Circular economy in practice – case Outokumpu

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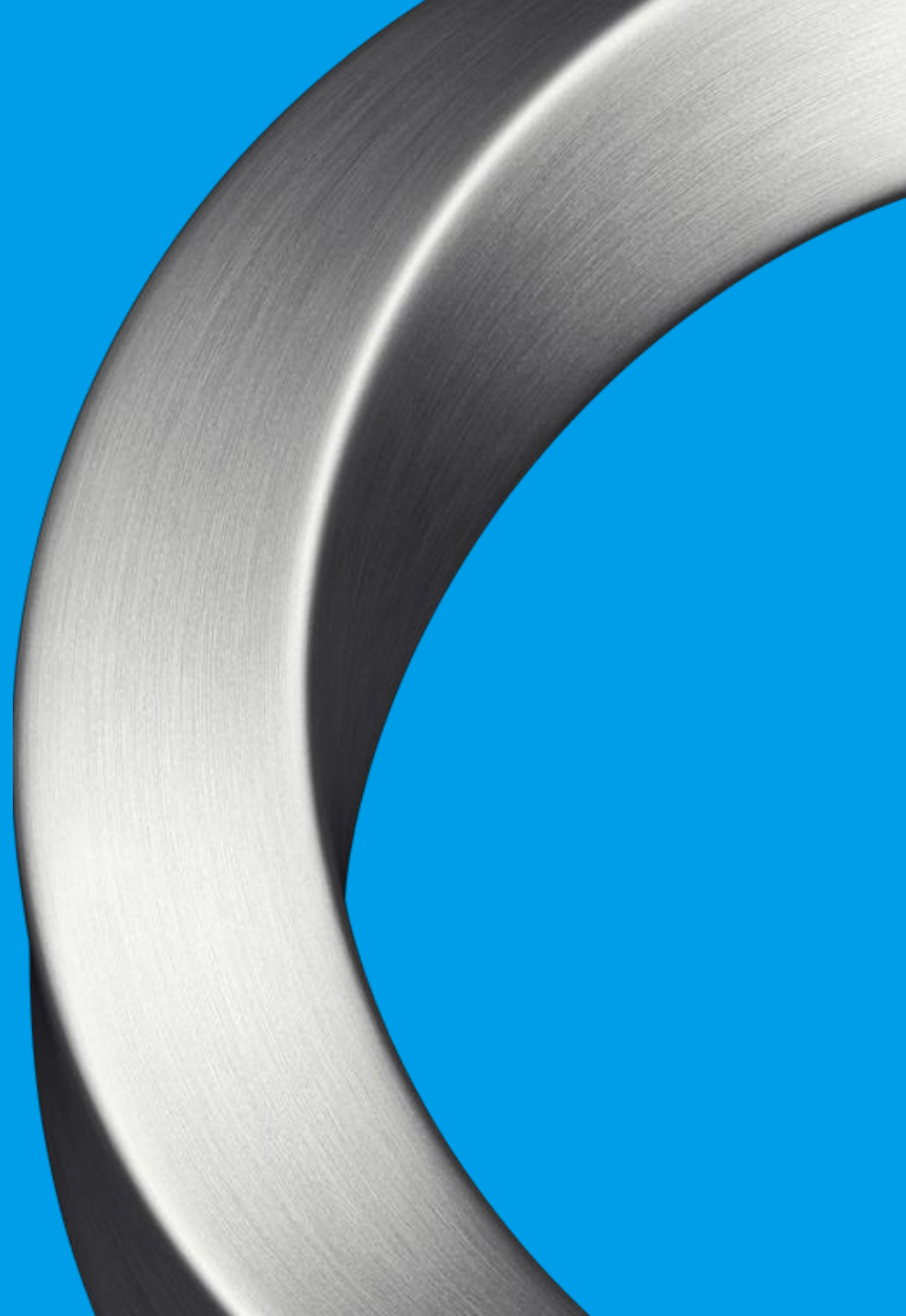

