May 23, 2024

BuV 565L - LCA Results

DR I CoC Sustainability Business Development
Based on a life cycle assessment performed with Swiss Climate

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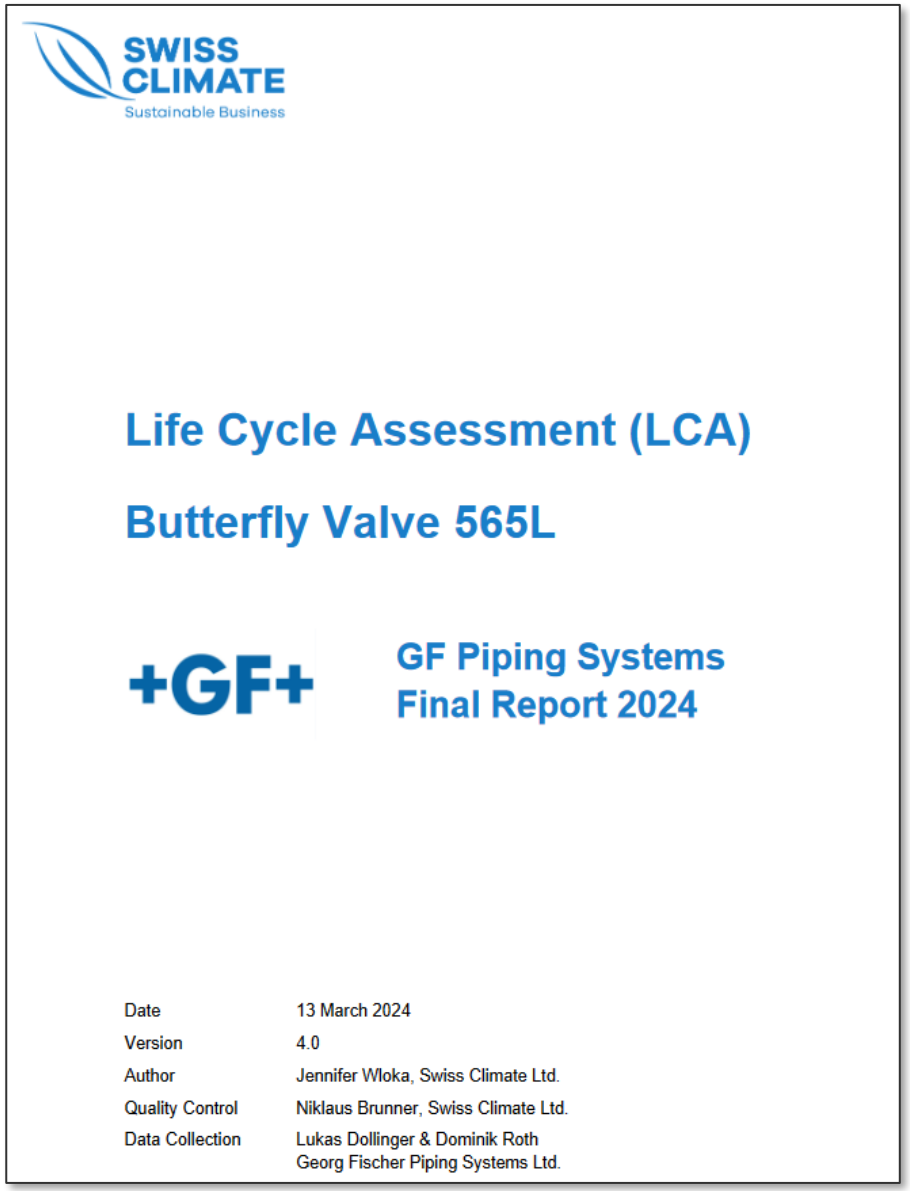
SWISS CLIMATE
Sustainable Business

Life Cycle Assessment (LCA)

