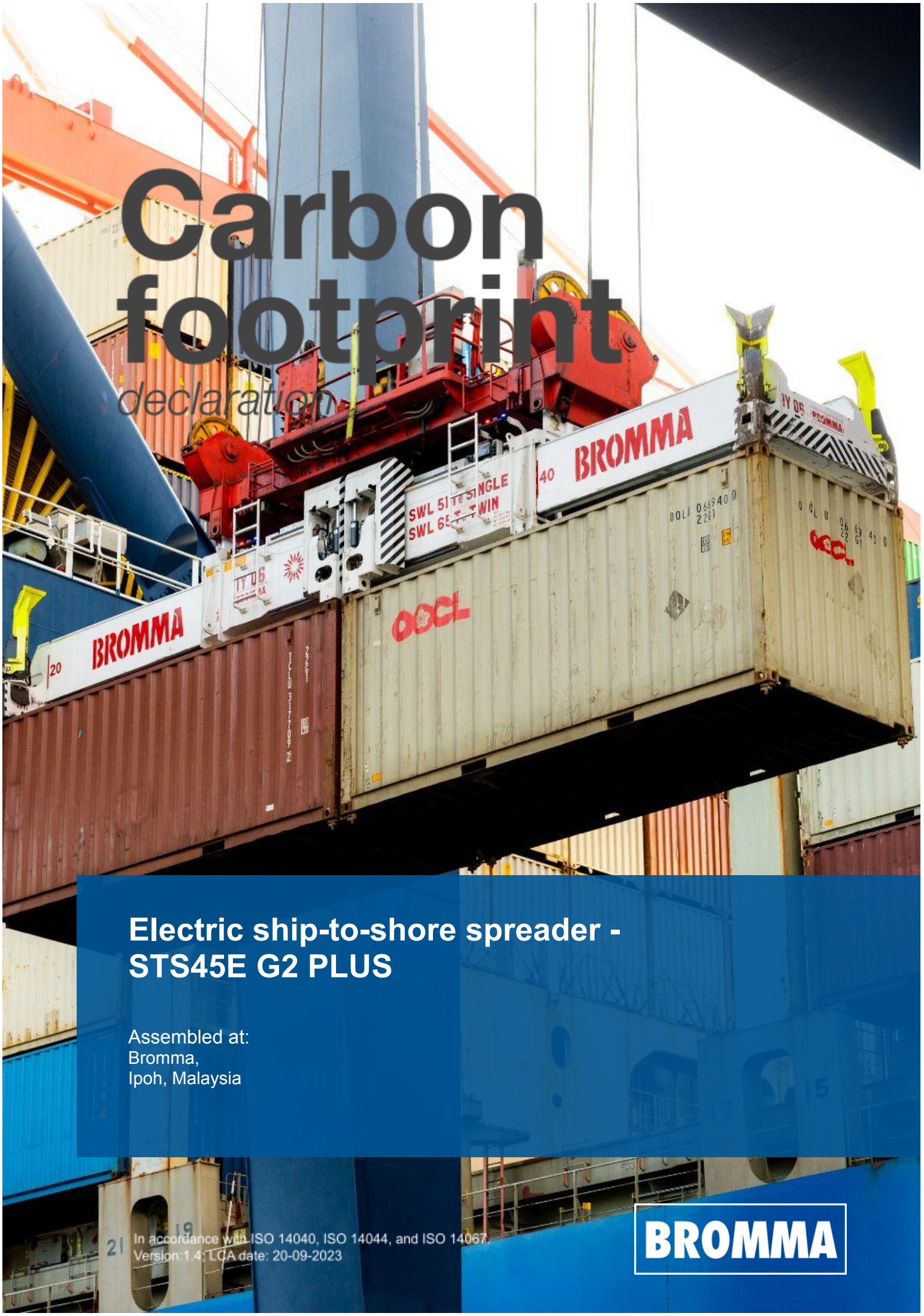


Carbon footprint

declaration

Electric ship-to-shore spreader - STS45E G2 PLUS

Assembled at:
Bromma,
Ipoh, Malaysia

In accordance with ISO 14040, ISO 14044, and ISO 14067
Version:1.4, LCA date: 20-09-2023

