

**United Nations Forum on Climate Change Mitigation,  
Fuel Efficiency and Sustainable Urban Transport**

16-17 March 2010

# **A Convenient Truth: Perspectives for Reducing Resource Use in Urban Transport**



***Mr Karlson James Hargroves (Charlie)***

***Executive Director, The Natural Edge Project  
Griffith University and The University of Adelaide***

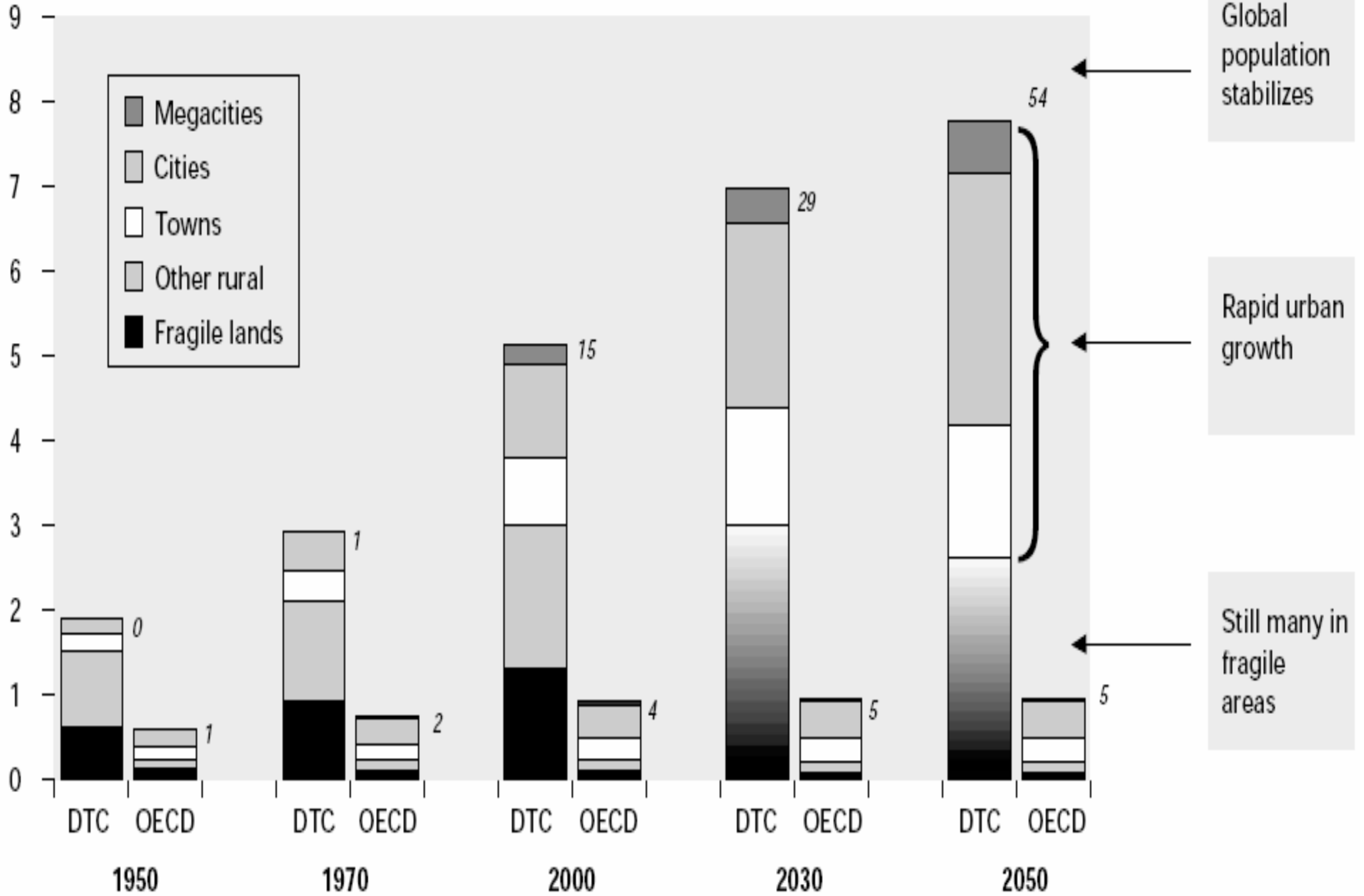
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***With Prof. Ernst Ulrich von Weizsäcker***

Shanghai has built more  
skyscrapers in the last 10 years  
then there are in the whole of  
New York!