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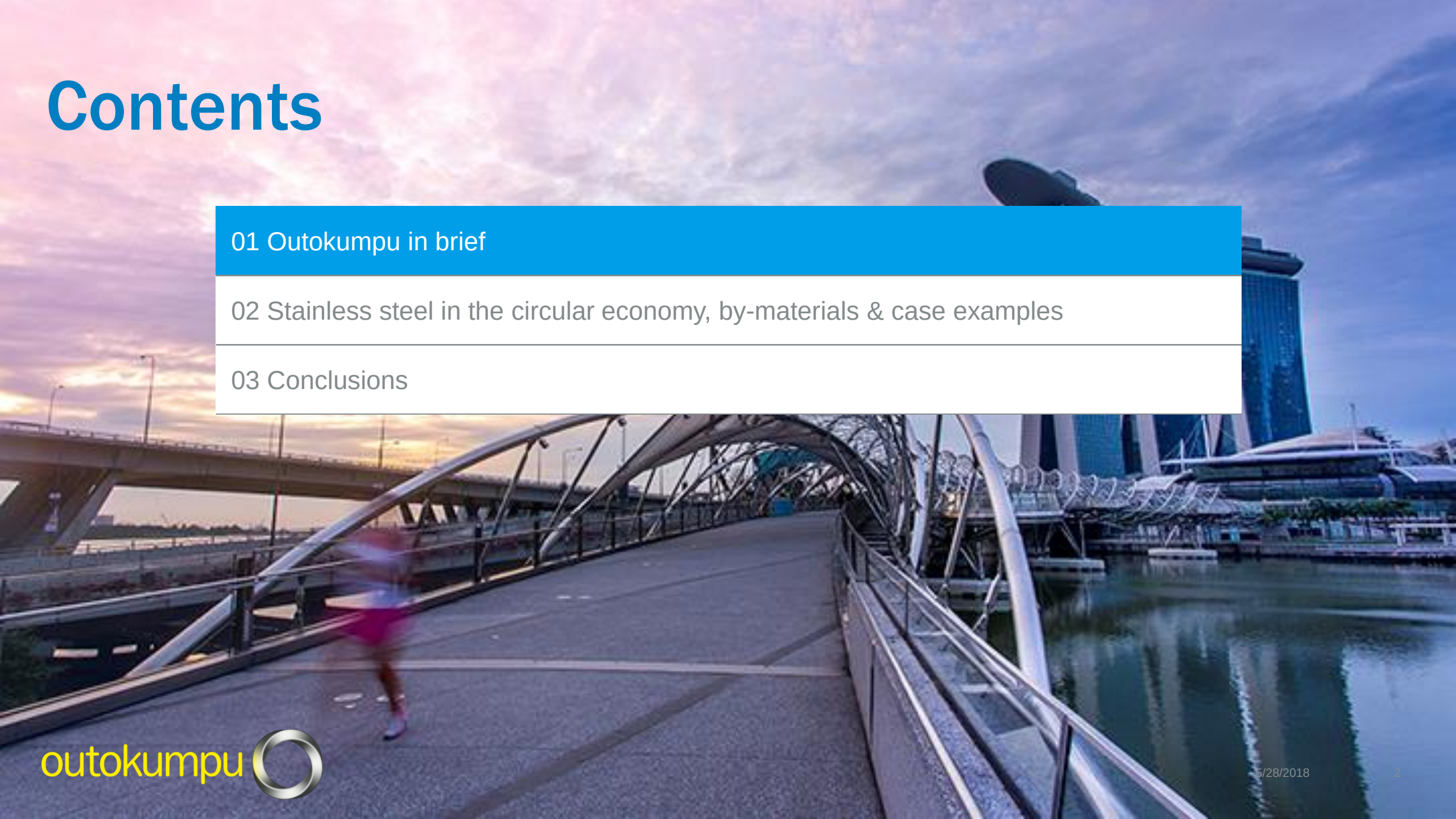

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The history of Outokumpu

1910s–1920s

From 'mystical hill' to the discovery of stainless steel

1930s–1940s

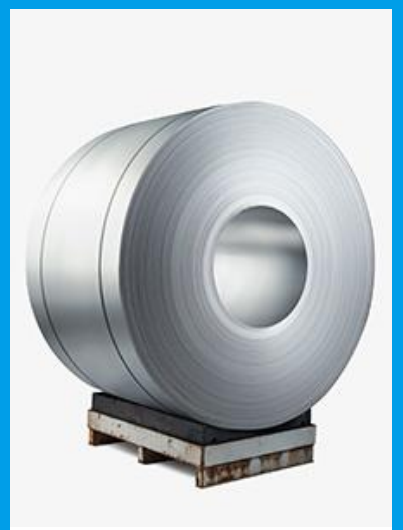
Major copper producer. 1932 Outokumpu Oy founded

1950s–1960s

Expanding into other metals

1970s–1980s

Multi-metal mining and technology company



1990s–2000s

Focus on stainless steel

2010s

A new global leader in advanced materials

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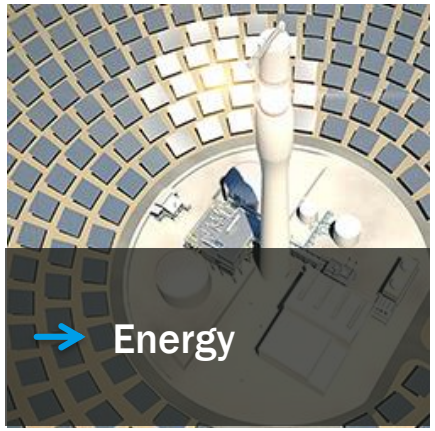
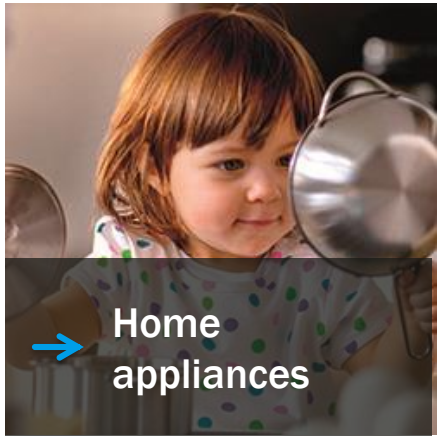
Stainless steels are everywhere and everyday – demand is increasing