BROMMA

Introduction

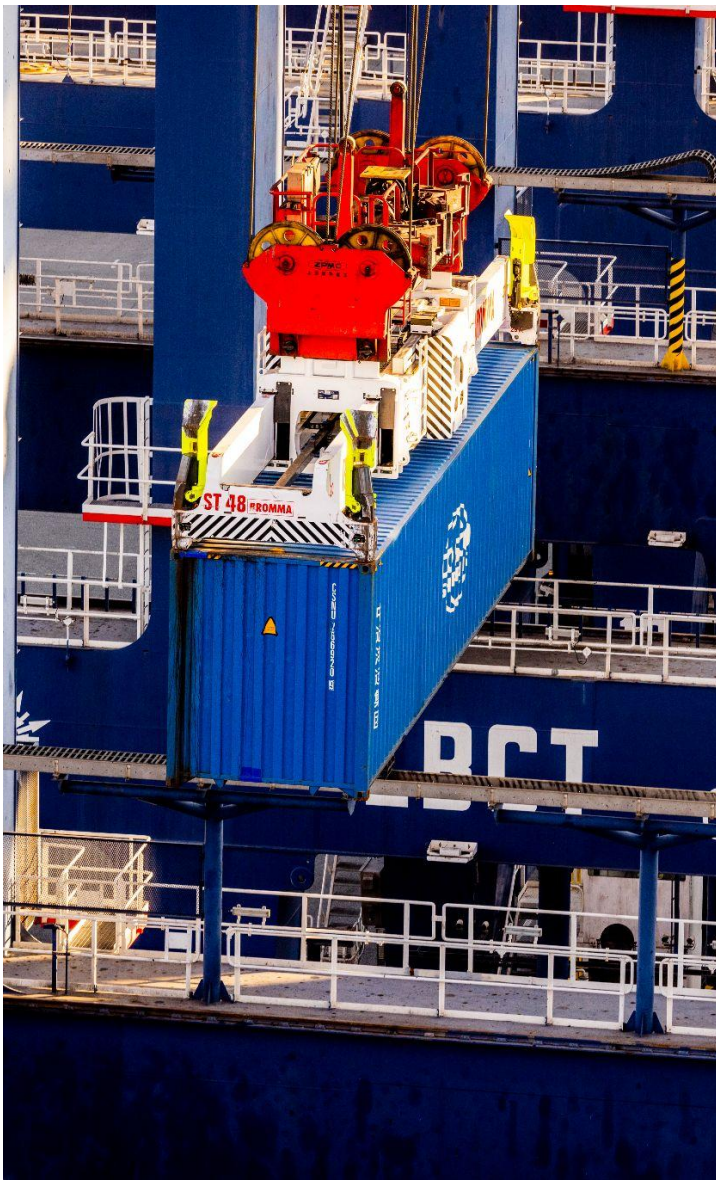
This carbon footprint declaration summarizes the results of a life cycle assessment (LCA) conducted for Bromma's electric spreader.

Bromma in brief

Bromma is the industry market leader in ship-to-shore spreaders, mobile harbor crane spreaders, and yard crane spreaders. A pioneer in the container handling industry, Bromma is focused on lifting the productivity of its customers through more reliable spreaders. Bromma has delivered crane spreaders to 500 terminals in 90 nations on 6 continents, and Bromma spreaders are in service today at 99 out of the world's largest 100 container ports. Bromma's industry-leading all-electrics spreaders and recent products such as the Spreader Monitoring System are part of this continuing effort.