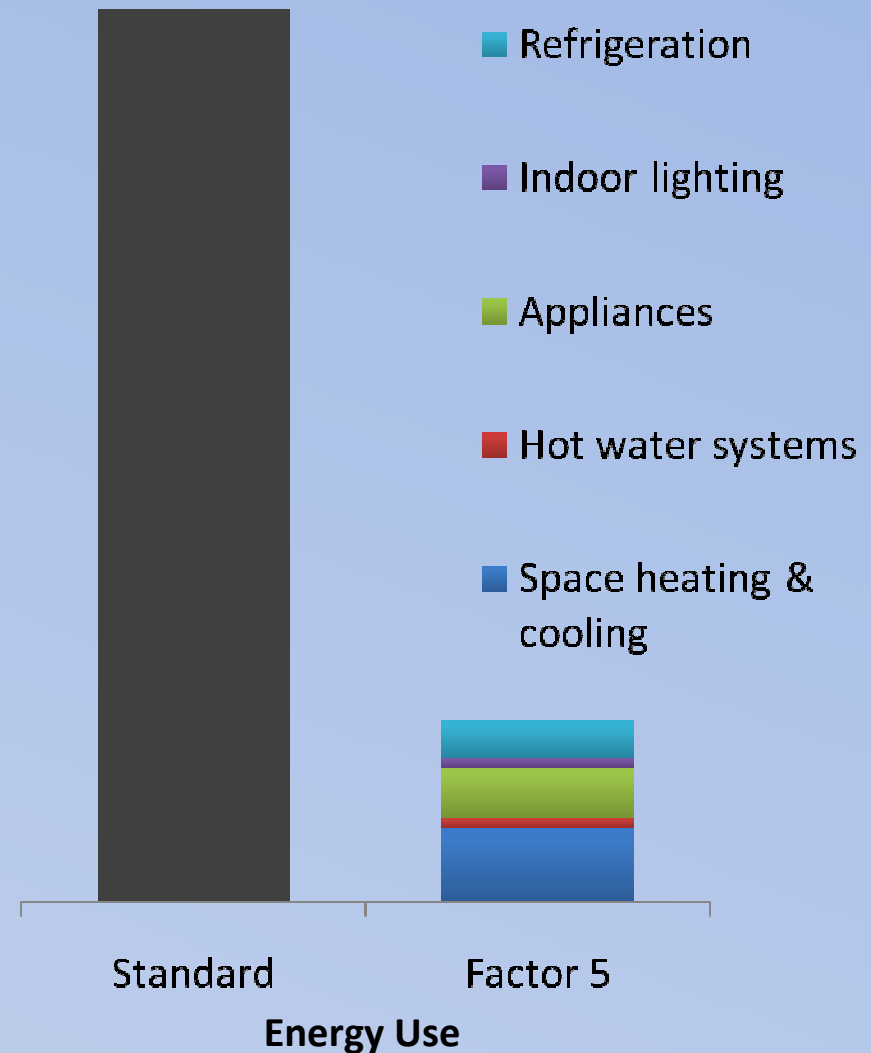


# Population (billions)



Source: World Bank (2003) *World Bank Development Report 2003: Sustainable Development in a Dynamic World*, Oxford University Press, Oxford.

# Residential Buildings



# Commercial Buildings



- Building orientation/envelope
- Energy management systems
- HVAC
- Efficient office equipment
- Efficient lighting
- Retrofitting existing buildings



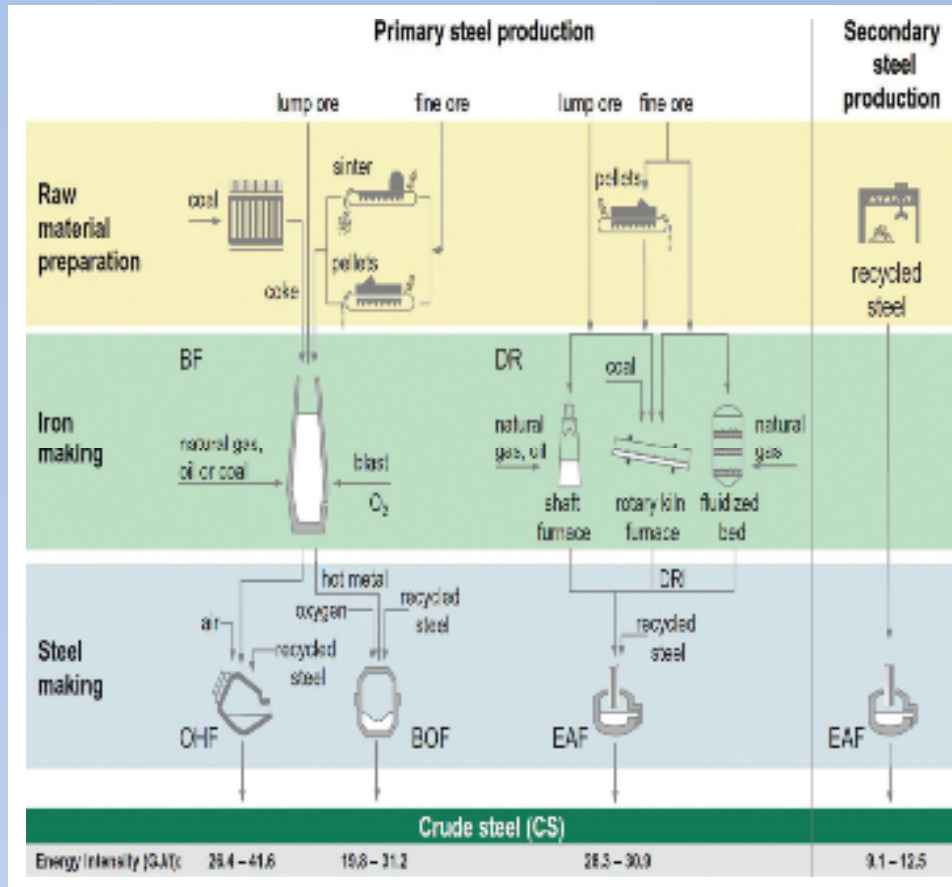
Standard

Factor 5

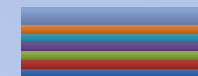
Energy Use



# Heavy Industry (Steel Production)



- EAF Production Method
- Net Shape Casting
- Heat & Power Recovery
- Feedstock Change
- Fuel Switching
- Energy Monitoring & Management Systems
- Preventative Maintenance