Stainless steel is

- Strong
- Resistant
- Formable
- Beautiful
- Safe
- Recyclable

Outokumpu operates around the world

2017 sales 6 400 million euros
10 141 professionals in over 30 countries

Chromium makes steel stainless – essential for hygieny

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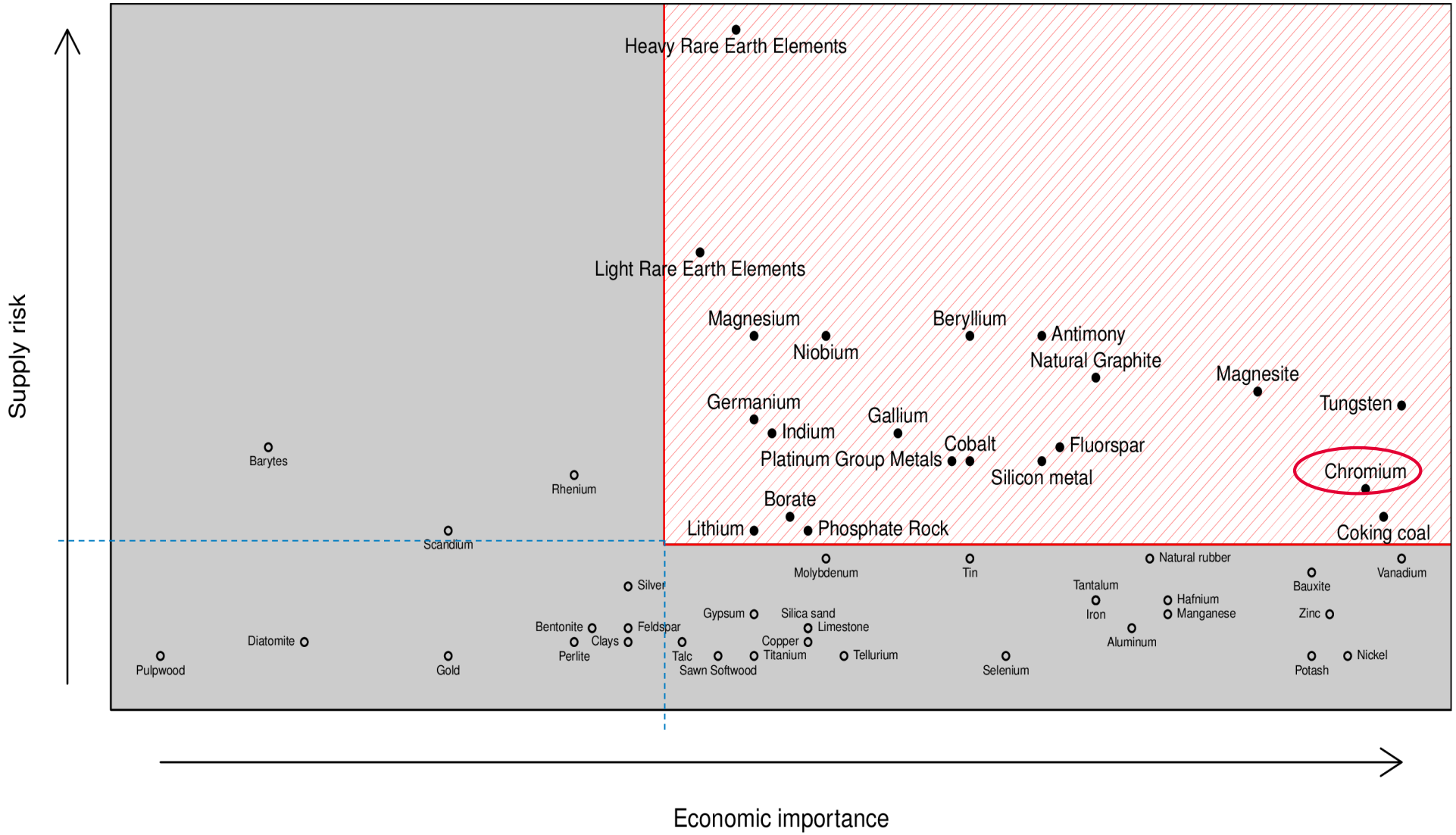
Kaplin

EU Critical Raw Materials – List 2014



Outokumpu story in Kemi – Tornio area starts from chromium

Outokumpu Kemi chromium mine and Tornio works – a part of Kemi - Tornio industry

Kemi chromite mine – the only one in the EU

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One of the World Largest Recyclers – Outokumpu Tornio works