Butterfly Valve 565L

+GF+

GF Piping Systems
Final Report 2024

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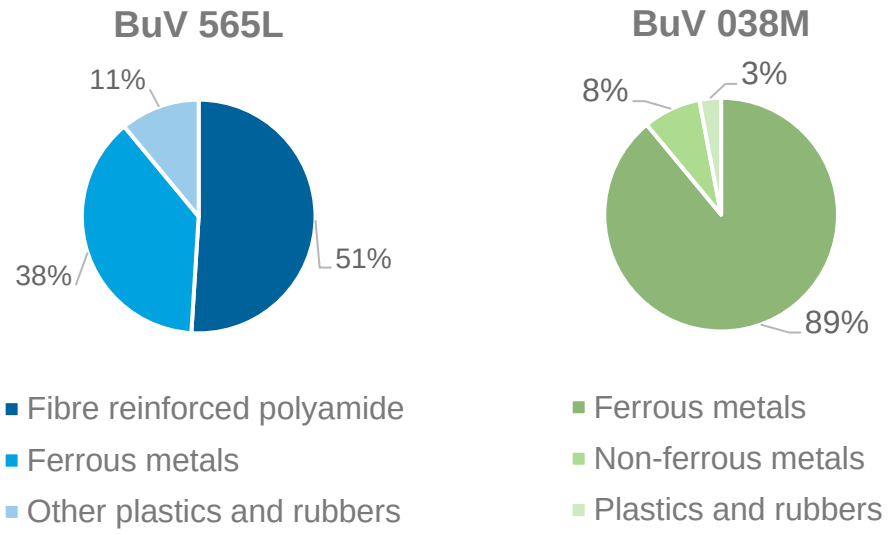
Comparative LCA

Comparative LCA – product and system boundaries

Materials in the GF valve and metal alternative



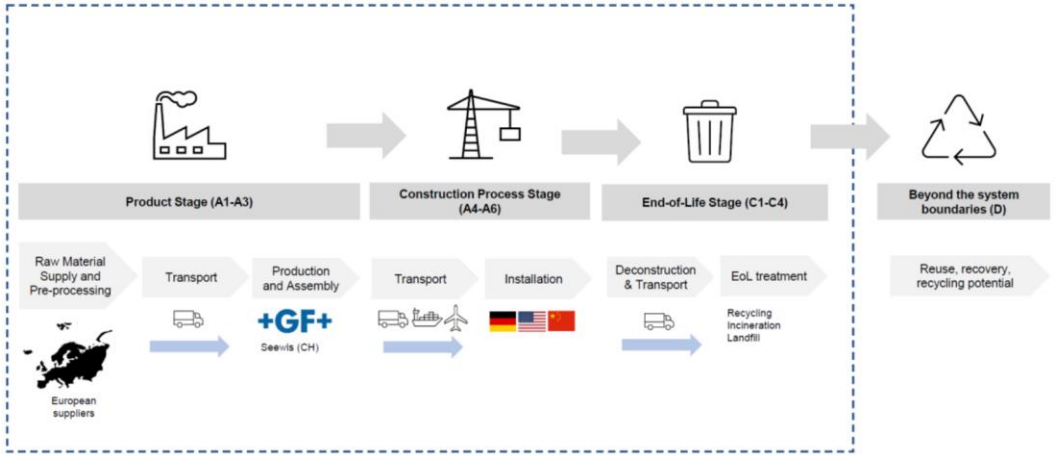
BuV 565L (DN 100)

Material	Weight [kg]
Fibre reinforced polyamide	2.06
Ferrous metals	1.51
Other plastics and rubbers	0.45
Total	**4.02**

Metal valve (DN 100)

Material	Weight [kg]
Ferrous metals	7.80
Non-ferrous metals	0.67
Plastics and rubbers	0.24
Total	**8.70**

