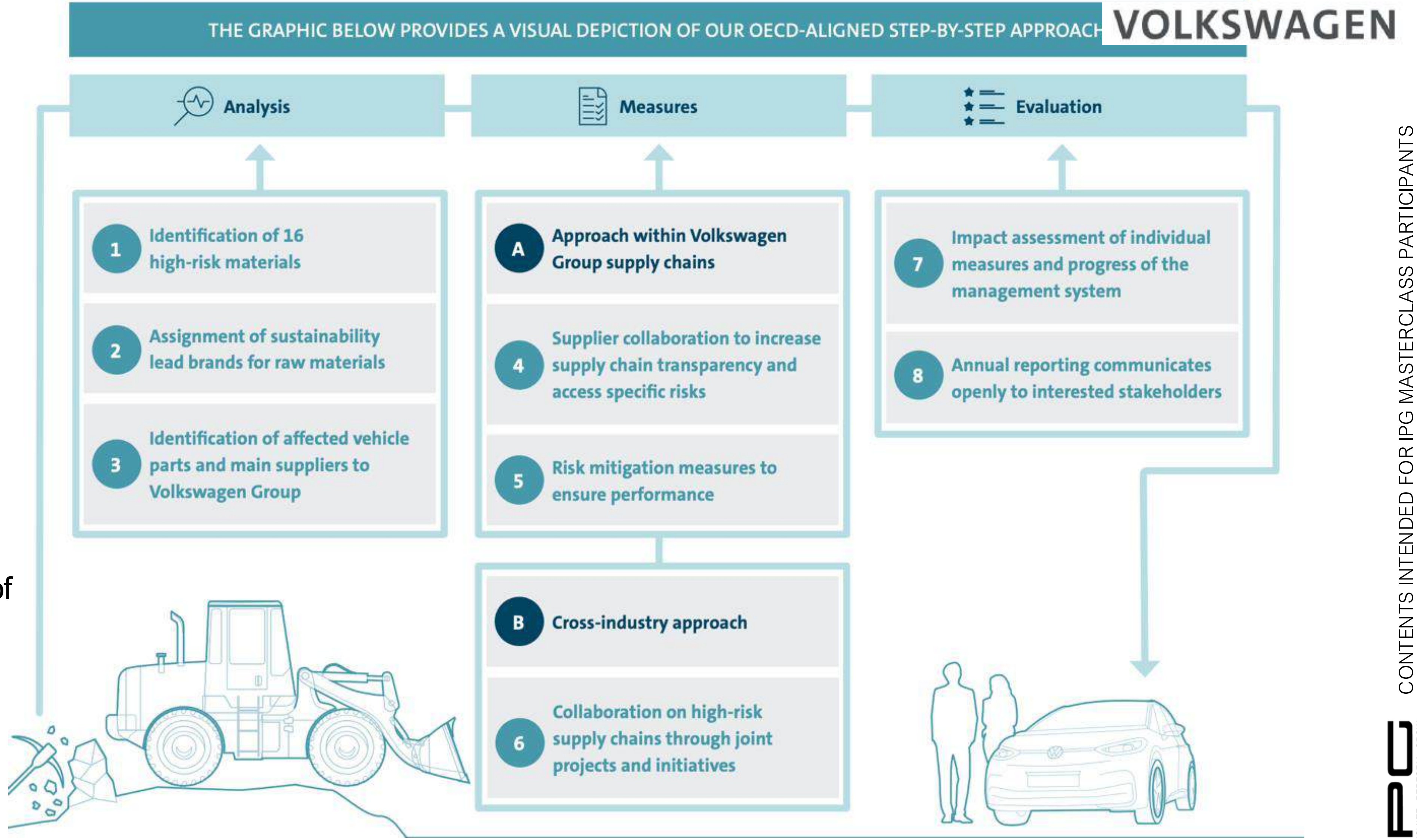
VOLKSWAGEN

Good Practice Beispiel

Supply Chain Analysis for critical raw materials

Volkswagen – Development of sustainable WG strategy – Risk and Audit Approach

- In 2020 and 2021, Volkswagen Group implemented different approaches for the **identification of risks in different raw material supply chains**
- Risk assessment and selection of initial risk mitigation efforts did begin in 2020;
- however, the majority of this work was carried out in 2021 and is currently ongoing and continuously evolving



Quelle: IPG Research

CONTENTS INTENDED FOR IPG MASTERCLASS PARTICIPANTS

1/5

Volkswagen – Responsible Raw Material Report 2021

Materialien und ihre Hauptrisiken:

VOLKSWAGEN

Material	Hauptrisiken
Lithium	Risks to workers' occupational health and safety; Adverse environmental impacts
Kobalt	Child Labor; Modern Slavery; Systematic or widespread human rights abuses; Human rights abuses committed by public or private security forces; Support to non-state armed groups or public or private security forces; Risks to workers' occupational health and safety; Adverse environmental impacts; Infringement on labor rights; Discrimination and harassment
Nickel	Child Labor; Modern Slavery; Systematic or widespread human rights abuses; Human rights abuses committed by public or private security forces; Support to non-state armed groups or public or private security forces; Risks to workers' occupational health and safety; Adverse environmental impacts; Infringement on labor rights; Discrimination and harassment; Threats to indigenous people and communities
Graphit	Human rights abuses committed by public or private security forces; Risks to workers' occupational health and safety; Adverse environmental impacts; Infringement on labor rights; Threats to indigenous people and communities
Zinn, Titan, Wolfram, Gold, konfliktbehaftete Mineralien	Child Labor; Modern Slavery; Systematic or widespread human rights abuses; Human rights abuses committed by public or private security forces; Support to non-state armed groups or public or private security forces; Risks to workers' occupational health and safety; Adverse environmental impacts; Infringement on labor rights; Discrimination and harassment; Threats to indigenous people and communities

Quelle: IPG Research

Volkswagen – Responsible Raw Material Report 2021

Materialien und ihre Hauptrisiken:

VOLKSWAGEN

Aluminium	Child labor; Modern slavery; Systematic or widespread human rights abuses; Adverse environmental impacts; Threats to indigenous people and communities
Kupfer	Adverse environmental impacts; Threats to indigenous people and communities
Naturkautschuk	Adverse environmental impacts; Risks to workers' occupational health and safety; Child labor; Modern Slavery; Discrimination and harassment, including against vulnerable groups; Infringement on labor rights; Threats to indigenous people and communities
Seltene Elemente	Child Labor; Modern Slavery; Systematic or widespread human rights abuses; Human rights abuses committed by public or private security forces; Support to non-state armed groups or public or private security forces; Risks to workers' occupational health and safety; Adverse environmental impacts; Infringement on labor rights; Discrimination and harassment
Stahl	Adverse environmental impacts; Risks to workers' occupational health and safety; Infringement on labor rights; Discrimination and harassment, including against vulnerable groups; Threats to indigenous people and communities

Quelle: IPG Research

Good Practice Beispiel

Mercedes-Benz

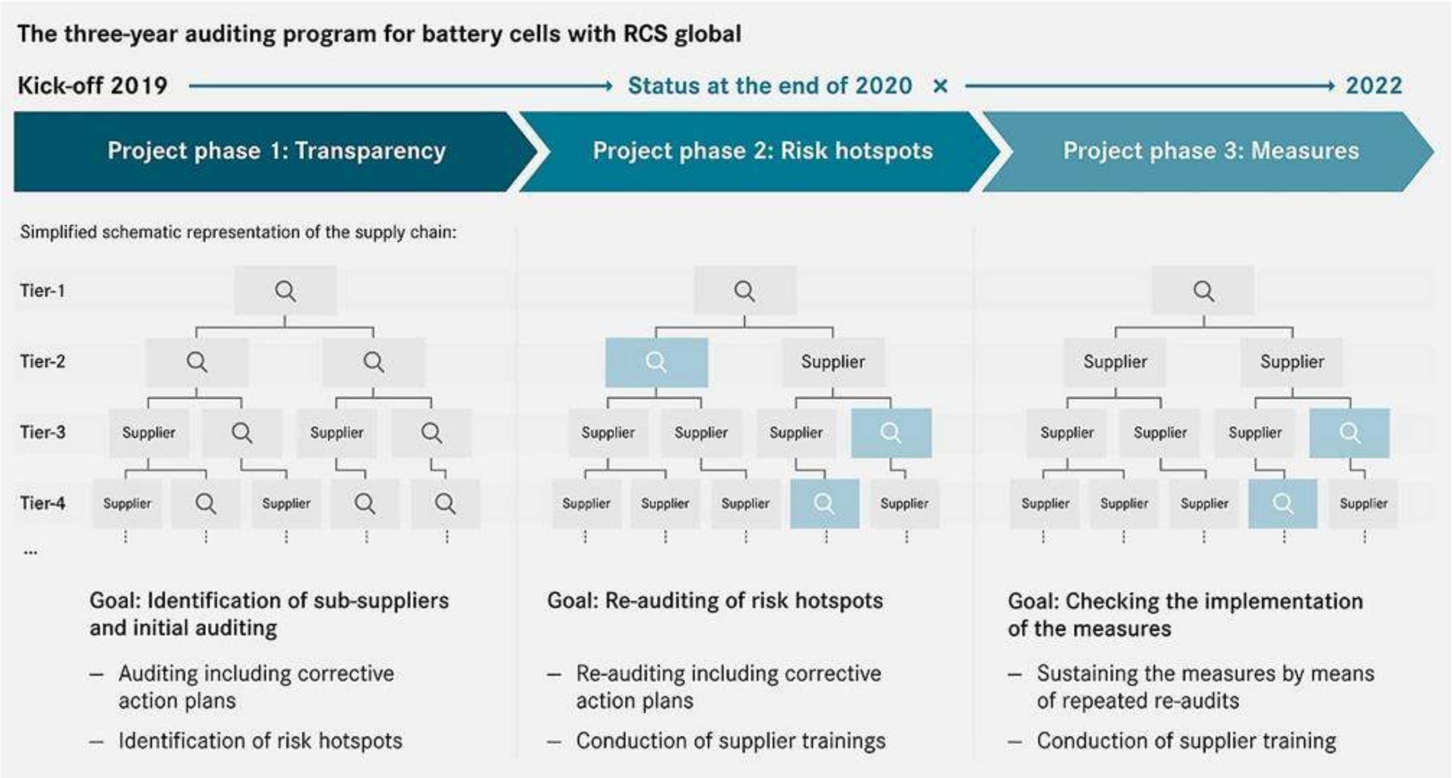
Good Practice Beispiel

Supply Chain Analysis for critical raw materials

Mercedes Supply Chain Analysis for critical raw materials – Example Baterry cells

Mercedes-Benz

- The supply chains of battery cell suppliers to Mercedes-Benz are assessed at all tiers, from battery cell supplier to mine site, by RCS Global.
- This assessment **includes aspects such as the prevention of child labour and forced labour, health and safety at work, material control and due diligence systems.** Where necessary individual corrective action plans are agreed with the suppliers and their implementation is continuously monitored.
- **The aim of this corrective action and regular monitoring is to ensure that a continuous improvement process takes place in the supply chain**. This ultimate aim is that the cobalt for battery cells comes from responsible sources of supply that meet the requirements of Mercedes-Benz AG.



The program‘s aims are as follows:

- Creating transparency and auditing of the company's cobalt supply chain at every tier from the battery cell supplier down to mine level
- Auditing the due diligence management systems and procurement practices of suppliers in the cobalt supply chain
- Initiate a process of continuous improvement by monitoring the implementation of corrective action plans and providing audite e trainings.

1/1

Quelle: IPG Research

Heat map WG risk classification

- In August 2020, the sustainability risk analysis and its measures were approved by the SCM Board.
- 115 category groups were classified as red, i.e., high environmental and social risk. This classification will serve as the basis for all further measures in sustainable procurement in the coming years.

Example

Preparation of external analysis

Prioritization:

- Environmental risk
- Social risk
- Purchasing volume
- External costs / risk working hours

Assessment by the sustainable procurement working group

Procedure:

- Environmental risk
- Social risk
- Purchasing volume
- External costs / risk working hours

Comparison of heat map by divisions – category managers

Current status Heat map

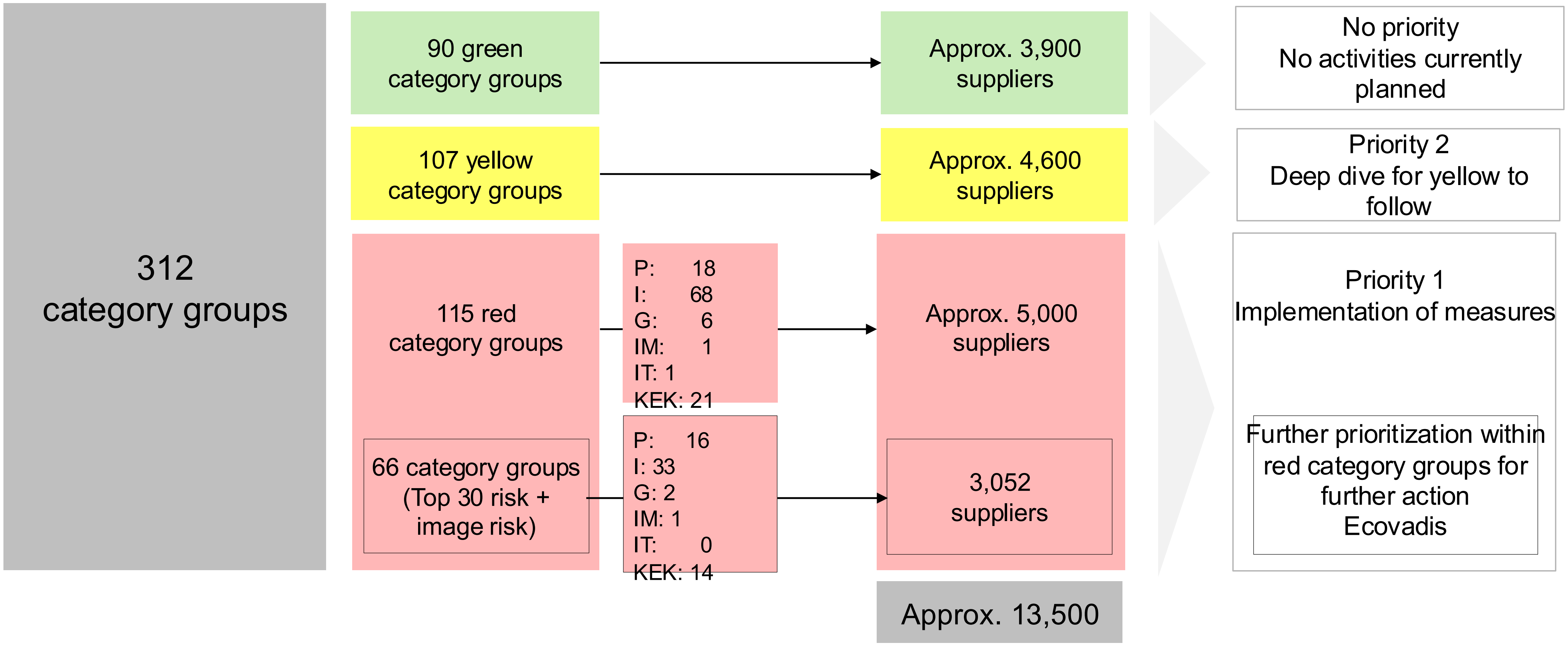
Number of working groups:

- **Red: 115**
- **Yellow: 107**
- **Green: 90**

Category group prioritization

Classification of category groups into three risk levels and prioritization. (Note: Suppliers who deliver to multiple category groups have been assigned to the category group with the highest priority.)

