

Life Cycle Assessment and Benchmark for Floral Image

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Key Findings



To provide the same service of **5 years of refreshing Floral Image flower arrangements**, it is necessary to provide and dispose of **227 farmed flower arrangements**, on average.

As a result, the carbon footprint of 5 years of service of Floral Image flower arrangements is **80x lower** than 5 years of service with farmed flower replacements.

Designer Flowers
Refreshed Monthly



Key Findings



On a 1:1 comparison, the average Floral Image arrangement has a 190% higher footprint than a farmed flower arrangement.

But because Floral Image arrangements have a much longer lifespan, at the second purchase of fresh flowers, Floral Image has achieved a lower footprint.

The main hotspots in the Floral Image service are:

- ▶ The raw materials, particularly the epoxy resin
- ▶ The use of electricity in the manufacture stage
- ▶ The service van

Opportunities to reduce footprint:

- ▶ Improve fuel efficiency of service vans
- ▶ Engage suppliers to use green energy
- ▶ Explore alternative designs with less resin

Introduction



Objective

Provide a cradle-to-grave LCA of Floral Image’s service compared to fresh flower services.



Outcomes

Deliver data/statistics to support marketing materials and underpin environmental value proposition.



Method

Life Cycle Assessment (LCA) of environmental and social hotspots in products and supply chain.



Understanding Floral Image Impacts

- ▶ Assess environmental impacts over 5 years
- ▶ Map resource flows
- ▶ Identify sector & geographical social risks



Goal and Scope

Analysis Settings

Scope	→	Cradle to grave
Geography	→	Australian market
Functional Unit	→	Decorative service over 5 years
Comparative	→	LCA with farmed flower arrangements
Indicators	→	GWP, Human health, Ecosystems, Resources
Allocation	→	Point of substitution
Additional	→	Social risk (modern slavery), raw material flows
Exclusions	→	Infrastructure, labour, non-decorative functions

Arrangements Included & Durability

FLORAL IMAGE:

5-year lifespan
→ 1 input to FU

FARMED FLOWERS:

7–10 days lifespan
→ 183–261 inputs to FU

System Diagrams

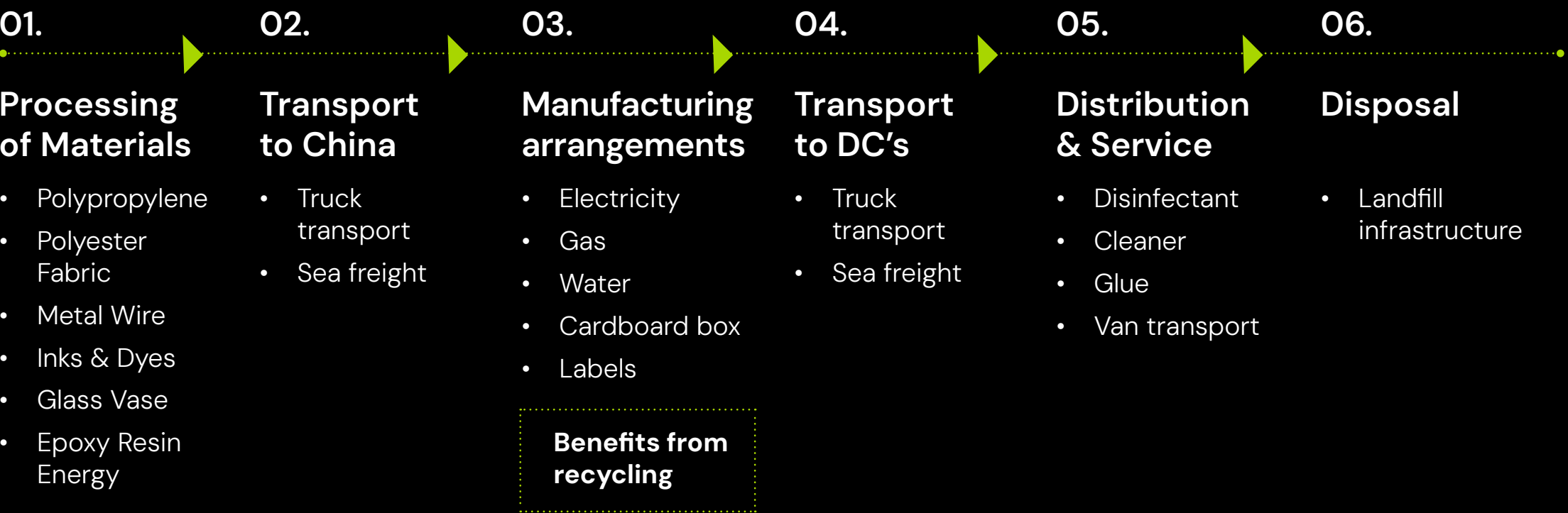
FLORAL IMAGE:

Includes plastics, resin, vase, electricity, transport (China → Australia → service → disposal).

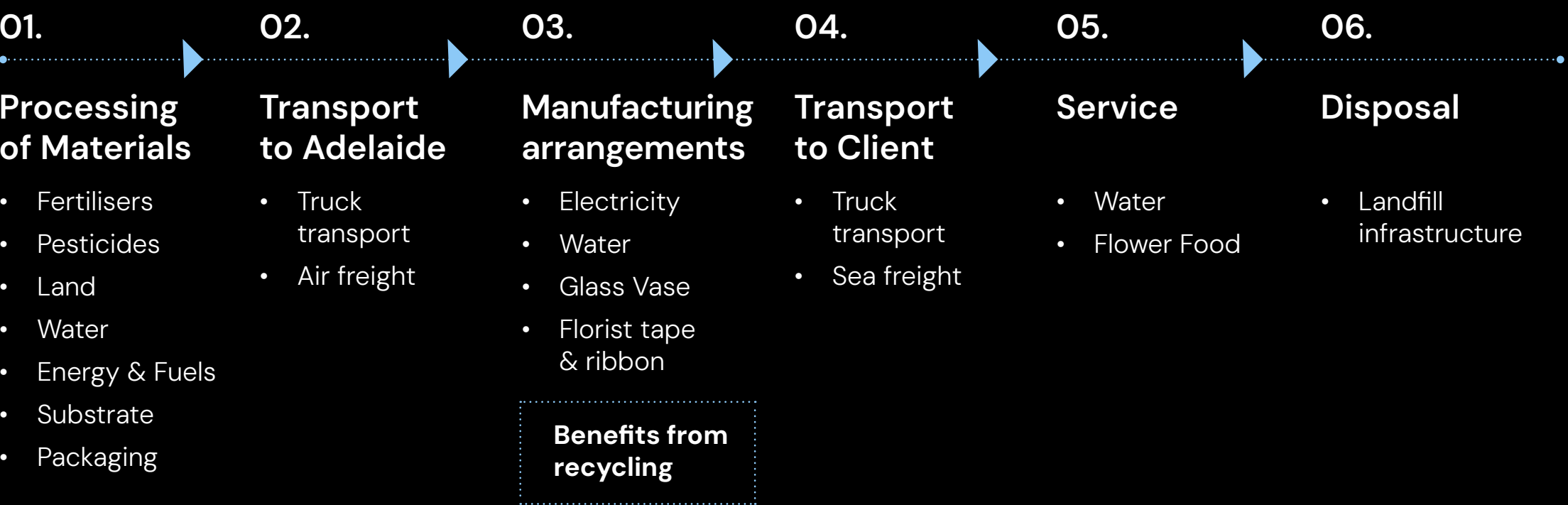
FARMED FLOWERS:

Includes cultivation, energy, fertilisers, refrigerated freight, florist assembly, disposal.

Floral Image



Farmed flowers





Data Sources

Floral Image

LIFE CYCLE STAGE	DATA DESCRIPTION	DATA SOURCES	BACKGROUND DATA
Raw Materials	Quantities of raw materials for each arrangement	Floral Image	ecoinvent 3.5
Transport to manufacture	Transport from supplier to manufacturing site	Floral Image	ecoinvent 3.5
Manufacture	Processing of raw materials into finished arrangement	Floral Image	ecoinvent 3.5
Transport to distribution centres	Transport via truck and ship to Australian DC's	Floral Image	ecoinvent 3.5 AusLCI
Service	Changeover transport, consumables for refresh	Floral Image	AusLCI Consumable ingredients from ecoinvent 3.5
Disposal	Landfill of arrangement	Same as inputs	AusLCI

Farmed flowers

LIFE CYCLE STAGE	DATA DESCRIPTION	DATA SOURCES	BACKGROUND DATA
Flower cultivation	Cultivation inputs Arrangement composition	Literature research for cultivation, Arrangement composition from Floral Image	ecoinvent 3.5
Transport to assembly	Transport from farms to Adelaide	Floral Image	ecoinvent 3.5
Assembly	Energy, water, vase & auxiliary arrangement materials	Floral Image	AusLCI
Service	Delivery to client, water top ups & flower food Arrangement longevity	Floral Image	AusLCI
Disposal	Landfill arrangement	Same as inputs	AusLCI

Calculating the Environmental Impact



Carbon Footprint

Translates a contribution to climate change.
Measured in mass og greenhouse gases emitted – kg CO₂ eq.



Human Health

Shows how the total environmental impacts affect human health.
Measured in how many years an average life will lose to disability (Disability-Adjusted Life Years – DALY).



Ecosystems

Indicates damaged caused to natural ecosystems.
Measured in the intensity of the loss of certain reference species (in species yr).



Resources

Measures how much the raw materials and fuels impact available resource reserves.
Measured in currency.



Calculating the Social Risk

Analysed in SHDB: Labour rights, health/safety, human rights, governance, community infrastructure. Risks include modern slavery.

LABOUR RIGHTS & DECENT WORK

- Child Labour
- Forced Labour
- Excessive Working Time
- Wage Assessment
- Poverty
- Migrant Labour
- Freedom of Association
- Unemployment
- Labour Laws

HEALTH & SAFETY

- Injuries & Fatalities
- Toxics & Hazards

HUMAN RIGHTS

- Indigenous Rights
- High Conflicts
- Gender Equality
- Human Health Issues

GOVERNANCE

- Legal System
- Corruption

COMMUNITY INFRASTRUCTURE

- Hospital Beds
- Drinking Water
- Sanitation
- Children out of School
- Smallholders vs Commercial Farms