System boundaries

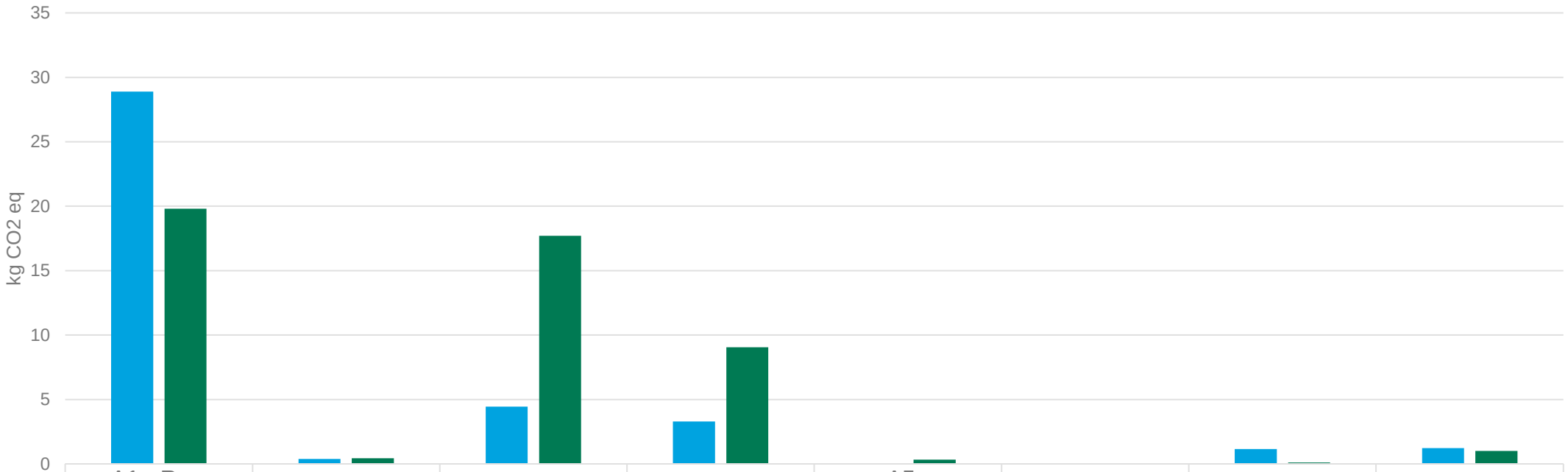


The LCA covers the Product Stage (A1-A3), Construction Process Stage (A4-A5), and End-of-Life Stage (C1-C4). According to the product category rule (PCR) for construction goods, the Use Stage (B1-B7) is optional and was not included.

Assumptions on product lifetime	BuV 565L	Metal valve
Reference service life (RSL) for this LCA, based on customer data	**23 years**	**7.8 years**
Maintenance	negligible	2x replacement of the entire valve during one RSL of the BuV 565L

Comparative LCA – climate change impact

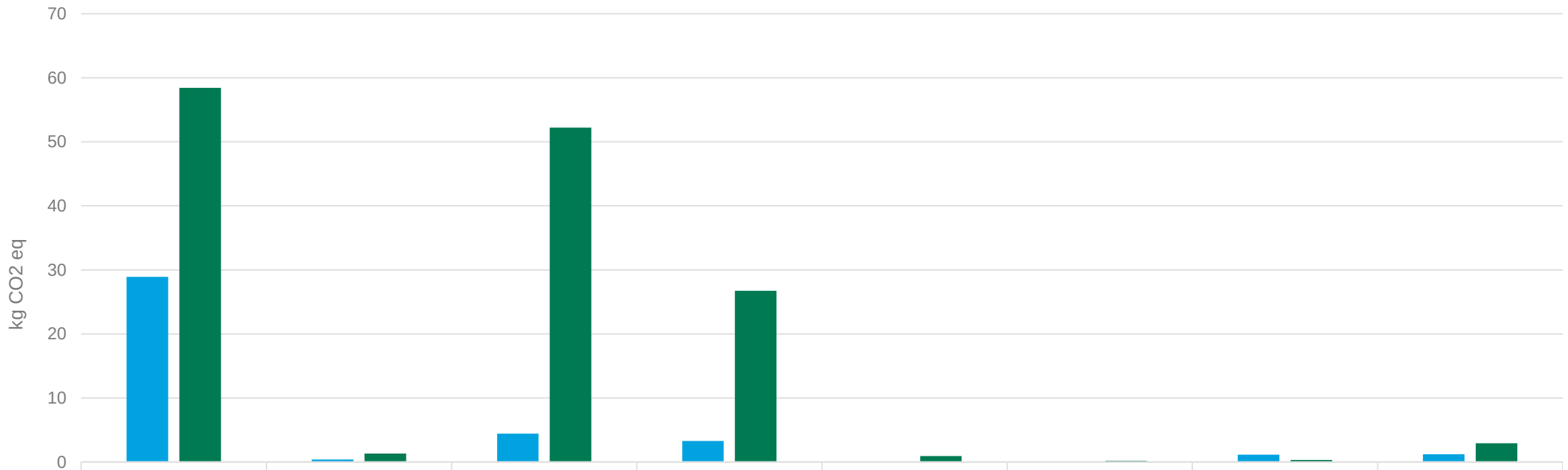
Results over the lifetime of each valve (23 years for the BuV 565L, 7.8 for the metal valve)