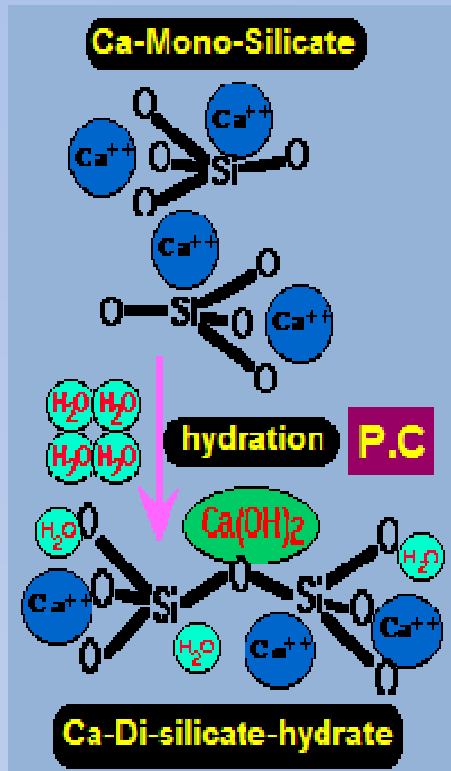


Standard

> Factor 5

Energy Use

# Heavy Industry (Cement Production)



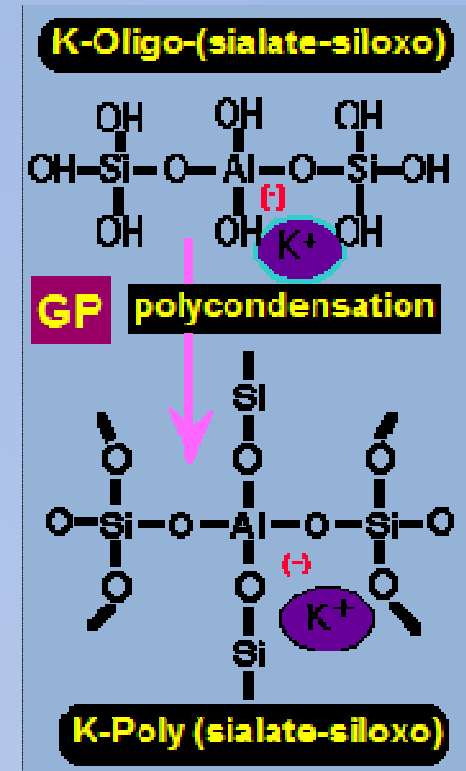
**Portland  
Cement**

- Alumino-silicate (geopolymer)
- Magnesium-phosphate cement
- Sulfo-aluminate cement
- Materials Efficiency
- Fuel Switching
- Kiln Design

