worldsteel
ASSOCIATION

Steel & the Environment – Global Challenges

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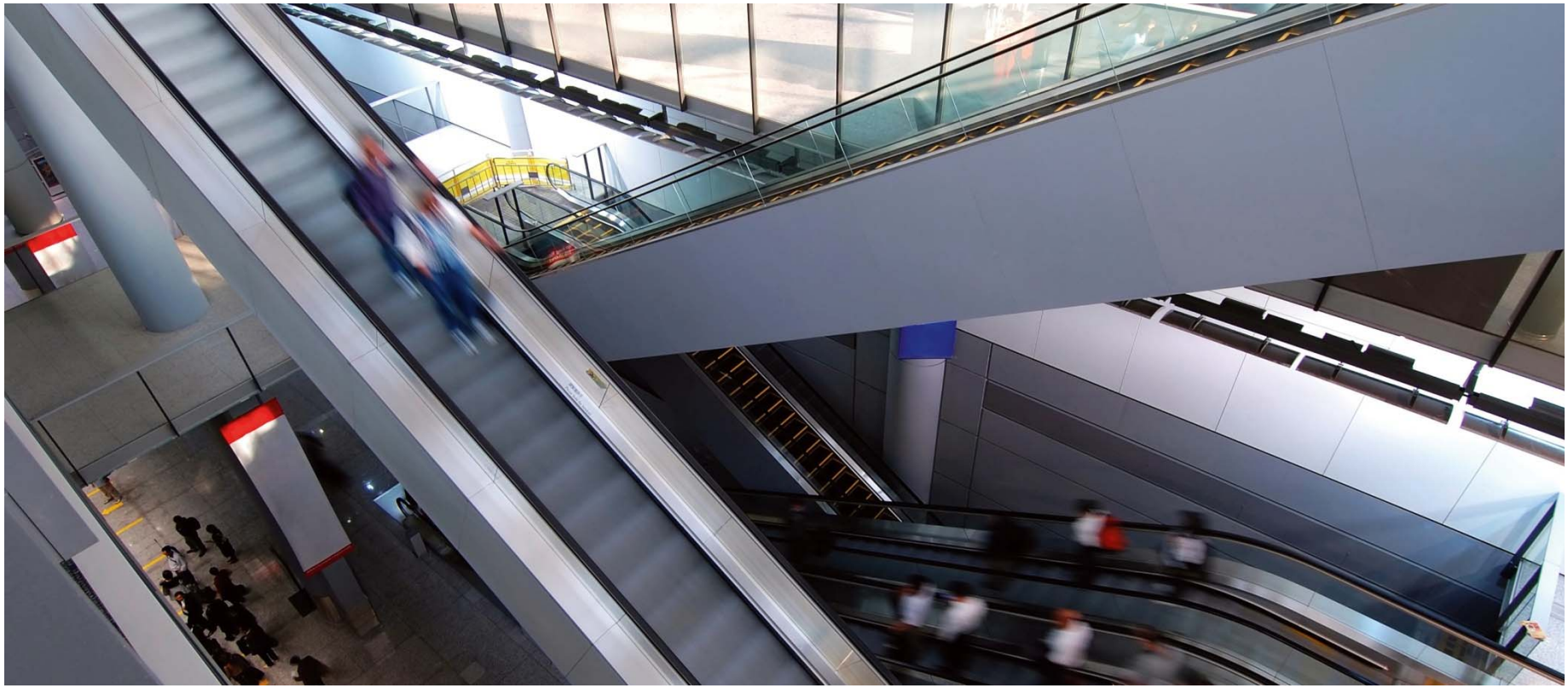
Chairman, worldsteel Environment Committee
September 2015