	A1 - Raw material supply	A2 - Transport	A3 - Manufacturing	A4 - Transport	A5 - Construction installation	C2 - Transport	C3 - Waste processing	C4 - Disposal
BuV 565L	28.9	0.386	4.44	3.29	0.0409	0.028	1.15	1.22
Metal valve Lug-Style	19.8	0.447	17.7	9.06	0.323	0.0606	0.115	1

Comparative LCA – climate change impact

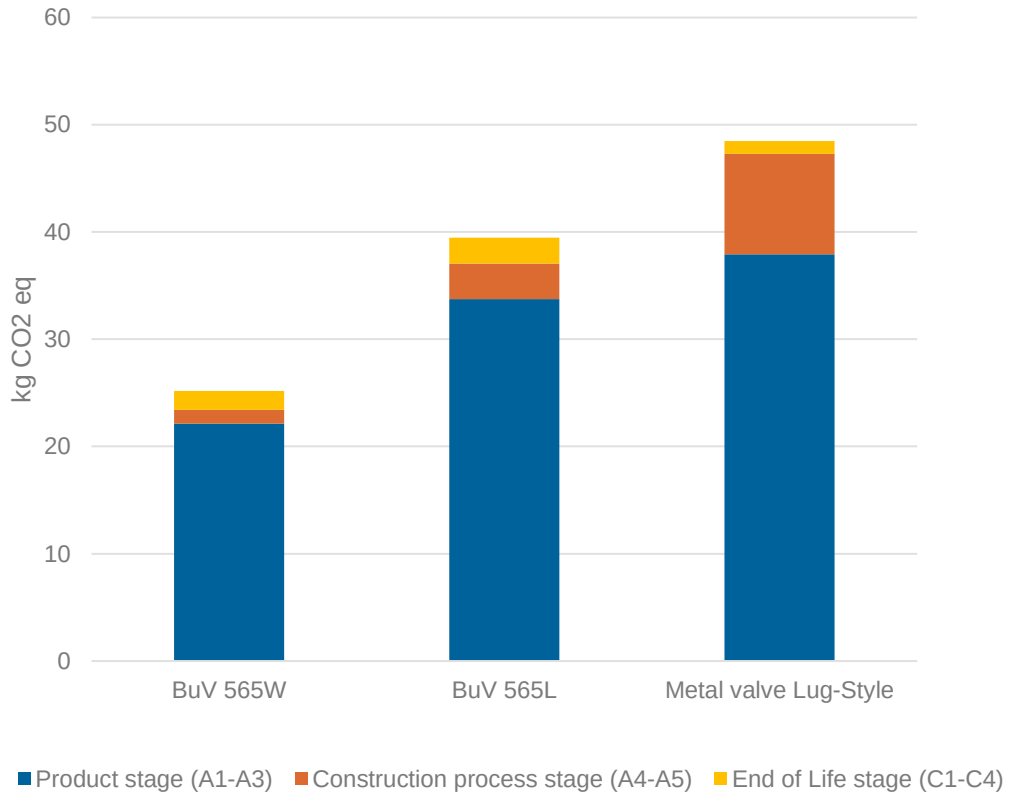
Results over the service life of the BuV 565L, i.e. incl. 2 replacements of the metal valve



