



Prospects and future challenges of lubricants

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- **SKF company in a nutshell**
 - **Lubricants challenges and future outlook**
 - **SKF path to net zero emission: impact of lubricants**
 - **Environmental impact of the bearing grease**
 - **Q&A**



> 40,000

employees

70

manufacturing locations

130

countries

40

customer industries

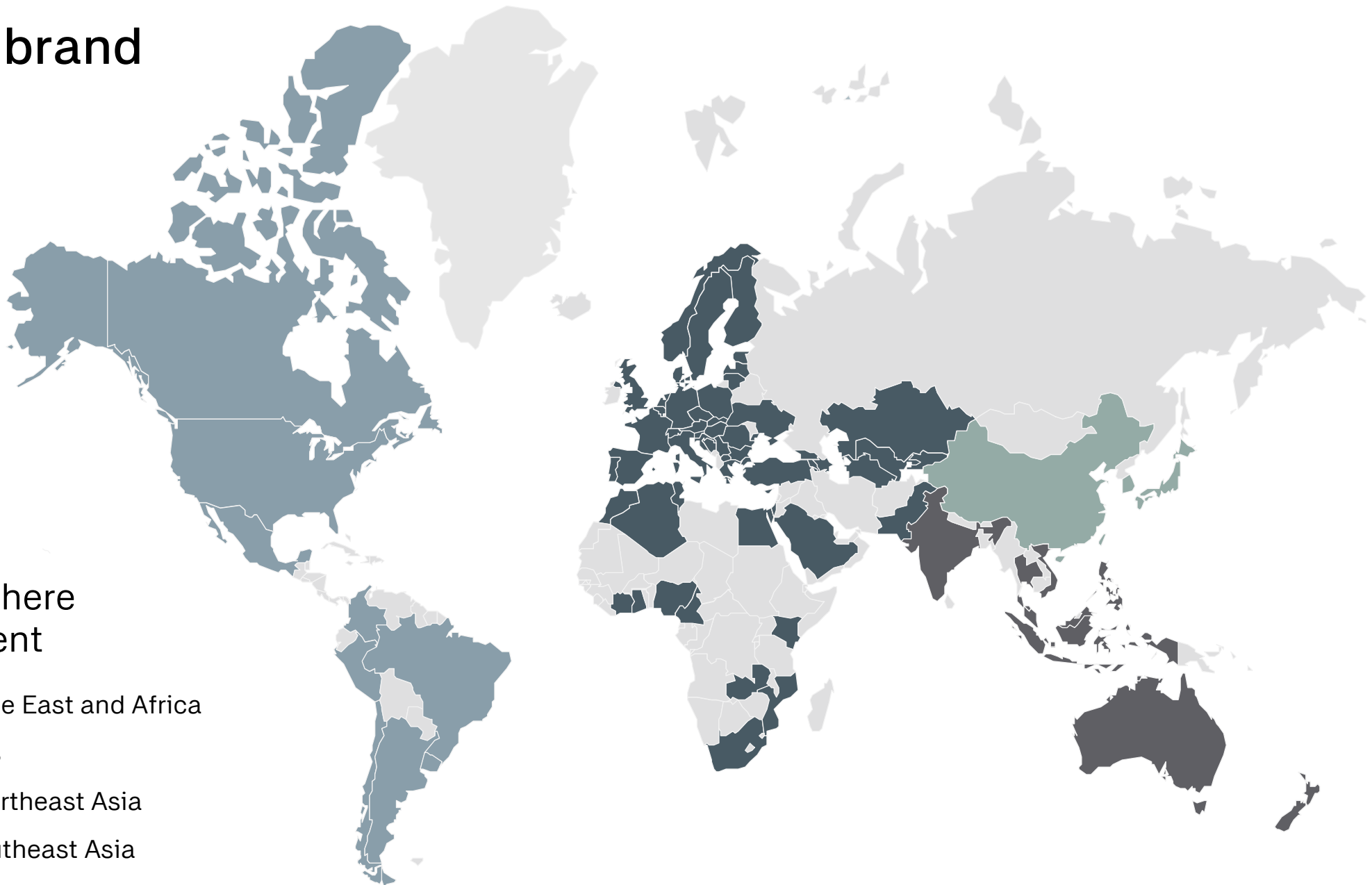
> 17,000

distributors

A global brand

Countries where
SKF is present

- Europe, Middle East and Africa
- The Americas
- China and Northeast Asia
- India and Southeast Asia