Example



Day 2 - Morning Modules 3

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1 | 09:00 – 09:45
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Sustainability category group analysis
Part 2: Category optimization levers for sustainability

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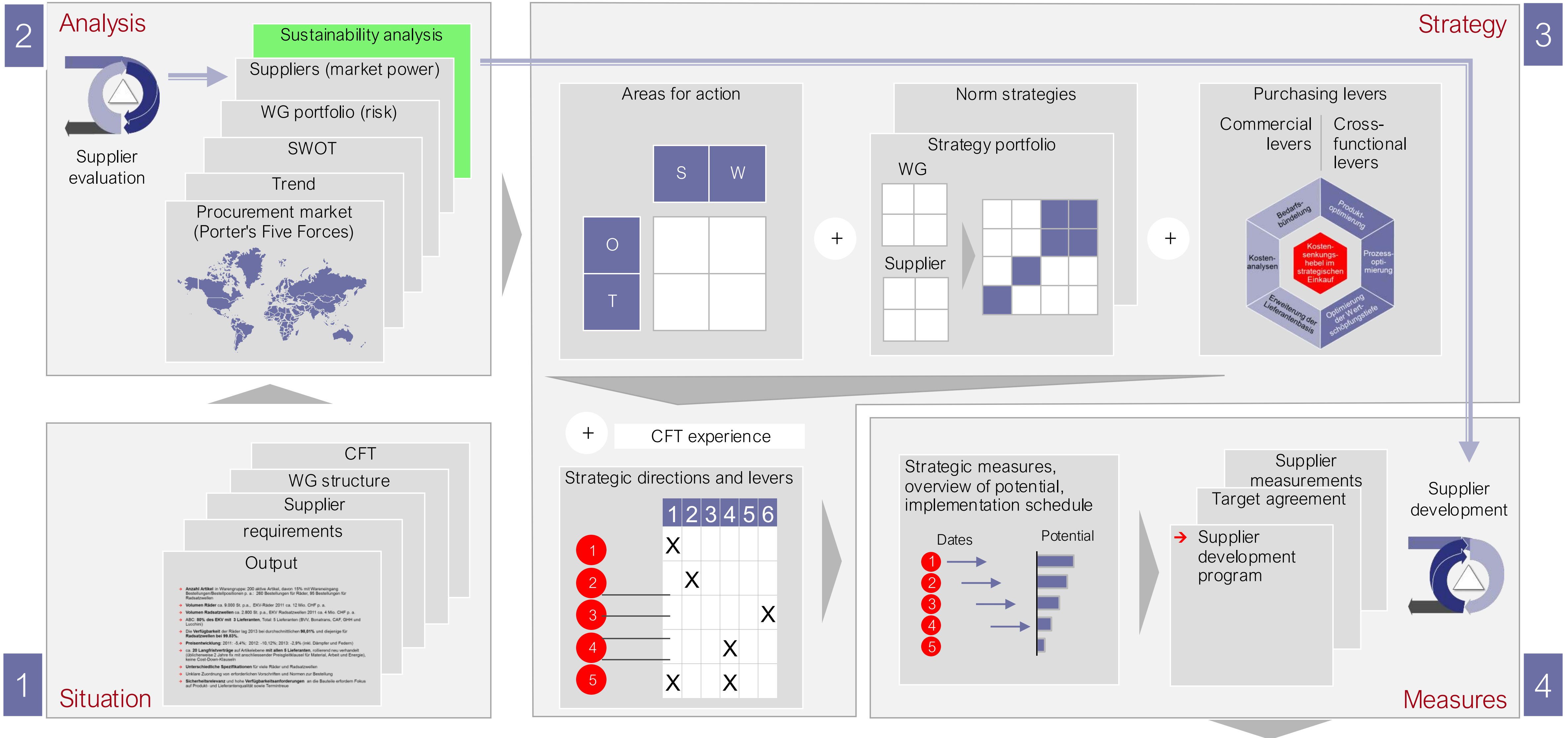
Sustainability Category Group Analysis

Part 2: Category optimization levers for sustainability

Roadmap for strategy development and implementation

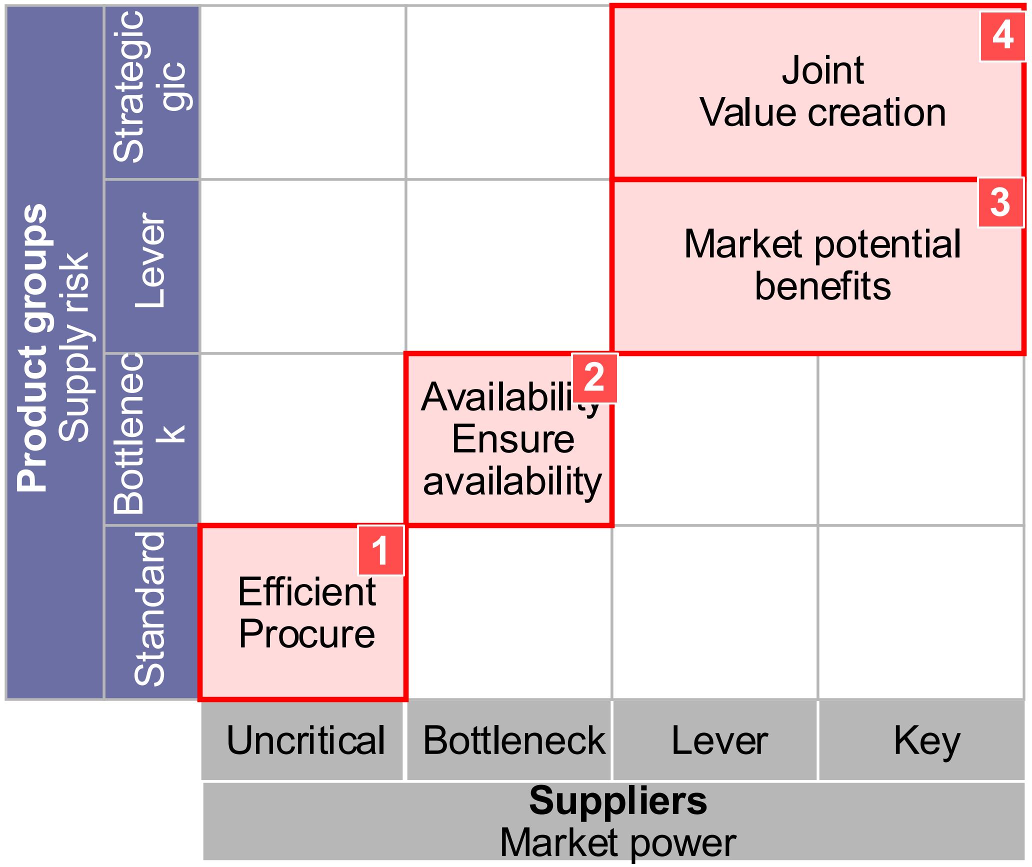


S: Strengths W: Weaknesses O: Opportunities T: Threats WG: Product groups CFT: Cross-functional team

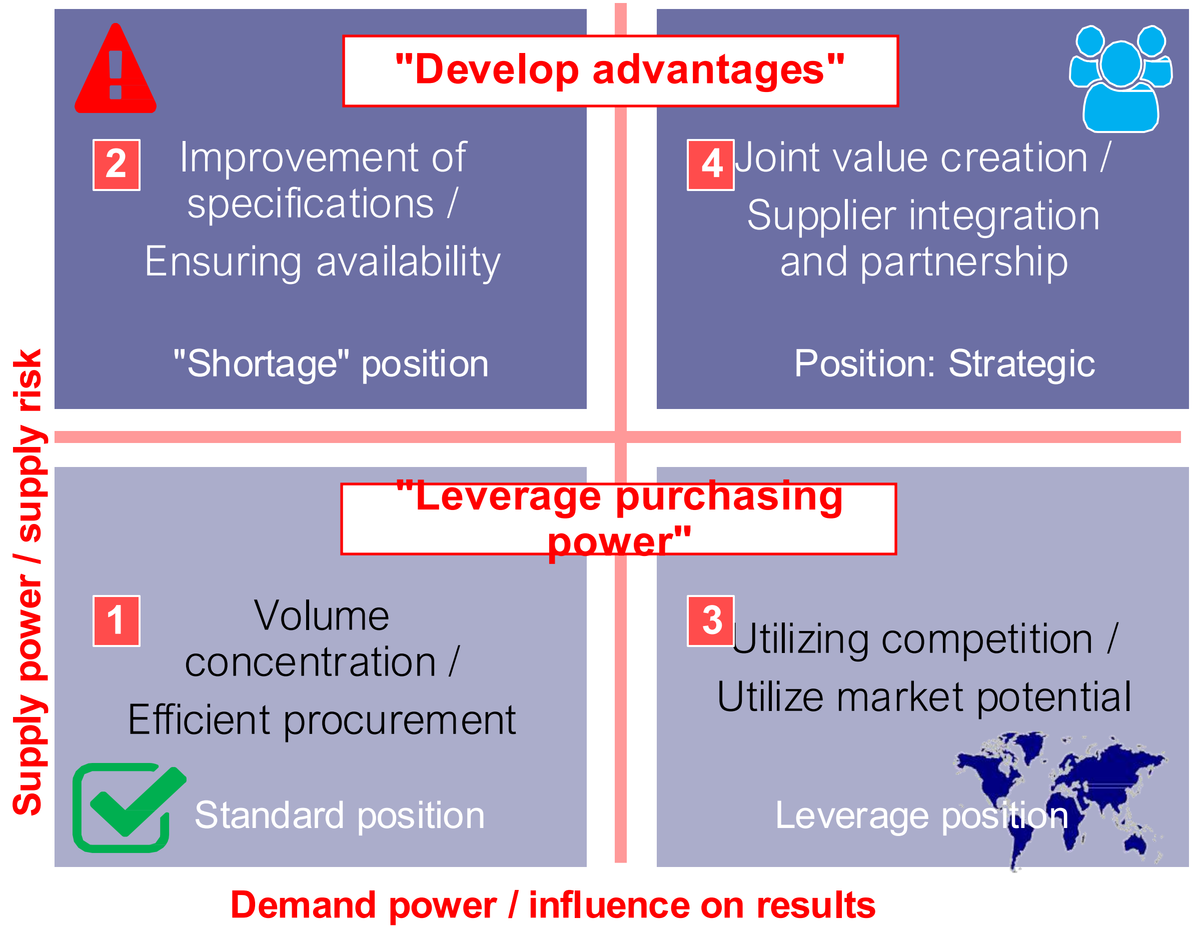
Source: IPG

Purchasing leverage matrix with best-fit approaches

Positioning Standard strategy



Best-fit strategic directions and purchasing leverage



Source: IPG

Purchasing leverage matrix with best-fit approaches

2 Improvement of specifications / Ensure availability

Position "Bottleneck"

4 Joint value creation / Supplier integration and partnership

Position "Strategic"

"Develop advantages"

Supply risk /market power of suppliers (low → high)

	low	high
high	Bottleneck parts Bottleneck suppliers	Strategic parts Key suppliers
low	Standard parts Non-critical suppliers	Lever parts Lever Suppliers

low ↔ high

Market power of buyers

Influence on buyers

"Leveraging purchasing power"

1 Volume concentration / Efficient procurement

Standard position

3 Exploitation of competition / Exploiting market potential

Leverage position

Outsourcing

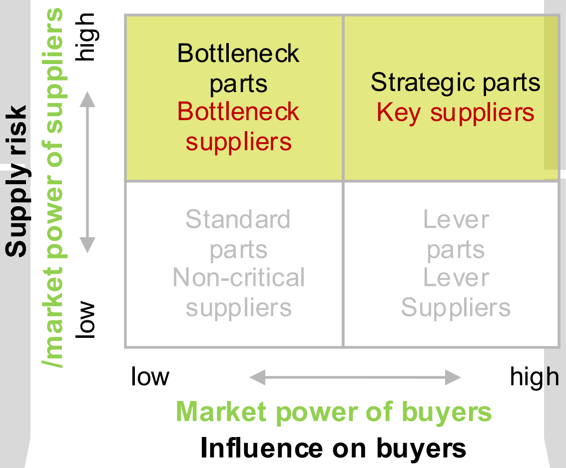
Source: IPG

20 Category optimization levers for sustainability

Improvement of specifications

- ☐ S1 **Changing specifications** to promote sustainability
- ☐ S2 **Changing product design** (e.g. through modularity, reparability, lightweight construction) for greater sustainability
- ☐ S3 **Innovations**: Actively pursuing sustainability innovations among our suppliers
- ☐ S4 **Demand management**: Reduction of demand ("reduce") in product groups with high criticality/high sustainability risks -> Reduction of total material quantity in the cycle through less use
- ☐ S5 **Reducing resource use**: The proportion of primary raw materials will be reduced through the use of recycled and renewable materials ("Reduce")
- ☐ S6 **Extending service life**: Extending the service life of materials, components, and products through maintenance and repair as well as overhaul and reconditioning ("Reuse")
- ☐ S7 **Intensify use**: Get more output from the same amount of materials through reuse, redistribution, and sale of materials, components, and products ("Reuse")
- ☐ S8 **Upcycling of products**: Creative and sustainable use of old and used materials, components, and products at the end of their useful life to create new products of higher value or better quality ("Recycle")
- ☐ S9 **Recycling**: Parts or materials are recovered from the product for reuse ("recycle").
- ☐ S10 **Dematerialization**: Physical materials, components, and products are replaced by non-physical (primarily digital) products or services

"Develop advantages"



- Suitable for ABC
- Top 3 levers for ABC

Joint value creation

- ☐ W1 Make **the entire value creation process** more efficient in line with sustainability goals
- ☐ W2 Make **logistics** more sustainable, e.g., fewer emissions, fewer kilometers, etc. (e.g., from global to local sourcing)
- ☐ W3 **Change supply chains**, e.g., vertical integration*, to achieve greater transparency
- ☐ W4 **Supplier qualification**: Implement qualification measures for sustainability
- ☐ W5 **Intensify supplier relationships**: Get to know suppliers better and build relationships that are more focused on sustainability
- ☐ W6 **Performance-based contracting**: Programs that offer suppliers incentives to develop more sustainable concepts
- ☐ W7 **Lobbying**: Introduction and enforcement of new political measures to promote sustainable behavior
- ☐ W8 **New procurement markets**: Moving away from geographical sustainability hotspots
- ☐ W9 **Cooperative partnerships** for sustainability with suppliers
- ☐ W10 Focus **on certifications** and sustainability standards in **purchasing**

* **Vertical integration** refers to a form of corporate concentration in which the vertical range of manufacture is increased by merging several companies with successive stages of processing or trade. Vertical integration is therefore also referred to as vertical corporate concentration.

Source: IPG

DUALIS - Category group – Category optimization levers for sustainability

M3 - Sprint 2/2

Additional specialized material-sustainability databases (1/4)

No.	Improvement of specifications 1/2	Description
S1	**Changing specifications** to promote sustainability	• **Changing specifications to promote sustainability** means reviewing and adjusting product or material requirements to reduce environmental and social impact. • For example, it can include switching to recycled materials, reducing packaging, using energy-efficient components, or designing products for longer life and easier recycling. This lever helps companies make their procurement and production more sustainable without compromising functionality or quality.
S2	**Changing product design** (e.g. through modularity, reparability, lightweight construction) for greater sustainability	• **Changing product design for greater sustainability** means improving how a product is built to reduce its environmental impact over its entire life cycle. • This can include using modular designs for easy repair or upgrade, lightweight construction to save materials and energy, and designing for durability or recyclability. The goal is to make products that use fewer resources, last longer, and create less waste.
S3	**Sustainability innovations**: Actively pursuing sustainability innovations among our suppliers	• **Innovations: Actively pursuing sustainability innovations among our suppliers** means working closely with suppliers to develop new, more sustainable materials, technologies, and processes. • This can include co-creating low-carbon solutions, improving resource efficiency, or introducing circular products. The goal is to drive continuous improvement and make sustainability a shared source of innovation and competitive advantage across the supply chain.
S4	**Demand management**: Reduction of demand ("reduce"), Reduction of total material quantity	• **Demand management: Reduction of demand ("reduce")** means lowering the total amount of materials or products used — especially in categories with high environmental or social risks. • This can be achieved by using products more efficiently, extending their lifespan, or avoiding unnecessary consumption. The goal is to reduce the overall material flow in the value chain and minimize negative sustainability impacts.
S5	**Reducing resource use**: The proportion of primary raw materials will be reduced through "secondary material" (recycled and renewable)	• **Reducing resource use** means lowering the amount of primary (new) raw materials needed by using recycled or renewable materials instead. • This approach helps to save natural resources, decrease waste, and cut carbon emissions — supporting a more circular and sustainable material cycle.