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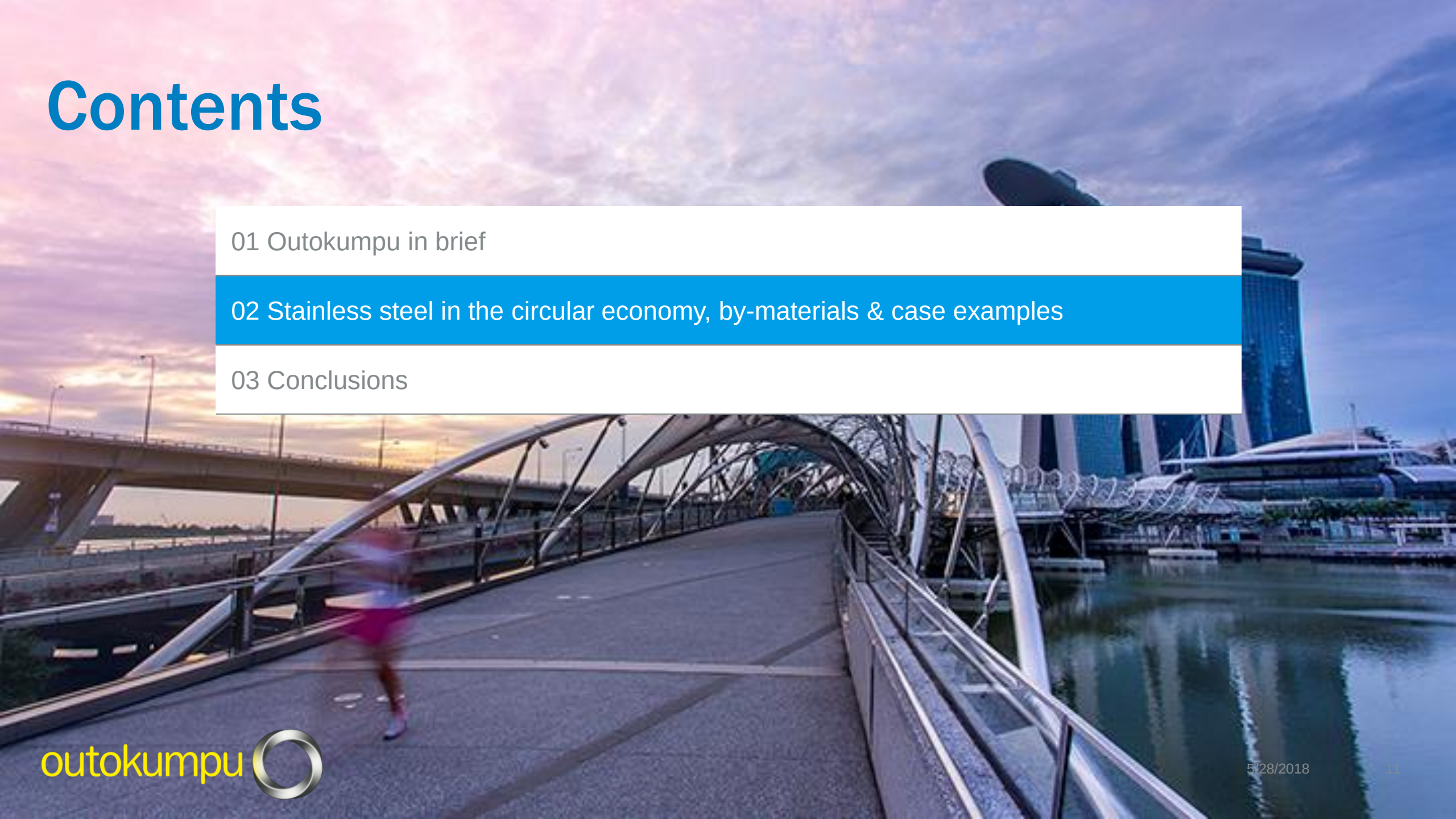