WE ARE EVERYWHERE

"~20% of the world's energy is used to overcome friction!"
(Holmberg, Kenneth; Erdemir, Ali (1 September 2017). "Influence of tribology on global energy consumption, costs and emissions")

An aerial photograph of a coastal city, likely Bergen, Norway, serves as the background. The city is built on a peninsula surrounded by water, with steep mountains in the distance. Overlaid on the image are numerous circular icons representing different modes of transport and industrial processes. These include a helicopter, airplane, ship, train, car, truck, boat, crane, excavator, hand holding a tool, bottle, toilet paper roll, stroller, wheelchair, ramp, and a person walking. Each icon is connected to a specific location on the map by a dotted white line, illustrating the ubiquity of friction across all forms of movement and industry.[illegible][illegible]

Lubricants challenges



- Toxic free environment
- EU climate ambition 2030 and 2050
- Clean and circular economy



- Chemical Strategy for Sustainability (CSS)
- Safe and Sustainable by Design (SSbD framework)
- Classification Labelling and Packaging (CLP)
- Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- and more will come

*Performance
Requirements*

- Longer service life / maintenance intervals
- Extreme application conditions

Impact / future outlook

- **Reduction of lubricants CO₂ footprint** 
- **Restricted or banned substances in coming years due to EU regulations**
 - estimated 30% of approx. 8.000 substances used in the lubricant industry could be eliminated
 - Raw material availability issue / new to be developed (additional assessment / testing etc..)
- **Linear to circular value chain / limitation of lubricant consumption**
- **Focus on performance increase**

In our operations we expect to deal with...



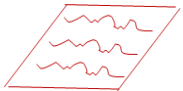
Synthetic, ecofriendly, bio based raw materials



Re-refined base-oils



technologies to increase fluids service life
e.g. RecondOil



New coatings & surface texture (e.g: roughness etc..)



Smart testing and
new/enhanced tribology tests



Use of machine learning algorithms and AI



Enhanced / new models
(standard models to be revised)

.... with focus on our path to net zero emission from cradle to grave



Decarbonizing in progress

The SKF path to net zero emissions

In operations and supply chain by 2050

2022 update

The SKF Position Paper

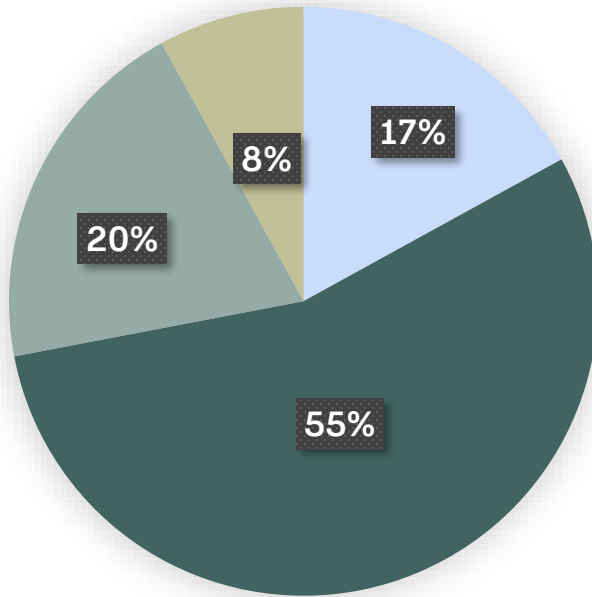
www.skf.com/sg/organisation/sustainability/decarbonizing



CO2 emission to produce a bearing

Simplified scheme from LCA (Lifecycle Assessment Study)

SKF Bearings
Energy/Carbon footprint



■ SKF Manufacturing

■ Steel & raw materials

■ Suppliers (Forging, turning, HT, rolling elements, grease, lubrication, packaging etc.)

■ Transportation

Up to 80% of energy consumption
and CO2 emissions to produce a
Bearing are out of SKF