DUALIS - Category group – Category optimization levers for sustainability

M3 - Sprint 2/2

Additional specialized material-sustainability databases (2/4)

No.	Improvement of specifications 2/2	Description
S6	**Extending service life**: Extending the service life of materials, components, and products ("Reuse")	• **Extending service life** means keeping materials, components, and products in use for as long as possible through regular maintenance, repair, refurbishment, or reconditioning. • This reduces waste, conserves resources, and lowers environmental impact by avoiding the need for new production (“Reuse”).
S7	**Intensify use**: Get more output from the same amount of materials through reuse, redistribution, and sale of materials, components, and products ("Reuse”)	• **Intensify use** means maximizing the value and usage of materials, components, and products by reusing, redistributing, or reselling them. • This approach ensures that existing resources deliver more output over their lifetime, reducing waste and the need for new raw materials (“Reuse”).
S8	**Upcycling of products**: Creative and sustainable use of old and used materials, components, and products at the end of their useful life ("Recycle")	• **Upcycling of products** means transforming old or used materials, components, and products into new items of higher value or improved quality. • This creative process extends product life, reduces waste, and supports sustainability by turning what would be discarded into something useful and valuable (“Recycle”).
S9	**Recycling**: Parts or materials are recovered from the product for reuse (”Recycle").	• **Recycling** means recovering valuable parts or materials from used products and processing them for reuse. This reduces waste, saves natural resources, and helps close the material loop by turning discarded items into new raw materials (“Recycle”).
S10	**Dematerialization**: Physical materials, components, and products are replaced by non-physical (primarily digital) products or services	• **Dematerialization** means replacing physical materials, components, and products with digital or non-physical alternatives. • This reduces resource use, waste, and emissions by shifting from material-intensive production to digital solutions or services.

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DUALIS - Category group – Category optimization levers for sustainability

M3 - Sprint 2/2

Additional specialized material-sustainability databases (3/4)

No.	Joint value creation 1/2	Description
W1	Make **the entire value creation process** more efficient in line with sustainability goals	• **Making the entire value creation process more efficient** means optimizing all stages of production, logistics, and sourcing to reduce waste, energy use, and emissions. • The goal is to create more value with fewer resources while aligning business operations with sustainability objectives.
W2	Make **logistics** more sustainable, e.g., fewer emissions, fewer kilometers, etc. (e.g., from global to local sourcing)	• **Making logistics more sustainable** means reducing the environmental impact of transportation and supply chains. • This can include cutting emissions, shortening transport distances, and shifting from global to local sourcing to lower the carbon footprint and improve efficiency.
W3	**Change supply chains**, e.g., vertical integration*, to achieve greater transparency	• **Changing supply chains** means restructuring sourcing and production networks — for example, through vertical integration — to improve transparency, traceability, and control over environmental and social impacts throughout the value chain. • This can include shortening supply chains, working with certified suppliers, implementing digital traceability systems, and improving collaboration across all tiers.
W4	**Supplier qualification**: Implement qualification measures for sustainability	• **Supplier qualification** means developing and implementing training, assessment, and improvement programs to ensure that suppliers meet defined sustainability standards in areas such as environment, labor, and ethics. • This can include supplier audits, sustainability certifications, on-site training, and continuous performance monitoring.
W5	**Intensify supplier relationships**: Get to know suppliers better and build relationships focused on sustainability	• **Intensifying supplier relationships** means building closer, long-term partnerships with suppliers to improve collaboration, transparency, and shared commitment to sustainability goals. • This can include regular audits, joint innovation projects, sustainability workshops, and open data sharing to drive continuous improvement.

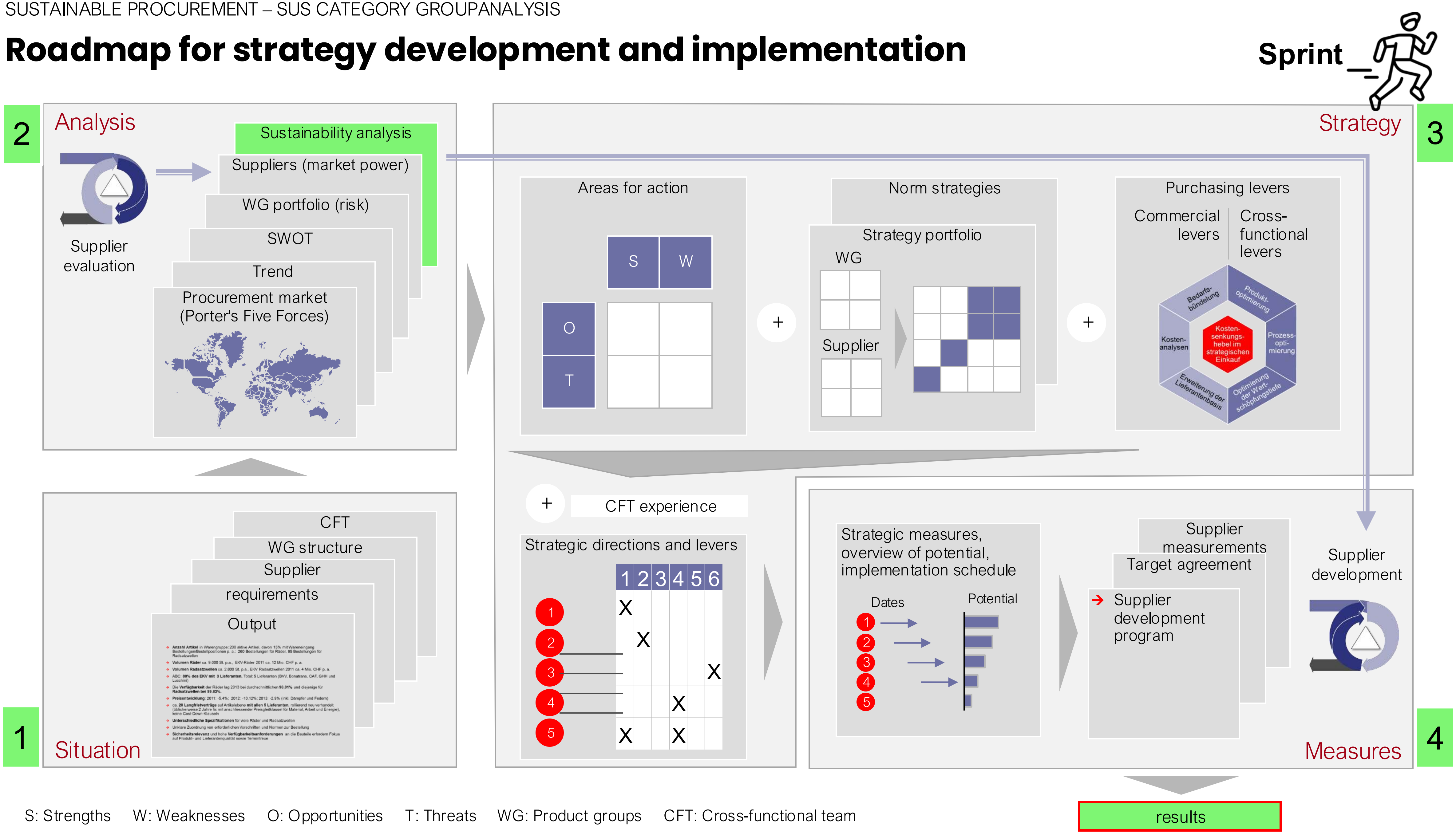
DUALIS - Category group – Category optimization levers for sustainability

M3 - Sprint 2/2

Additional specialized material-sustainability databases (4/4)

No.	Joint value creation 2/2	Description
W6	**Performance-based contracting**: Programs that offer suppliers incentives to develop more sustainable concepts	• **Performance-based contracting** means creating agreements where suppliers are rewarded based on achieving specific sustainability outcomes rather than just delivering products or services. • This can include incentives for reducing emissions, improving energy efficiency, using eco-friendly materials, or meeting circular economy targets.
W7	**Lobbying**: Introduction and enforcement of new political measures to promote sustainable behavior	• **Lobbying** means actively engaging with policymakers and industry associations to advocate for regulations and policies that promote sustainable production and consumption. • This can include supporting environmental standards, social responsibility laws, or incentives for green innovation.
W8	**New procurement markets**: Moving away from geographical sustainability hotspots	• **New procurement markets** means sourcing from regions or suppliers with lower environmental and social risks to reduce exposure to sustainability hotspots. T • his can include shifting production to areas with stronger environmental regulations, fair labor practices, or better access to renewable resources.
W9	**Cooperative partnerships** for sustainability with suppliers	• **Cooperative partnerships for sustainability with suppliers** means working closely with suppliers to jointly develop and implement sustainable solutions. • This can include sharing knowledge, setting common sustainability goals, co-investing in green technologies, or improving social and environmental performance across the supply chain.
W10	Focus **on certifications** and sustainability standards in **purchasing**	• **Focus on certifications and sustainability standards in purchasing** means prioritizing suppliers and products that meet recognized environmental, social, and ethical standards. • This can include certifications such as ISO 14001, Fair Trade, FSC, or EcoVadis ratings to ensure responsible sourcing and continuous improvement in sustainability performance.

Roadmap for strategy development and implementation



S: Strengths W: Weaknesses O: Opportunities T: Threats WG: Product groups CFT: Cross-functional team

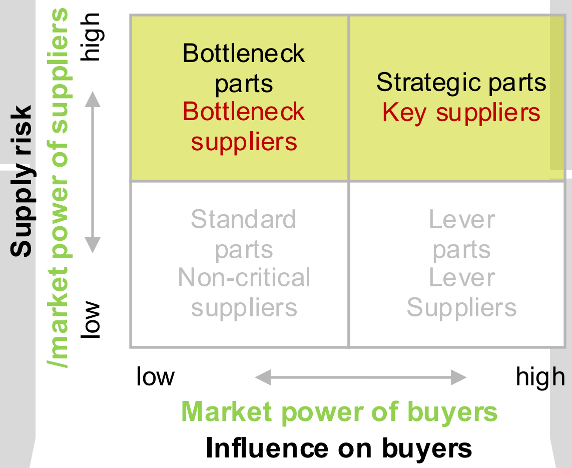
Source: IPG

20 Category optimization levers for sustainability

Improvement of specifications

- S1 **Changing specifications** to promote sustainability
- S2 **Changing product design** (e.g. through modularity, reparability, lightweight construction) for greater sustainability
- S3 **Innovations**: Actively pursuing sustainability innovations among our suppliers
- S4 **Demand management**: Reduction of demand ("reduce") in product groups with high criticality/high sustainability risks -> Reduction of total material quantity in the cycle through less use
- S5 **Reducing resource use**: The proportion of primary raw materials will be reduced through the use of recycled and renewable materials ("Reduce")
- S6 **Extending service life**: Extending the service life of materials, components, and products through maintenance and repair as well as overhaul and reconditioning ("Reuse")
- S7 **Intensify use**: Get more output from the same amount of materials through reuse, redistribution, and sale of materials, components, and products ("Reuse")
- S8 **Upcycling of products**: Creative and sustainable use of old and used materials, components, and products at the end of their useful life to create new products of higher value or better quality ("Recycle")
- S9 **Recycling**: Parts or materials are recovered from the product for reuse ("recycle").
- S10 **Dematerialization**: Physical materials, components, and products are replaced by non-physical (primarily digital) products or services

"Develop advantages"



Suitable for ABC

Top 3 levers for ABC

Joint value creation

- W1 Make **the entire value creation process** more efficient in line with sustainability goals
- W2 Make **logistics** more sustainable, e.g., fewer emissions, fewer kilometers, etc. (e.g., from global to local sourcing)
- W3 **Change supply chains**, e.g., vertical integration*, to achieve greater transparency
- W4 **Supplier qualification**: Implement qualification measures for sustainability
- W5 **Intensify supplier relationships**: Get to know suppliers better and build relationships that are more focused on sustainability
- W6 **Performance-based contracting**: Programs that offer suppliers incentives to develop more sustainable concepts
- W7 **Lobbying**: Introduction and enforcement of new political measures to promote sustainable behavior
- W8 **New procurement markets**: Moving away from geographical sustainability hotspots
- W9 **Cooperative partnerships** for sustainability with suppliers
- W10 Focus **on certifications** and sustainability standards in **purchasing**

* **Vertical integration** refers to a form of corporate concentration in which the vertical range of manufacture is increased by merging several companies with successive stages of processing or trade. Vertical integration is therefore also referred to as vertical corporate concentration.

Source: IPG

Good practice example 1

Concrete sleepers

Good practice example 2

Fuels and combustibles

Day 2 - Morning Modules 3

9:00 - 12:00

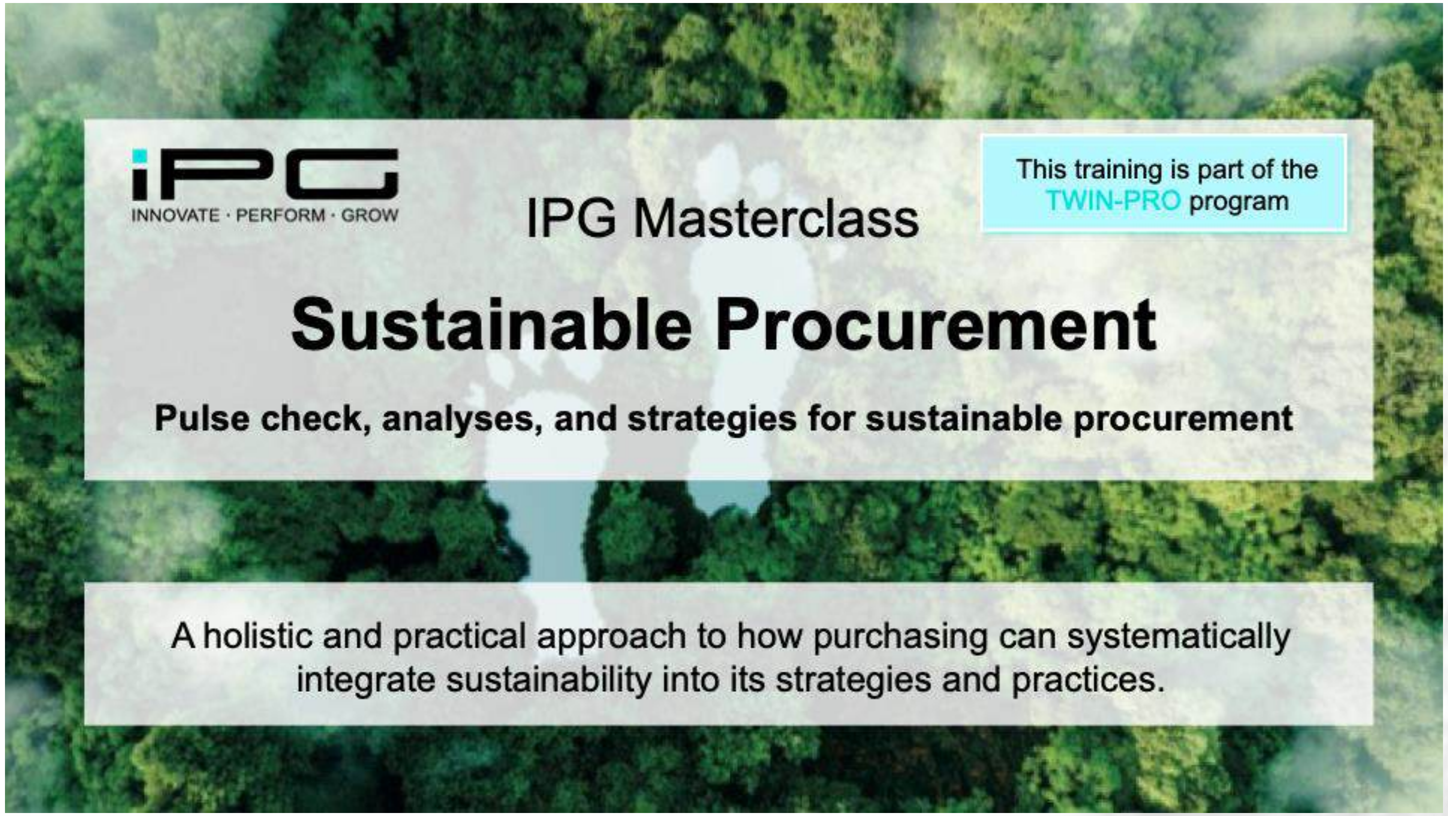
1	**Module 3** Sustainability category group analysis *Reflection*	09:00 – 09:45
2	**M3 - Sprint** Sustainability category group assessment (Heat Map)	09:45 – 10:30 10:30 - 10:45 (Coffee break)
3	**M3 - Sprint** Sustainability optimization lever assessment for category management	10:45 – 12:00

Day 2 - Afternoon Modules 4

13:00 – 15:00

4	**Module 4** Sustainability supplier analysis	13:00 – 13:45
5	**M4 - Sprint** Supplier measures for sustainability	13:45 – 14:30 14:00 - 14:15 (Coffee break)
6	Wrap-up session 1 & Outlook training session 2	14:30 – 15:00

Questions & comments — Coffee break — All times given are indicative and may vary.