Circulation of stainless steel

Steel producer

Product manufacturer

Service provider

User

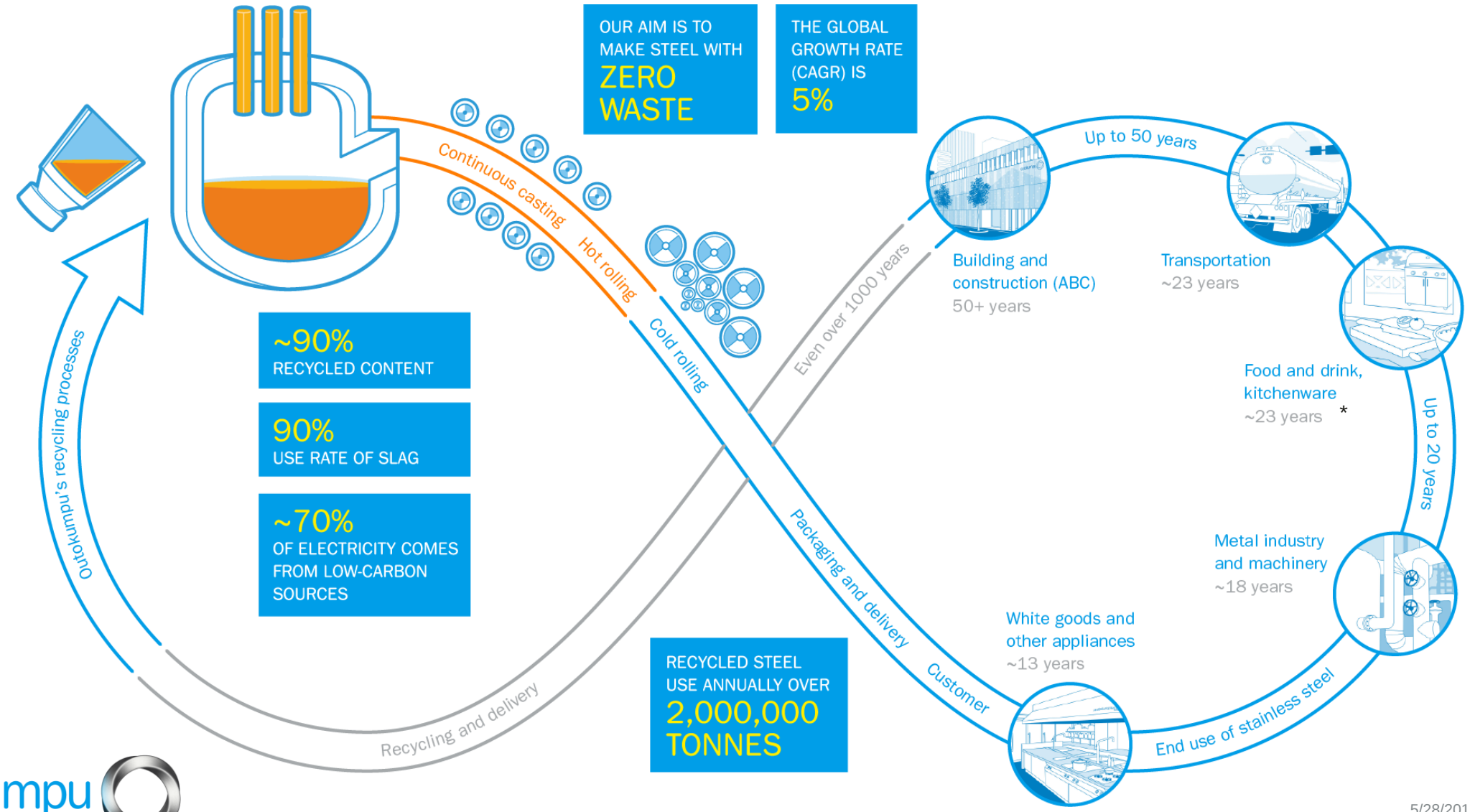
Recycle

Refurbish/remanufacture

Reuse

Maintain/prolong

Recycle - Outokumpu business is based on recycling



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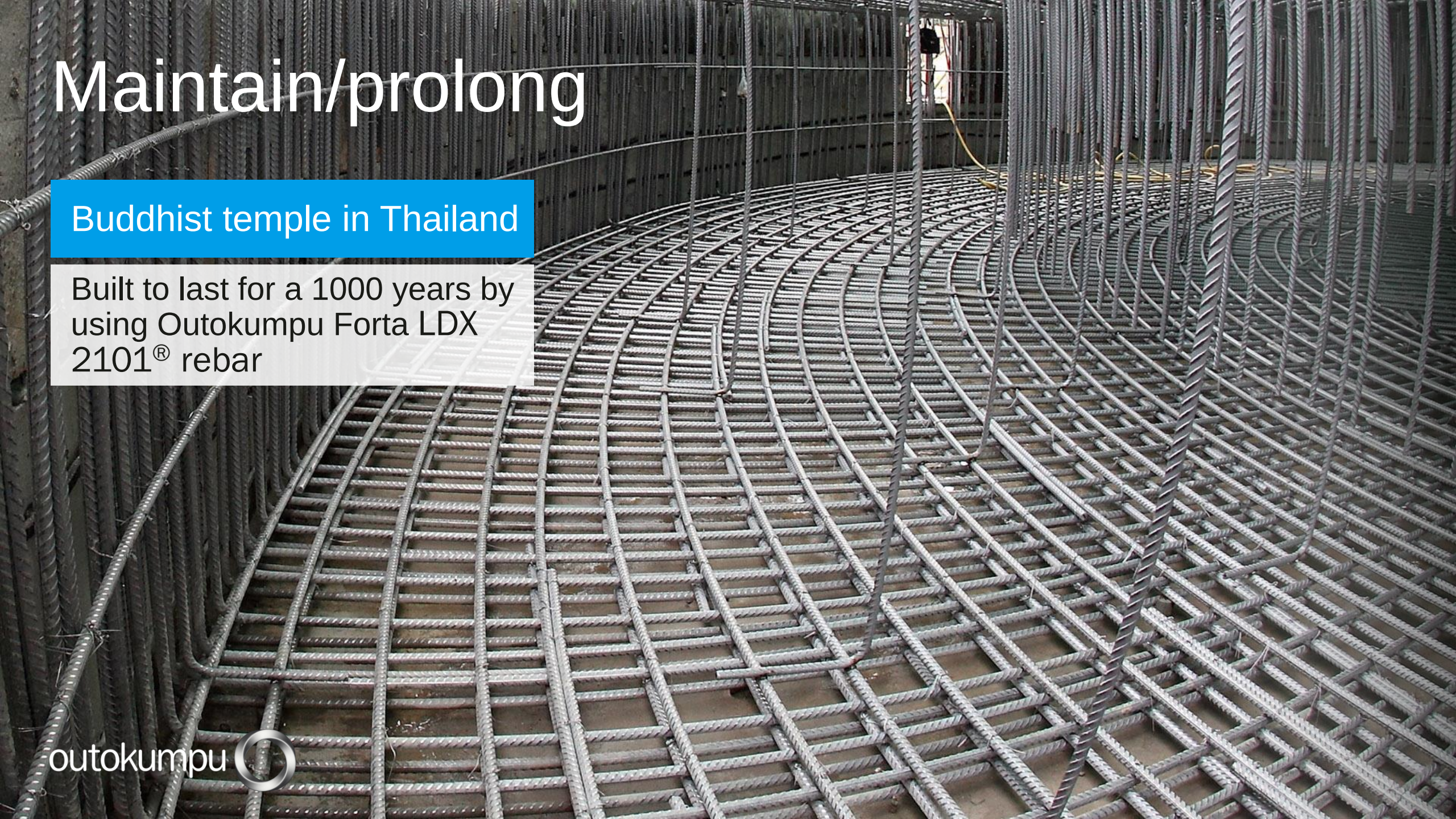
Maintain/prolong