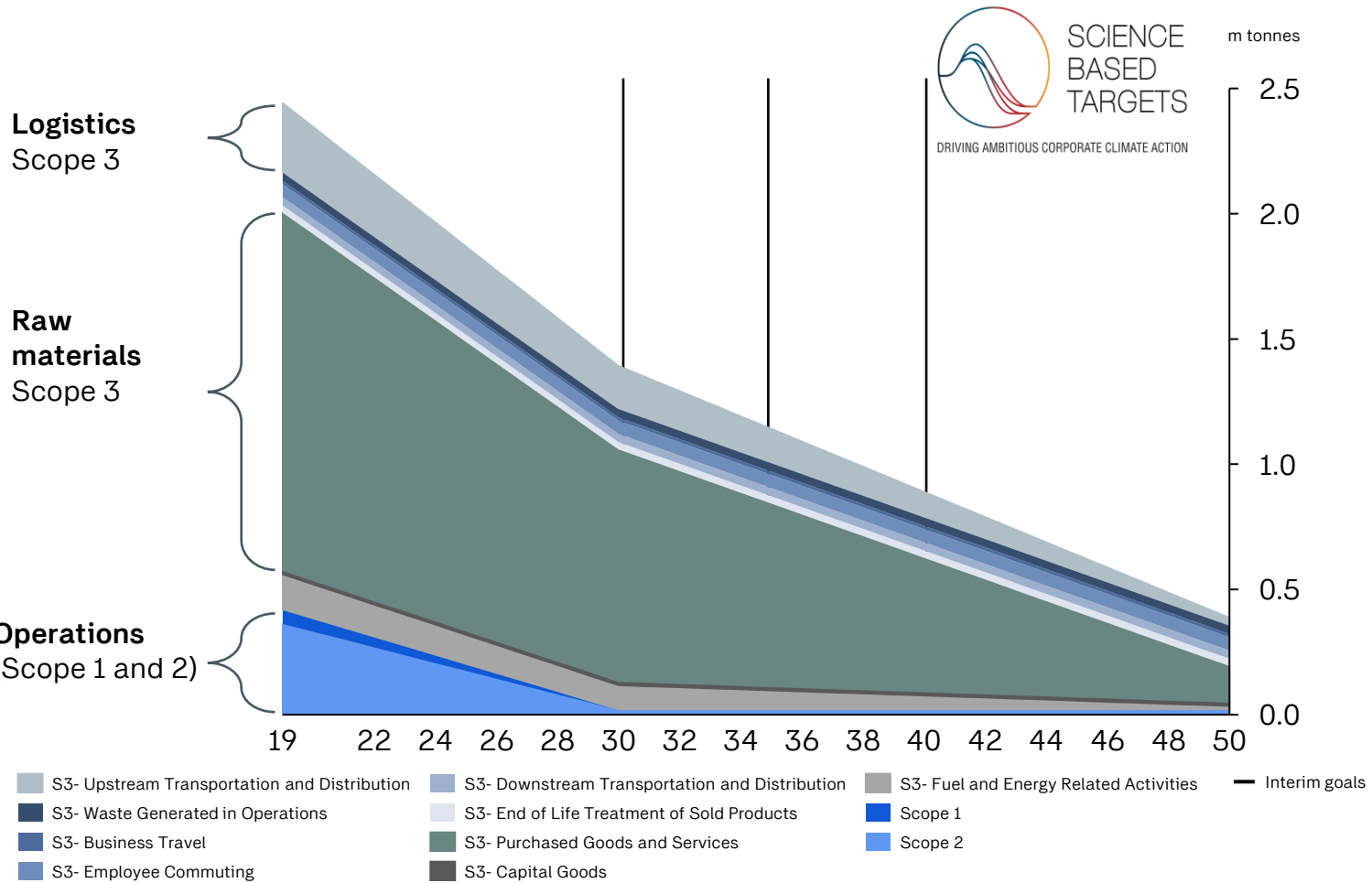


Focus on our Suppliers!



Climate Transformation | SKF's Climate Trajectory

Net Zero emission trajectory, *m tonnes* (counted high impact categories)



