

Steel use in transport

from a sustainability perspective

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1. Importance of life cycle thinking



Tailpipe Emission Regulation

Grams CO₂ per kilometer, normalized to NEDC



How to get it?

**Weight reduction
is one of solutions.**

Challenging weight reduction with HSS



Changes in social back ground

rapid economic growth

fuel economy

crash safety

global warming

SBT

mild steel

High Tensile Strength Steel (HSS)

Super HSS

~440MPa class

**~590MPa
class**

**780~
980MPa**

**1180MPa~
Hot stamp**

Tensile strength (Gpa)

0

3

6

9

12

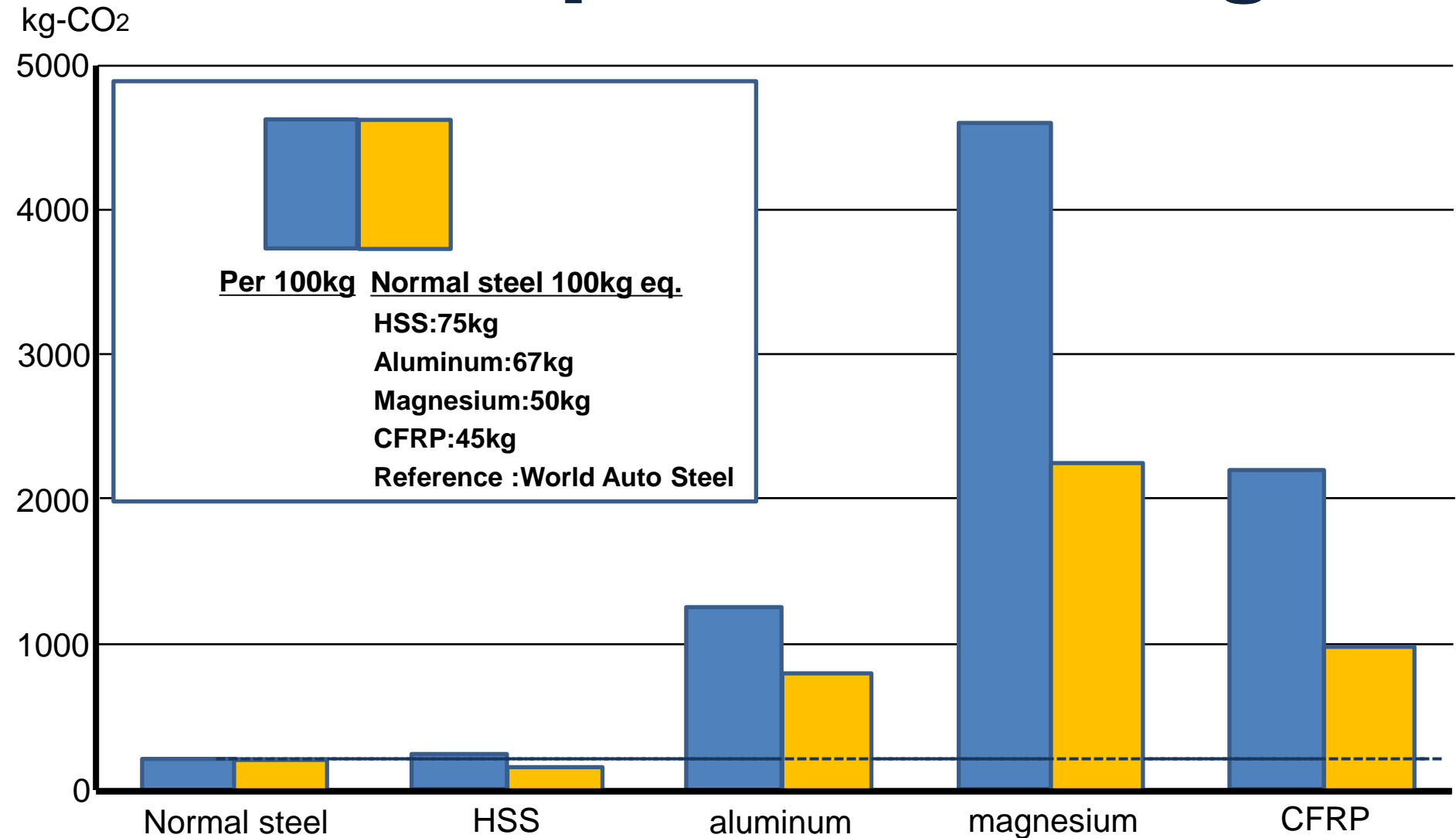
**flat steel
plate**

wire rod

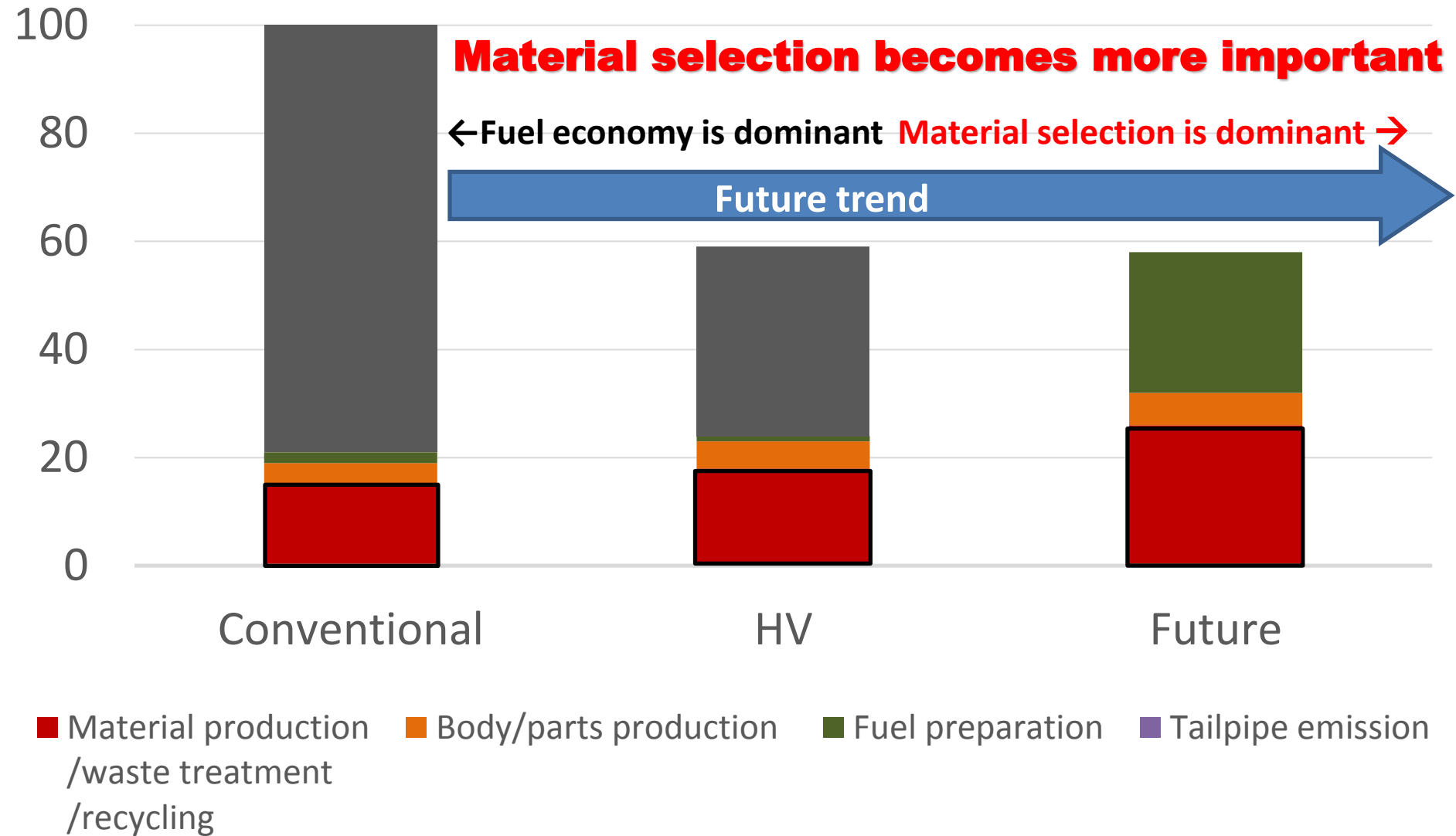
Unexplored Area

theoretical strength

CO₂ emission from material production stage



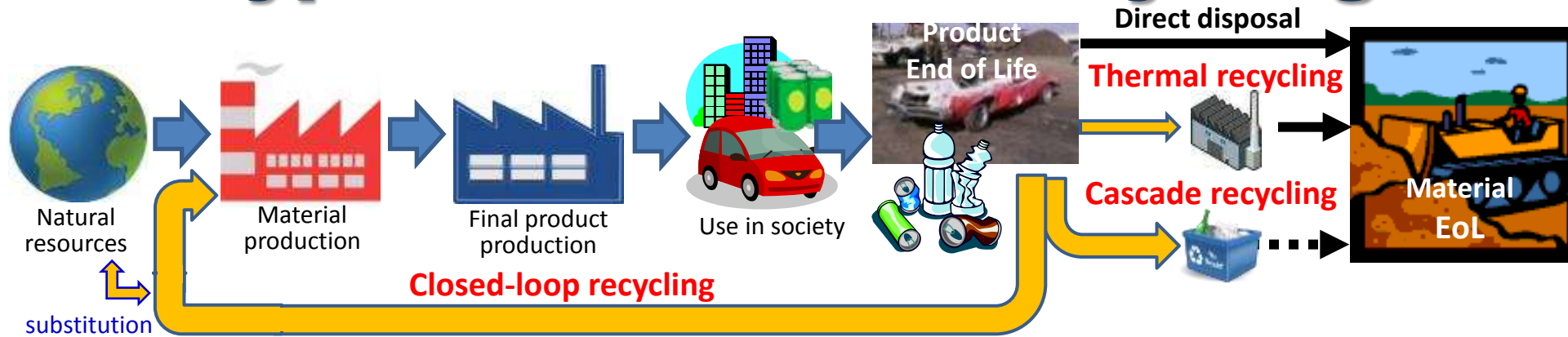
Life long environmental impact of vehicle