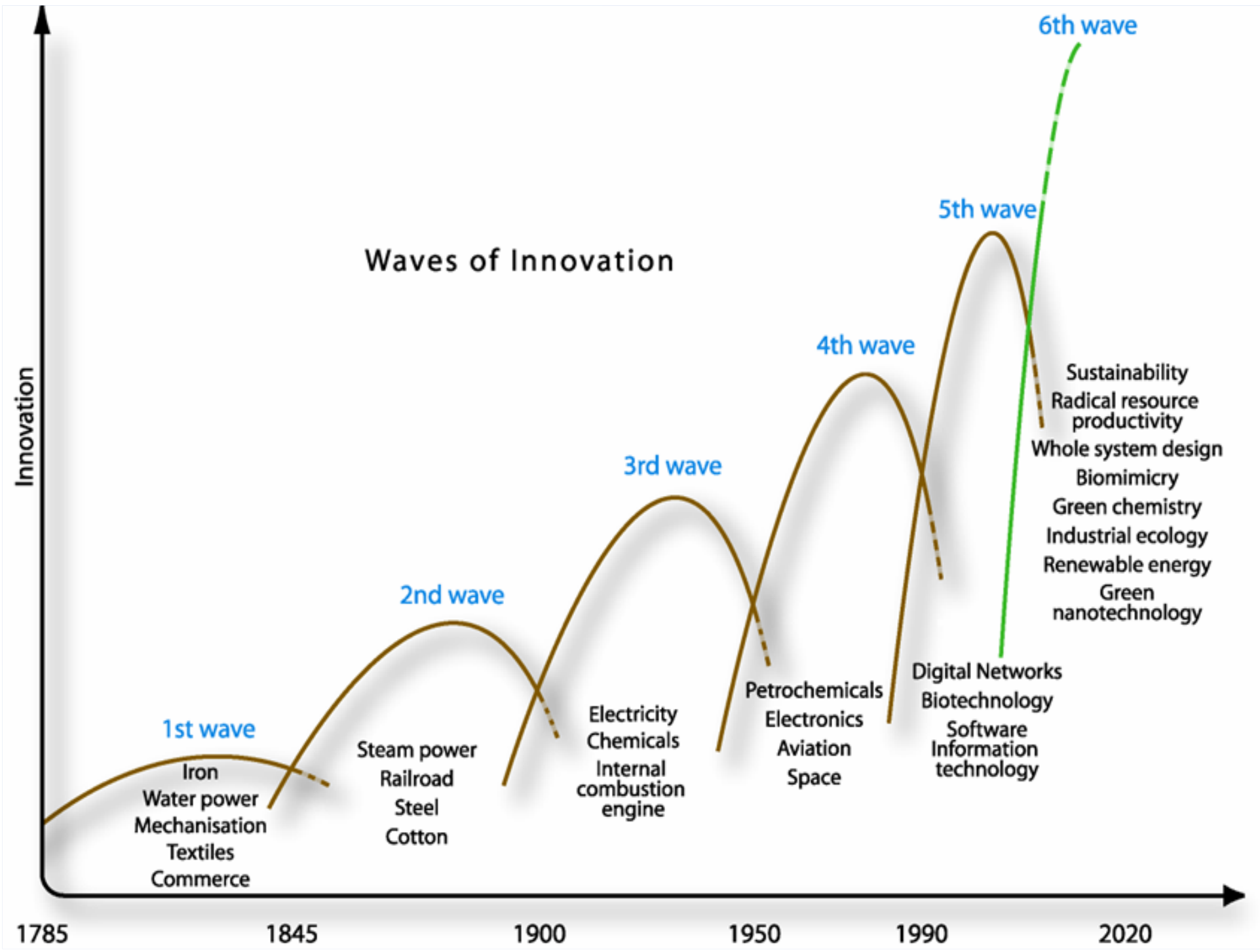
Standard

Factor 5

Energy Use



**Geo-Polymer  
Cement**



**Waves of Innovation**

Innovation

1785 1845 1900 1950 1990 2020

1st wave

Iron  
Water power  
Mechanisation  
Textiles  
Commerce

2nd wave

Steam power  
Railroad  
Steel  
Cotton

3rd wave

Electricity  
Chemicals  
Internal combustion engine

4th wave

Petrochemicals  
Electronics  
Aviation  
Space

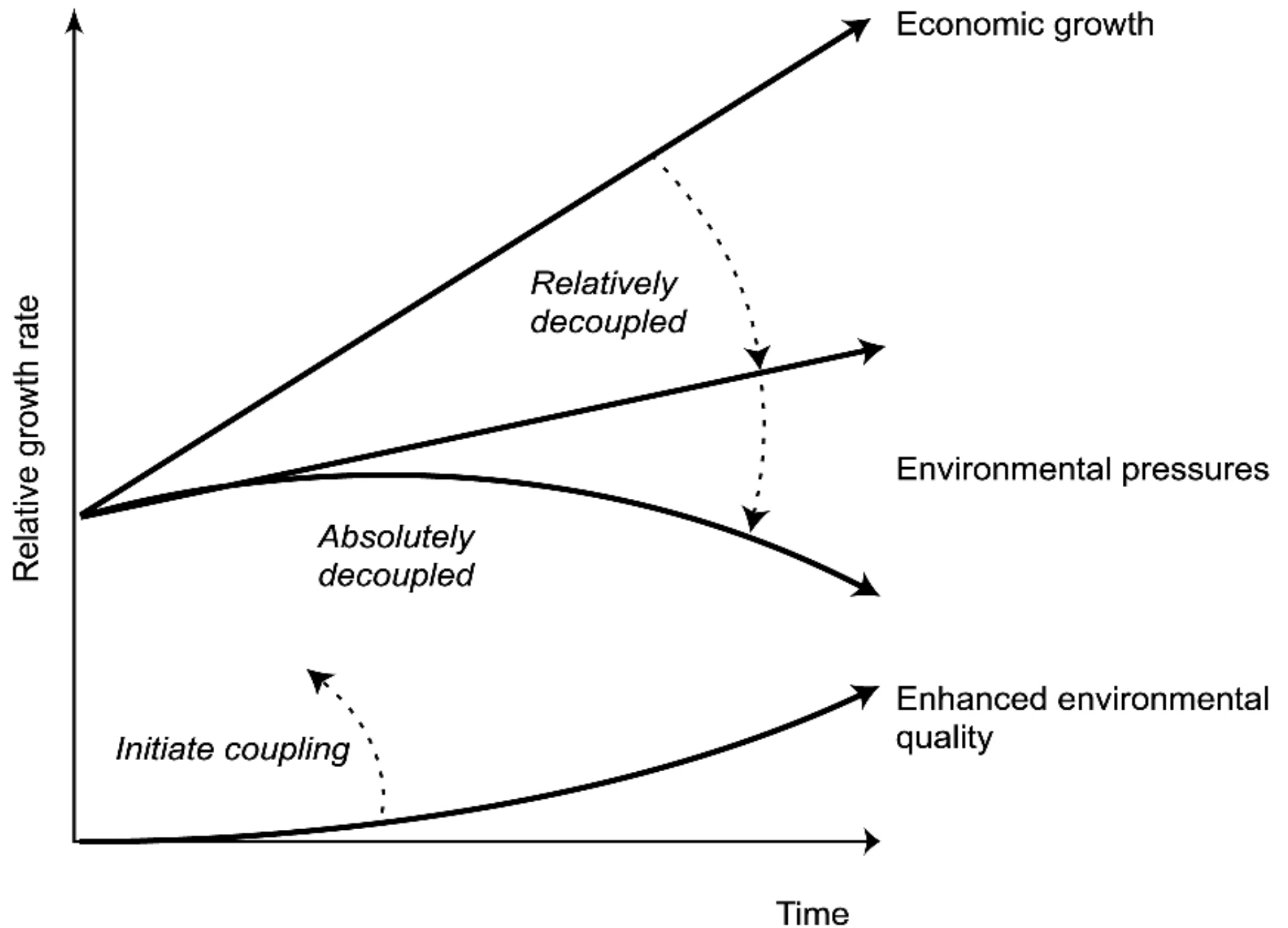
5th wave

Digital Networks  
Biotechnology  