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Good practice examples

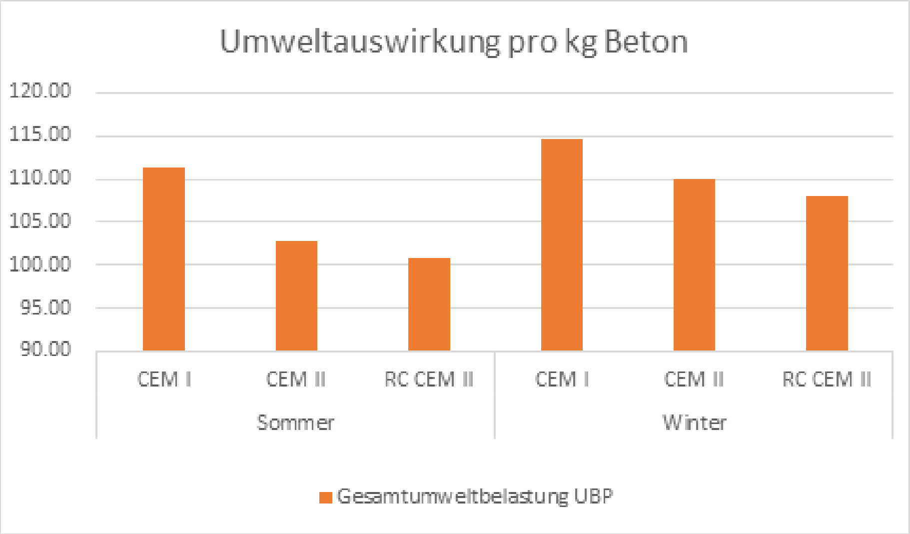
Good practice example

Good practice example 1
Concrete sleepers

Sustainability – Concrete sleeper category group – Initial situation and strategic directions

The production of cement gives concrete a bad reputation when it comes to climate change.

Cement is essential for the production of concrete. And we need concrete for most of our buildings. However, the production of just one ton of cement releases **700 kilograms of carbon dioxide**. This may be less than the emissions from steel production per ton, but we produce around 53 million cubic meters of concrete per year in Germany alone. Globally, carbon dioxide emissions from cement account for only seven percent, but the trend is rising. For this reason, the United Nations is calling for the development of climate-friendly cement-based materials in its environmental program.



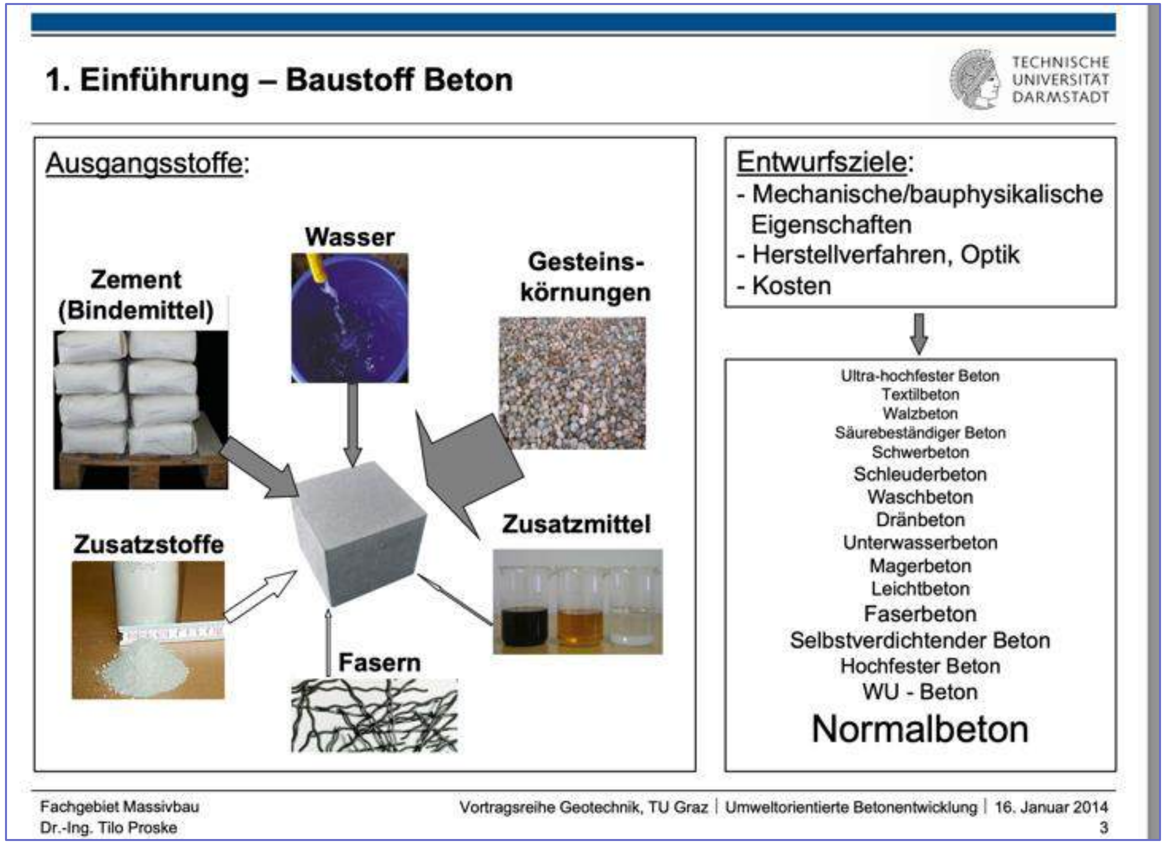
CEM II CEMENT

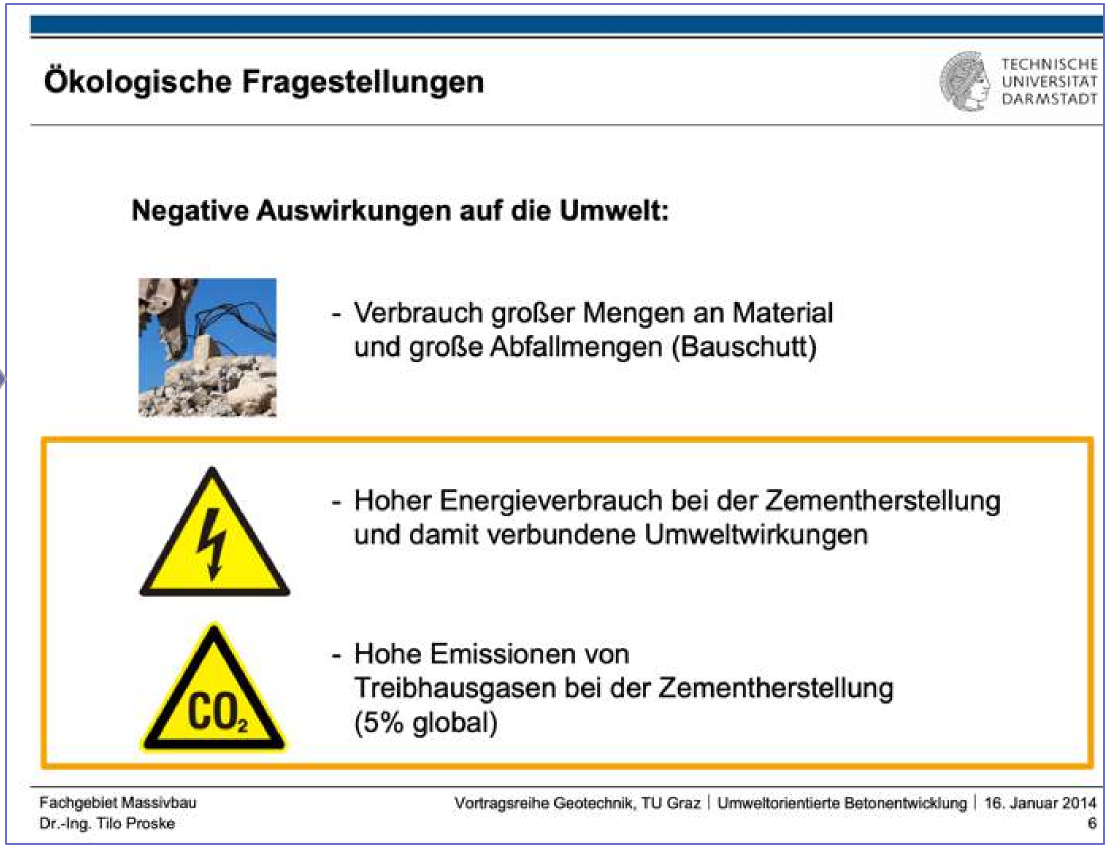
- **Initial situation: Identifying a more environmentally friendly concrete sleeper**
- Life cycle assessment **CEM II/A-LL 52.5N** incl. RC concrete is better than CEM I (Portland)
- Proportion of recycled concrete (up to 40%) has positive effects
  - E2E approach—reuse of old concrete sleepers
  - Proportion of RC concrete varies between 0-40% depending on availability
- The technical requirements are guaranteed
- Risk management K250 – residual risk of aging is classified as low
- BLS / SOB are also switching to CEM II
- Goal: complete switch to CEM II from 2021
- After switching to CEM II, launch of a sustainability communication campaign

1/10

Source: ABC

Sustainability – Concrete sleeper category group – Initial situation and strategic directions

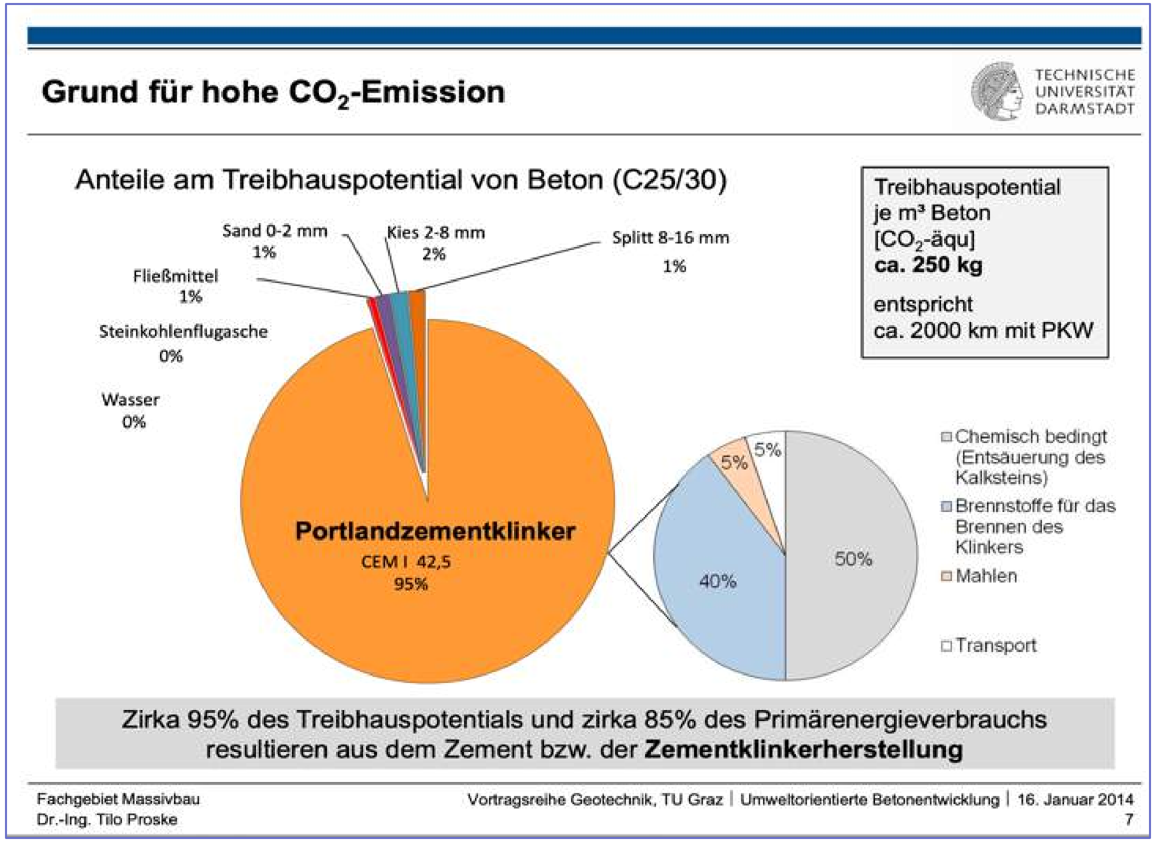




2/10

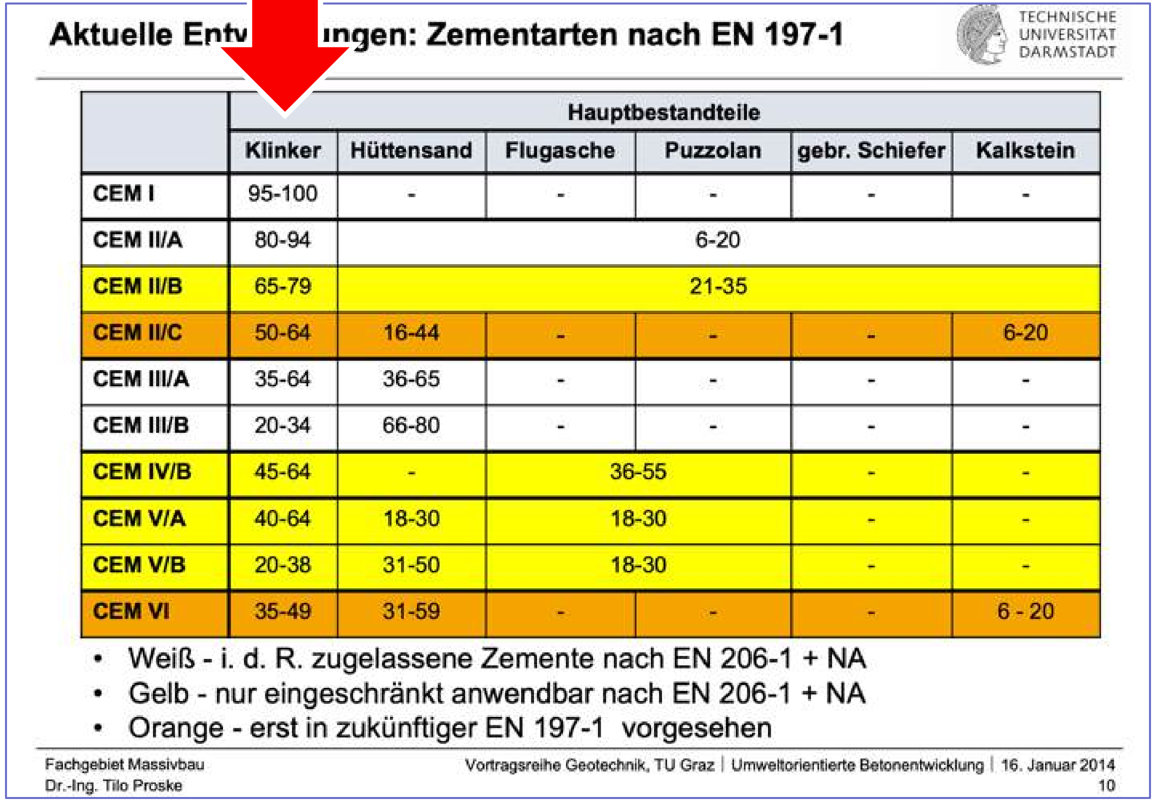
Source: ABC

Sustainability – Concrete sleeper category group – Initial situation and strategic directions