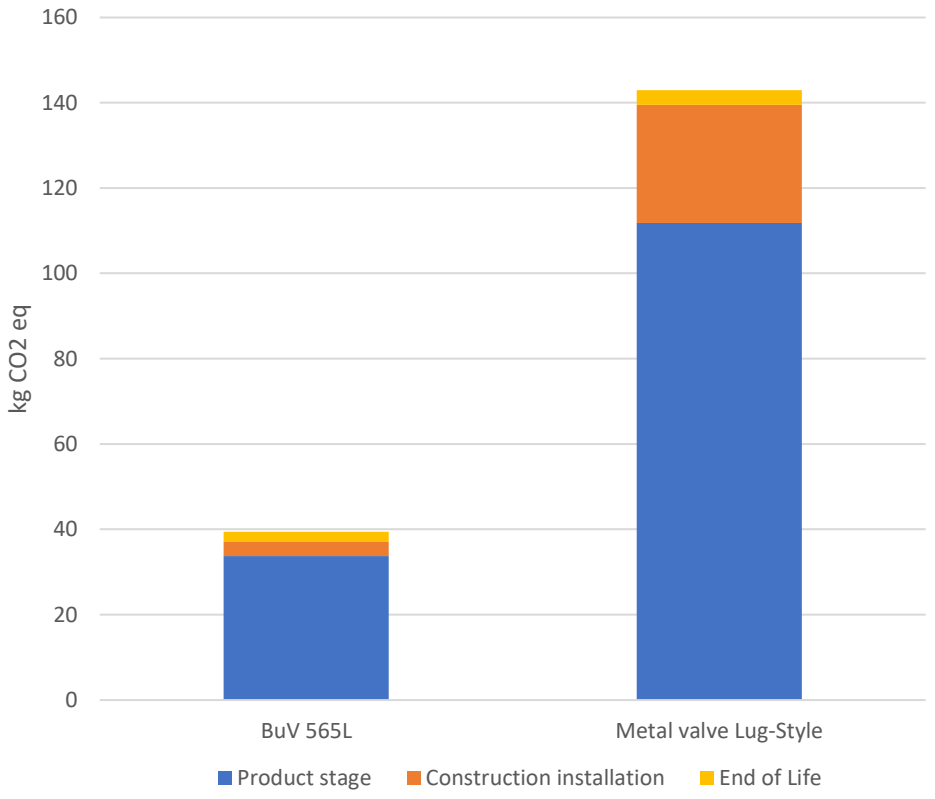
	A1 - Raw material supply	A2 - Transport	A3 - Manufacturing	A4 - Transport	A5 - Construction installation	C2 - Transport	C3 - Waste processing	C4 - Disposal
BuV 565L	28.9	0.386	4.44	3.29	0.0409	0.028	1.15	1.22
Metal valve Lug-Style	58.41	1.32	52.22	26.73	0.95	0.18	0.34	2.95

Comparative LCA – climate change total

Results over the lifetime of each valve (23 years for the BuV 565L, 7.8 for the metal valve)



Results over the service life of the BuV 565L, i.e. incl. 2 replacements of the metal valve



For reference, the climate change impact of the BuV 565W is shown here as well.