Software  
Information technology

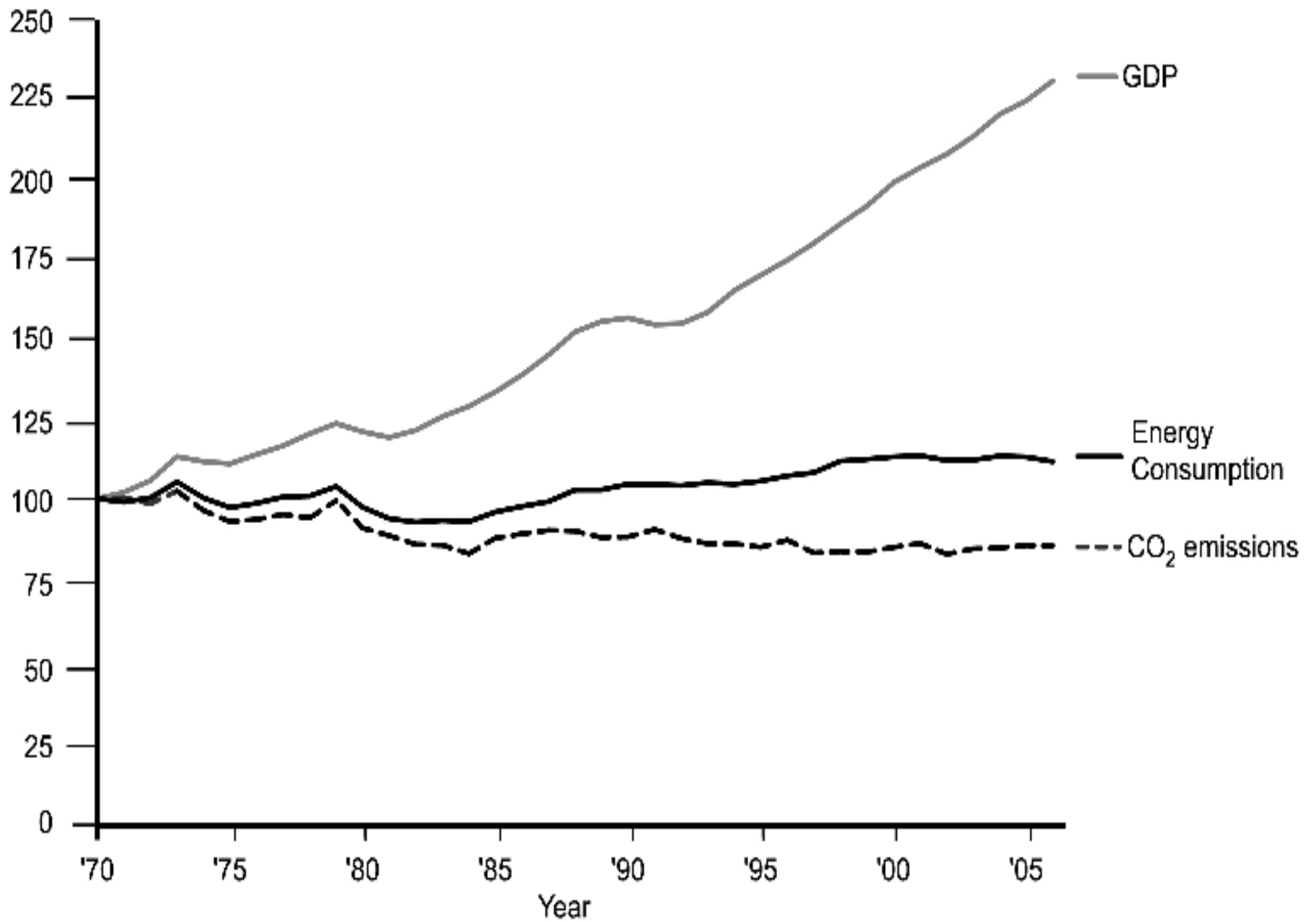
6th wave

Sustainability  
Radical resource productivity  
Whole system design  
Biomimicry  
Green chemistry  
Industrial ecology  
Renewable energy  
Green nanotechnology



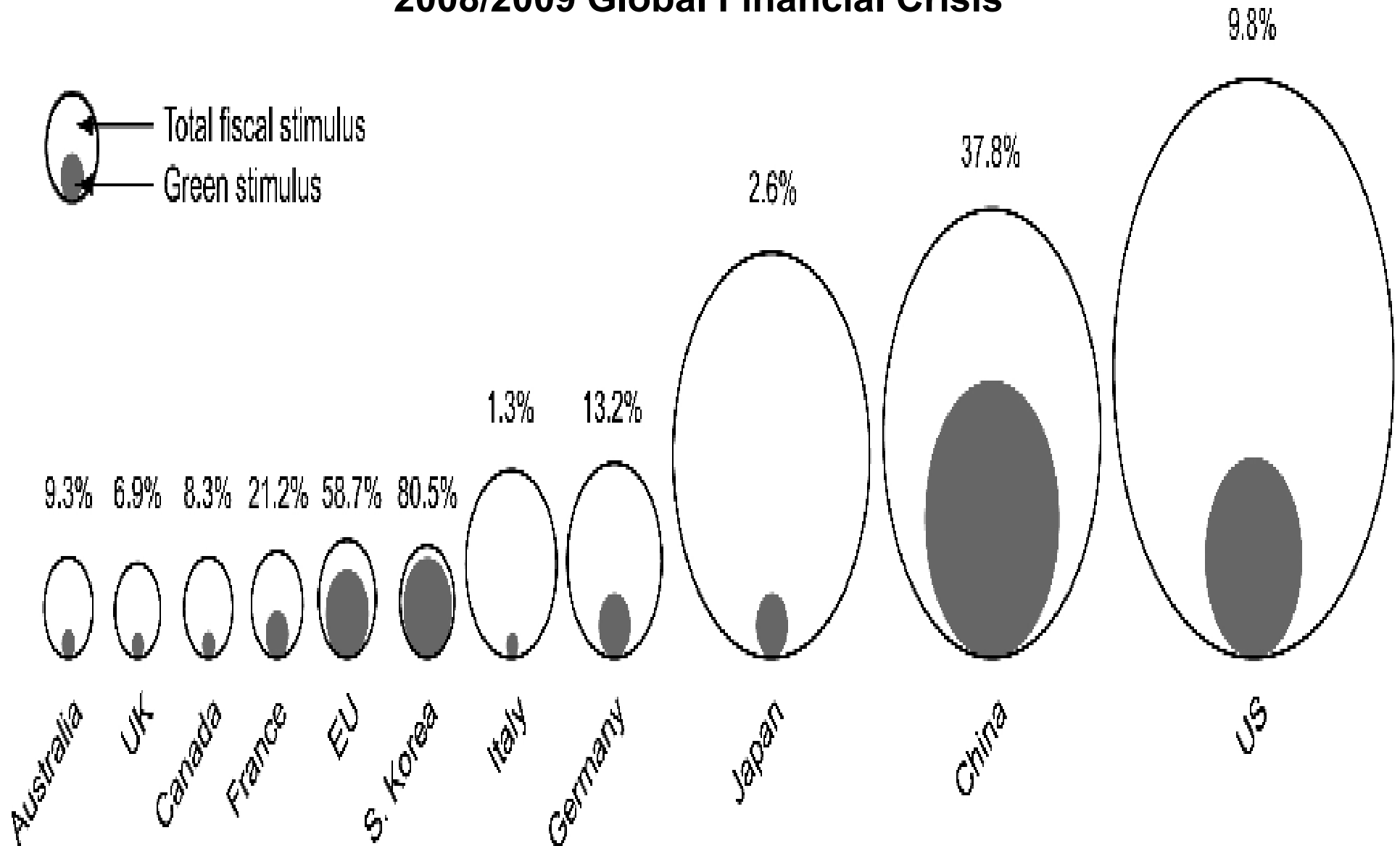


Source: Smith, M., Hargroves, C. and Desha, C. (2010) *Cents and Sustainability: Securing Our Common Future by Decoupling Economic Growth from Environmental Pressures*, Earthscan, London.