Source: ABC

Sustainability – Concrete sleeper category group – Initial situation and strategic directions



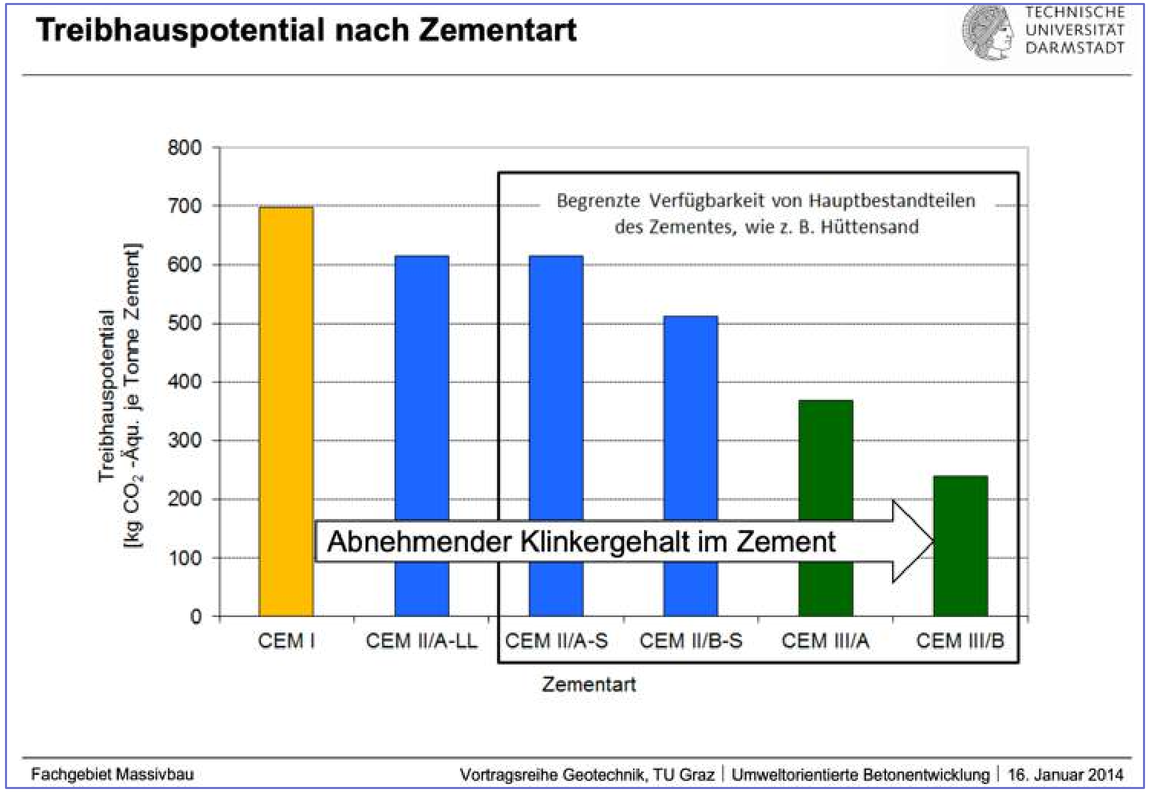
Aktuelle Entw… ungen: Zementarten nach EN 197-1

TECHNISCHE UNIVERSITÄT DARMSTADT

	Hauptbestandteile					
	Klinker	Hüttensand	Flugasche	Puzzolan	gebr. Schiefer	Kalkstein
CEM I	95-100	-	-	-	-	-
CEM II/A	80-94	6-20				
CEM II/B	65-79	21-35				
CEM II/C	50-64	16-44	-	-	-	6-20
CEM III/A	35-64	36-65	-	-	-	-
CEM III/B	20-34	66-80	-	-	-	-
CEM IV/B	45-64	-	36-55		-	-
CEM V/A	40-64	18-30	18-30		-	-
CEM V/B	20-38	31-50	18-30		-	-
CEM VI	35-49	31-59	-	-	-	6 - 20

- Weiß - i. d. R. zugelassene Zemente nach EN 206-1 + NA
- Gelb - nur eingeschränkt anwendbar nach EN 206-1 + NA
- Orange - erst in zukünftiger EN 197-1 vorgesehen

Fachgebiet Massivbau
Dr.-Ing. Tilo Proske
Vortragsreihe Geotechnik, TU Graz | Umweltorientierte Betonentwicklung | 16. Januar 2014
10



Source: ABC

3/10

Sustainability – Concrete sleeper category group – Initial situation and strategic directions

Fachgebiet Massivbau
Dr.-Ing. Tilo Proske

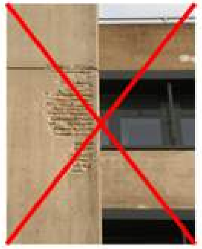
Vortragsreihe Geotechnik, TU Graz | Umweltorientierte Betonentwicklung | 16. Januar 2014
12

Problemstellung bei deutlich klinkerreduzierten Zementen und Betonen

TECHNISCHE UNIVERSITÄT DARMSTADT

- **Problemstellung:**
  Die gewünschten Eigenschaften von Beton mit geringerem Anteil an reaktivem Portlandzementklinker bzw. anderen reaktiven Stoffen ist mittels üblicher Betontechnologie nicht mehr erreichbar.

  - Verarbeitbarkeit
  - Mechanische Eigenschaften (Druckfestigkeit...)
  - Dauerhaftigkeit (Karbonatisierung, Frost, Chloride, Sulfat…)



Anpassung der **Betontechnologie,** z. B. bei großen Mengen Kalkstein

Fachgebiet Massivbau
Dr.-Ing. Tilo Proske

Vortragsreihe Geotechnik, TU Graz | Umweltorientierte Betonentwicklung | 16. Januar 2014
16

Entwicklung von Ökobeton bzw. Ökozement für die Baupraxis

TECHNISCHE UNIVERSITÄT DARMSTADT

- Mindestens **gleichwertige** bemessungsrelevante **Festbetoneigenschaften**
- Ausreichende **Verarbeitbarkeitseigenschaften**
- Verwendung in ausreichender Menge **verfügbarer Ausgangsstoffe**
- Nutzung **vorhandener Anlagentechnik** zur Zement- und Betonherstellung ohne großen Investitionsbedarf
- **Kostenneutralität**

3/10

Source: ABC

Sustainability – category group: concrete sleepers – Summary of sustainability risks/opportunities

SBB CFF FFS

Overall assessment

- The investment strategy and the life cycle assessment have shown that concrete sleepers are the best type of sleeper in terms of LCC.
- Taking opportunities and risks into account therefore enables an overall improvement in the sustainability of sleepers.

Main risks

- Sand/gravel (origin, scarce resource), check future availability of regional sand and gravel pits.
- Production is very energy-intensive. Review the energy strategy to reduce demand.

Opportunities (including circular economy)

- Proportion of alternative fuels in cement production.
- **Ecological concrete mix (CEM II, recycled content)**. NAT is considering using CEM II and recycled concrete as standard. This would be anchored in the specifications in the future.
- **ABC currently pays for the disposal of concrete sleepers**. Check whether disposal costs can be avoided in future by reusing old concrete sleepers in new sleepers.
- **Use of the full capacity (currently 40% max.) of recycled concrete** as a contribution to reducing land use.

7/10

Source: ABC

Sustainability – category group concrete sleepers CEM II CEMENT

Scope 3

ABC is now also focusing on ecology when it comes to railway sleepers

ABC's concrete sleepers are now produced in a more environmentally friendly way. The new formula uses concrete granulate from old sleepers and climate-friendly cement.
This saves ABC up to **8,000 tons of gravel and 570 tons of CO2 every year**. That is equivalent to around **1,500 return flights to London**.

ABC needs around 150,000 concrete sleepers for its rail network every year. Concrete is a mixture of cement, gravel, sand, and water. The production of cement requires a lot of energy. In addition, CO2 is released during the production of cement clinker in a chemical reaction. In close cooperation, ABC and its supplier Vigier Rail have optimized the concrete recipe and tested it successfully. The new concrete sleepers therefore contain CEM II cement. This has a lower cement clinker content and causes fewer CO2 emissions during production than the CEM I cement used previously.

SBB CFF FFS

Die SBB setzt neu auch bei Bahnschwellen auf Ökologie

Ab sofort sind die Betonschwellen der SBB ökologischer produziert. Für die neue Rezeptur wird Betongranulat aus alten Schwellen und klimafreundlicher Zement verwendet. So spart die SBB Jahr für Jahr bis zu 8000 Tonnen Kies und 570 Tonnen CO2 ein. Das entspricht rund 1500 Flügen London retour.

Text: Melchior Bendel | Fotos: zvg/ldd/mad

Weitere Artikel: www.news.sbb.ch 1/3

Die SBB benötigt jährlich für ihr Streckennetz rund 150'000 Betonschwellen. Beton ist ein Gemisch aus Zement, Kies, Sand und Wasser. Die Herstellung von Zement benötigt viel Energie. Zudem tritt bei der Herstellung von Zementklinker in einer chemischen Reaktion CO2 aus. In enger Zusammenarbeit haben die SBB und der Lieferant Vigier Rail die Betonrezeptur optimiert und erfolgreich getestet. Die neuen Betonschwellen enthalten deshalb sogenannten CEM-II-Zement. Dieser hat einen geringeren Anteil Zementklinker und verursacht in der Produktion weniger CO2-Emissionen als der bisher verwendete CEM-I-Zement.

Natürliche Ressourcen schonen

Mit der neuen Rezeptur wird ebenfalls der Materialkreislauf geschlossen. So werden alte Betonschwellen von Vigier Rail zu Betongranulat zerkleinert. Dieses wird anschliessend für die Herstellung der neuen Schwellen verwendet, wo es bis zu 40% des Kiesanteils ersetzt. So wird der Kiesverbrauch für die Betonschwellen der SBB jährlich um bis zu 8000 Tonnen reduziert. Kies ist zwar ein natürlich vorkommender Rohstoff, doch er ist begrenzt verfügbar und die Kiesreserven werden auch in der Schweiz zunehmend knapp. Die Beimischung von Recyclinggranulat startet noch dieses Jahr. Zusammen mit dem neuen Zement ist die Produktion von Bahnschwellen damit so ökologisch wie nie zuvor.

Schwellenherstellung

SBB setzt auf Kreislaufwirtschaft

Durch eine möglichst lange Lebensdauer der Anlagen und die Wiederverwendung von Material können natürliche Ressourcen eingespart werden. Das schont die Umwelt und zahlt sich auch finanziell aus. Den Weg zu mehr Kreislaufwirtschaft geht die SBB gemeinsam mit ihren Lieferanten. Diese Woche begann Vigier Rail mit der Produktion der ökologischen Betonschwellen. Neben der SBB beziehen auch die BLS und andere Bahnunternehmen Betonschwellen von Vigier Rail.

Holz oder Beton?

Ein Vorteil von Betonschwellen ist ihre lange Lebensdauer und ihre hohe Stabilität. Deshalb werden sie vor allem auf Strecken eingesetzt, die mit grossen Belastungen und hoher Geschwindigkeit befahren werden. Gegenüber Holzschwellen zeichnen sich Betonschwellen zudem durch tiefere Lebenszykluskosten aus. Durch die längere Nutzungsdauer ist auch die Umweltbelastung einer Betonschwelle aufs Jahr gerechnet tiefer als die einer Holzschwelle. Holzschwellen werden bei der SBB aber weiterhin eingesetzt. Sie haben sich dank ihrer Widerstandsfähigkeit beispielsweise auf Rangierbahnhöfen sehr gut bewährt.

Weitere Artikel: www.news.sbb.ch 2/3

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10/10

Source: ABC

https://news.sbb.ch/medien/artikel/99212/die-sbb-setzt-neu-auch-bei-bahnschwellen-auf-oekologie

Good practice example

Good Practice Example 2
Burning Fuels and combustibles

Category group: Burning Fuels and combustibles
Category Strategy for Sustainability – – Management summary

Goal and goal achievement

- The target of 5% or ~1.26 MCHF savings on expenditure in 2020 (25.0 MCHF) will be achieved with confirmed measures.
- CO_2 emissions from fossil fuels purchased directly by ABC are to be halved between 2020 and 2027. (2020: 60,750 tons; 2027: 30,476 tons)

Strategy

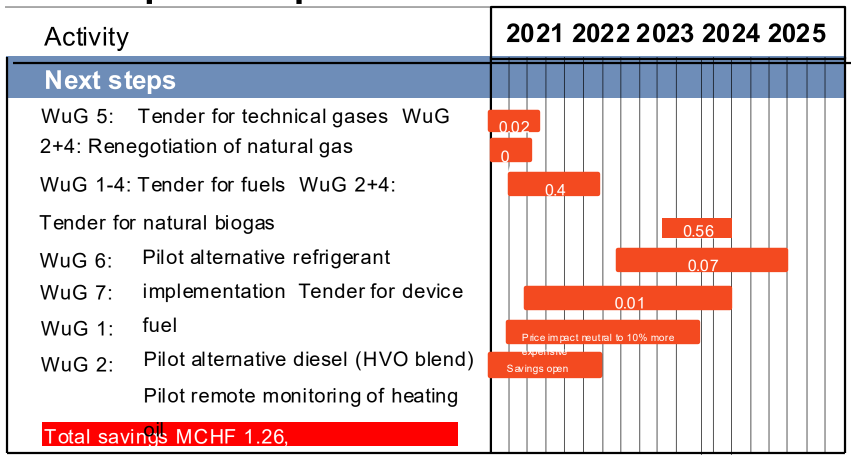
- Develop new potential suppliers for alternative energies
- **Define alternative fuels for diesel B0 by means of a pilot project** and qualified development and optional tendering of CO2-neutral or low-carbon alternative products (biogas, biopropane, biogenic heating oil, fuel cards for electric vehicles, etc.), taking into account technology and economic dependencies.
- **Bundling expiring contracts for** fuel cards, pellets, heating oil, diesel, and alternative energies to leverage competitive intensity
- **Continuously review purchasing cooperations,** e.g., with other public companies, subsidiaries, and partners of Cargo.
- **Build up knowledge and experience** for the procurement (keyword: structured procurement) of natural gas and biopropane until the market opens in 2024.
- **Pilot project for passenger transport using climate-friendly refrigerant**, propane, starting in 2022/3. Understand the technology, find out whether there are any risks.
- **Remote monitoring (telemetry) of heating oil tanks and order triggering at ABC centrally**, supplier or, if necessary, automatically. Include new possibilities for "guided buying."
- **Track fuel and heating oil purchase quantities** and notify various CFTs if CO2 reduction targets are not met.
- **Requests for services from suppliers** of technical gases, e.g., for welding work.