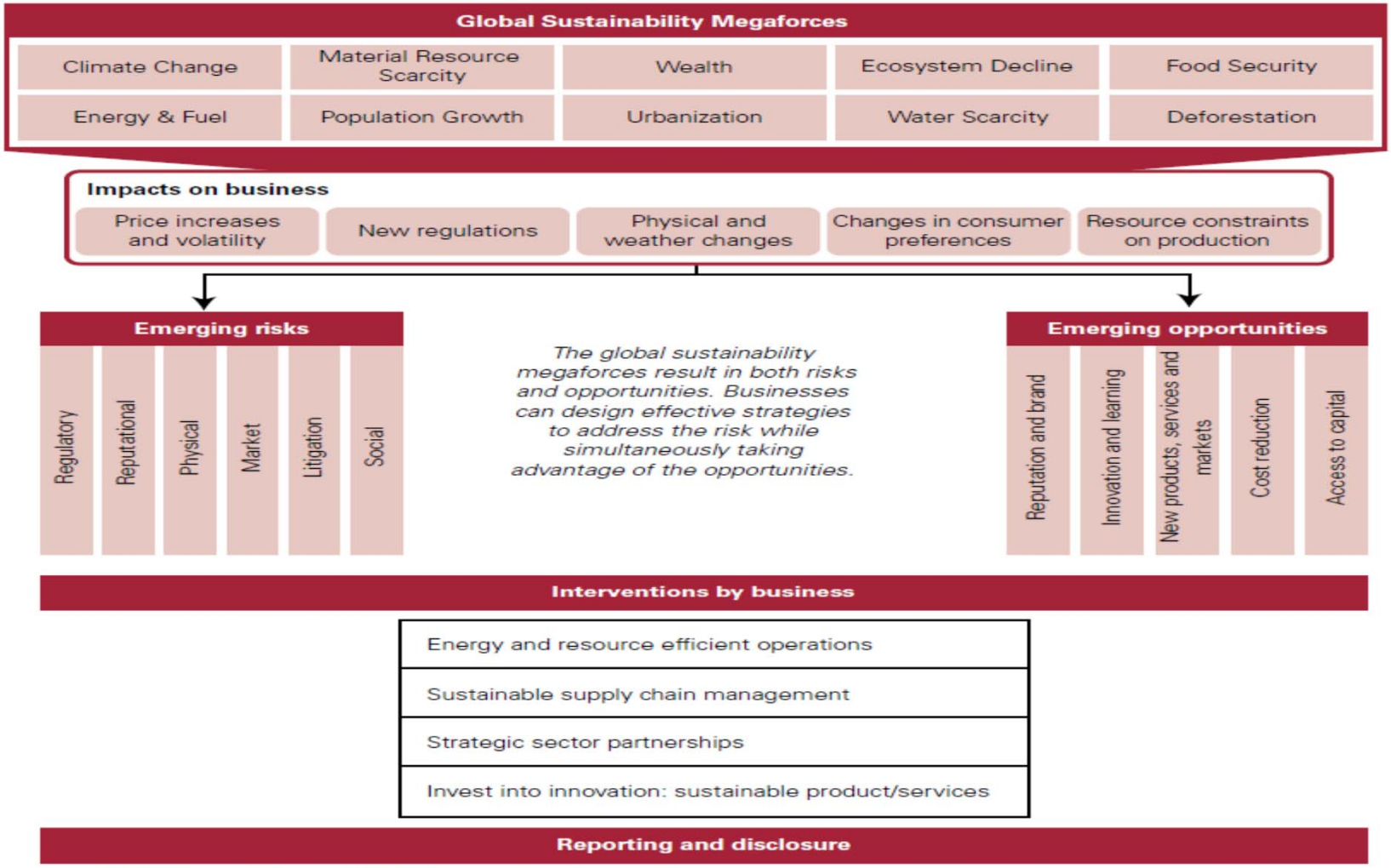


Presentation Outline

- Global challenges of sustainability
- Climate change
- Climate policy & regulation
- Breakthrough technology development
- Increasing demand for resources
- The importance of steel to society
- The sustainability of steel
- Steel in the circular economy
- Life cycle thinking.

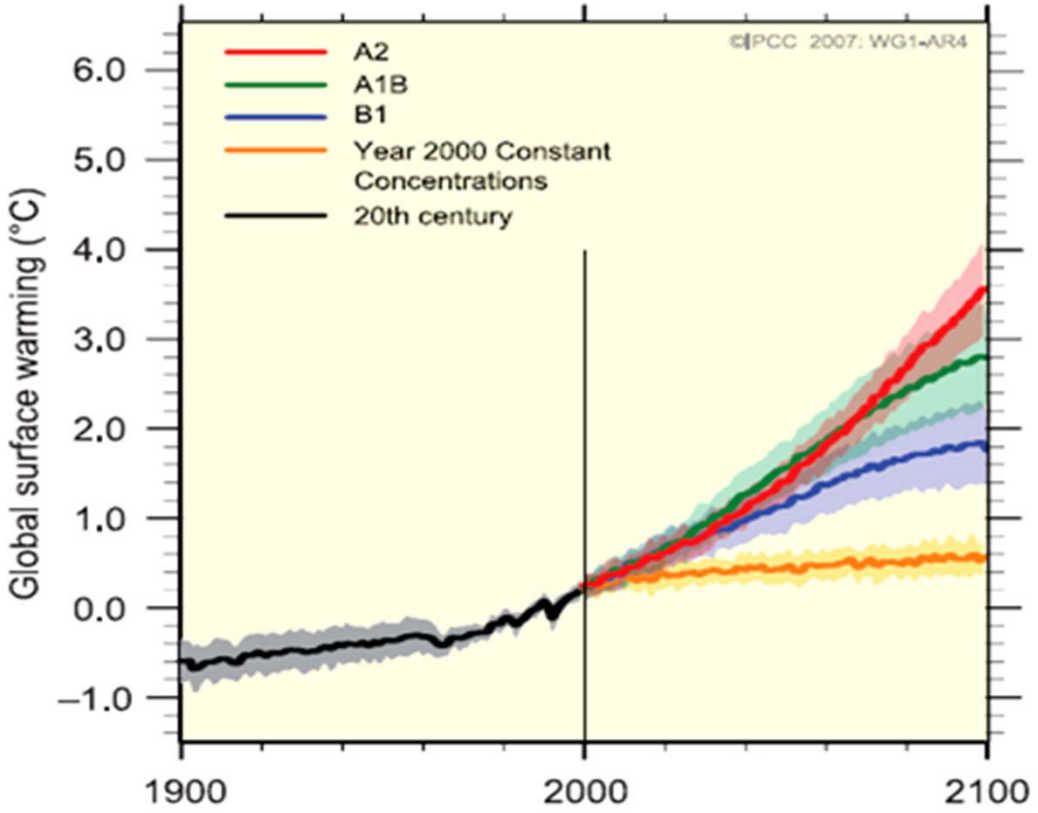
The Global Challenges of Sustainability

Business risks and opportunities



Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*

Climate Change



Continued emissions would lead to further warming of 1.1ºC to 6.4ºC over the 21st century (best estimates: 1.8ºC - 4ºC)
Source: IPCC

Steelmaking & Climate Change

The challenge

Growth

World steel consumption will double by 2050

Sustainability

Ambition to cut CO_2 emissions by at least 50 % by 2050

On average, approximately 1.8 tonnes of CO_2 are emitted per tonne of steel produced globally. According to the IEA, the steel industry accounts for 6.7% of total world CO_2 emissions.