Buddhist temple in Thailand

Built to last for a 1000 years by using Outokumpu Forta LDX 2101® rebar



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Outokumpu – recycler and additing high value for material

- Stainless steel: main raw material is recycled steel (scrap)
- Alloying materials essential: Chromium - own chromite mine and ferrochrome (FeCr) production
  - Others alloying elements Ni, Mo etc.
- Recycled material content in our steel > 85%
  - Recycling has nothing to do with the product quality – all our products fulfill the highest and demanding standards
- By-products: slag is essential material in all metal production

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One of the highest proportions of recycled content

Our stainless steel contains one of the highest proportions of recycled content on the market, and we keep pushing this further to conserve virgin raw materials.

Increasing this recycled share is the single most effective measure we have to reduce our environmental impact.

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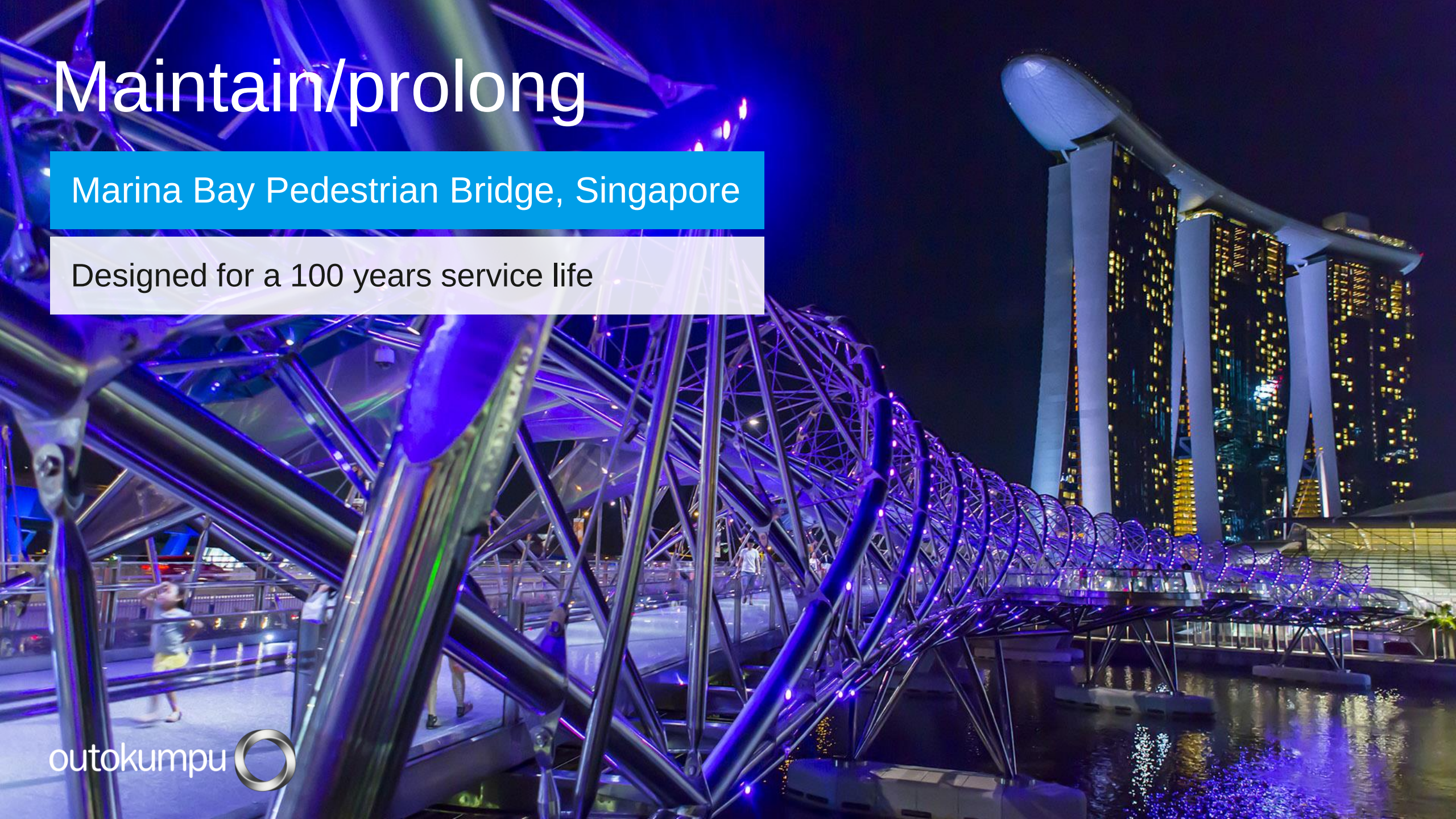
Examples: Refurbish/remanufacture - X2000 trains