Source: ABC

CO2 reduction, implementation speed

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total, Tonnen CO2eq/Jahr in Scope 1	65'475	60'750	57'404	54'605	43'988	41'573	37'545	33'764	30'476	22'690	8'107	3'669
WuG 1, Treibstoff für Schienenfahrzeuge												
WuG 1, Diesel Traktion Mio. L/Jahr	10.97	10.32	10.30	10.09	7.09	7.09	6.50	6.00	5.50	5.00	1.00	0.50
Entspr. Tonnen CO2eq/Jahr in Scope 1	29'993	28'231	28'164	27'590	19'387	19'387	17'773	16'406	15'039	13'672	2'734	1'367
Massnahme Reduktion			HVO Blend Pilot Tessin	HVO Blend Tessin	HVO Blend ganze CH Effekt Elektri-fizierung	HVO Blend ganze CH Effekt Elektri-fizierung	HVO Blend ganze CH Effekt Elektri-fizierung	HVO Blend ganze CH Effekt Elektri-fizierung	HVO Blend ganze CH Effekt Elektri-fizierung	HVO Blend ganze CH Effekt Elektri-fizierung	HVO 100% ganze CH Effekt Elektri-fizierung	HVO 100% ganze CH Effekt Elektri-fizierung
WuG 2, Brennstoffe für Gebäude												
WuG 2, Heizöl Gebäude Mio.L/Jahr	5.51	5.31	5.00	4.60	4.20	3.80	3.40	3.00	2.70	1.40	0.70	0.20
Entspr. Tonnen CO2eq/Jahr in Scope 1	14'969	14'425	13'593	12'506	11'418	10'331	9'243	8'156	7'340	3'806	1'903	544
WuG 2, Erdgas Gebäude GWh/Jahr (*90% v. Gesamtbeda	45.81	39.66	37.00	34.00	31.00	28.00	25.00	22.00	20.00	10.00	5.00	-
Entspr. Tonnen CO2eq/Jahr in Scope 1	9'268	8'024	7'486	6'879	6'272	5'665	5'058	4'451	4'047	2'023	1'012	0
Massnahme Reduktion. *ca. 10% Erdgas siehe Anlagen			Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung	Pellets, Fernheizung biogene Heizöle	Pellets, Fernheizung biogene Heizöle	Pellets, Fernheizung biogene Heizöle
WuG 3, Treibstoff für Strassenfahrzeuge												
WuG 3, Diesel, *Benzin Strassenfgz. Mio.L/Jahr	3.18	2.97	2.35	2.21	2.00	1.80	1.59	1.38	1.17	0.97	0.76	0.55
Entspr. Tonnen CO2eq/Jahr in Scope 1	8'732	8'137	6'444	6'065	5'496	4'928	4'359	3'790	3'222	2'653	2'085	1'516
Massnahme Reduktion. *Anteil Benzin z.Z. 3% sinkend in Diesel eingerechnet			Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas
WuG 4, Brennstoffe Anlagen (Weichenheiz.)												
WuG 4, Erdgas GWh/Jahr,(*10% v. Gesamtbedarf)	5.09	4.41	3.70	3.40	3.10	2.80	2.50	2.20	2.00	1.00	0.50	-
Entspr. Tonnen CO2eq/Jahr in Scope 1	1'030	892	749	688	627	567	506	445	405	202	101	0
WuG 4, PropangasTonnen/Jahr	490.00	344.00	320.00	290.00	260.00	230.00	200.00	170.00	140.00	110.00	90.00	80.00
Entspr. Tonnen CO2eq/Jahr in Scope 1	1'484	1'042	969	878	787	697	606	515	424	333	273	242
Massnahme Reduktion. *ca. 90% Erdgas siehe Gebäude			Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas	Wechsel auf Elektro Biogas

Roadmap zur Implementation



Sustainability – category group: fuels and combustibles
Measures, CO2 reduction, quantification

From 2027 onwards, CO_2 emissions from fossil fuels purchased are to be halved compared to 2020.

		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total, tons of CO2eq/year in Scope 1		**65,475**	**60,750**	**57,404**	**54,605**	**43,988**	**41,573**	**37,545**	**33,764**	**30,476**	**22,690**	**8,107**	**3,669**
WuG 1, fuel for rail vehicles													
WuG 1, diesel traction million liters/year		10.9	10.32	10.30	10.09	7.09	7.09	6:50	6.00	5.50	5.00	1.00	0.50
Equivalent tons of CO2eq/year in Scope 1		29,993	28,231	28,164	27,590	19,387	19,387	17,773	16,406	15,039	13,672	2,734	1,367
Reduction measure				HVO Blend Pilot Ticino	HVO Blend Ticino	HVO Blend whole of Switzerland	HVO Blend entire Switzerland	HVO Blend whole CH	HVO Blend entire Switzerland	HVO Blend entire CH	HVO Blend entire Switzerland	HVO 100% Whole of Switzerland	HVO 100% Whole of Switzerland
						Effect of electrification	Effect of electrification	Effect of electrification	Effect of electrification	Effect Electrification	Effect Electrification	Effect Electrification	Effect of electrification
WuG 2, fuels for buildings													
WuG 2, heating oil for buildings million liters/year		5.51	5.31	5.00	4.60	4.20	3.80	3.40	3.00	2.70	1.40	0.70	0.20
Equivalent tons of CO2eq/year in Scope 1		14,969	14,425	13,593	12,506	11,418	10,331	9,243	8,156	7,340	3,806	1,903	544
WuG 2, natural gas buildings GWh/year (*90% of total consumption)	da	45.81	39.66	37.00	34.0	31.00	28.00	25.00	22.00	20	10.00	5.00	-
Equivalent tons of CO2eq/year in Scope 1		9,268	8,024	7,486	6,879	6,272	5,665	5,058	4,451	4,047	2,023	1,012	0
Reduction measure. *Approx. 10% natural gas, see annexes				Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating	Pellets, district heating
											Biogenic heating oils	Biogenic heating oils	Biogenic heating oils
WuG 3, fuel for road vehicles													
WuG 3, diesel, *gasoline Road vehicles. Million liters/year		3.18	2.97	2.35	2.21	2.0	1.80	1.59	1.38	1.17	0.97	0.76	0.55
Equivalent tons of CO2eq/year in Scope 1		8,732	8,137	6,444	6,065	5,496	4,928	4,359	3,790	3,222	2,653	2,085	1,516
Reduction measure. *Proportion of gasoline currently 3%, falling, included in diesel.				Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas
WuG 4, fuel systems (point heating)													
WuG 4, natural gas GWh/year, (*10% of total* ***demand)***		5.09	4.41	3.7	3.4	3.1	2.80	2.50	2.20	2.00	1.00	0.50	-
Equivalent tons of CO2eq/year in Scope 1		1,030	892	749	688	627	567	506	445	405	202	101	0
WuG 4, propane gas tons/year		490	344	320	290	260	230.00	200.00	170.00	140.00	110.00	90.00	80
Equivalent tons of CO2eq/year in Scope 1		1,484	1,042	969	878	787	697	606	515	424	333	273	242
Measure: Reduction. *Approx. 90% natural gas, see Building				Switch to electricity Biogas	Switch to electricity Biogas	Switch to electricity Biogas	Switch to electricity Biogas	Switch to electricity Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas	Switch to electric Biogas

Source: ABC

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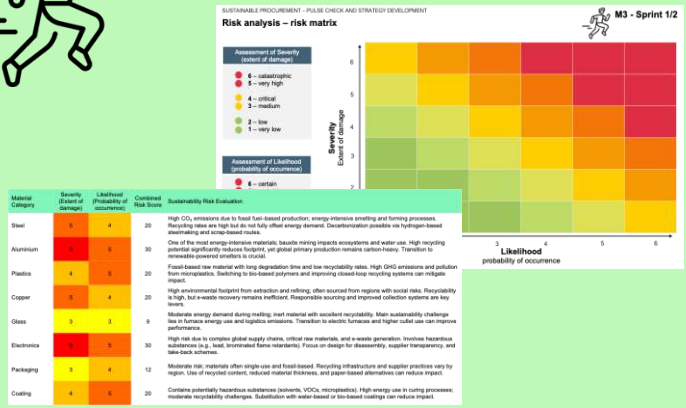
SUS Category Group analysis & SUS supplier analysis
Sprints

Sprint

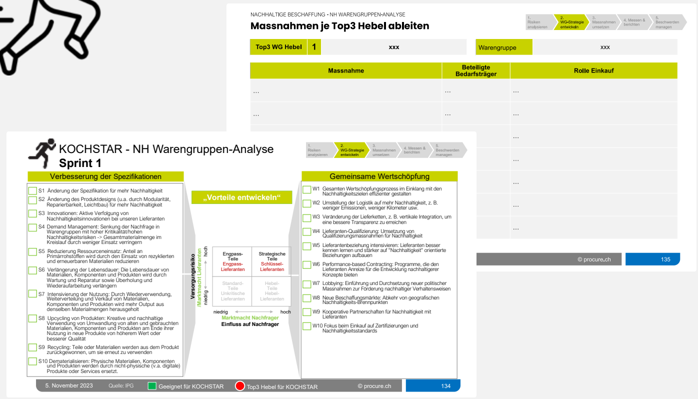
M3 – Sprint 1/2



Material criticality assessment

1. Which materials contribute most to CO_2 emissions, energy consumption, resource scarcity and all relevant sustainability focus areas defined (1-9)
2. Plot material groups into the Material Risk Matrix
3. Derive appropriate mitigation measures for each material group

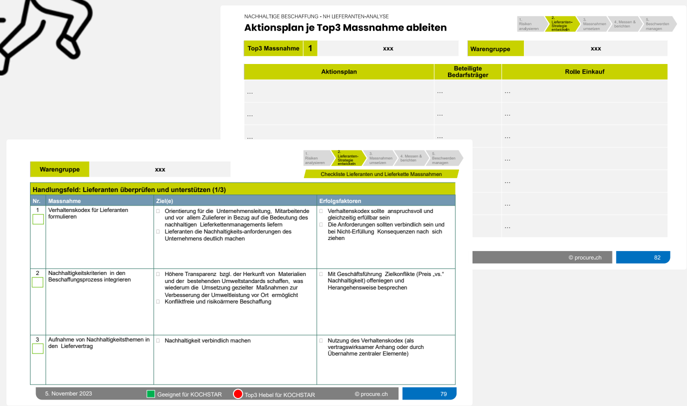
M3 – Sprint 2/2



Category optimization levers for sustainability

1. Which category group levers for sustainability do you consider most suitable for your category group?
2. Which top three levers would you prioritize?
3. What other stakeholders do you need to implement the top three levers?
4. What specific measures would you pursue for the top three levers?
5. What role does purchasing play in each case?

M4 - Sprint 3



Supplier measures for sustainability

1. Which supplier measures for sustainability do you consider most suitable for your category group?
2. Which top 3 measures would you prioritize?
3. What other resources do you need to implement the top three measures?
4. What specific action plan do you intend to pursue for each of the top three measures?
5. What role does purchasing play in each case?

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DUALIS - Category group – material criticality assessment

Category group – material criticality assessment

To create a Material Heat Map for your product category based on the Bill of Materials (BOM) and known specifications per procurement item, you first need to answer the following key question:

This central question can be broken down into sub-questions such as:

1. **Which materials contribute most to CO_2 emissions, energy consumption, resource scarcity and all relevant sustainability focus areas defined (1-9)**
2. **Plot material groups into the Material Risk Matrix**
3. **Derive appropriate mitigation measures for each material group**

Answering these will allow you to visualize — through the Heat Map and Risk Matrix — in which **material sustainability priorities** you should focus.

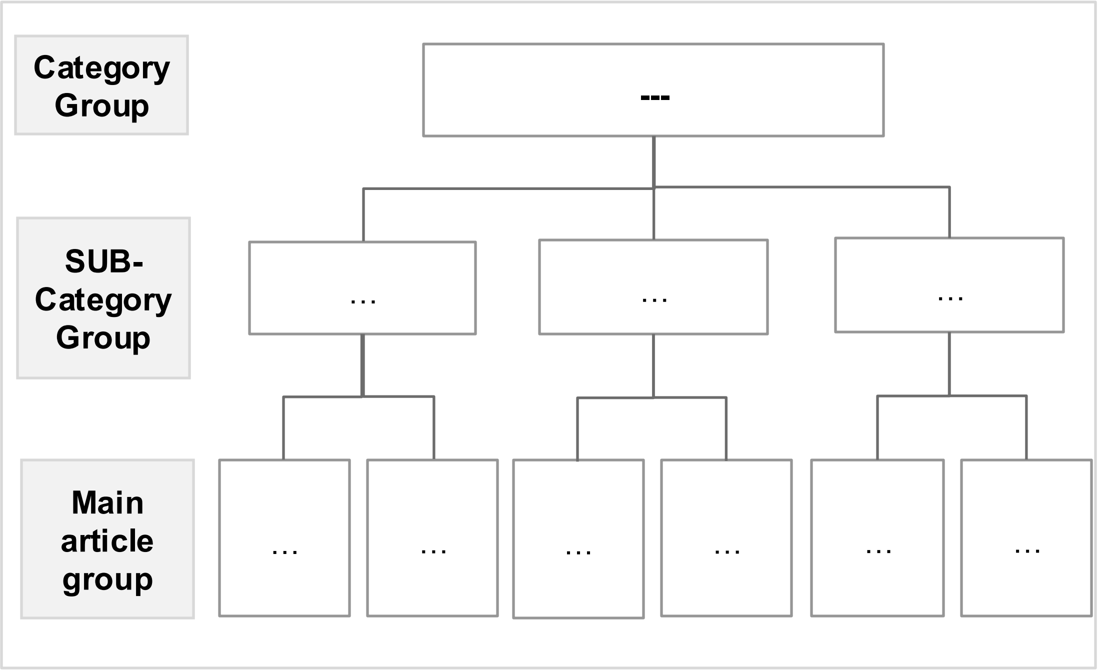
DUALIS - Category group – material criticality assessment

M3 - Sprint 1/2

Category Group (Material group)

- A **commodity group (or material group)** in procurement is a **category of goods or services** that share similar characteristics, functions, or sourcing strategies.
- It helps companies **organize and manage their purchases** by grouping items with comparable suppliers, markets, or cost structures — for example, “metals,” “electronics,” or “packaging materials.”

Category Group Tree



Bill of Material

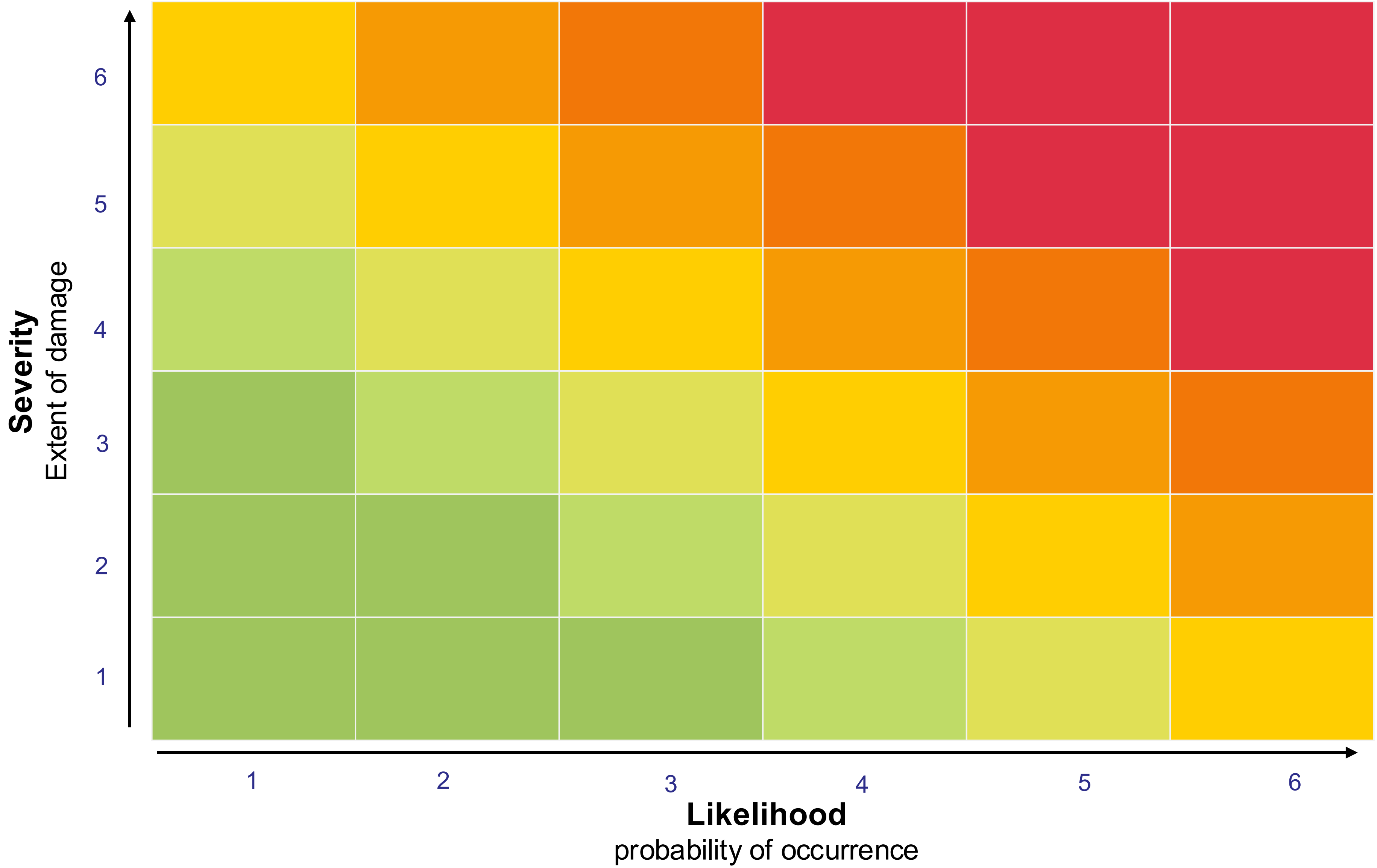
- A **Bill of Materials (BOM)** is a **comprehensive list of all materials, components, and parts** required to manufacture a product, including quantities and specifications for each item.
- It serves as the **recipe or blueprint for production**, showing how individual components fit together into the final product.
- A BOM helps ensure **accurate procurement, planning, cost estimation, and inventory management** throughout the manufacturing process.