Climate Policy & Regulation

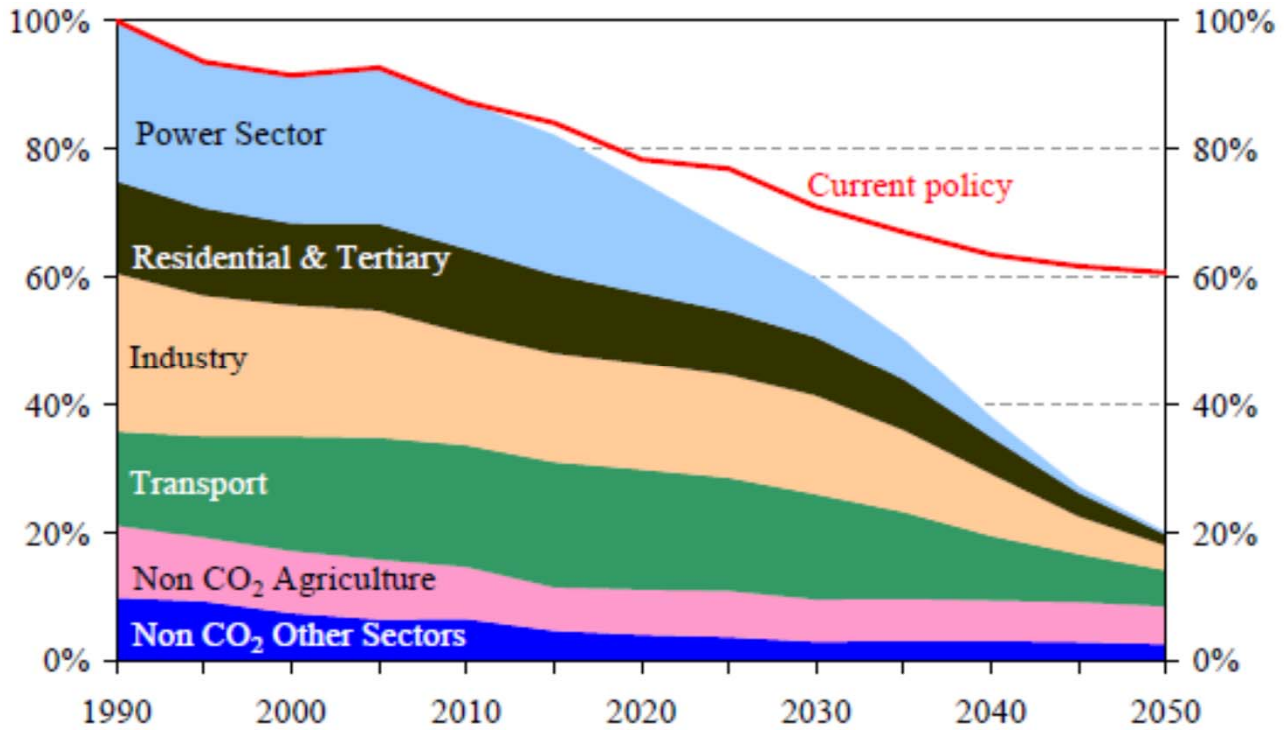
- More countries are introducing or are planning to introduce CO_2 related measures (either as economic or regulatory instruments) as a result of their INDCs (Intended Nationally Determined Contributions) ahead of the CoP in Paris in December
- Trading schemes are being piloted in China, have been adopted in South Korea and the EU ETS is in its 3rd phase, with the 4th phase also being discussed
- It is likely that more and more countries & regions will introduce ETS and/or other financial instruments
- With more trading schemes being implemented, and potentially also linked, industry will face a carbon price that is variable globally.

Governments need to recognise and embrace the importance of a strong and healthy industrial base in a sustainable economy.

Since ~35% of steel is traded internationally, policies must promote a level playing field to ensure that steel companies in one region are not put at a disadvantage with steelmakers from other regions or in relation to competing materials.

