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STAINLESS – A SUSTAINABLE PARTNERSHIP

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Daily Interaction with Stainless Steel



The Stainless Steel Families

Martensitics

High strength
Reasonable ductility
Hardenable by heat treatment
Modest corrosion resistance

PH
17/4

C Cr

C Cr
Ni

Ferritics

Reasonable ductility & corrosion resistance
Resistant to SCC

Cr

Cr
Ni

Duplex Grades

High strength
Good to excellent corrosion resistance
Good ductility
Good fatigue strength

Lean
2101
2304

Std
2205

Supr
2507

Austenitics

Good strength
Highly formable
Good to excellent corrosion resistance
Excellent ductility even at very low temperatures

Cr
Mn Ni
201

Cr Ni
304

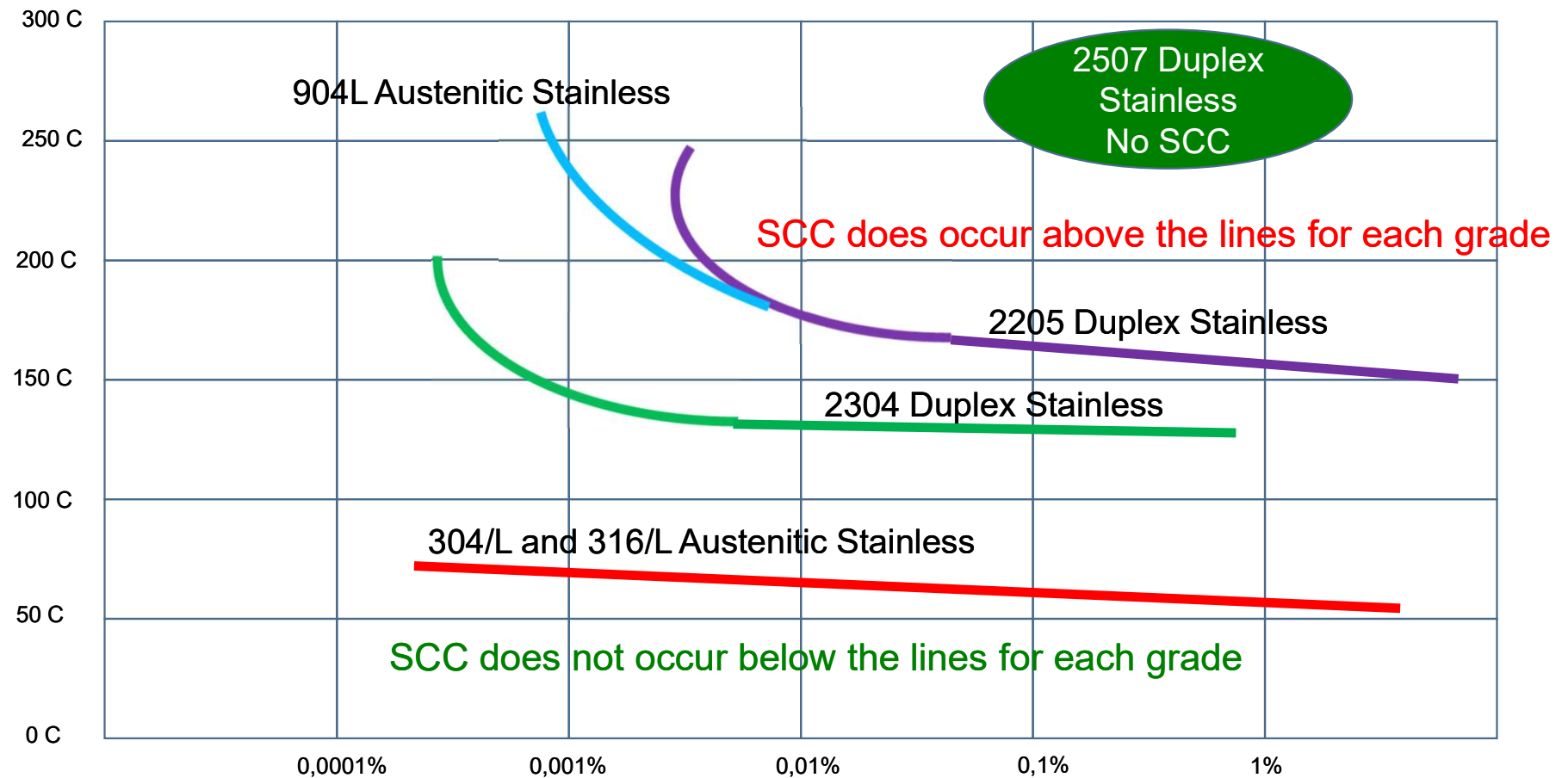
Cr Ni
Mo
316

Supr
254
904

4 families, more than 100 available grades

Note; SCC = Stress Corrosion Cracking

Stainless SCC Grade Thresholds



The X-axis represents the Chloride ion concentration in the exposure environment (logarithmic scale)