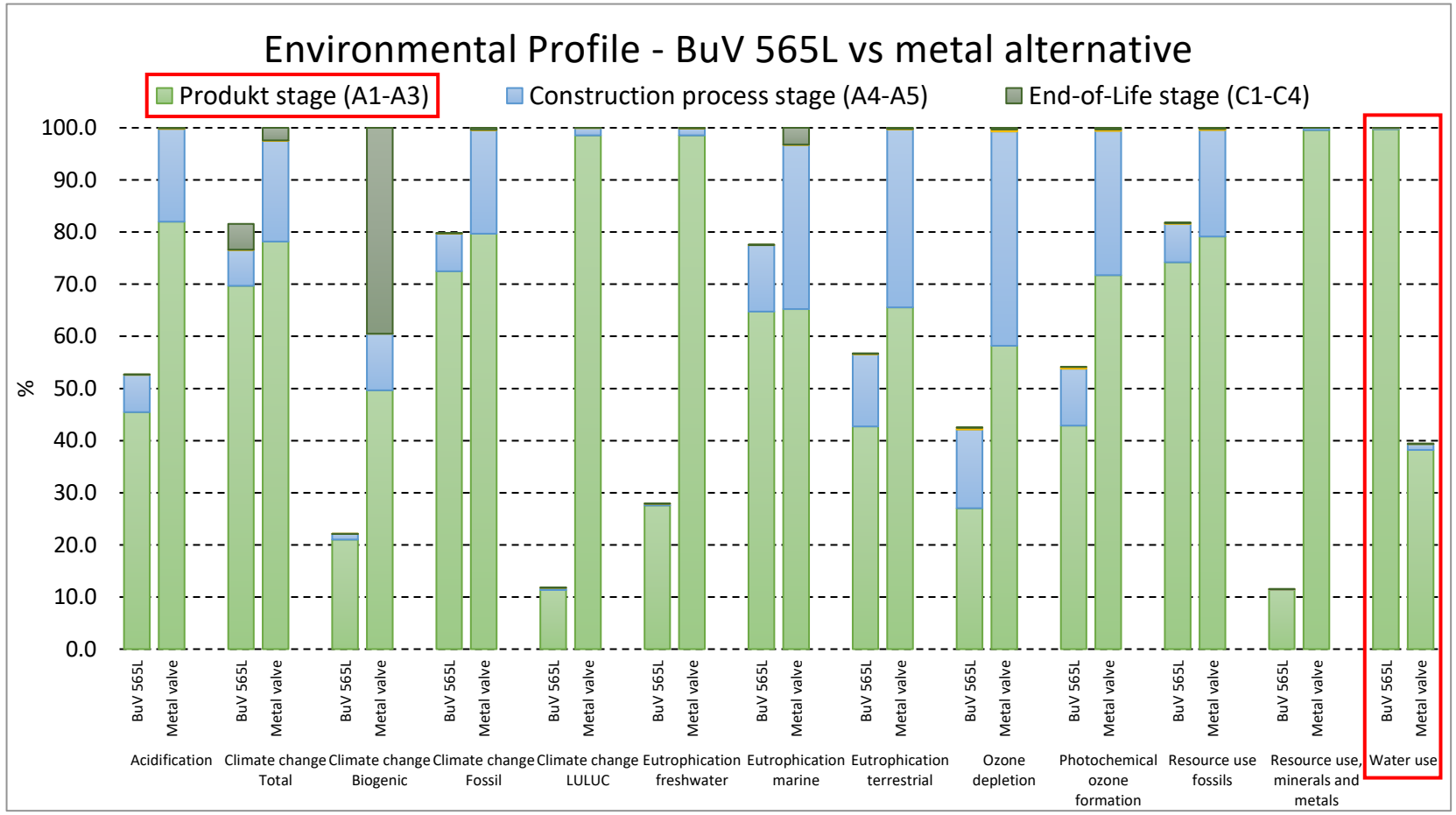
Conclusions

- Compared with the **metal valve, the GF lug-style BuV has a ~20% lower total climate change impact (per valve).**
- Compared with the **metal valve, the GF lug-style BuV has a ~ 70% lower total climate change impact (over the reference service life of the BuV 565L**, i.e. incl. two replacements of the metal valve).
- Compared with the **GF wafer-style, the GF lug-style BuV has a 36% higher total climate change impact.**

- **Raw materials are responsible for the majority of climate change/ environmental impacts** for all valves: both the production of fibre reinforced polyamide (51% of mass of BuV 565L) and ferrous metals (89% of mass of the metal alternative) lead to significant environmental impacts.
- Other life cycle stages with **significant impacts are manufacturing and transport** (cf. also previous slides).
- In Seewis, electricity from renewable sources is used to manufacture the BuV 565L, lowering the production footprint. For the metal alternative, energy requirements for production were simulated with average market data.
- Due to the lower weight of the GF valves compared with the metal alternative, transport emissions are lower too.