Policy Direction

Short term competitiveness issues & long term strategic challenges



Example: Schematic of EC's 2050 road map to a decarbonised Europe

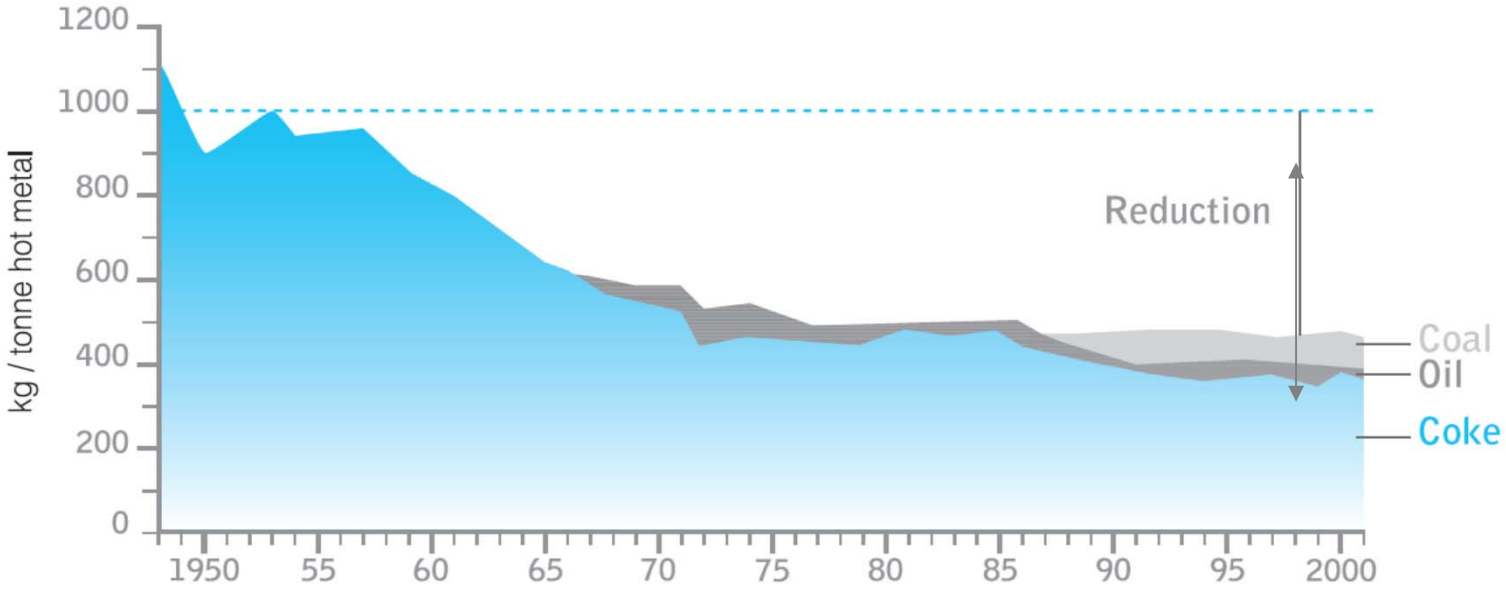
CO_2 Intensity

Need for new technology in the medium to long term

- Focus on ironmaking (80-90 % of CO_2)
- Present operation close to “best practice”

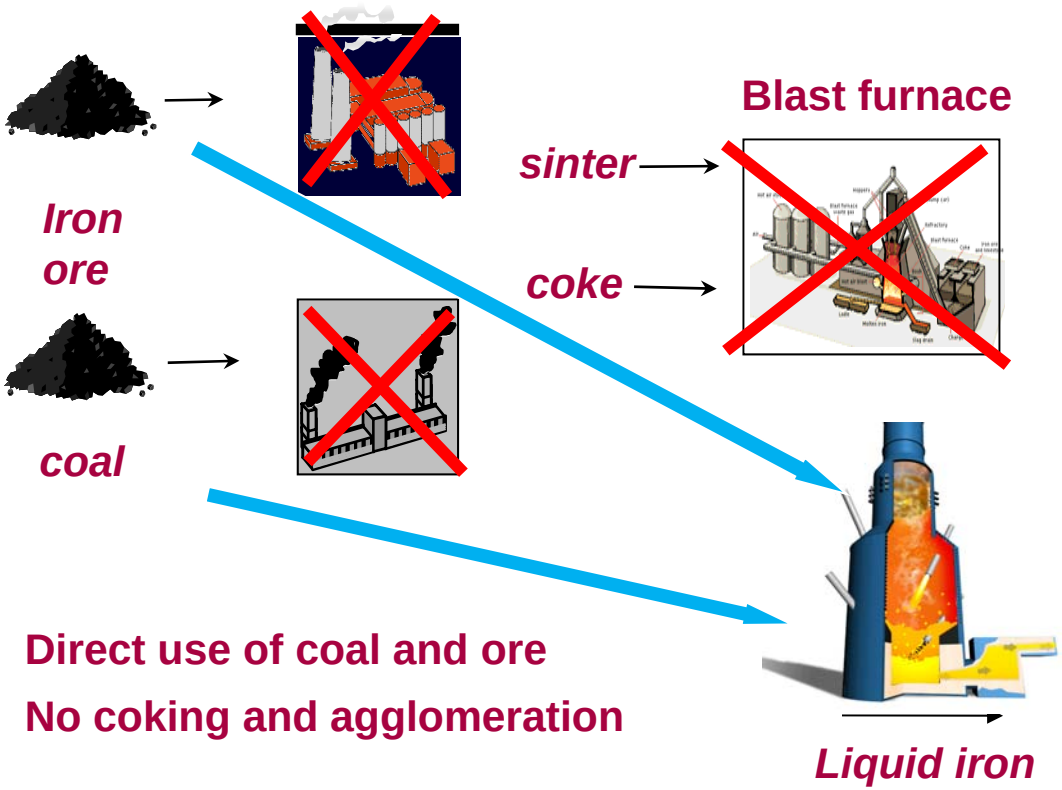
→ Further energy saving will not deliver long term target