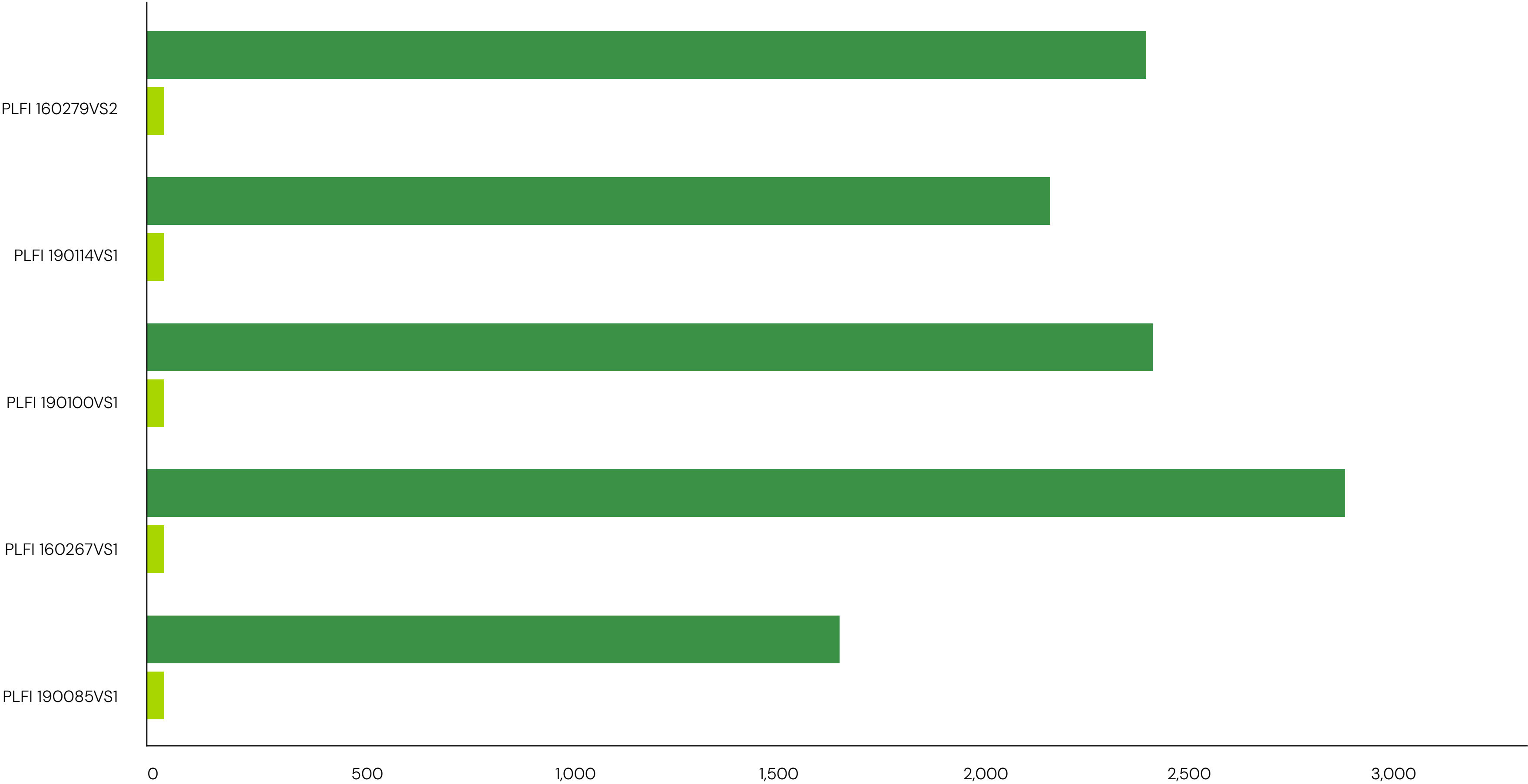
Results

Carbon Footprint

- Avg. Floral Image service (5 yrs): 29 kg CO₂ eq.
- This figure is 80x lower than farmed flowers
- Highest: PLFI160279VS2; Lowest: PLFI190100VS1

Farmed Flowers

Floral Image



Global Warming (kg CO₂ eq per 5 years of service)

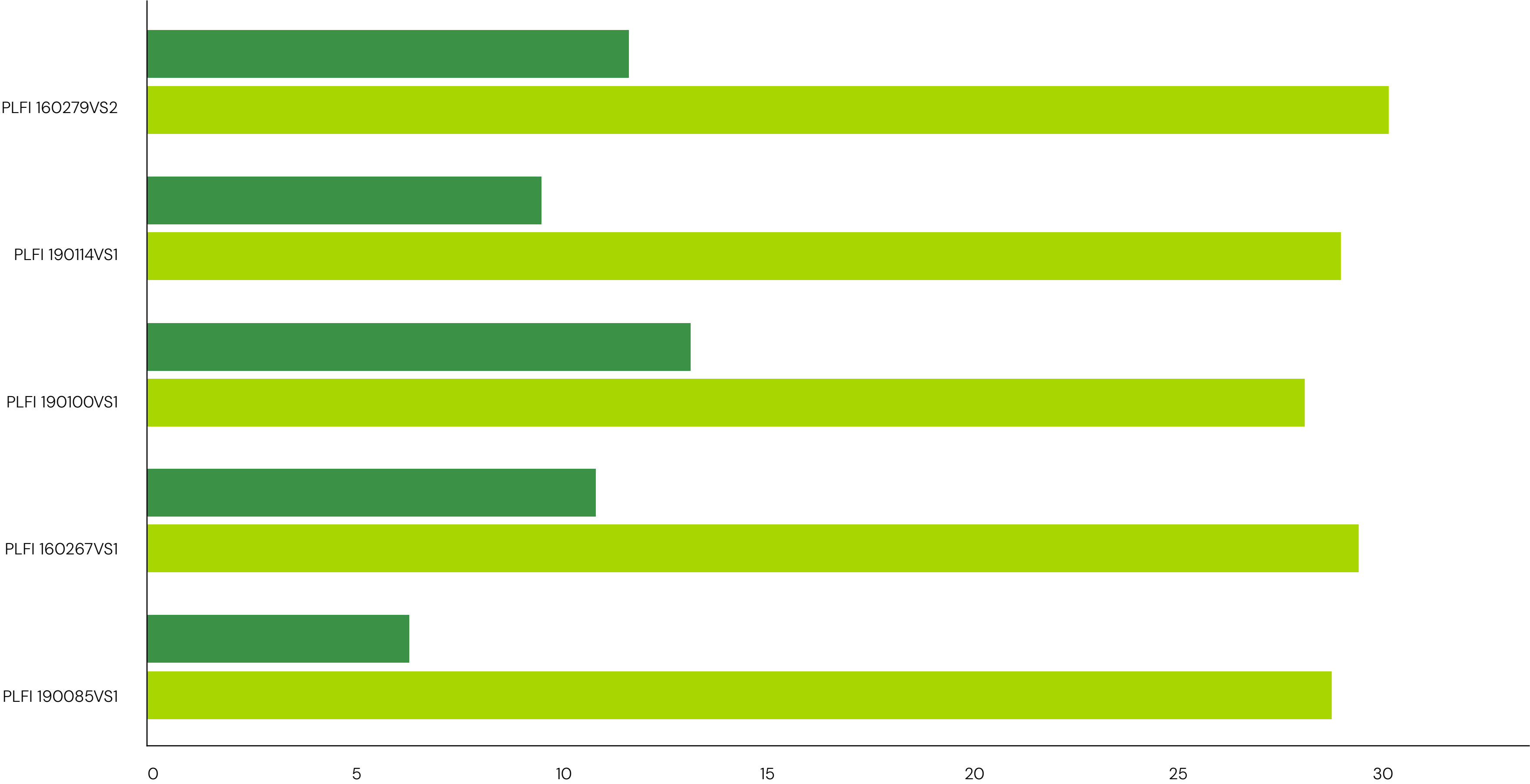
Results

1:1 Comparison

- Floral Image per arrangement: 190% higher than farmed flowers
- But service model reverses this after reuse