- Outokumpu supplied stainless steel for the high-speed X2000 trains of the Swedish state railway company SJ in 1990s
- SJ is upgrading the trains to extend their service life by another 20 years
- **The original train frames made of stainless steel continue in use**, bringing in major savings and environmental benefits

Maintain/prolong

Marina Bay Pedestrian Bridge, Singapore

Designed for a 100 years service life



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Maintain/prolong

The Chrysler Building, New York

Over 80 years old – Cleaned only twice

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Reducing emissions during product use – fuel tank

Use of Outokumpu HyTens® steel allows extremely thin walls and tailored strength, making the tank three kilograms lighter than the conventional fuel tank made of plastic

- Reduced overall vehicle weight
- Reduced fuel consumption
- Reduced emissions.

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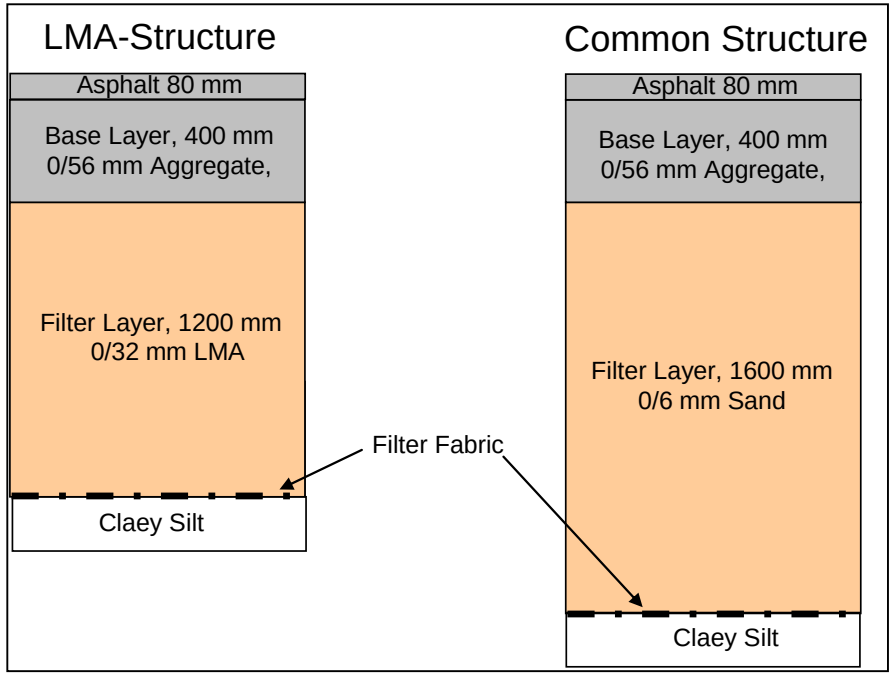
By-products: sustainability in society

- Without slag there is no metal products
  - Slag formers added (limestone etc.)
  - Slag = Mineral product
- Quality steering of slag products starts from the molten phase
- Outokumpu slag products are sold mainly to construction purposes
  - Mmaterial efficiency, metal recovery and reuse is essential
  - In Tornio: FeCr slag ~700 000 t/a. Stainless steel slag ~300 000 t/a
  - Every working day an amount of 60-80 trucks of slag have to be treated, metals recovered, slag products crushed and/or produced according to EU quality standards and loaded to external transport for customers

Slag products - environmental and economy benefits

- In standard road construction the use of slag products means ~35% less total material (~200 truck loads per road kilometre!)
  - Technical properties are better than in natural stones
  - E.g. annual use of Tornio FeCr slag in road and basement construction saves 1 000 000 tonnes of virgin materials and 350 000 t CO2 emissions



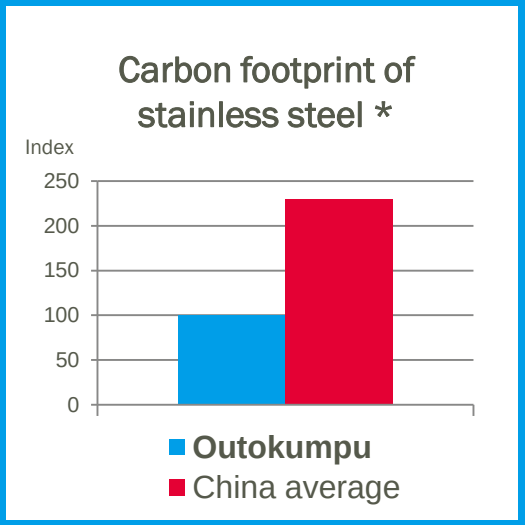
Metal recycling is not possible without significant use of electricity

Outokumpu is one of the biggest recyclers in the world.