→ Breakthrough technology development needed



Breakthrough Technology Developments

(1) HIsarna



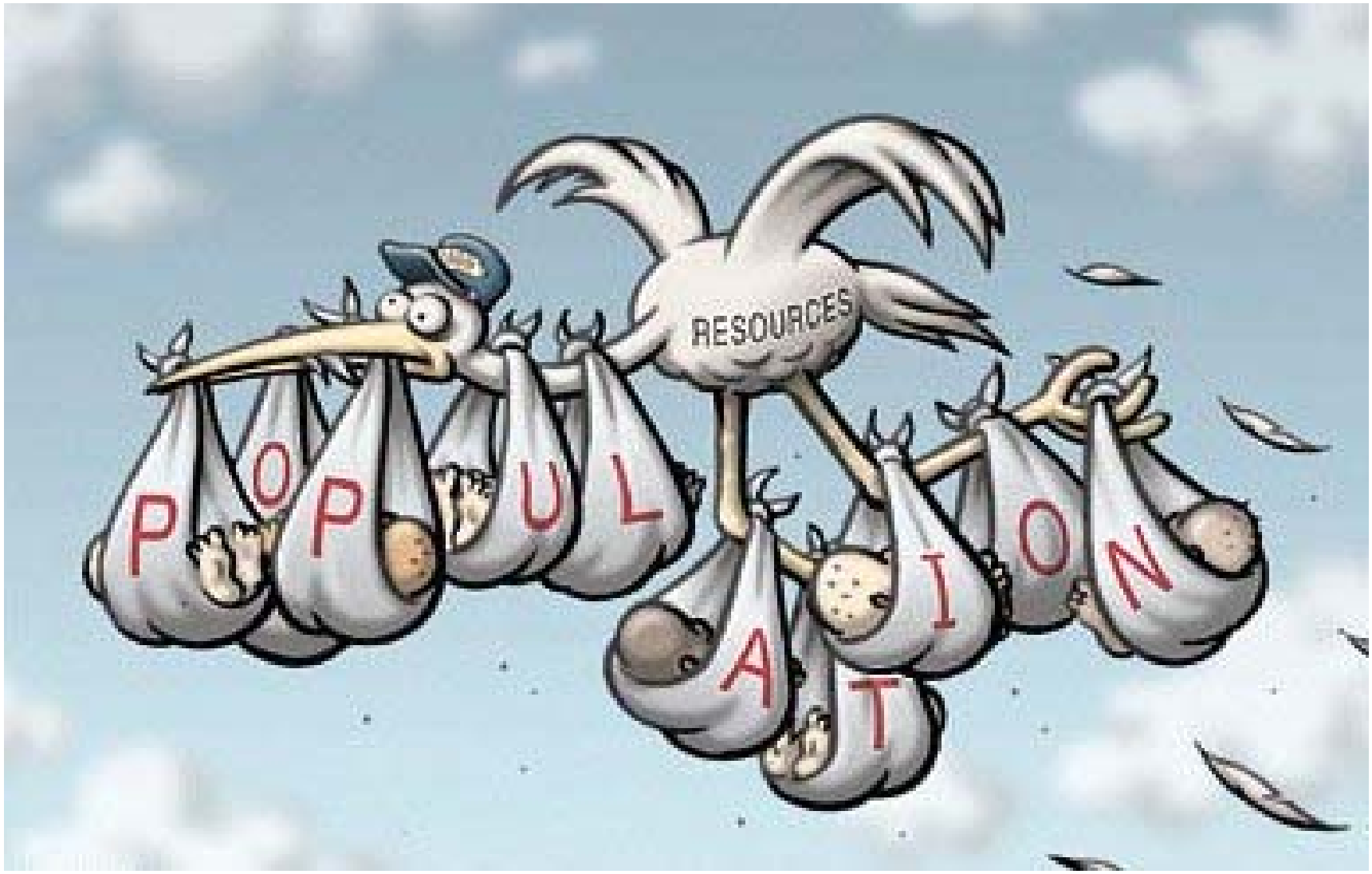
Direct use of coal and ore

No coking and agglomeration

(2) Carbon capture & utilisation: Algae

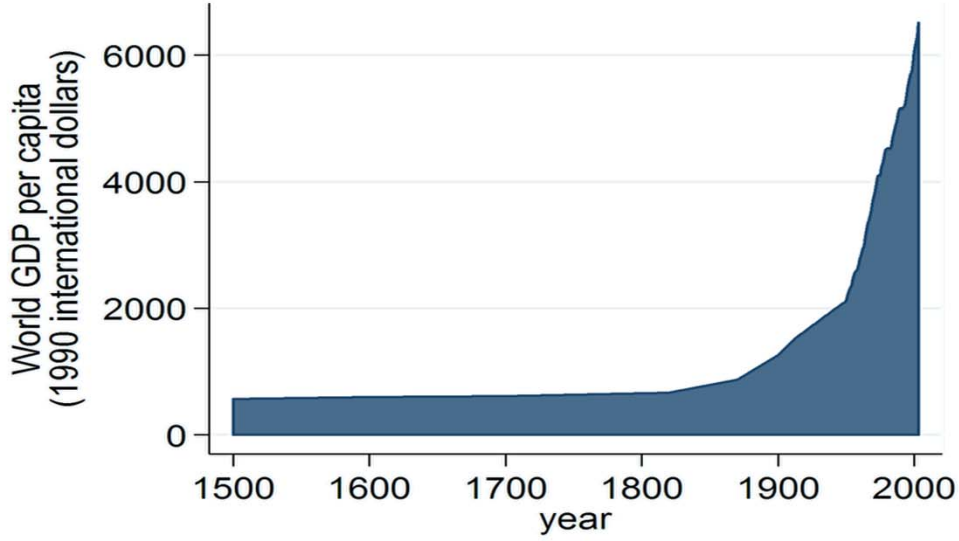
Breakthrough technology development must be accelerated, but to do so the financial burden will have to be shared between the industry and government.