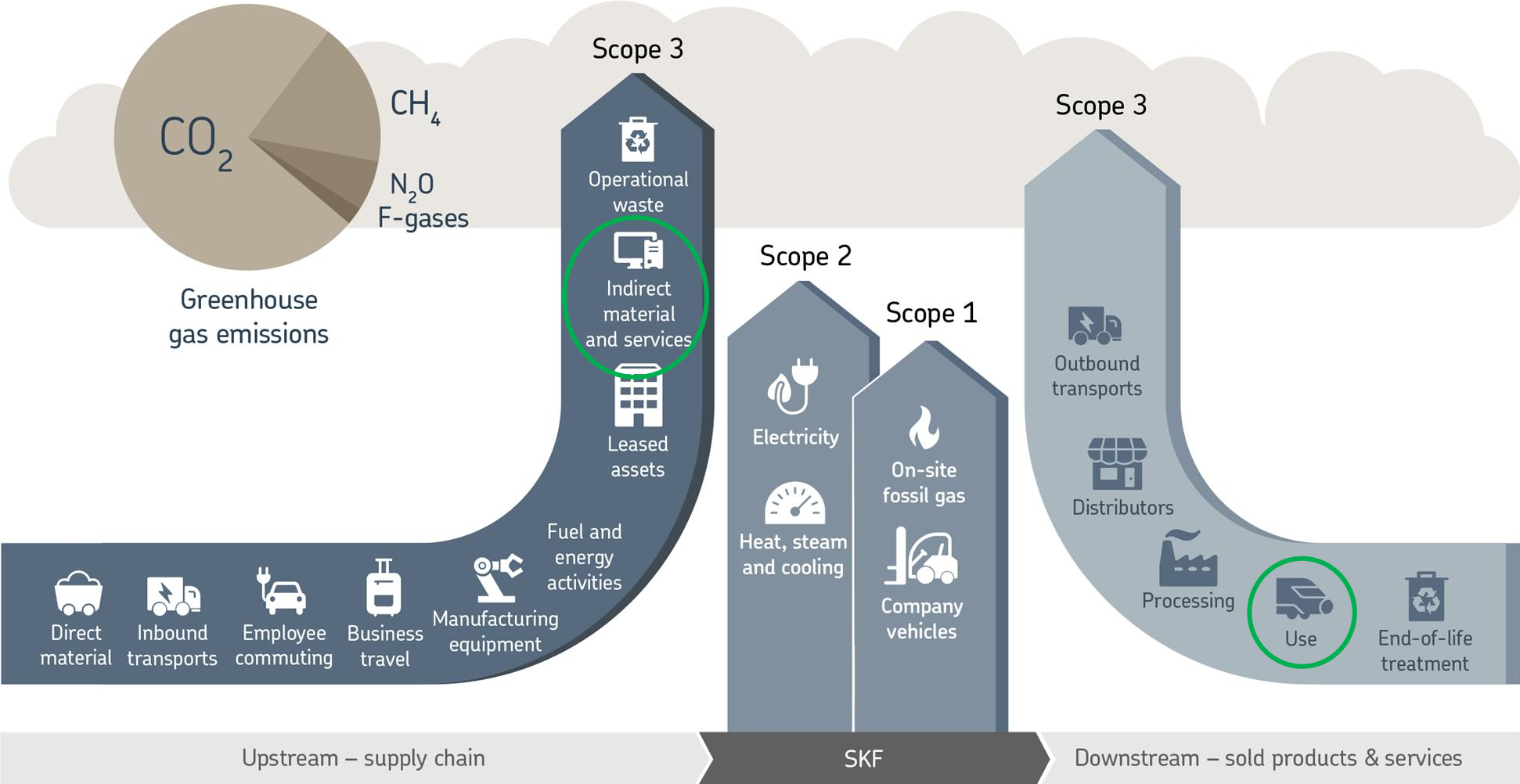
Committing to the goals

- Goals are grounded in the SKF organization
- Short- and long-term goals are approved by the Science Based Target Initiative (aligned with the Paris agreement 1.5 C)
- Detailed plans defined for the three main impacts (logistics, direct materials and operations)

Scopes and related emissions for SKF

Lubricants contribution

- to our factories purchased materials goals (scope 3 - upstream)
- to our product sustainability targets (scope 3 – upstream & downstream)