Farmed Flowers

Floral Image



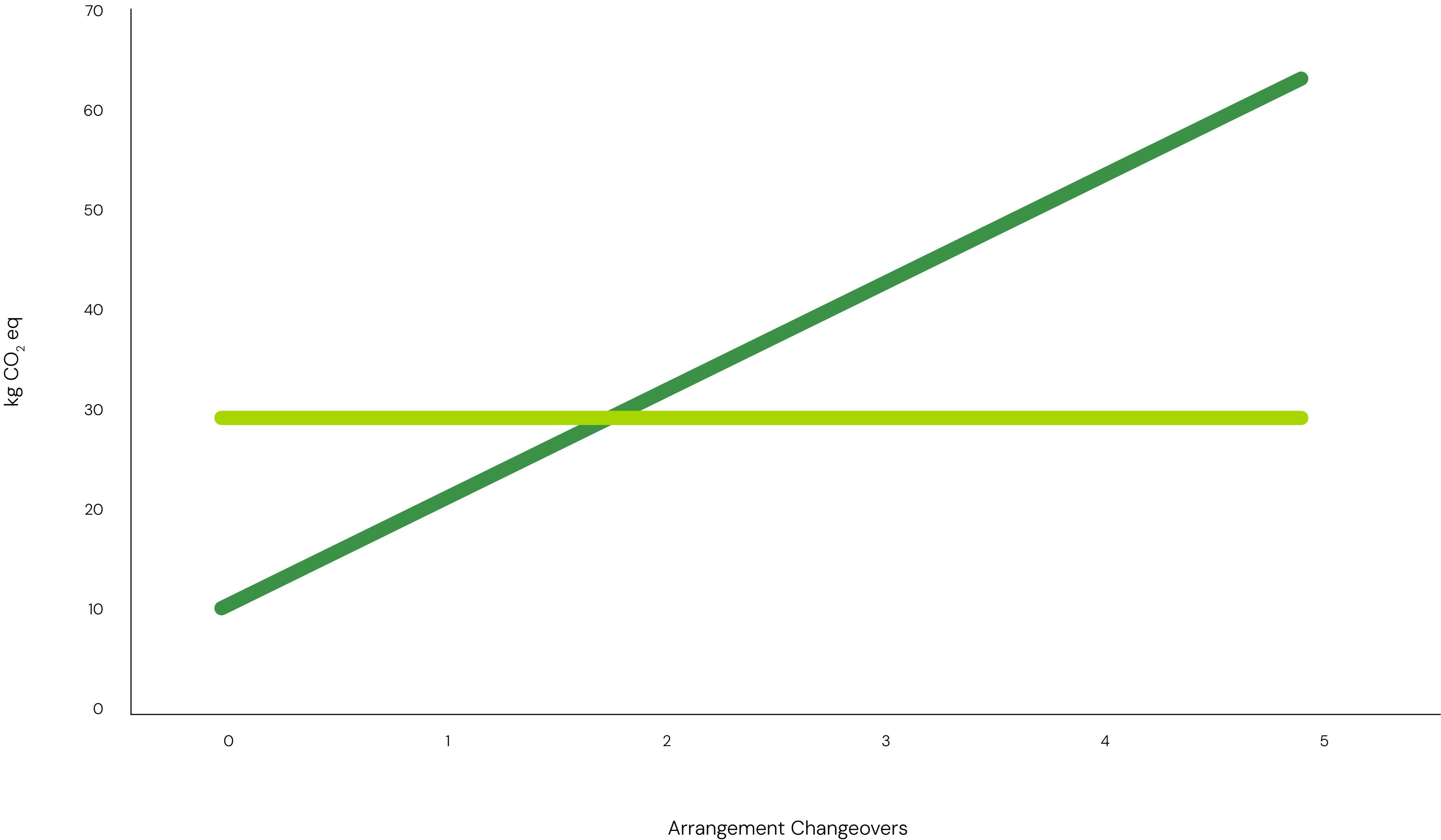
Global Warming (kg CO₂ eq per arrangement)

Results

Breakeven Point

- Only 2 changeovers needed for Floral Image to outperform farmed flowers
- Farmed flowers replaced ~227 times in 5 yrs

- Average Farmed Flowers
- Average Floral Image



Results

Impact Reductions

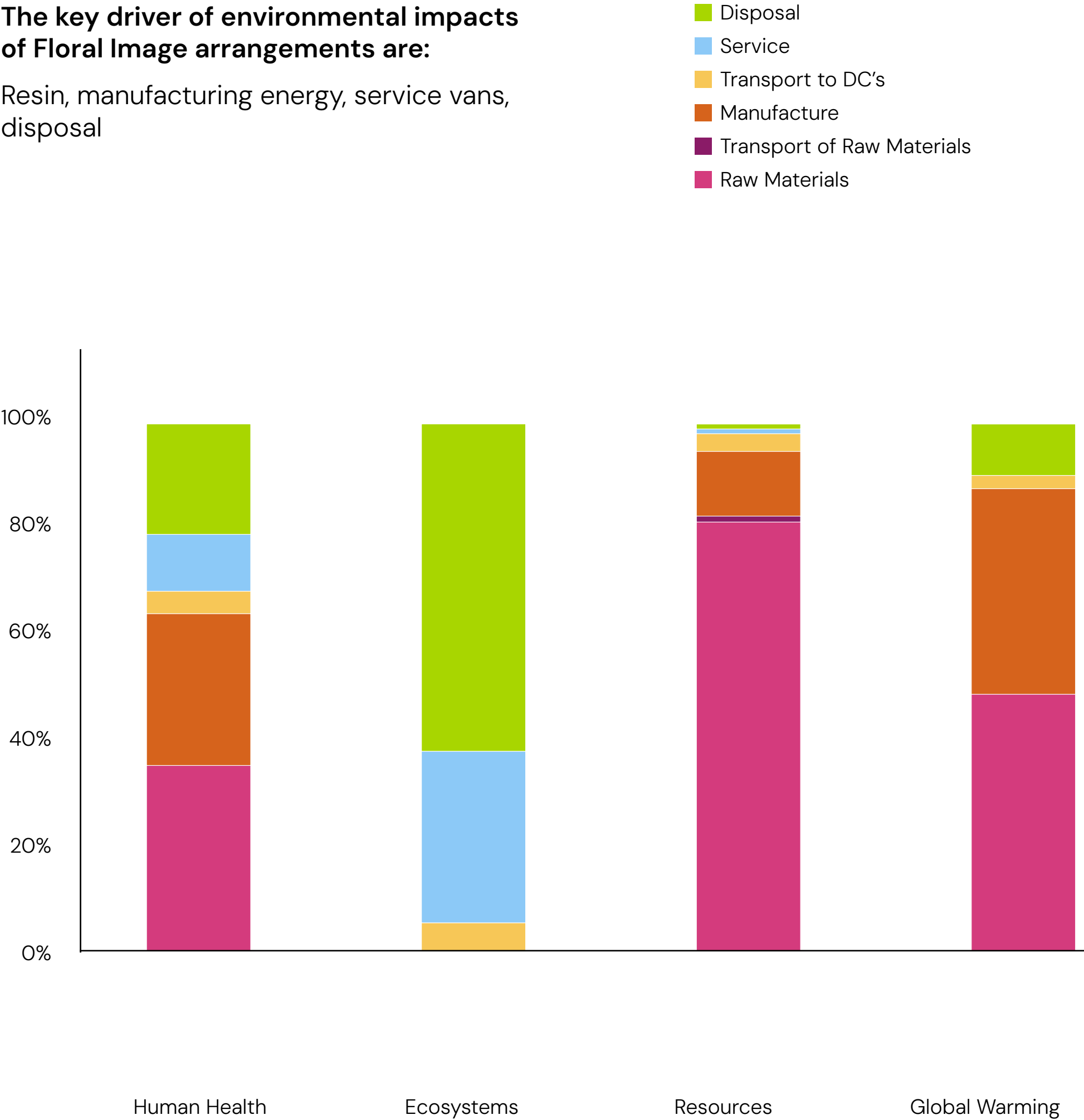
The impact of Floral Image service is 98%–100% lower than the same service provided by farmed flower arrangements