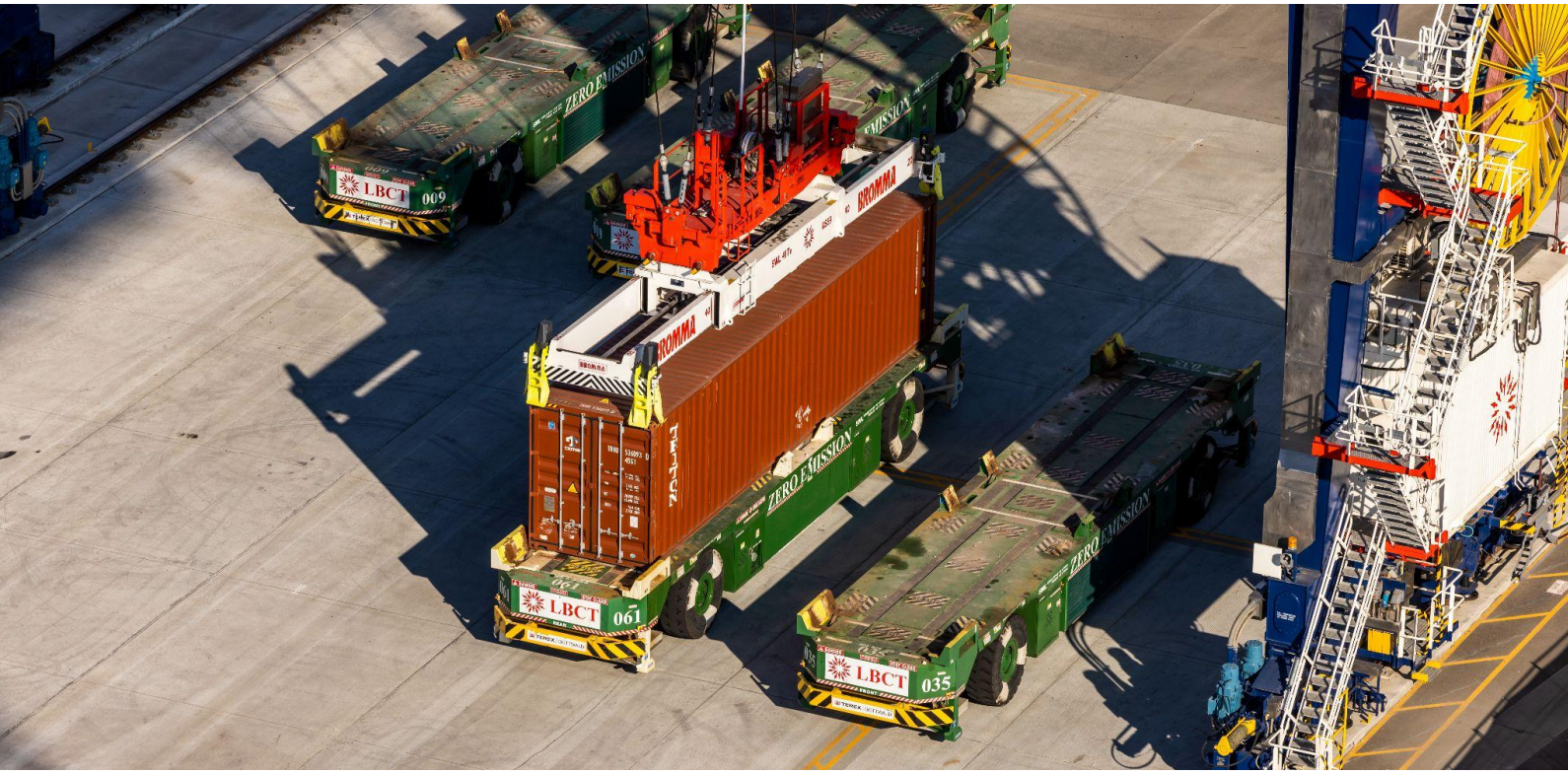
Product information

The STS45E G2 PLUS all-electric twin-lift separating spreader is designed to support terminals in achieving their environmental goals without sacrificing productivity or efficiency. The Bromma all-electric STS spreader is the fastest all-electric spreader in the market with its accurate positioning when telescoping and its increased telescoping and twin separating speed. By choosing to use an all-electric spreader for the ship-to-shore operations, terminals can benefit from reduced electricity consumption, thus saving on operational costs and avoiding any risks related to hydraulic leakage. The STS45E G2 PLUS all-electric spreader is the ideal mix of environmentally advanced, highly productive, and versatile container handling. It is designed to meet the highest specifications. Made of high-quality, high-strength steel, the STS45E G2 PLUS spreader provides high lifting capacity with a low nominal tare weight thanks to the box design of the telescoping beams and the main frame. All components can be easily assembled, adjusted, removed and are accessible for inspection and maintenance.