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Existing usage examples



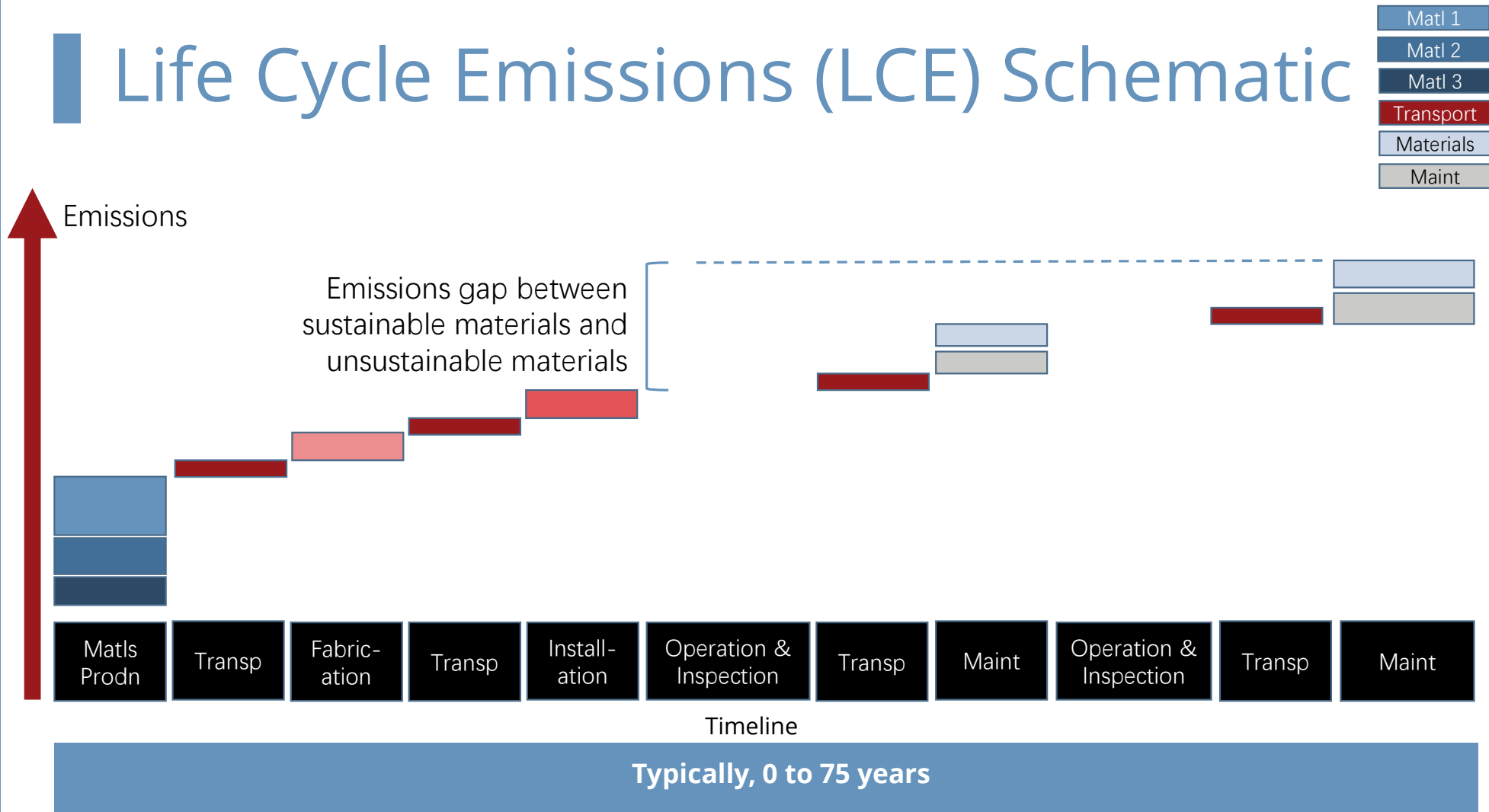


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Associated Processes

- ☐ Lithium and Silicon extraction
- ☐ Dairy processing
- ☐ Heating

Life Cycle Emissions (LCE) Schematic



LCE Schematic Explanation

Over the full lifetime of a product or installation, emissions are generated