Comparative LCA – complete environmental profile

Results over the lifetime of each valve (23 years for the BuV 565L, 7.8 for the metal valve)



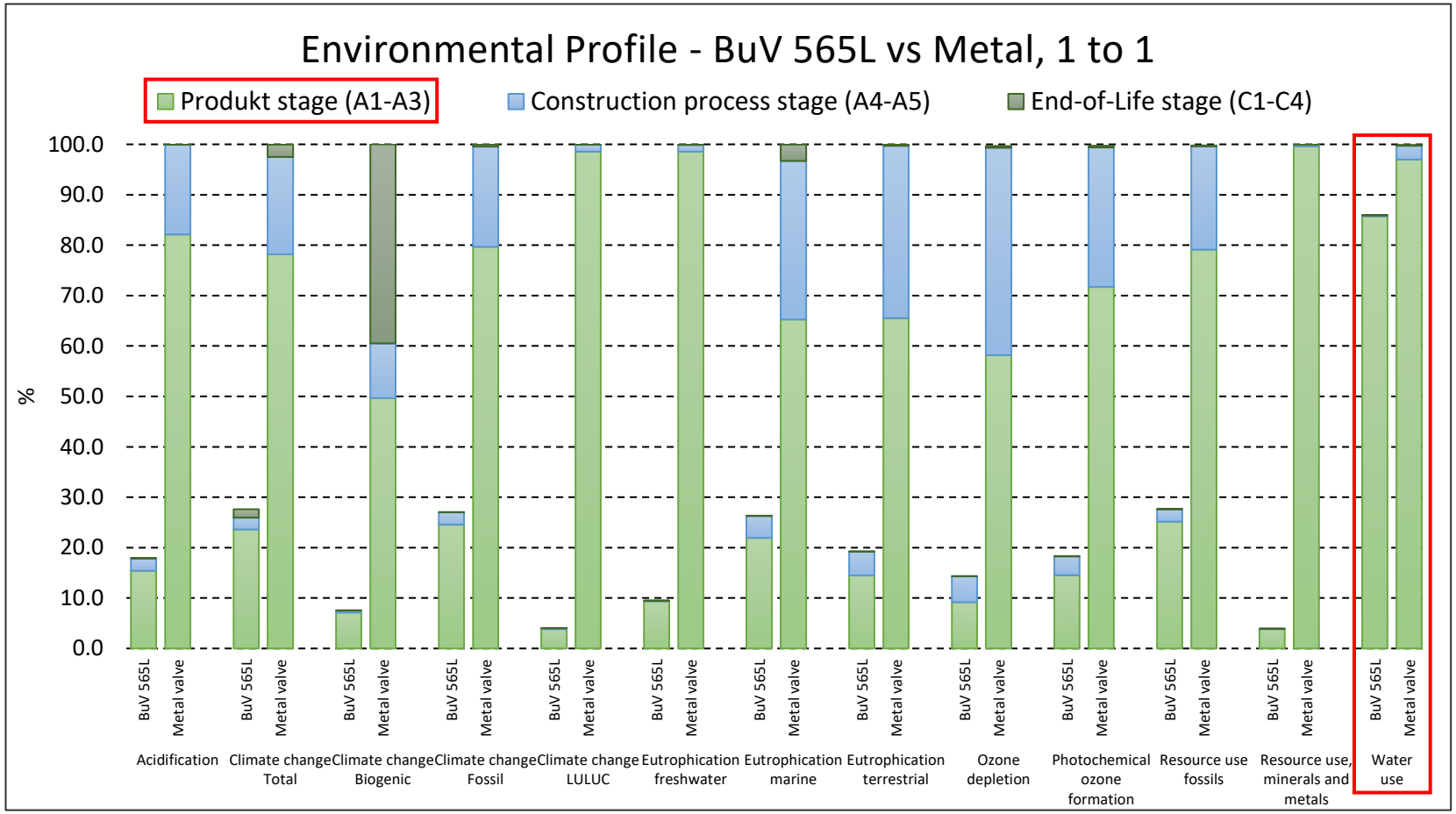
- **Normalized graph** (100%), scaled to the higher-impact valve