Material class	% of share
Core structure	84,8
Power drive	11,17
Flipper or guide	2,52
Electronics	1,53

Table 1. Percentage share of material.



Life cycle assessment methodology

This carbon footprint declaration is a summary of the results of a thorough life cycle assessment (LCA), which is based on the internationally recognised ISO 14067 standard. The LCA study has been critically reviewed by a third party to ensure it meets the requirements of the ISO standard.

LCA information	
Scope	Cradle-to-grave, with options.
Functional unit/ declared unit	1 unit of STS45E spreader (Total weight: 12,4 tons)
Reference service life	80 000 hrs
Cut-off rules	A cut-off of 3% is applied
Allocation	Mass balance and time-based allocation
Geographical coverage & time period	Europe Year 2023
Background data source	“LCA for experts” and ecoinvent LCA databases
Software	GABI v10
Critical reviewer	Vladimir Koci, LCA STUDIO

Table 2. LCA information

Description of life cycle and system boundaries

The LCA includes raw material extraction, manufacturing of components by suppliers, in-house assembly, use phase and maintenance of the Electric spreader.

The **product manufacturing** phase includes raw material extraction, manufacturing of components, and assembly of the electric spreader.

The **use phase** consists of the operation of the electrical spreader. The spreader operates using electrical energy from the machine to which it is attached to so it does not have its own power source. The use phase covers the electricity usage in 80 000 operating hours which is the designed operating hours. EU average electric grid mix is used with a GWP100 of 0,324 kgCO2 eq./kWh.

The **maintenance phase** includes production of all components and oils that are typically replaced during the lifetime of the product.

The **transportation phase** includes transport from Kalmar site in Bromma, Malaysia to the customers site. Transport during the manufacturing and other life cycle phases are taken into account based on estimates and averages due to unavailability of primary data.

The **end-of-life phase** is modeled according to the cut-off method. Therefore, it is excluded from the main results as it was modeled using generic data and no primary data was available on how the equipment is treated at the End-of-life

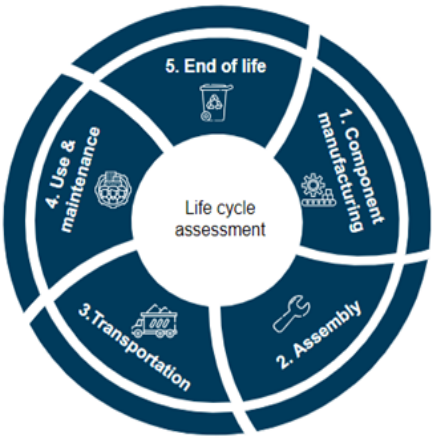


Figure 1. Life cycle phases.