These emissions comprise

- Material production emissions (cradle to gate)

- Material transport emissions (both new materials and replacement parts)

- Material fabrication emissions

- Installation creation and/or building emissions

- Installation operation and inspection emissions (vary from very low to high)

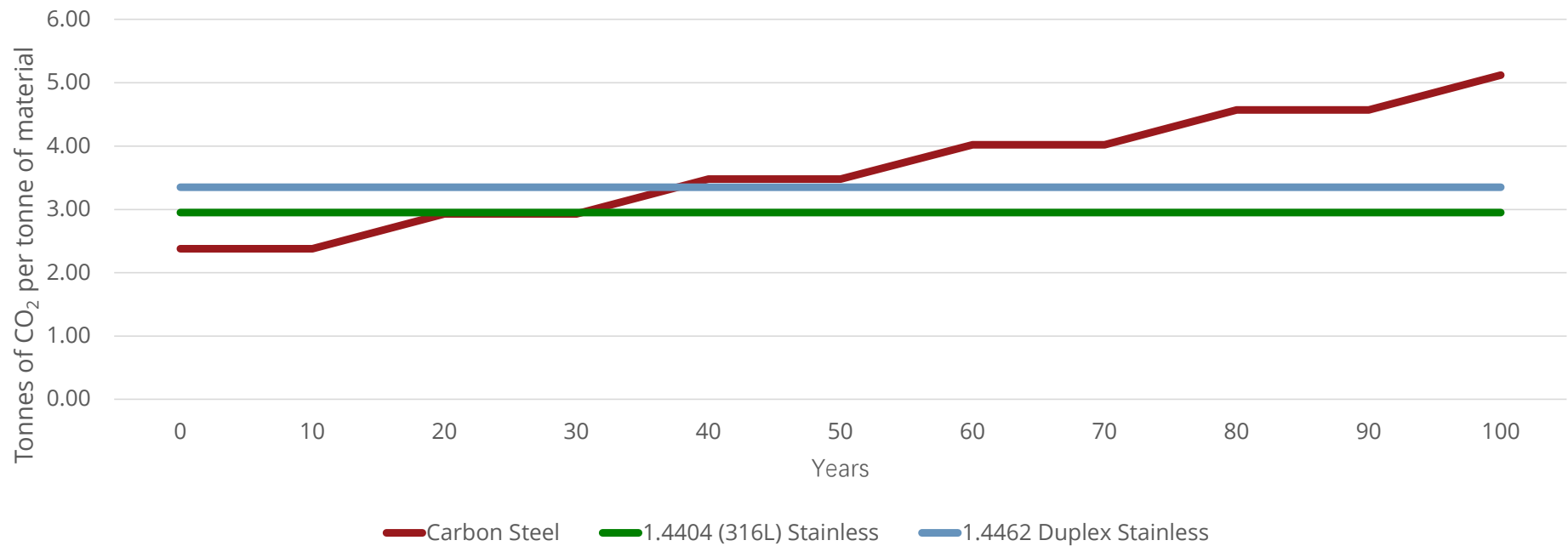
Depending on the product or installation