DUALIS - Category group – material criticality assessment
Material Risk Matrix

M3 - Sprint 1/2

Assessment of Severity (extent of damage)
6 – catastrophic
5 – very high
4 – critical
3 – medium
2 – low
1 – very low

Assessment of Likelihood (probability of occurrence)
6 – certain
5 – probable
4 – occasional
3 – conceivable
2 – unlikely
1 – inconceivable



DUALIS - Category group – material criticality assessment Recommended mitigation measures

M3 - Sprint 1/2

Material Category	**Mitigation Measures**

Case Study – BiH Company

MATERIAL MIX - Cockware & Frying Pan

SaraCook

Material Category	Severity (Extent of damage)	Likelihood (Probability of occurrence)	Combined Risk Score	Sustainability Risk Evaluation
Steel (Stainless)	3	5	12	Moderate risk. Stainless steel production requires significant energy but has long product lifespan and high recyclability. Local sourcing in BiH reduces logistics emissions. Decarbonization potential through renewable energy use in steelmaking.
Aluminium	3	5	15	High energy use during smelting; moderate local recycling. Reduced footprint possible by using secondary aluminium and renewable-powered foundries. Transportation emissions lower due to regional sourcing.
Plastic Handles	4	4	16	Fossil-based and limited recycling in local context. Potential microplastic release during use or disposal. Substitution with bio-based or recycled polymers possible.
Non-stick Coating	4	5	16	Contains PFAS or other chemicals of concern; high curing energy demand. Alternatives (e.g., ceramic coatings) reduce toxicity and GHG emissions. Compliance with REACH/SVHC crucial.
Glass Lids	3	3	9	Moderate energy use in melting; good recyclability. Local production minimizes logistics footprint. Increasing cullet content reduces energy and emissions.
Packaging Materials	3	4	12	Single-use materials, often fossil-based. Moderate recyclability depending on regional waste systems. Sustainable options: FSC-certified paper, recycled film, or compostable packaging.
Accessories	3	3	9	Small impact individually but numerous across production. Potential social risks if imported. Regional sourcing and recycled metal content lower footprint.

Case Study – BiH Company

MATERIAL MIX - Cockware & Frying Pan

SaraCook

Recommended mitigation measures

Material Category	**Mitigation Measures**
Steel (Stainless)	Source low-carbon or recycled stainless steel; optimize forming processes for energy efficiency; engage suppliers in emission tracking.
Aluminium	Increase use of recycled aluminium; ensure renewable power in smelting; apply design-for-recycling to reduce scrap waste.
Plastic Handles	Transition to bio-based or recycled plastics; avoid additives that hinder recyclability; collaborate with local recyclers.
Non-stick Coating	Phase out PFAS; switch to ceramic or water-based coatings; monitor compliance with EU chemical safety standards.
Glass Lids	Increase recycled glass (cullet) share; work with suppliers using electric furnaces; reuse or collect broken lids for recycling.
Packaging Materials	Shift to recyclable paper and film; reduce packaging volume; source from FSC-certified or regional producers.
Accessories	Use recycled metal content; consolidate suppliers regionally; monitor compliance with fair labor and environmental standards.

Case Study – BiH Company

MATERIAL MIX – Refrigerator & Freezer


BosnaCool

Material Category	Severity (Extent of damage)	Likelihood (Probability of occurrence)	Combined Risk Score	Sustainability Risk Evaluation
Steel	4	5	20	High CO_2 emissions due to fossil fuel–based production; energy-intensive smelting and forming processes. Recycling rates are high but do not fully offset energy demand. Decarbonization possible via hydrogen-based steelmaking and scrap-based routes.
Aluminium	5	6	30	One of the most energy-intensive materials; bauxite mining impacts ecosystems and water use. High recycling potential significantly reduces footprint, yet global primary production remains carbon-heavy. Transition to renewable-powered smelters is crucial.
Plastics	5	4	20	Fossil-based raw material with long degradation time and low recyclability rates. High GHG emissions and pollution from microplastics. Switching to bio-based polymers and improving closed-loop recycling systems can mitigate impact.
Copper	4	5	20	High environmental footprint from extraction and refining; often sourced from regions with social risks. Recyclability is high, but e-waste recovery remains inefficient. Responsible sourcing and improved collection systems are key levers.
Glass	3	3	9	Moderate energy demand during melting; inert material with excellent recyclability. Main sustainability challenge lies in furnace energy use and logistics emissions. Transition to electric furnaces and higher cullet use can improve performance.
Electronics	5	6	30	High risk due to complex global supply chains, critical raw materials, and e-waste generation. Involves hazardous substances (e.g., lead, brominated flame retardants). Focus on design for disassembly, supplier transparency, and take-back schemes.
Packaging	4	3	12	Moderate risk; materials often single-use and fossil-based. Recycling infrastructure and supplier practices vary by region. Use of recycled content, reduced material thickness, and paper-based alternatives can reduce impact.
Coating	4	4	20	Contains potentially hazardous substances (solvents, VOCs, microplastics). High energy use in curing processes; moderate recyclability challenges. Substitution with water-based or bio-based coatings can reduce impact.

Case Study – BiH Company

MATERIAL MIX – Refrigerator & Freezer


BosnaCool

Recommended mitigation measures (1/2)

1. Steel
Key Risks: High GHG emissions, fossil energy dependency.
Mitigation Measures:

- Source steel from suppliers using **electric arc furnaces (EAF)** powered by renewable energy.
- Prioritize **certified low-carbon or recycled steel** (e.g., ResponsibleSteel).
- Engage suppliers in **Scope 3 emission reporting and reduction programs**.

2. Aluminium
Key Risks: Very high energy consumption, mining-related biodiversity loss.
Mitigation Measures:

- Prefer **secondary (recycled) aluminium** with documented traceability.
- Work with smelters powered by **renewable energy**.
- Require supplier adherence to **Aluminium Stewardship Initiative (ASI)** standards.

3. Plastics
Key Risks: Fossil-based feedstocks, pollution, poor recyclability.
Mitigation Measures:

- Transition to **bio-based or recycled plastics (rPP, rPET)**.
- Limit plastic use through **design-for-recycling** principles.
- Partner with suppliers committed to **closed-loop systems** and **plastic neutrality initiatives**.

4. Copper
Key Risks: Energy-intensive refining, mining pollution, social risks in sourcing.
Mitigation Measures:

- Prioritize **recycled copper** or certified responsibly mined sources (e.g., **Copper Mark**).
- Implement **traceability** for upstream suppliers.
- Audit suppliers for **labor, safety, and environmental compliance**.

Case Study – BiH Company

MATERIAL MIX – Refrigerator & Freezer

BosnaCool

Recommended mitigation measures (2/2)

5. Glass
Key Risks: High furnace energy demand, transport emissions.
Mitigation Measures:

- Increase **cullet content** (recycled glass share).
- Collaborate with suppliers using **electric or hybrid furnaces**.
- Optimize **packaging and transport routes** to reduce CO_2 footprint.

6. Electronics
Key Risks: Hazardous substances, rare earth extraction, e-waste.
Mitigation Measures:

- Implement **supplier REACH and RoHS compliance audits**.
- Partner in **take-back or recycling schemes** for electronic waste.
- Encourage **eco-design for disassembly and repairability**.

7. Packaging
Key Risks: Resource inefficiency, waste generation.
Mitigation Measures:

- Switch to **recyclable, biodegradable, or paper-based** materials.
- Standardize **minimalist packaging design** across product lines.
- Source from **FSC- or PEFC-certified** packaging suppliers.

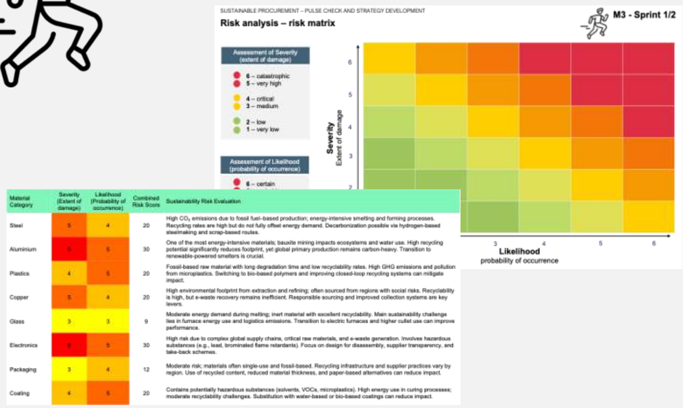
8. Coating
Key Risks: VOC emissions, hazardous solvents, energy use.
Mitigation Measures:

- Substitute with **low-VOC, water-based, or powder coatings**.
- Optimize **curing temperature and process efficiency**.
- Require supplier compliance with **REACH/SVHC** regulations.

SUS Category Group analysis & SUS supplier analysis
Sprints

Sprint

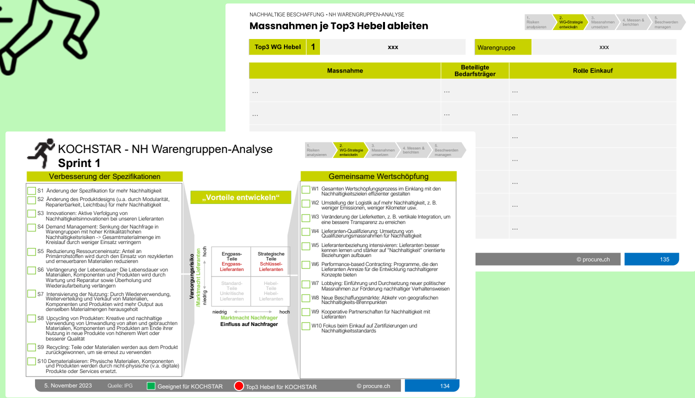
M3 – Sprint 1/2



Material criticality assessment

1. Which materials contribute most to CO_2 emissions, energy consumption, resource scarcity and all relevant sustainability focus areas defined (1-9)
2. Plot material groups into the Material Risk Matrix
3. Derive appropriate mitigation measures for each material group

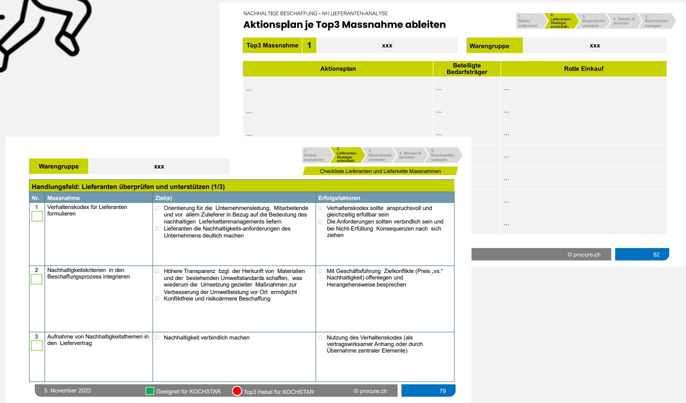
M3 – Sprint 2/2



Category optimization levers for sustainability

1. Which category group levers for sustainability do you consider most suitable for your category group?
2. Which top three levers would you prioritize?
3. What other stakeholders do you need to implement the top three levers?
4. What specific measures would you pursue for the top three levers?
5. What role does purchasing play in each case?

M4 - Sprint 3



Supplier measures for sustainability

1. Which supplier measures for sustainability do you consider most suitable for your category group?
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3. What other resources do you need to implement the top three measures?
4. What specific action plan do you intend to pursue for each of the top three measures?
5. What role does purchasing play in each case?

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Top 3 levers for sustainability

M3 - Sprint 2/2

Top 3 category group levers	1	xxx

Category group	xxx

Measure	Stakeholders involved	Role of purchasing
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…

Source: IPG

Top 3 levers for sustainability

M3 - Sprint 2/2

Top 3 category group levers	2	xxx	Category group	xxx

Measure	Users involved	Role of purchasing
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…

CONTENTS INTENDED FOR IPG MASTERCLASS PARTICIPANTS

Source: IPG

Top 3 levers for sustainability

M3 - Sprint 2/2

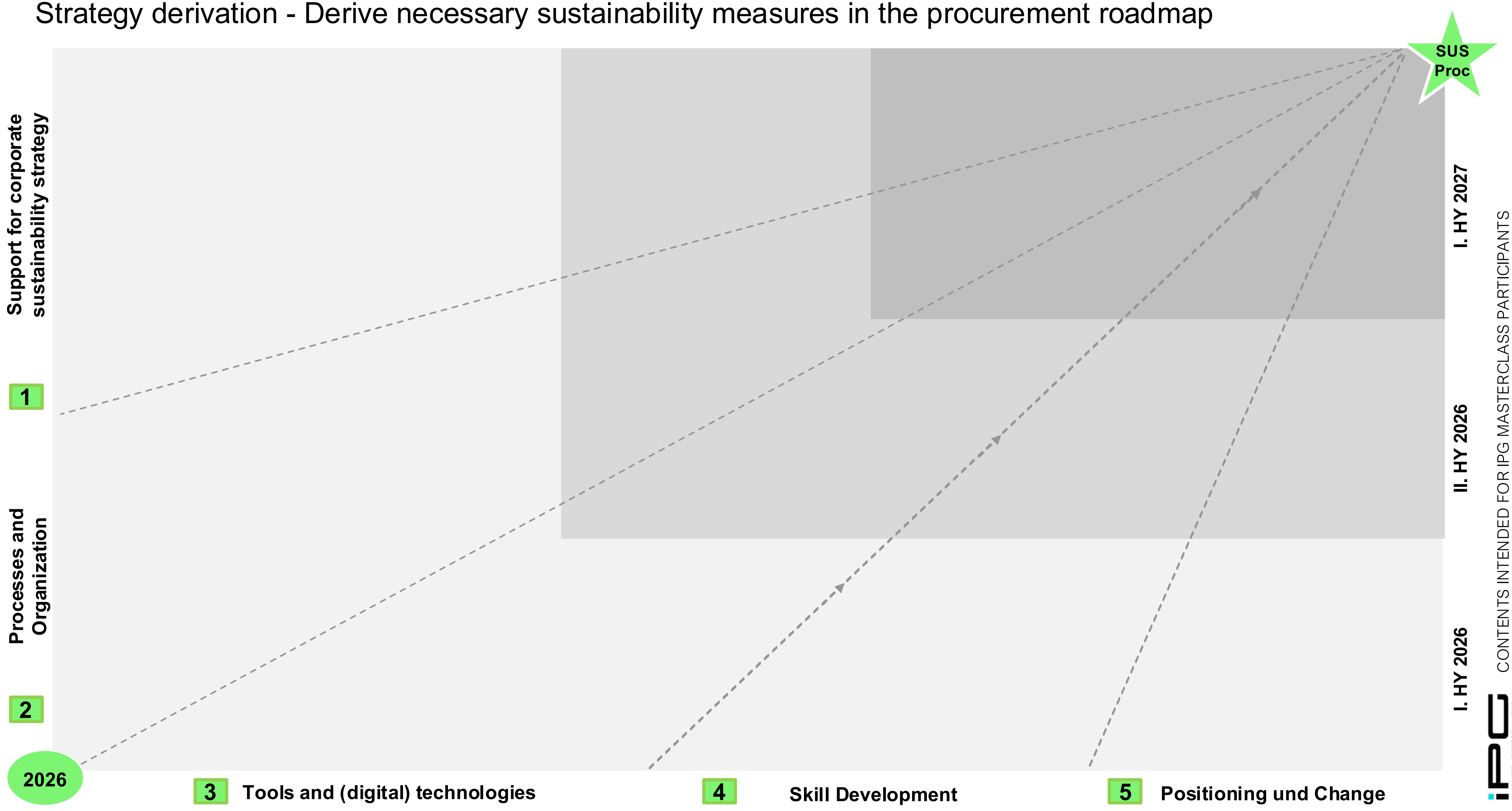
Top 3 category group levers	3	xxx

Category group	xxx

Measure	Users involved	Role of purchasing
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…
…	…	…