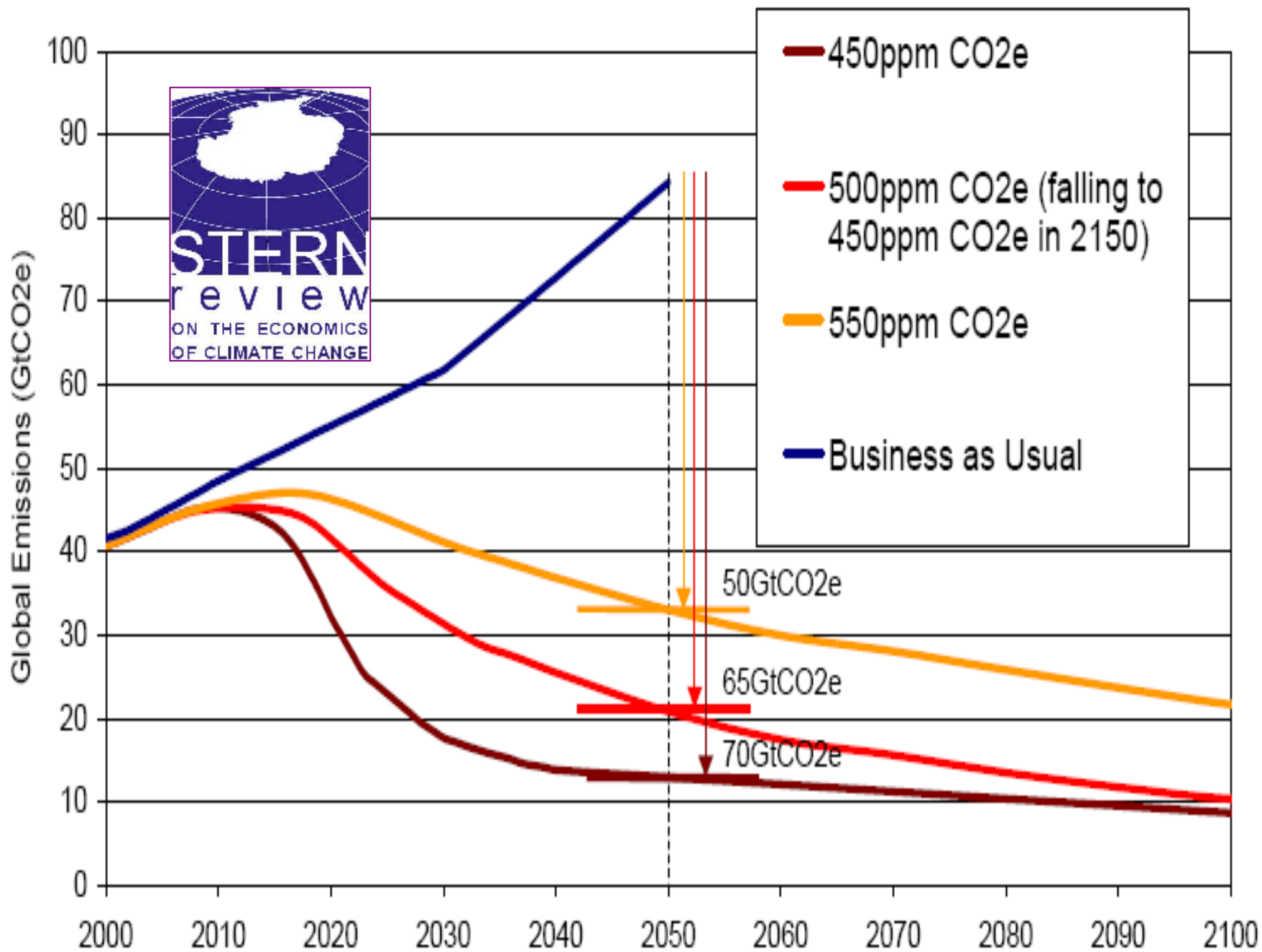


Source: UK Department for Environment, Food and Rural Affairs, and World Resource Institute. (Cited in 'Factor Five')

## Fiscal Stimulus Considerations 2008/2009 Global Financial Crisis



Source: Robins, N., Clover, R. and Singh, C. (2009) *A Climate for Recovery – The Colour of Stimulus Goes Green*, HSBC Global Research, London.





Economic	Social	Environmental
<p><b>Deterioration of infrastructure from Air Pollution</b> (e.g. tropospheric ozone caused by vehicle emissions is estimated to cost the UK economy US\$135 million/year through rubber decomposition and disintegration.)</p>	<p><b>Air Pollution related Health Effects</b> (e.g. a 1999 study revealed that as many as 10,000 people die prematurely in Delhi due to air pollution each year, equivalent to an average of one death every 52 minutes in the city.)</p>	<p><b>Generation of Greenhouse Gases causing Global Warming</b> (e.g. in 2004 the global transportation sector was responsible for 23% of world energy-related CO<sub>2</sub> emissions, with road transport (cars and freight trucks) accounting for 74%.)</p>
<p><b>Reduced Agricultural Yields from Air Pollution</b> (e.g. tropospheric ozone is estimated to cause up to US\$12 billion/year in lost production in Europe.)</p>	<p><b>Corrosion of Heritage Structures</b> (e.g. sulphur and nitrogen oxides corrode buildings and heritage structures, such as the Taj Mahal in India and the Colosseum in Rome.)</p>	<p><b>Oil Depletion</b> (e.g. oil demand is projected to grow from 85 million barrels per day in 2008 to 105 mb/d in 2030. Conventional oil production is set to peak around 2010 in non-OPEC countries.)</p>

Economic	Social	Environmental
<p><b>Costs related to Global Warming</b> (e.g. according to the Stern Review costs related to global warming may be as high as 20% of GDP.)</p>	<p><b>Public Health and Fitness</b> (e.g. every 60 minutes spent in the motor vehicle on average per day, the probability of a participant being obese increases by 6%.)</p>	<p><b>Air Pollution</b> (e.g. the formation of photochemical smog and tropospheric ozone, release of particulate matter such as PM<sub>10</sub>, and the products of incomplete combustion)</p>
<p><b>Traffic Congestion</b> (e.g. in 2003 it was estimated that congestion cost UK businesses as much as GBP15 billion a year.)</p>	<p><b>Inequity</b> (e.g. more than half the population in automobile dependant cities are transportation disadvantaged)</p>	<p><b>Acidification</b> (e.g. along with coal fired electricity generation transport emissions contribute to acidification that can lead to a loss of ecosystem resilience.</p>
<p><b>Infrastructure Investment</b> (e.g. cities that focus on road systems can spend up to 17% of their wealth, cities focused on integrated public transport systems can spend 5%.)</p>	<p><b>Community Development</b> (e.g. community and neighbourhood interactions are lessened in low public transport cities.)</p>	<p><b>Land Use</b> (e.g. the loss of land to parking and roads greatly reduces the amount of productive land available.)</p>

**Strategy A:** *To achieve a significant reduction in the energy/carbon intensity of vehicles through both improved design of passenger and freight transportation modes (cars, trucking, air travel, rail and shipping), and a shift to low or no carbon fuels.*