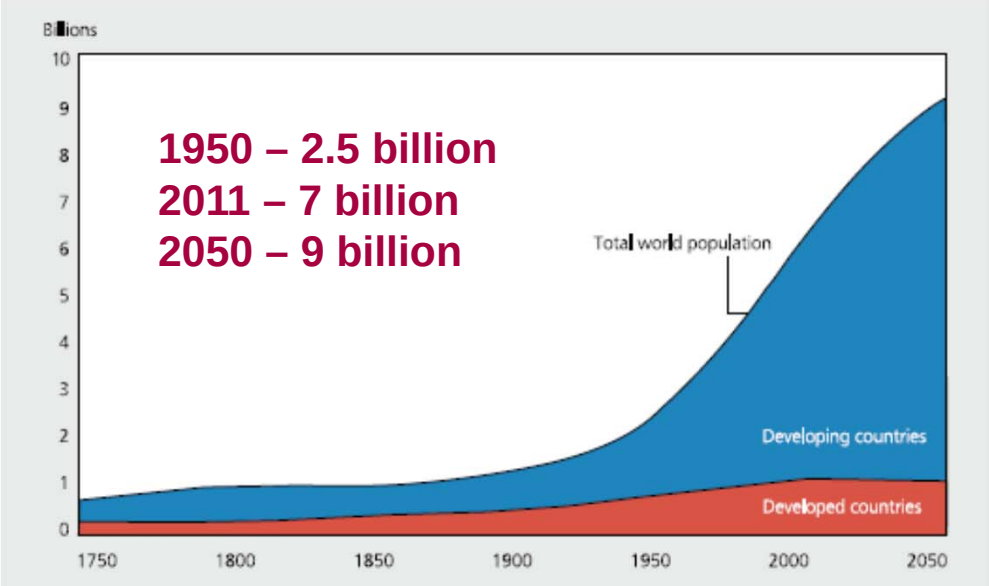
Increasing Demand For Resources



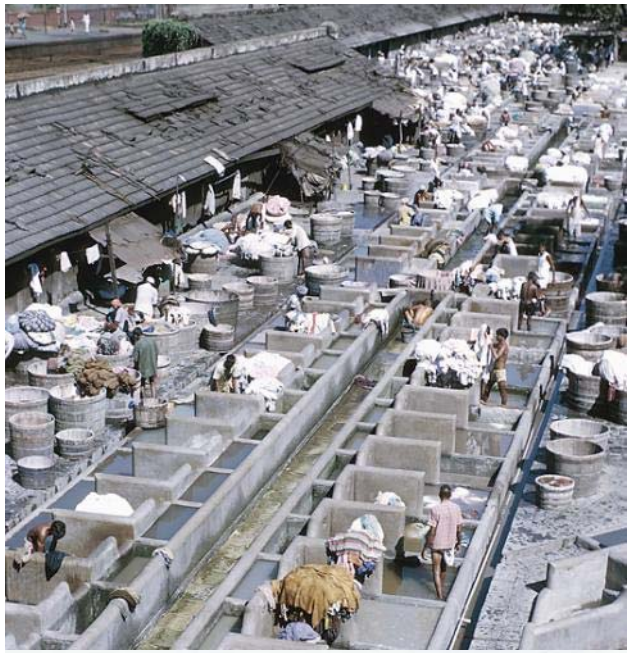
The rise of the middle-class consumer

An Opportunity….





1950 – 2.5 billion
2011 – 7 billion
2050 – 9 billion



Steel

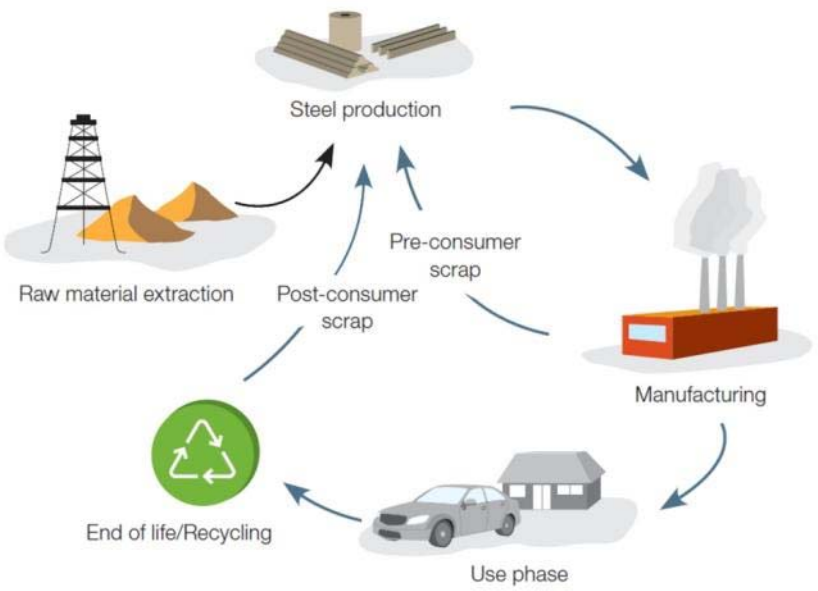
The backbone of continued economic development

Steel is everywhere in our lives and is central to making modern society sustainable – if it is not made of steel, it is made with steel.