Source: IPG

Strategy derivation - Derive necessary sustainability measures in the procurement roadmap



Case Study – BiH Company

BILL OF MATERIAL (BOM) - Cockware

SaraCook

No.	Component	Description / Material	Function / Notes
1	**Pot Body**	Stainless steel (AISI 304 / 18-10), aluminum core, or multi-layer base	Main vessel for cooking
2	**Base Disc (Thermal Base)**	Aluminum or copper encapsulated in stainless steel	Ensures even heat distribution
3	**Lid (Top Cover)**	Tempered glass or stainless steel	Retains heat and moisture
4	**Lid Handle / Knob**	Bakelite, silicone, or stainless steel	Heat-resistant grip for safe handling
5	**Side Handles (2x)**	Stainless steel, Bakelite, or silicone-coated	Attached to pot body for lifting
6	**Rivets / Screws**	Stainless steel	Fixation of handles
7	**Sealing Ring (optional)**	Silicone or rubber	For tightly fitting lids (in pressure pots)
8	**Surface Coating (optional)**	Non-stick (PTFE, ceramic, or enamel)	For easier cleaning and corrosion resistance
9	**Logo / Brand Marking**	Laser engraving or print	Branding element
10	**Packaging**	Carton box with labeling and protective inserts	Retail or transport packaging

Case Study – BiH Company

BILL OF MATERIAL (BOM) - Frying Pan

SaraCook

No.	Component	Description / Material	Function / Notes
1	**Pan Body**	Cast aluminum, forged aluminum, stainless steel, or carbon steel	Main component for frying
2	**Base Plate (Induction Base)**	Magnetic stainless steel (AISI 430)	Enables induction cooking
3	**Inner Coating**	Non-stick (PTFE, ceramic, or hard anodized)	Prevents sticking and eases cleaning
4	**Outer Coating / Finish**	Heat-resistant lacquer or enamel	Protects surface and enhances aesthetics
5	**Handle**	Bakelite, stainless steel, or wood	Ergonomic, heat-insulated grip
6	**Rivet / Screw Fixation**	Stainless steel	Joins handle and pan body
7	**Lid (optional)**	Tempered glass or stainless steel	Included for covered frying pans
8	**Protective Cap / Insert**	Silicone or plastic	Reinforcement at handle connection
9	**Logo / Branding Plate**	Laser-marked or embossed	For brand identification
10	**Packaging**	Carton or sleeve with manual and label	Ready-for-sale packaging

Case Study – BiH Company

MATERIAL MIX - Cockware & Frying Pan

SaraCook

No.	Material Group	Examples of Use	Properties / Purpose
1	**Metals**	Stainless steel, aluminum, copper	Excellent heat conduction, corrosion resistance, long lifespan
2	**Non-stick Coatings**	PTFE, ceramic, hard anodized coatings	Prevents sticking, improves cooking performance and cleaning
3	**Plastics / Polymers**	Bakelite, silicone, nylon	Heat-insulated handles and knobs, ergonomic design
4	**Glass**	Tempered glass lids	Heat resistant, transparent for visibility during cooking
5	**Elastomers**	Rubber, silicone seals	Used for sealing and insulation (e.g. pressure pots)
6	**Fasteners**	Stainless steel rivets or screws	Fixation of handles and assembly stability
7	**Surface Finishes**	Enamel, anodized or polished metal	Aesthetic design, anti-corrosion protection
8	**Packaging Materials**	Cardboard boxes, inserts, labels	Safe transport, retail presentation, branding

RISK ASSESSMENT – Cockware & Frying Pan – MATERIAL-MIX

SaraCook

Material Category	1. GHGs / Fossil Use	2. Resource Efficiency & Recycling	3. Hazardous Substances	4. Water Consumption / Scarcity	5. Packaging Material	6. Land Use / Biodiversity	7. Energy Consumption & Efficiency	8. Non-GHG Emissions	9. Social Sustainability / Labor	Overall Risk Level
1. Steel & Carbon Steel	Medium – CO_2-intensive smelting but regional sourcing	Medium – good recyclability; scrap return needed	Medium – minor alloying substances	Low – limited process water	Low	Low	High – rolling & forming energy intensive	Medium – dust & noise in metal forming	Medium – fair local conditions	**High**
2. Aluminum & Alloys	Medium – moderate fossil energy share	High – high recycling potential, but needs closed loop	Medium – minor alloy additives	Low	Low	Low	High – casting and forging very energy intensive	Medium – emissions from melting & quenching	Medium – SME labor standards acceptable	**High**
3. Non-Stick / Enamel Coatings	High – solvent and curing energy use	Medium – limited recycling of coated materials	High – PTFE/ceramic chemicals, possible PFAS residues	Medium – cleaning and bath use	Low	Medium – chemical waste risk	Medium – curing energy demand	High – VOCs and particulates	Medium – moderate EHS oversight	**High**
4. Plastics & Elastomers (Handles, Knobs)	Medium – petroleum-based	Medium – partial recyclability	Medium – possible additives (BPA, flame retardants)	Low	Medium – molded packaging inserts	Medium – indirect impact	Medium – moderate process energy	Medium – VOCs from molding	Medium – fair labor locally	**Medium**
5. Glass Lids & Inserts	Medium – furnace energy demand	Medium – recyclable but fragile	Low	Medium – water for cooling and cleaning	Low	Low	High – melting temperature >1500 °C	Medium – furnace dust and noise	Low	**Medium**
6. Fasteners & Auxiliaries (Rivets, Oils, Sealants)	Medium – metal & lubricant inputs	Medium – partial recovery possible	Medium – lubricant chemicals	Low	Low	Low	Medium – machining & forming energy	Medium – vapors, fumes	Medium – workshop labor standards	**Medium**
7. Packaging Materials (Carton, Film, Ink)	Medium – fossil and paper inputs	Medium – recyclable	Low	Low	High – large packaging volume	Medium – forestry sourcing impact	Medium – paper and ink energy	Medium – VOCs from printing	Medium – fair SME labor	**Medium**

Material criticality assessment

Sprint

	Sustainability focus	Explanations
1	Greenhouse gases / Use Fossil energy sources	Greenhouse gases are gases that contribute to the greenhouse effect and can be of both natural and anthropogenic (human-induced) origin / Emissions from transport and livestock farming
2	Resource Efficiency & Circular economy	In contrast to the linear "take-make-dispose" model, the circular economy is an economic model that decouples growth from the consumption of finite resources. The goal is to keep products, components, and resources in cycles and to preserve their value for as long as possible. Specifically, the aim is to narrow material (and energy) cycles: • Narrowing - On the one hand, the proportion of primary raw materials is reduced through the use of recycled and renewable materials; on the other hand, the total amount of material in the cycle is reduced through less use. • Slow down - The service life of products and components is extended through maintenance, repair, refurbishment, updates, and upgrades. This preserves value for longer and reduces the need for new materials. • Intensify - More output is obtained from the same quantities of materials through more intensive use of products. • Close – Materials should be reused for a new purpose at the end of their useful life. • Dematerialize – Physical products are replaced by non-physical (primarily digital) products or services.
3	Hazardous substances	Hazardous substances are substances and preparations/mixtures (solid, liquid, or gaseous) that have one or more hazardous properties and can therefore endanger the life or health of humans and animals, pollute the environment, or damage property.
4	Water consumption & Water scarcity	Water consumption is colloquially defined as the amount of water used for human consumption. This includes water used for direct human consumption as well as water supplied for everyday life, agriculture, commerce, and industry. Water scarcity occurs when there are insufficient water resources to meet existing water demand.

Source: IPG Research

Material criticality assessment

Sprint

	Sustainability focus	Explanations
5	**Packaging material**	Packaging generally refers to the covering or (partial or complete) wrapping of an object, in particular for its protection or for better handling.
6	**Land use/ Preservation of biodiversity**	The term "biodiversity" refers to the total diversity of life. The diversity of the ecosystem (habitats such as water, forest, alpine areas). The diversity of species (animals, plants, fungi, microorganisms). The diversity of genes (within a species and within the entire ecosystem). Land use (also land cover) refers to the way in which humans use soil and land areas (parts of the solid earth's surface).
7	**Energy consumption & energy efficiency**	Energy consumption colloquially refers to the demand for energy for various applications. Energy is necessary to perform work. Depending on the application, a distinction is made between mechanical work, lighting, and heating and cooling processes, which are characterized by time-related measurements and parameters. Energy efficiency is the ratio of service, goods, or energy output to the energy input. Energy efficiency is therefore understood to mean the rational use of energy.
8	**Emissions (excluding GHG*)**	Emission of particles, substances, (sound) waves, or radiation into the environment.
9	**Social sustainability / compliance with labor standards and fair business practices**	Social sustainability describes the conscious organization of social and cultural systems. Social sustainability should enable a stable society in which all members can participate and which guarantees human dignity, labor rights, and human rights across generations.

Source: IPG Research

Case Study – BiH Company

BILL OF MATERIAL (BOM) – Refrigerator

BosnaCool

No.	Component	Material / Description	Function / Purpose
1	**Cabinet / Outer Shell**	Powder-coated steel or painted sheet metal	Structural housing and aesthetic surface
2	**Inner Liner**	High-impact polystyrene (HIPS) or ABS plastic	Hygienic interior surface
3	**Insulation Foam**	Polyurethane (PU) foam	Thermal insulation to maintain temperature
4	**Compressor Unit**	Hermetically sealed compressor with refrigerant (R600a / R134a)	Circulates refrigerant through the cooling circuit
5	**Condenser Coil**	Copper or aluminum tubing	Releases heat to ambient air
6	**Evaporator Coil**	Aluminum tubing	Absorbs heat inside the cabinet
7	**Thermostat / Temperature Sensor**	Electronic or mechanical control	Regulates internal temperature
8	**Door Assembly**	Metal or plastic with magnetic gasket	Provides tight seal and user access
9	**Shelves and Drawers**	Tempered glass or plastic	Supports food storage
10	**Lighting Unit**	LED module	Interior illumination
11	**Control Panel / Display**	Electronic module with buttons or touch interface	Allows user settings and control
12	**Door Gasket**	Flexible rubber seal	Prevents air leakage
13	**Feet / Rollers**	Plastic or metal supports	Stability and mobility
14	**Refrigerant Piping**	Copper tubes	Connects compressor, condenser, and evaporator
15	**Back Cover and Ventilation Grid**	Sheet metal or plastic	Protects components and enables airflow
16	**Packaging**	Cardboard, protective foam inserts	For transportation and retail protection

Case Study – BiH Company

BILL OF MATERIAL (BOM) – Freezer

BosnaCool

No.	Component	Material / Description	Function / Purpose
1	**Cabinet / Outer Shell**	Powder-coated steel or painted sheet metal	Structural frame and housing
2	**Inner Liner**	Aluminum or HIPS plastic	Durable, low-temperature resistant surface
3	**Insulation Foam**	High-density polyurethane foam	Thermal insulation for sub-zero temperatures
4	**Compressor Unit**	Heavy-duty hermetic compressor (R600a / R290)	Maintains freezing temperature
5	**Condenser Coil**	Copper or aluminum tubing	Dissipates heat to the environment
6	**Evaporator Coil**	Aluminum tubing or plate	Absorbs heat from internal chamber
7	**Thermostat / Controller**	Electronic or mechanical	Maintains consistent low temperature
8	**Lid / Door Assembly**	Steel or plastic with magnetic gasket	Ensures airtight closure
9	**Storage Baskets**	Coated wire or plastic	Organizes frozen goods
10	**Lighting Unit**	LED or fluorescent light	Provides visibility inside
11	**Drain Plug**	Plastic with seal ring	For defrost water removal
12	**Door Gasket**	Flexible rubber or silicone	Prevents air ingress and frost build-up
13	**Compressor Base / Feet**	Metal frame with rubber mounts	Reduces vibration and noise
14	**Refrigerant Lines**	Copper tubing	Transfers refrigerant between components
15	**Control Panel / Indicator Lights**	Simple on/off and temperature indicators	Displays operation status
16	**Packaging**	Reinforced carton and foam padding	Protection during transport

Case Study – BiH Company

MATERIAL MIX – Refrigerator & Freezer

BosnaCool

No.	Material Group	Examples of Use	Notes / Characteristics
1	**Metals**	Steel (outer shell, frame), aluminum (evaporator, condenser), copper (refrigerant piping)	Durable, corrosion-resistant, excellent thermal conductivity
2	**Plastics & Polymers**	HIPS, ABS (inner liners), silicone or rubber (gaskets), polyurethane (insulation)	Lightweight, insulating, moldable, cost-effective
3	**Elastomers**	Magnetic door gaskets, seals, vibration dampers	Ensures air-tightness and noise reduction
4	**Electronics**	Thermostats, control units, LED lighting	Enables temperature regulation and user interface
5	**Glass**	Tempered shelves and panels	Hygienic and visually appealing interior surfaces
6	**Coatings & Paints**	Powder coating, enamel, anti-fingerprint finishes	Protection against corrosion, improved aesthetics
7	**Packaging Materials**	Cardboard, foam inserts, stretch wrap	Protection during transport and handling

RISK ASSESSMENT – Refrigerator & Freezer – MATERIAL-MIX

BosnaCool

Material Category	1. GHGs / Fossil Use	2. Resource Efficiency & Recycling	3. Hazardous Substances	4. Water Consumption / Scarcity	5. Packaging Material	6. Land Use / Biodiversity	7. Energy Consumption & Efficiency	8. Non-GHG Emissions	9. Social Sustainability / Labor	Overall Risk Level
1. Steel & Metals	🔴 High – high fossil energy in mining & smelting	🟠 Medium – recyclable but high losses	🟠 Medium – exposure to heavy metals	🟠 Medium – water-intensive mining	🟢 Low	🟠 Medium – mining impacts ecosystems	🔴 High – energy-intensive production	🟠 Medium – air pollution & particulates	🔴 High – mining labor risks (Asia/Africa)	🔴 **High**
2. Plastics & Polymers	🔴 High – fossil-based materials	🔴 High – poor recyclability & degradation	🟠 Medium – additives & microplastics	🟢 Low – low direct water use	🟢 Low	🟠 Medium – feedstock extraction	🔴 High – energy demand in polymerization	🟠 Medium – volatile compounds	🟠 Medium – factory working conditions	🔴 **High**
3. Electronic Components	🟠 Medium – depends on mix of metals	🟠 Medium – limited recycling rates	🔴 High – contains lead, bromine, rare earths	🟠 Medium – water used in chip production	🟢 Low	🟠 Medium – mining inputs	🔴 High – high power in chipmaking	🟠 Medium – process emissions	🔴 High – labor, conflict minerals, EHS risks	🔴 **High**
4. Insulation Foams	🔴 High – often petrochemical origin	🔴 High – difficult to recycle	🔴 High – may release HFCs/HCFCs	🟢 Low	🟢 Low	🟢 Low	🔴 High – energy-intensive chemicals	🔴 High – VOC and particle emissions	🟠 Medium – chemical handling risks	🔴 **High**
5. Glass Components	🟠 Medium – fossil fuels for melting	🟠 Medium – recyclable but energy-heavy	🟢 Low	🟠 Medium – moderate water use	🟢 Low	🟢 Low	🔴 High – furnace operations	🟠 Medium – dust and noise	🟢 Low	🟠 **Medium**
6. Cables & Wiring	🟠 Medium – metal & plastic inputs	🟠 Medium – recycling feasible but complex	🟠 Medium – may contain lead or PVC	🟢 Low	🟢 Low	🟢 Low	🔴 High – copper & insulation processing	🟠 Medium – emissions during extrusion	🔴 High – supplier labor issues	🔴 **High**
7. Packaging Materials	🟠 Medium – fossil-based plastics or paper	🟠 Medium – partially recyclable	🟢 Low	🟢 Low	🔴 High – packaging volume & waste	🟠 Medium – forestry or extraction	🟠 Medium – energy in production	🟠 Medium – VOCs, dust	🟠 Medium – working conditions in packaging sector	🟠 **Medium**

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