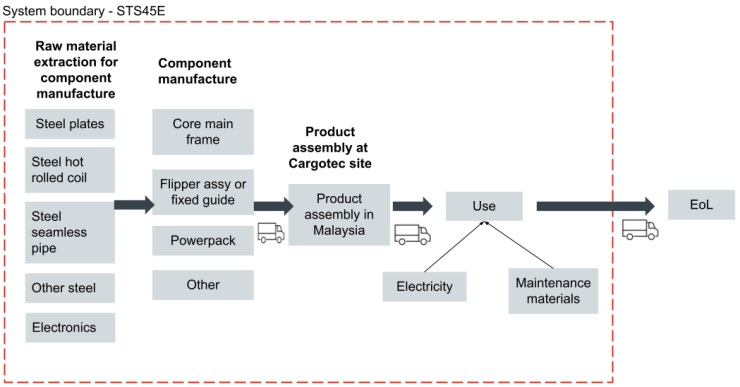
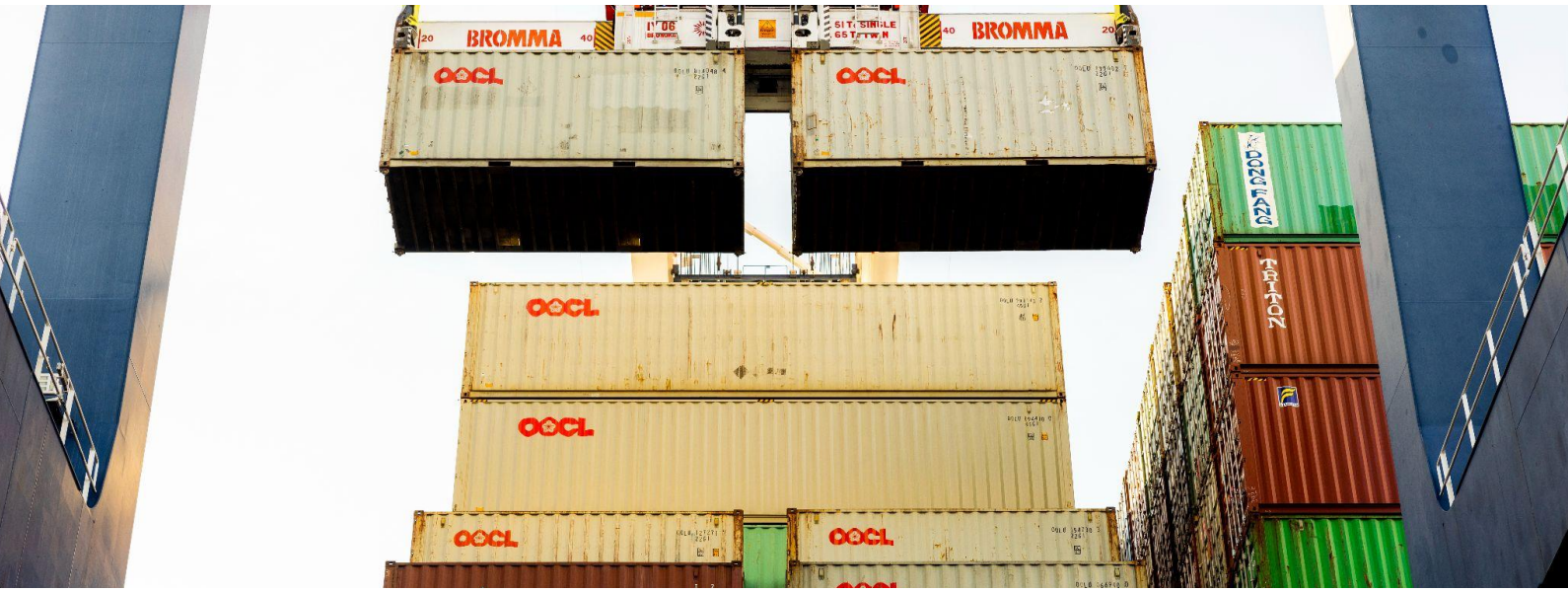