ARRANGEMENT	GLOBAL WARMING POTENTIAL	HUMAN HEALTH	ECOSYSTEMS	RESOURCES
PLFI 190085VS1	99.8%	99.9%	98.1%	98.3%
PLFI 160267VS1	99.8%	99.8%	98.7%	99.0%
PLFI 190100VS1	99.7%	99.7%	98.7%	98.8%
PLFI 190114VS1	99.8%	99.9%	98.9%	98.7%
PLFI 160279VS2	99.7%	99.7%	98.3%	98.7%

Impact Drivers

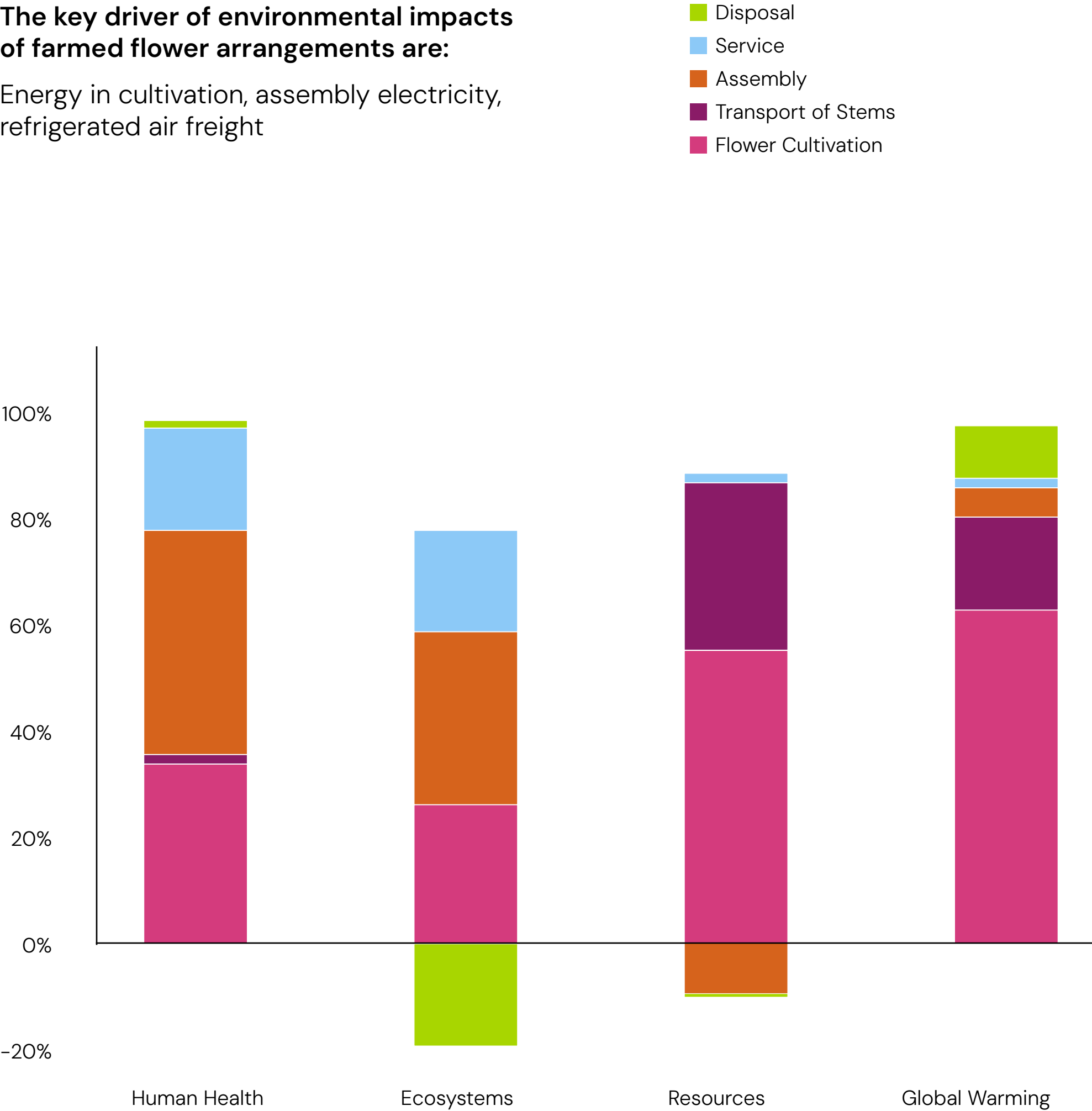
The key driver of environmental impacts of Floral Image arrangements are:

Resin, manufacturing energy, service vans, disposal



The key driver of environmental impacts of farmed flower arrangements are:

Energy in cultivation, assembly electricity, refrigerated air freight



Key Assumptions/Data Quality

ASSUMPTION OR DATA QUALITY ISSUE	DISCUSSION	CONCLUSION ON INFLUENCE ON LCA RESULTS
Data availability on fresh flower cultivation	Inventory data for fresh flowers was sourced from literature and constrained by publicly available information. Specific data was found for tulips, roses, chrysanthemums, carnations and orchids. The remaining flower stems were modelled as an average of the above, excluding orchids which have a higher impact. A dataset on putter shrub from the LCA database Agribalyse was used as a proxy for green stems. Geographical consistency with origins reported was not ensured due to data availability. Seasonal variability in sourcing was also not considered. Even though this affects the LCA results for individual stems, it does not affect the comparative conclusions between the two services under study. This is because the key factor is the longevity of stems.	Low
Longevity of fresh flower arrangements	The longevity of fresh flower arrangements was determined by visual inspection of the arrangements created to mimic Floral Image products. The decay was monitored daily and the arrangement was deemed to be not fit for purpose when flowers became flaccid or lost petals. This is an expert observation of Floral Image based on their knowledge of standards for decorative arrangements in corporate settings. Given that the durability of fresh flower arrangements is so much smaller than that of artificial flowers (about 260 times), it is unlikely that a larger sample or a more conservative approach would have challenged the comparative conclusions between the two services under study.	Low
Sample size	Floral Image’s product portfolio is large (>1,000 products) compared to the sample size used in this study. This is unlikely to influence the comparative conclusions of this study, again due to the large difference in longevity between arrangements. The largest difference in environmental impacts between arrangements calculated in this study is 39% for Human Health scores. This implies that extrapolating the results of individual arrangements reported in this study to the entire product portfolio may not be applicable.	Medium



Additional Analyses

01.

Material Flows

Farmed flowers consume far more water and chemicals
Floral Image uses less plastic, chemicals, and produces less waste



02.

Social Risk

Chinese suppliers = higher risk than Australia; similar to Colombia, Malaysia, Vietnam; lower than Kenya



03.

Modern Slavery Issues

Australia: Migrant labour exploitation, low wages, unsafe work
Malaysia: Forced labour, bondage, abuse
Colombia: Exploitation, abuse, child labour
Kenya: Unsafe work, harassment, excessive hours
China: Forced labour, child labour, unsafe work, minority abuse