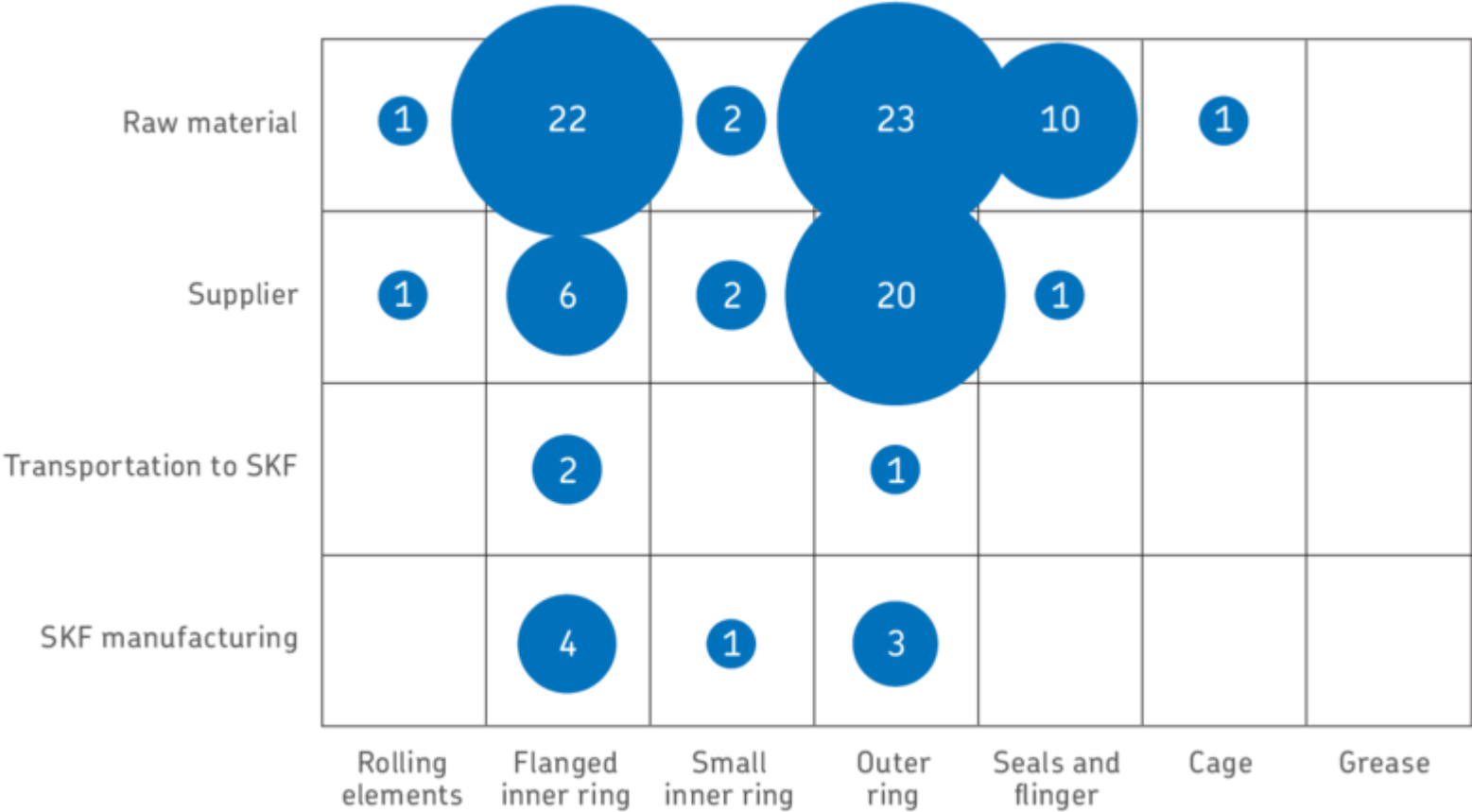


Focus on Bearing Grease



Example of “Sealed for Life” Automotive wheel-set Bearing Unit

Estimated Carbon footprint %



Focus on Bearing Grease

Example: “Sealed for Life” Railway wheel-set Bearing Unit



Industry:

Railways



Application

Transporting passengers - high speed



Position

Axelbox bearing

CO2 emission result

Bearing manufacturing

~ 1%



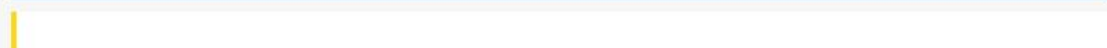
Frictional power loss

~ 99%



Grease consumption

< 1%



The values displayed are estimates and may not sum due to rounding. This estimation is based on SKF tapered roller bearing units installed in an axel box application for high speed trains. The bearings are refurbished on a fix maintenance schedule depending on the operating conditions. The combination of the operating conditions and the size of bearings means the main contributor to CO2 emissions is the frictional power losses.

Focus on Bearing Grease

Example: Relubrication



Industry:

Metals

Application

Casting machines

Position

Slab casters (strand support roller)

CO2 emission result



The values displayed are estimates and may not sum due to rounding. This estimation is based on open SKF spherical roller bearings. The bearings are replaced often due to corrosion damages and are regularly relubricated with grease.



Sustainable SKF Grease Portfolio

Impact on environment when using SKF products

Carbon Footprint impact	Friction Impact	Hazardousness Impact	Grease Life Impact
Calculated value (CO ₂ / kg grease)	Measurements on test rig	Reflecting risk level for • Environment • Humans	Grease Life Factor (GLF) for ranking

Summing up...

Together, we re-imagine rotation for a better tomorrow

By creating intelligent and clean solutions for people and the planet

... the aim of SKF future lubricants portfolio

- Purchased by suppliers aligned with SKF path to Net Zero emissions milestones
- Locally produced within our operations region
- Future proof: coming hazard classification of raw materials has to be considered beforehand for any new product development to avoid toxicity
- Sustainable metalworking fluids and oils in our factories, recycled when possible
- Bearing grease friction, life and PCF will be key differentiators depending on the application



SKF®