Figure.2 System boundary



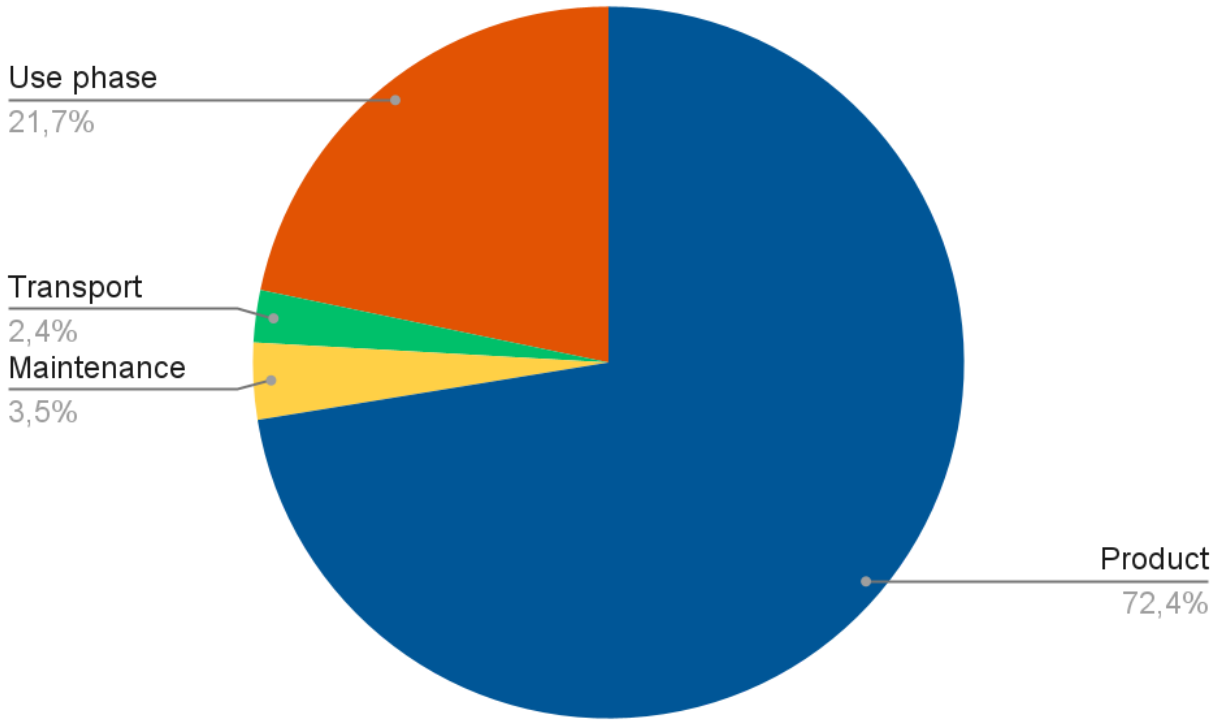
Results - Carbon footprint

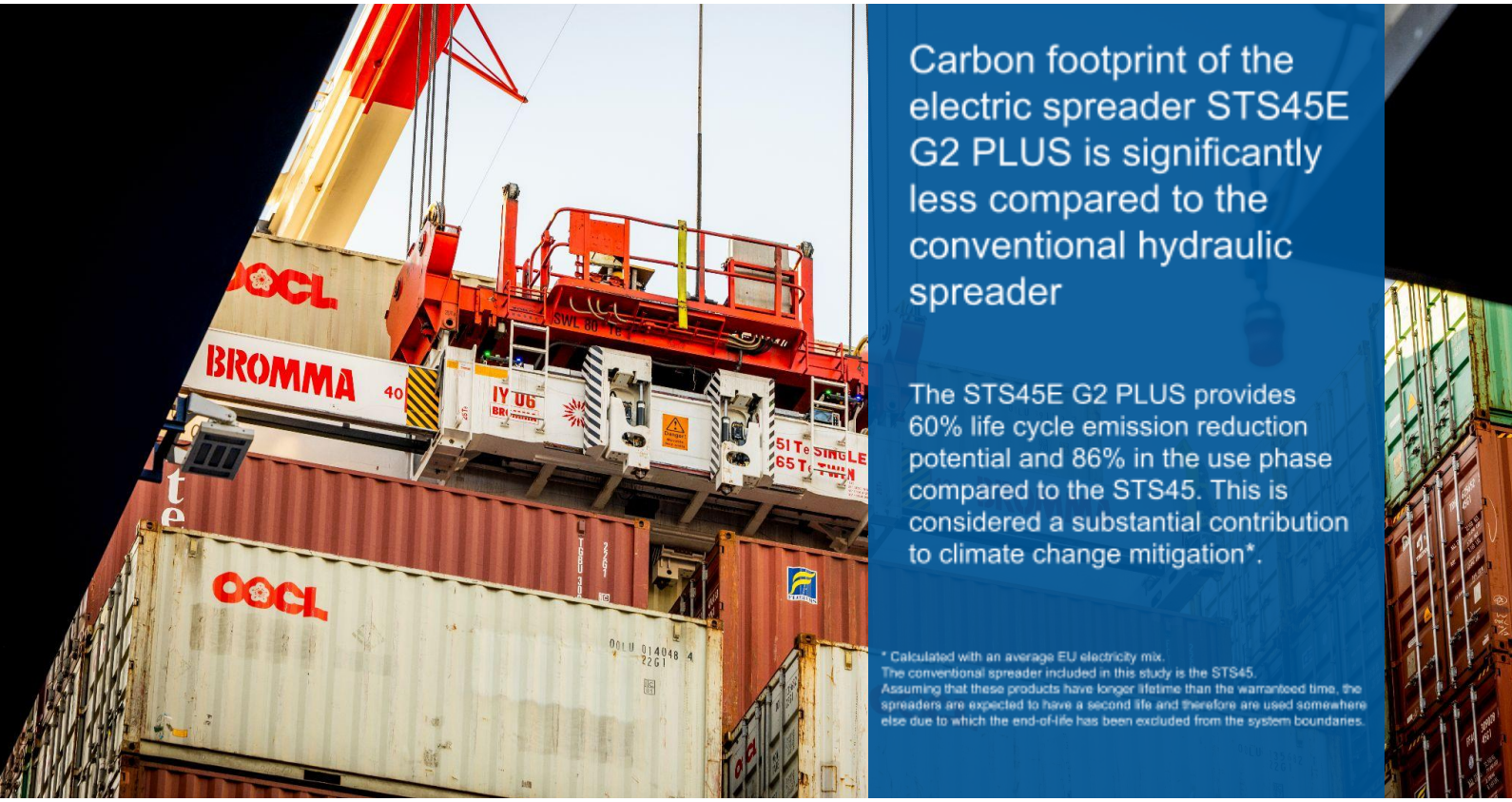
Table 3 lists the Greenhouse Gas emissions results for each greenhouse gas emission type and life cycle phase, according to ISO 14067. The contribution of each life cycle phase on the total carbon footprint is further examined in Figure 3.