85 - 90% of the raw materials we use in stainless steel are recycled – leading in the industry

Electricity is the most environmentally friendly in remelting of metals – energy policy and price are key factors in metal recycling.

EU energy and climate policies have a vital role in circular economy – without competitive energy prices recycling would not be possible in the EU.



Metal recycling is the oldest and best performing part of circular economy

* Source: Outokumpu, Eurofer and ISSF

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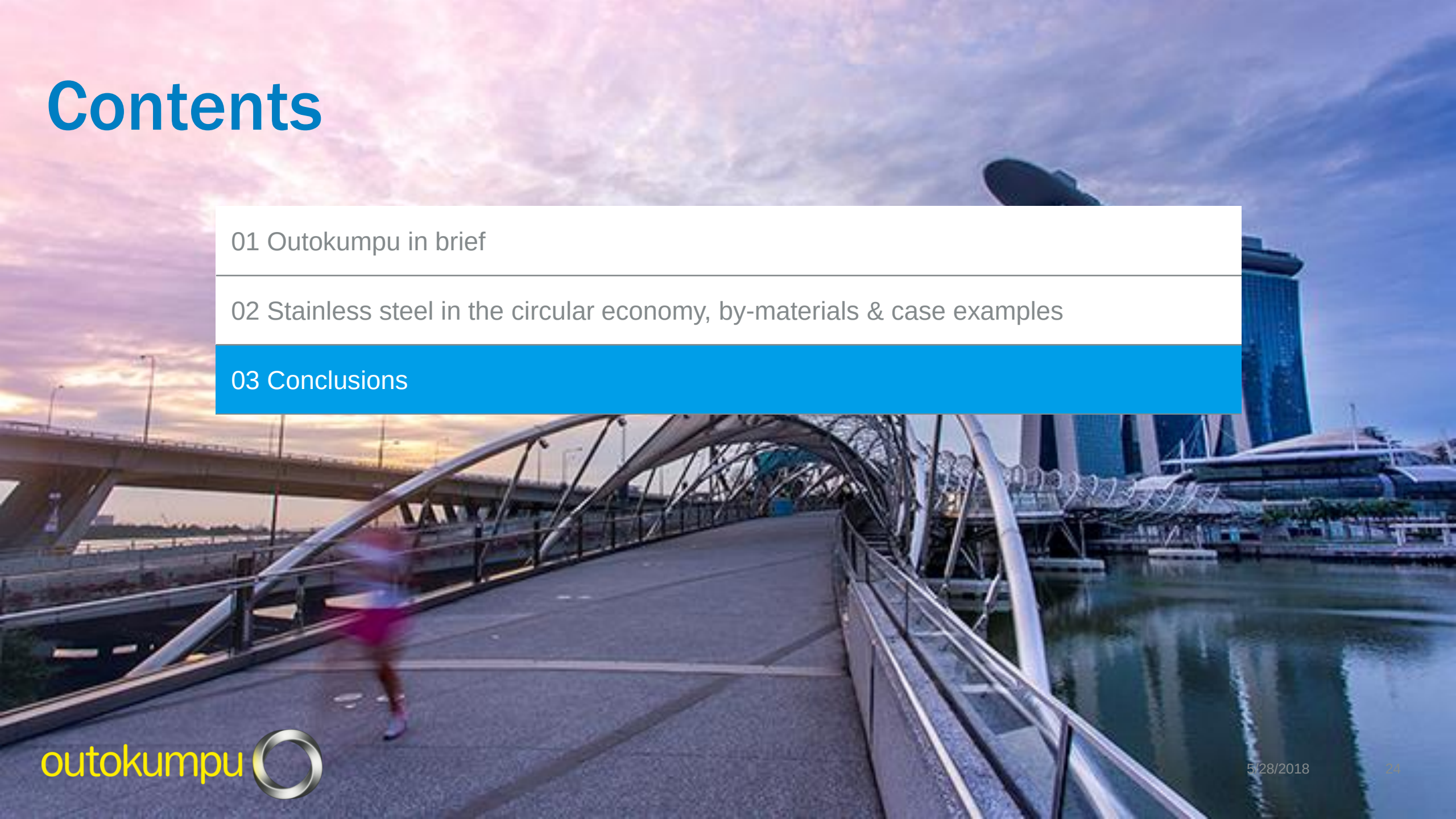

World needs long lasting, recyclable and sustainable solutions

Economic and population growth

Mobility and urbanization

Climate change and limited resources

Outokumpu stainless steel business is based on circular economy

Thank you!