Sustainable materials should only require limited intervention after installation

ie; **they represent the 'fit and forget' solution**

Sustainable materials should also be both reusable and fully recyclable at their end-of-life

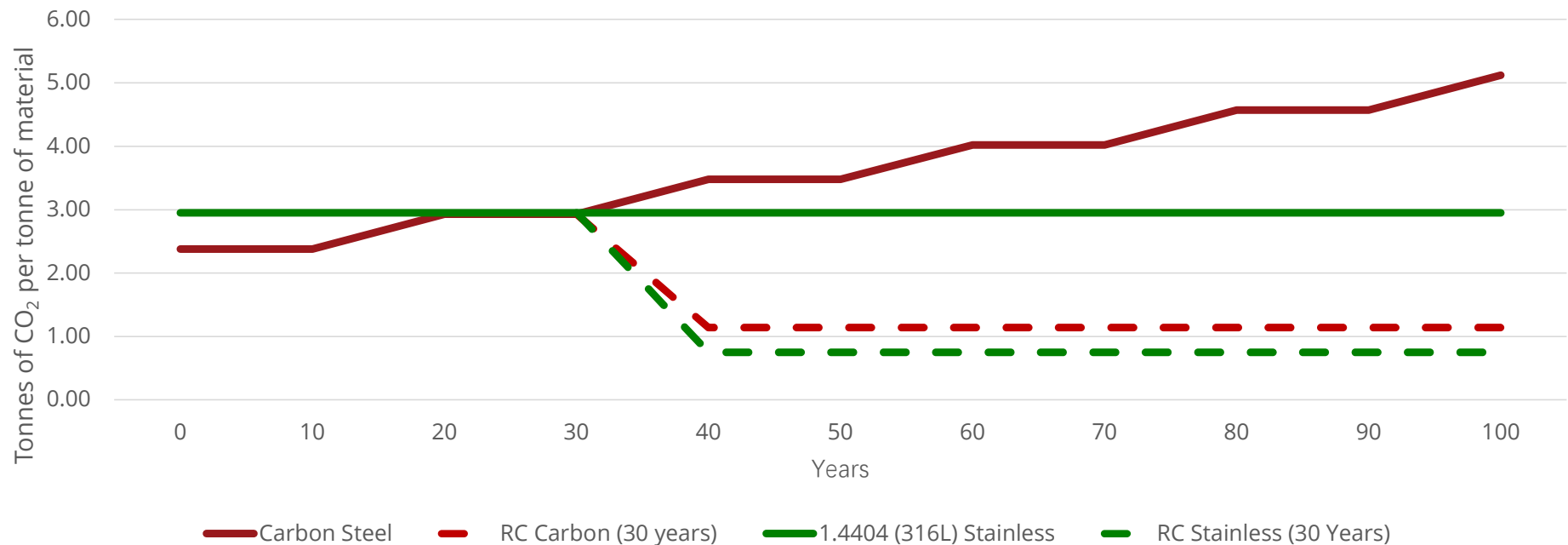
Life Cycle Emissions (LCE) Example 1



Source; IMO A & WSP UK Limited 2015 and worldstainless 2021

This application is underside cladding for a major road bridge in Turku, Finland

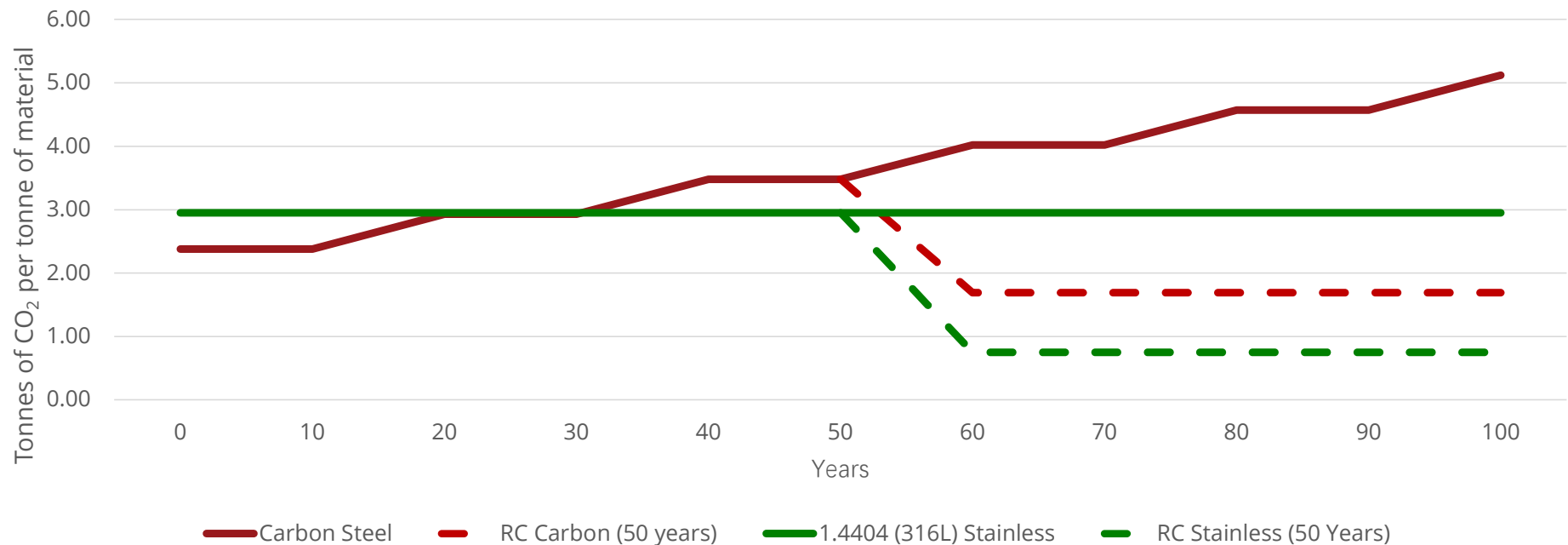
Life Cycle Emissions (LCE) Example 2



Source; IMO A & WSP UK Limited 2015 and worldstainless 2021

RC = Recycling emissions credit

Life Cycle Emissions (LCE) Example 3



Source; IMO & WSP UK Limited 2015 and worldstainless 2021

RC = Recycling emissions credit

General Comments

‘worldstainless’ happy to support both the NZSSDA and the NZ Geothermal Energy Industry regarding

- Material selection questions
- Life-cycle related questions
- Technical information relating to stainless steel grades and properties
- Product availability

Contact Tim Collins, Secretary-General, ‘worldstainless’

- collins@worldstainless.org



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Communication to Government / Investors

- ☐ Remove the “well kept secret”
- ☐ Not weather dependent
- ☐ Associated benefits (heating / byproducts production)
- ☐ Life Cycle Emissions advantages
- ☐ Support for Local economy / employment
- ☐ Internationally recognised NZ expertise
- ☐ End of life Recyclability



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Thank you for your attention



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Stainless Steels - the "fit and forget" solution for Geothermal