Annexes

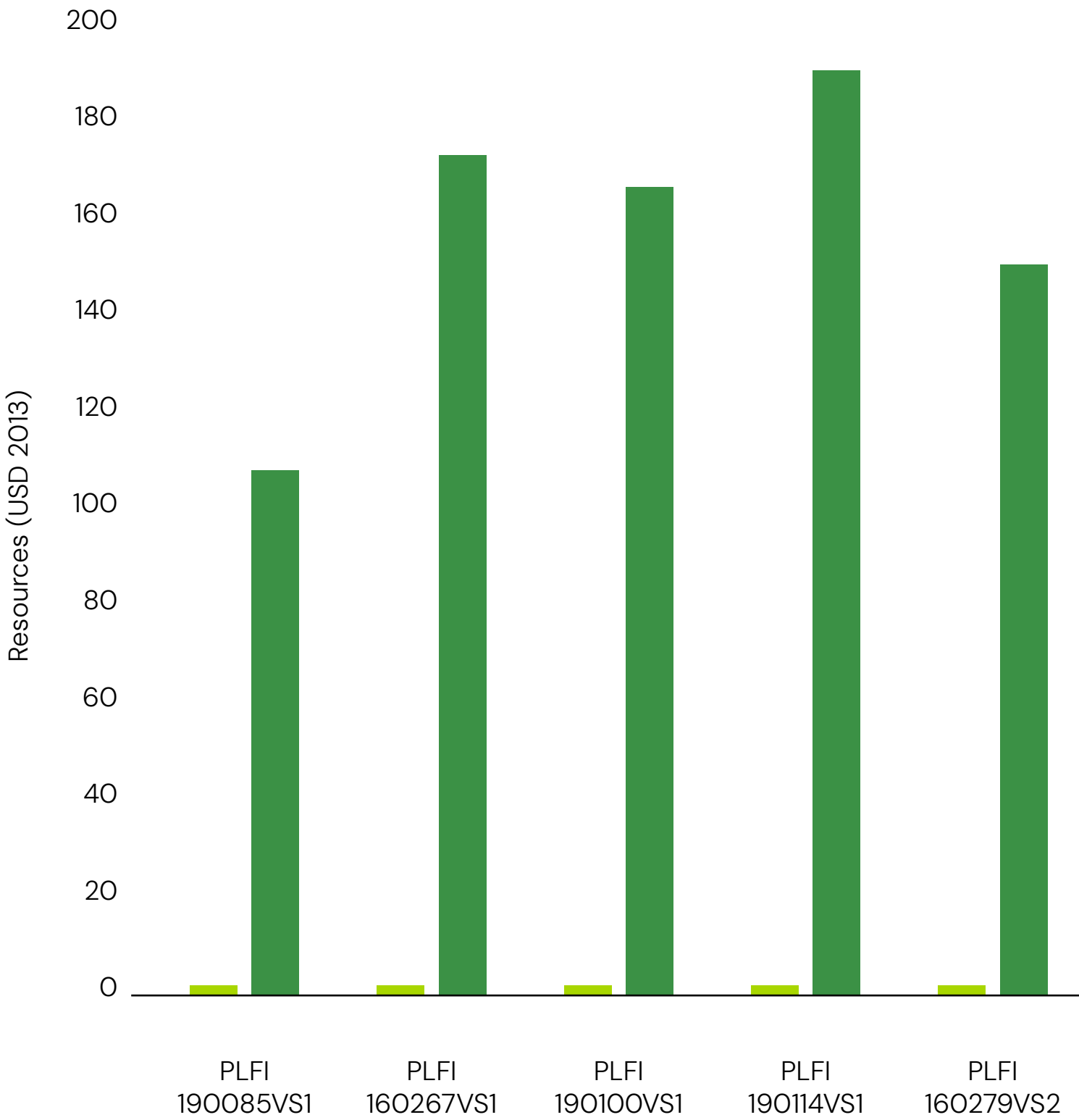
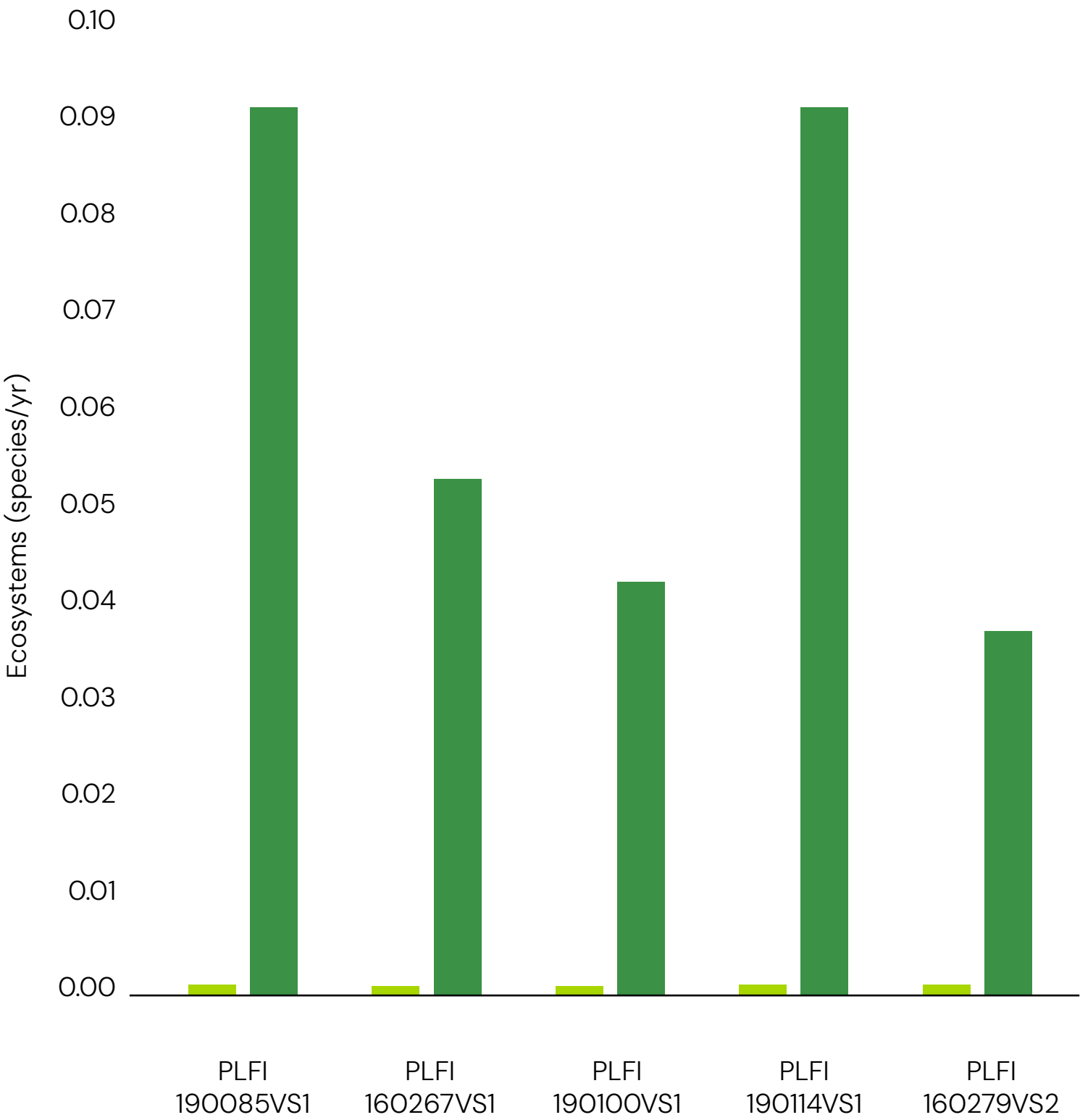
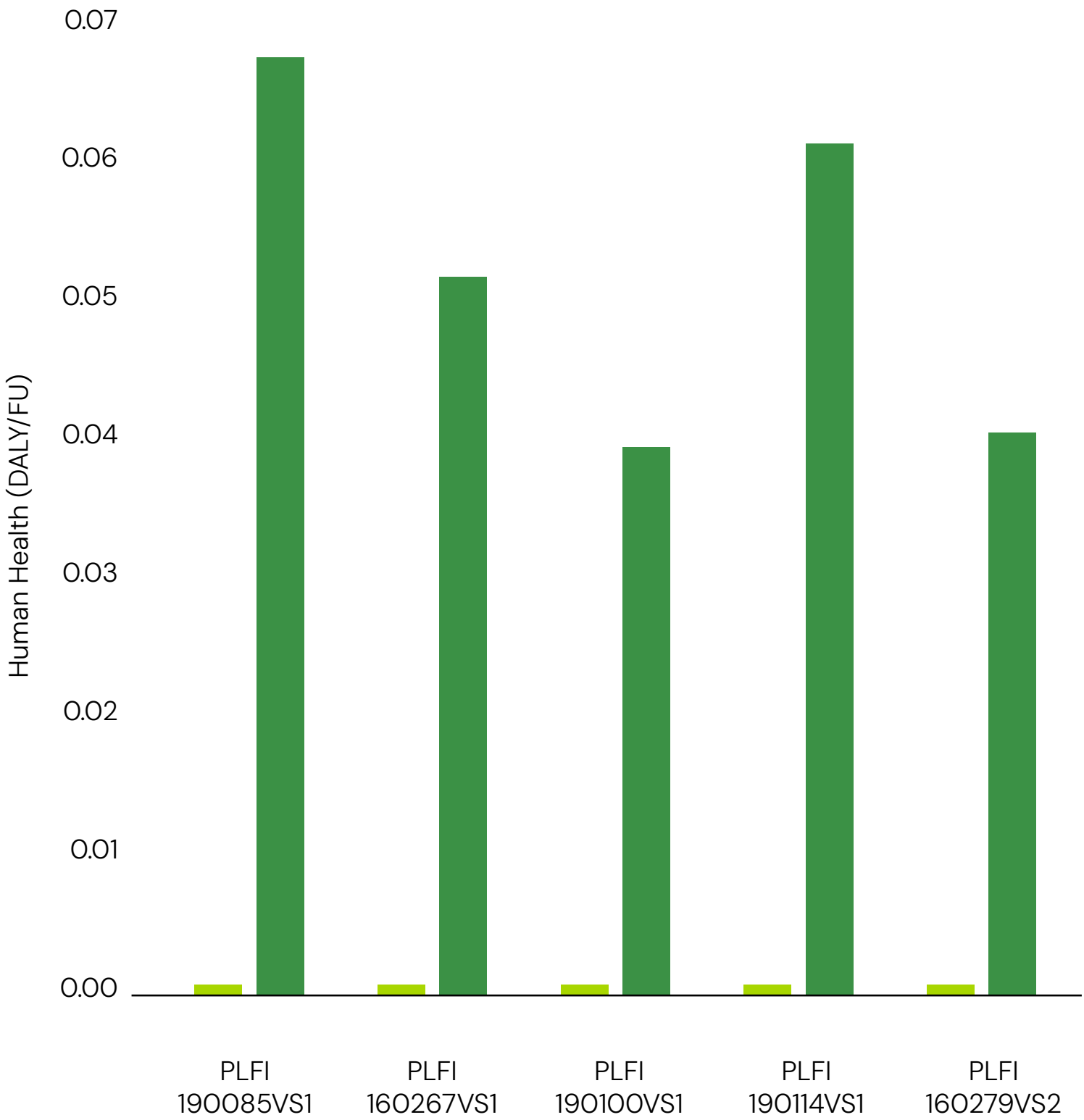
Fresh flower LCI Data Sources