2. Advantages of steel in material recycling



Types of Material Recycling



Thermal Recycling (Open-loop Recycling)

EoL products are incinerated and the heat is recovered as thermal energy to produce electricity or steam. The recovery has no effect on the reduction of natural resource consumption for virgin materials, but it is a low cost and energy saving way for recycling of flammable materials.



Cascade Recycling (Open-loop Recycling)

The material is used as a secondary material in another product. The recycle may continue cascadelly in several steps. In each step, the material quality drops or changes and finally the material comes to the EoL.



Closed-loop Recycling

The material is recycled to the original material without or with very little loss of its characteristics or quality so that the number of recycling can be infinite. Closed-loop recycling reduces consumption of natural resources of the material, accompanying environmental impacts, and generation of wastes. Closed-loop recycling is superior to open-loop recycling in terms of sustainability.



Conditions for Rational/Sustainable Material Recycling

- a) Separation and collection is easy**
- b) Environmental impact of recycling is smaller compared to production using natural resources**
- c) Recycling system is economically sustainable**

Additional conditions for “Closed-loop Recycling”

- d) No/small quality degradation through recycling**
- e) Can be recycled into various products**

Conclusions

- 1. Life Cycle Thinking is the key to keep right direction in global environmental issues**
- 2. Steel has great advantages in terms of material recycling**

Thank you for your attention

Steel,
the most eco-friendly
material