Steel: a Sustainable Material

The only truly cradle to cradle recycled material

Steel life cycle



Steel enables sustainability

- Never consumed – once made, it is used again and again without loss of quality or strength
- The most recycled material in the world
- Long-term investment that does not go to waste
- Efficient – strong yet light.

Too often regulations will focus only on the production phase or the use phase of a product, ignoring the full life cycle and leading to inappropriate outcomes.

Steel for a Sustainable Future

Premium steel grades that help make a difference

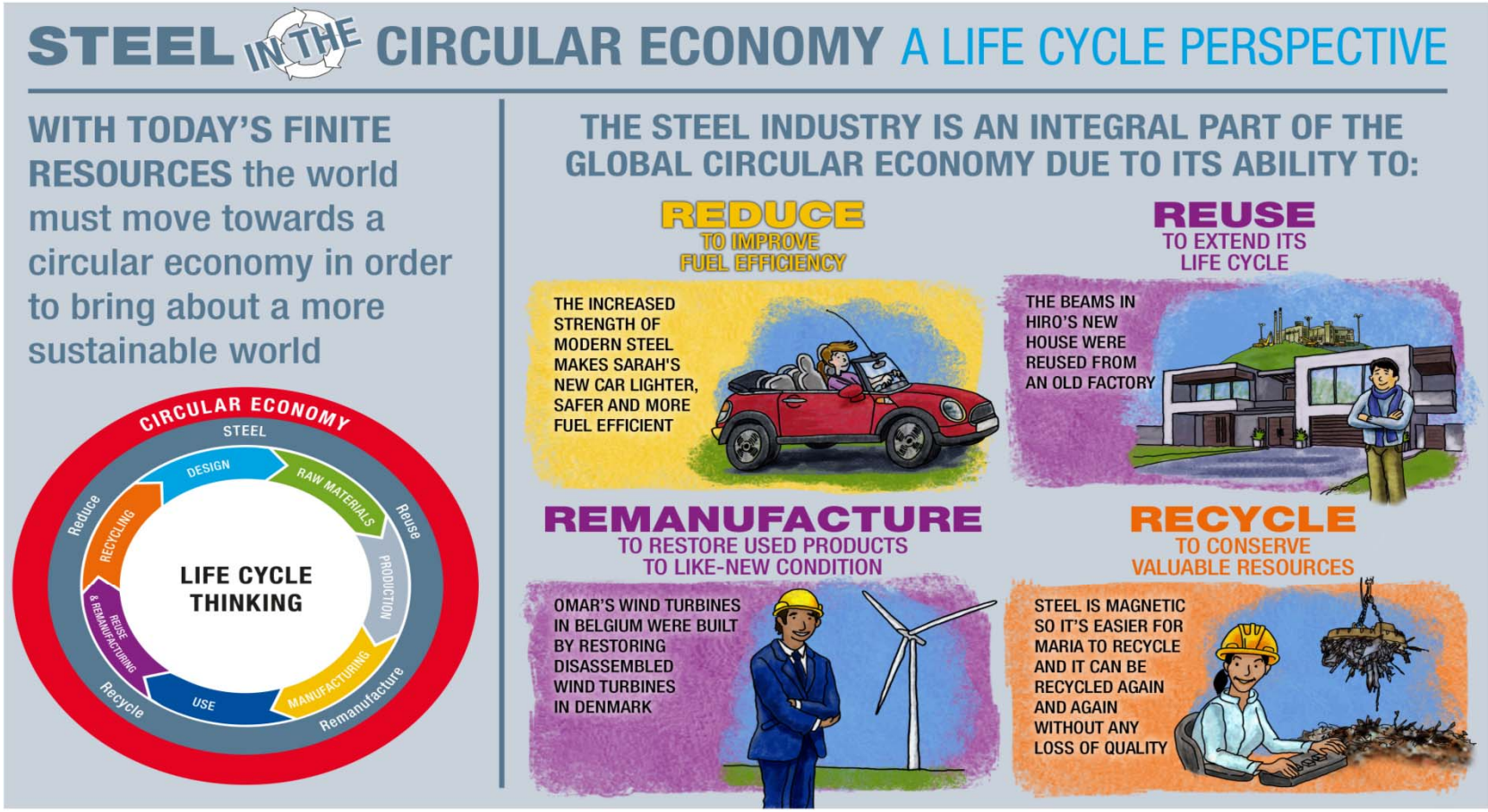
Durability, efficiency and flexibility make steel the material of choice for the world's most sustainable buildings

Steel supports the future of energy generation and makes the generators more efficient too

Steel is essential for sustainable vehicles and new grades make them even lighter, safer and more efficient

Steel manufacturing is CO_2 & energy intensive, but it enables significant CO_2 mitigation in other sectors.