kg CO_2 eq.	Production	Transport	Use	Maintenance	Total
ISO14067 GWP100, Aircraft emissions	0,01	0,00	0,01	0,00	0,02
ISO14067 GWP100, Net Biogenic GHG emissions	23,98	-26,40	90,00	4,20	91,78
ISO14067 GWP100, Emissions from land use change (dLUC)	21,89	9,82	1,04	0,31	33,1
ISO14067 GWP100, Fossil GHG emissions	32082,0	1070,0	9550,0	1540,0	44242,0
Total GWP100	**32127,9**	**1053,4**	**9641,1**	**1544,5**	**44366,9**

Table 3. Carbon footprint results

Figure.3 Total carbon footprint share of different lifecycle phases





Manufacturing and assembly

The manufacturing phase has the largest contribution (72,4%) to the life cycle emissions of the product compared to other phases.The *Core structure* is the biggest contributor in this phase to the carbon footprint of the product. It is also the component that makes up the most weight in the product.

Use phase

The use phase is the second largest contributor (22%) in the life cycle of the product. The emissions originate from electricity generation required during the lifetime of the product. An EU-average grid mix from GaBi was used at this stage.

Transport

The emissions from the transportation required for the manufacturing and distribution of the product has a low contribution (2,4%) when compared to the other life cycle phases.

Maintenance

This phase has a low contribution (3,5%) to the carbon footprint of the product. Emissions in this phase are associated with the replacement of components and oils.

End-of-life and circularity

The end of life phase is calculated according to the cut-off approach as Cargotec does not own live data on how the equipment is treated after the first life. It is assumed, even if the product does not have a second life after usage, the majority of it would likely be recycled as recycled steel is a valuable material.

References

1.	ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
2.	ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
3.	ISO 14067:2018: Greenhouse gasses — Carbon footprint of products — Requirements and guidelines for quantification.
4.	LCA report: “Bromma STS model LCA report (UPDATED) 20.10.2023”

BROMMA

A Tradition of Innovation

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www.bromma.com

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