STEM NAME	SOURCES
Alstremoria	No data found – used average flower as proxy.
Arum Leaves	Agribalyse, potted shrub.
Arum Lillies (Sub)	No data found – used average flower as proxy.
Black Stix	Agribalyse, potted shrub.
Blue Gum	No data found – used average flower as proxy.
Carnations (Sub)	Abeliotis, K.; Baria, S.; Detsis, V.; Malindretos, G. (2016) Life cycle assessment of carnation production in Greece. Journal of Cleaner Production. 112: 32–38
Copper Glow	No data found – used average flower as proxy.
Cymbidium Orchid	Soode, E.; Lampert, P.; Weber-Blaschke, G.; Richter, K. (2014) Carbon footprints of the horticultural products strawberries, asparagus, roses and orchids in Germany. Journal of Cleaner Production. 85 (15): 168–179.
English Box	Agribalyse, potted shrub.
Gladioulus	No data found – used average flower as proxy.
Gold Roses Finest	Alig, M.; Frischknecht, R. Life cycle assessment of cut roses (2018) Uster: Treeze.
Golden Angel Orchid	Soode, E.; Lampert, P.; Weber-Blaschke, G.; Richter, K. (2014) Carbon footprints of the horticultural products strawberries, asparagus, roses and orchids in Germany. Journal of Cleaner Production. 85 (15): 168–179.
Golden Cane	No data found – used average flower as proxy.
Grandiflora Roses (Sub)	Alig, M.; Frischknecht, R. Life cycle assessment of cut roses (2018) Uster: Treeze.
Gymea	No data found – used average flower as proxy.
Italian Ruscus	Agribalyse, potted shrub.
Leucodendron Spray Phyllica	No data found – used average flower as proxy.
Lisianthus	No data found – used average flower as proxy.
Lucodendrum	No data found – used average flower as proxy.
Magnolia Little Gem	No data found – used average flower as proxy.
Monstera	No data found – used average flower as proxy.
Oriental lily	No data found – used average flower as proxy.
Palius Palm	No data found – used average flower as proxy.
Phaeanopsis Orchid	Soode, E.; Lampert, P.; Weber-Blaschke, G.; Richter, K. (2014) Carbon footprints of the horticultural products strawberries, asparagus, roses and orchids in Germany. Journal of Cleaner Production. 85 (15): 168–179.
Ranunculus	No data found – used average flower as proxy.
Silver Dust (Sub)	No data found – used average flower as proxy.
Spider Mums (Sub)	Parrado–Moreno, C.A.; Ricardo–Hernandez, R.E.; Velasquez–Arredondo, H.I.; Lopera–Castro, S.H.; Hasenstab, C. (2019) An environmental evaluation of the cut-flower supply chain (Dendranthema grandiflora) through a life cycle assessment. Revista EIA, 16(31), enero–junio, pp. 27–42.
Standard Ruscus	Agribalyse, potted shrub. Davis, J; Wallman, M.; Sund, V.; Emanuelsson, A.; Cederberg, C.; Sonesson, U. (2011) Emissions of Greenhouse Gases from Production of Horticultural Products:
Tulip	Analysis of 17 products cultivated in Sweden. Gothenburg: Swedish Institute for Food and Biotechnology.

Annexes

Endpoint Impacts

- Benchmark
- Floral Image



Annexes

Modern Slavery Literature

COUNTRY	SOURCE
Australia	https://www.governmentnews.com.au/migrants-trapped-in-slave-like-conditions-at-aussie-farms/ https://www.abc.net.au/news/rural/2019-03-08/farm-labour-report-says-farmers-rely-on-illegal-labour/10881832 https://www.mq.edu.au/_data/assets/pdf_file/0019/214237/ajel_2015_4-werren.pdf
Malaysia	amnesty.org/download/Documents/36000/asa28002201 https://www.business-humanrights.org/en/business-human-rights-in-malaysia-a-report-from-kuala-lumpur
Colombia	https://laborrights.org/blog/201005/happy-mothers-day-and-2010-report-colombian-floriculture-industry-corporación-cactus https://laborrights.org/blog/201102/dank-smell-roses https://laborrights.org/sites/default/files/publications-and-resources/toolkit2009.pdf https://www.theatlantic.com/international/archive/2012/02/theres-a-1-in-12-chance-your-v-day-flowers-were-cut-by-child-laborers/253084/ https://www.theguardian.com/sustainable-business/2015/feb/12/the-women-suffering-for-your-valentines-day-flowers
Kenya	https://theconversation.com/concerted-campaign-helps-women-in-kenyas-flower-industry-get-a-better-deal-90254 https://issuu.com/ipisresearch/docs/160524_-_flowers https://www.ijern.com/journal/2018/May-2018/01.pdf https://www.fairtrade.org.uk/Media-Centre/Blog/2016/May/Blooming-futures-of-flower-workers
UK	https://www.independent.co.uk/news/uk/crime/modern-slaves-cornwall-flower-farm-workers-immigration-human-rights-bosahan-farm-manaccan-a8201146.html
China, Myanmar	https://cdn.minderoo.com.au/content/uploads/2016/01/27113827/Harnessing-the-power-of-business-to-end-modern-slavery-20161130-Final.pdf https://www.scmp.com/news/world/article/1333894/29-million-trapped-modern-day-slavery-china-30-million-worldwide https://thediplomat.com/2018/03/chinas-forced-labor-problem/ https://www.scmp.com/news/china/society/article/2182860/not-single-day-rest-victims-reveal-details-being-locked-and



Thank you