Steel in the Circular Economy



A change from traditional linear business models, in which products are manufactured, used and discarded, to a circular business model where products are repaired, returned, reused & recycled

This is fundamental to the triple bottom line concept of sustainability.

The Global Challenges of Sustainability

Sustainable Development and Life Cycle Thinking

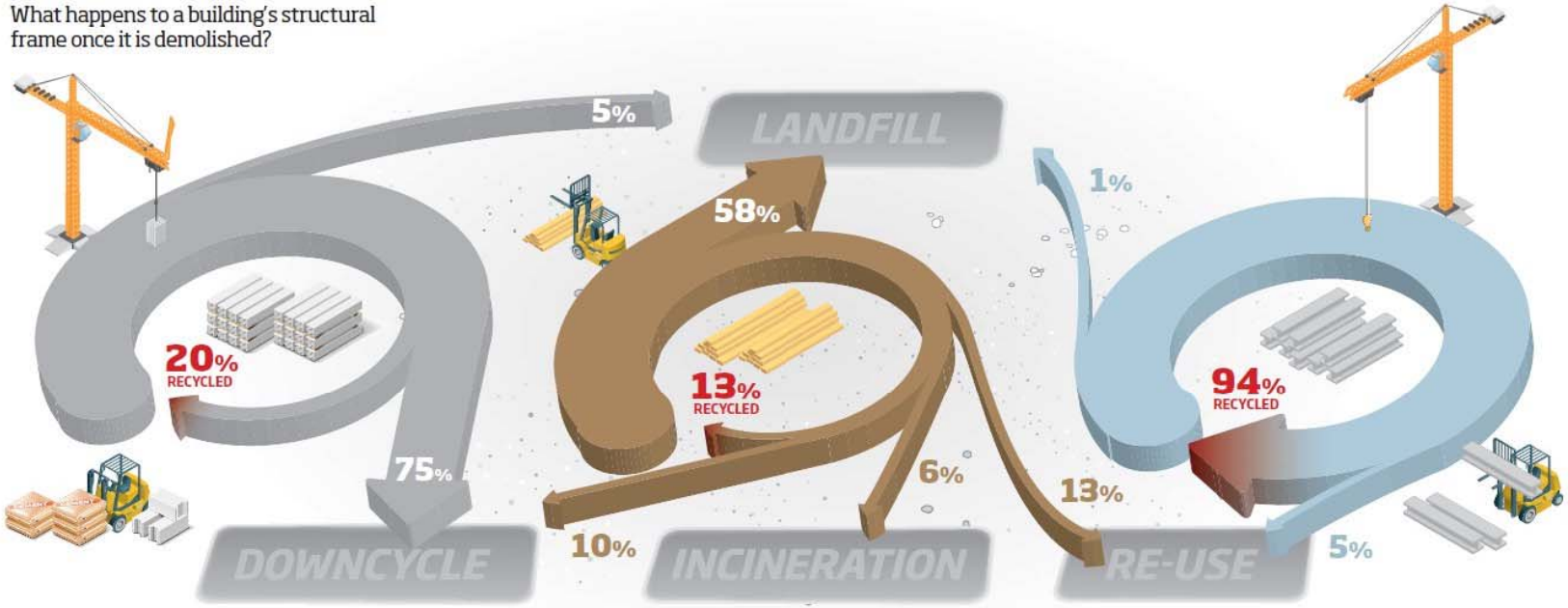
- Life Cycle Thinking is about making a **holistic** evaluation of the impact of a product or service
- Generally this is focused on **environmental impacts** but can also apply to social and economic impacts
- The **key aim** of Life Cycle Thinking is to avoid burden shifting
  - Minimising impacts at one stage of the life cycle, or in a geographic region, or in a particular impact category, while avoiding increases elsewhere.

Life Cycle Approach – End of Life Scenarios

THE FACTS

END-OF-LIFE SCENARIOS

What happens to a building's structural frame once it is demolished?



CONCRETE

The great majority of concrete from demolition sites is crushed and used as sub-base or fill. This is downcycling rather than recycling, ie a secondary use which is not of the same value as the first.

Aggregates from demolition may be re-used in concrete production but its use is restricted both by rules governing maximum percentages allowed and also by supply, since the amount of aggregate that can be recovered for this purpose is limited. Where aggregates are re-used in concrete, new cement, the source of most of the CO_2 emitted in concrete production, is still needed. The Concrete Centre is the source of the downcycling figure, with the other figures estimated using various sources.

TIMBER

Definitive information on what happens to timber waste following building demolition is difficult to find. Recent publications from TRADA indicate that up to 80% of timber waste in the UK goes to landfill. The information presented here is from the BRE Green Guide.

The downcycling figure is an estimate based on published information on how much timber is diverted from the waste stream for the manufacture of chipboard.

Problems with contamination in the waste stream in particular restrict opportunities to divert waste for re-use and recycling.

STEEL

Steel benefits from having a high intrinsic value supported by a well developed and efficient scrap collection infrastructure. It can be recycled at end of life to form products that are of the same, or higher, standard and quality as the original material and most steel components are large and easily captured.

Capture rates vary depending on the ease of extraction from the demolition site but are always above 90% and average 94% for all steel components. For sections, it is 99%.

These rates can be found in Material flow analysis of the UK steel construction sector, J. Ley, 2001.

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