Conclusions

- The **BuV 565L shows lower impacts in all categories except for water use**
- The **production of fibre reinforced polyamide requires high amounts of water**, leading to a higher water footprint of the BuV 565L (~24 m3) than of the metal alternative (~10 m3)
- On average, the **supply of raw materials is linked with ~75% of the overall environmental impacts**

Comparative LCA – complete environmental profile

Results over the service life of the BuV 565L, i.e. incl. 2 replacements of the metal valve



- **Normalized graph** (100%), scaled to the higher-impact valve

Conclusions

- The **BuV 565L shows lower impacts in all categories**; when considering the service life, i.e. including two replacements of the metal valve, this also applies to water use

Communication material

BuV 565L: comparative LCA with metal alternative*

Compared with the metal alternative, full recyclability of the BuV 565L cannot be guaranteed currently.

End-of-life

-50% less GHG emissions during transport of used products due to lower weight.

Transport

Very long service life due to great corrosion resistance.

Use

Raw materials

-20% less greenhouse gas (GHG) emissions per valve for the BuV 565L along the life cycle.

Manu-facturing

-75% less GHG emissions due to lower energy requirements for production.

Transport

-60% less GHG emissions during transport of finished products due to lower weight.

*Results in comparison with a metal valve. Based on a Life Cycle Assessment (LCA) conducted by Swiss Climate on behalf of GF Piping Systems.

Disclaimer

The information in the claims result from a comparative Life Cycle Assessment (LCA) commissioned by GF Piping Systems to the independent institute Swiss Climate AG, that conducted the study according to ISO 14040/14044. The LCA compares the environmental impacts across different phases of the lifecycles of the GF butterfly valve 565 lug-style and a generic metal valve, also in lug-style.

GF Piping Systems commissioned the study to gain knowledge on its products' environmental impacts according to the most advanced methodology and standards. The LCA results are used by GF Piping Systems to improve the environmental profile of its products as well as to increase transparency and to provide comparative information to its customers.

GF Piping Systems provided mainly primary data for the butterfly valve and made assumptions (e.g. based on customer experiences) for data gaps. Swiss Climate AG filled the remaining data gaps based on market values and commonly accepted assumptions and used the LCI database ecoinvent v3.8.1 for the calculations. For the butterfly valve 565 lug-style, the overall data quality was considered as good. For the metal alternative, more specific data would contribute to a more accurate representation of the product and therefore a more precise comparison.

The LCA has been submitted to internal critical review and quality checks at Swiss Climate AG. The LCA of the GF butterfly valve 565 lug-style has been submitted to third party review and was used to generate an Environmental Product Declaration (EPD).

BuV 565L: cradle-to-gate (A1-A3) product carbon footprint (PCF)

	BuV 565L with lever kg CO2e per unit	BuV 565L without lever kg CO2e per unit	Lever kg CO2e per lever
DN50	10.8	6.9	3.9
DN65	12.8	9.0	3.9
DN80	14.2	10.3	3.9
DN100	33.8	29.3	4.5
DN125	25.4	20.8	4.5
DN150	33.1	28.0	5.1
DN200	43.6	38.5	5.1
DN250	bare shaft	72.7	bare shaft
DN300	bare shaft	104.1	bare shaft

NB: The thread inserts between DN100 and DN125 change from thread M16 (DN100) to M20 (DN125) with the same outside diameter, resulting in lower material usage and thus greenhouse gas emissions.

BuV 565L: cradle-to-grave (A1-A5 + C2-C4) PCF, excl. use-phase (B)

	BuV 565L with lever kg CO2e per unit	BuV 565L without lever kg CO2e per unit	Lever kg CO2e per lever
DN50	12.6	8.2	4.5
DN65	15.0	10.5	4.5
DN80	16.6	12.1	4.5
DN100	39.5	34.3	5.2
DN125	29.6	24.4	5.2
DN150	38.7	32.8	5.9
DN200	51.0	45.1	5.9
DN250	bare shaft	84.9	bare shaft
DN300	bare shaft	121.7	bare shaft

NB: The thread inserts between DN100 and DN125 change from thread M16 (DN100) to M20 (DN125) with the same outside diameter, resulting in lower material usage and thus greenhouse gas emissions.


Thank you.