**Strategy B:** *To achieve a significant shift to lower energy/carbon intensity modes of transportation for both passenger travel (public transport, fast trains and video-conferencing) and freight transport (harnessing rail and shipping transport options).*



## ***Strategy A: Reducing the Energy/Carbon Intensity of Vehicles***

*The Potential for Decarbonisation of Cars and Light Vehicles*

*The Potential for Decarbonisation of Heavy Freight Trucks*

*The Potential for Decarbonisation of Aircraft*

*The Potential for Decarbonisation of Rail*

*The Potential for Decarbonisation of Shipping*

## ***Strategy B: Shifting to Lower Energy/Carbon Intensity Modes of Transportation***

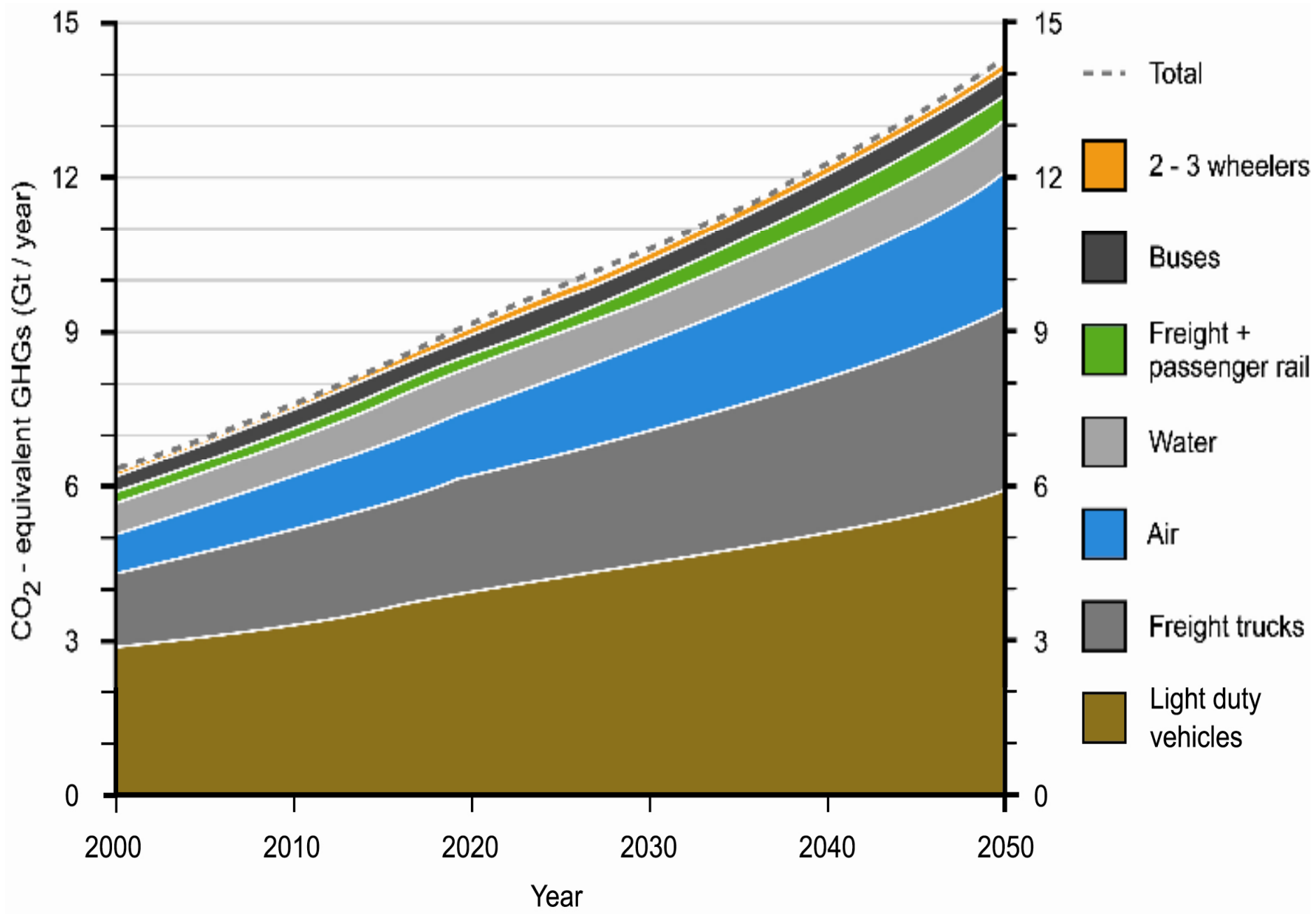
*Discouraging the Use of Cars*

*Investing in Public Transport and Other Modes*

*Alternatives to the Use of Trucks for Freight*

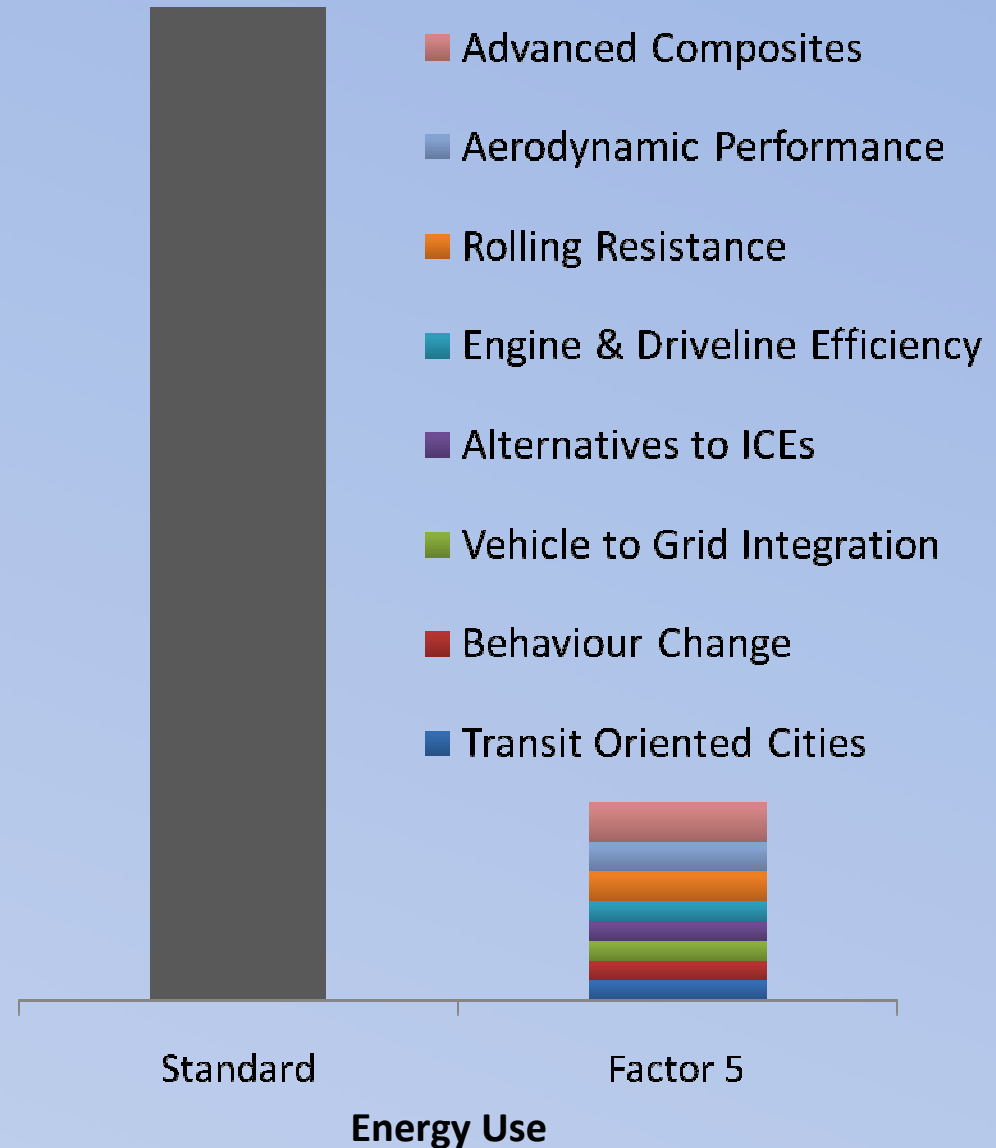
*Avoiding the Need to Travel by Air - Video Conferencing*

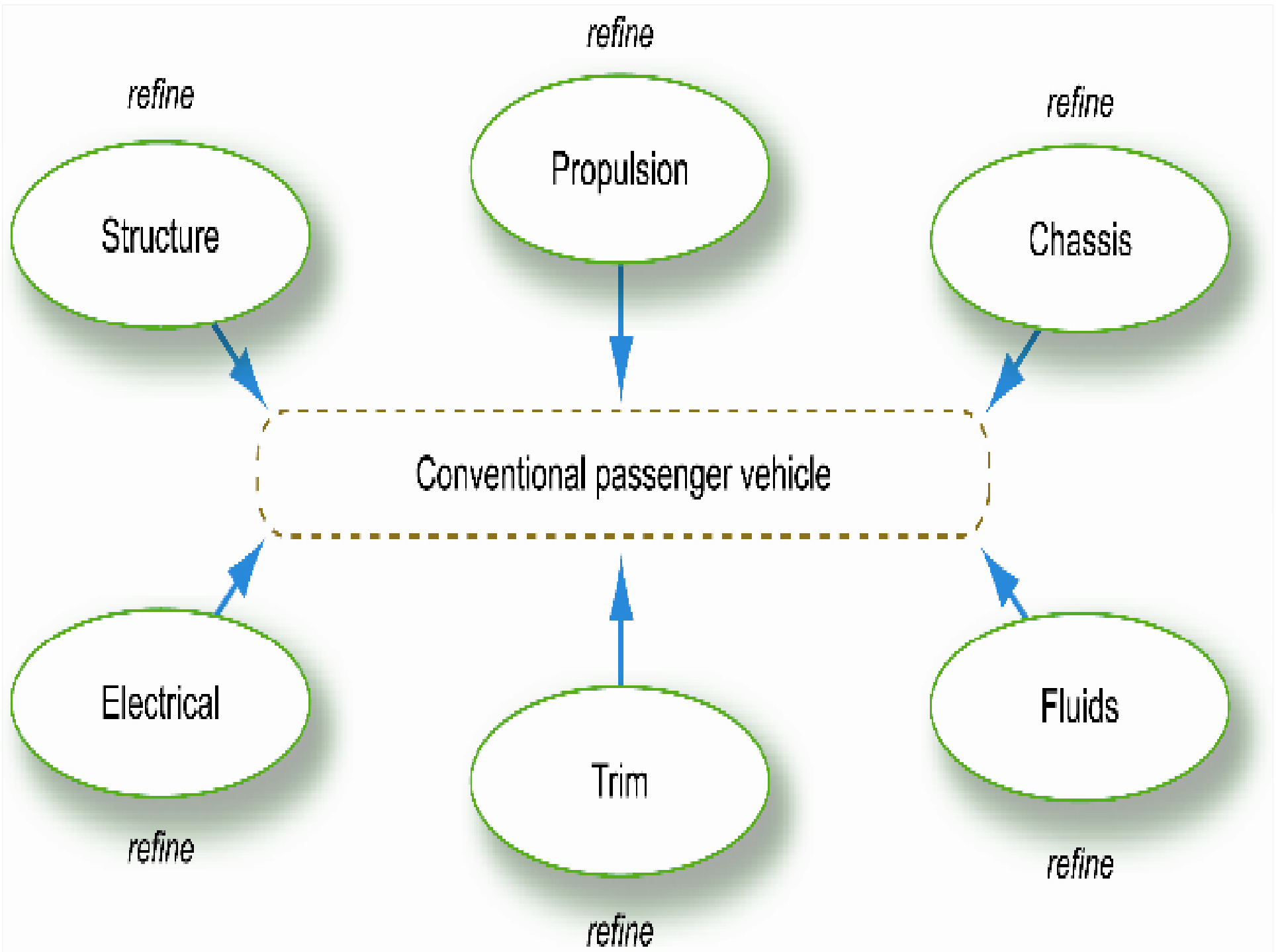
*Alternatives to Air transport - Fast Trains*



Source: World Business Council for Sustainable Development, 2003 (Cited in 'Factor Five')

# Light Duty Vehicles

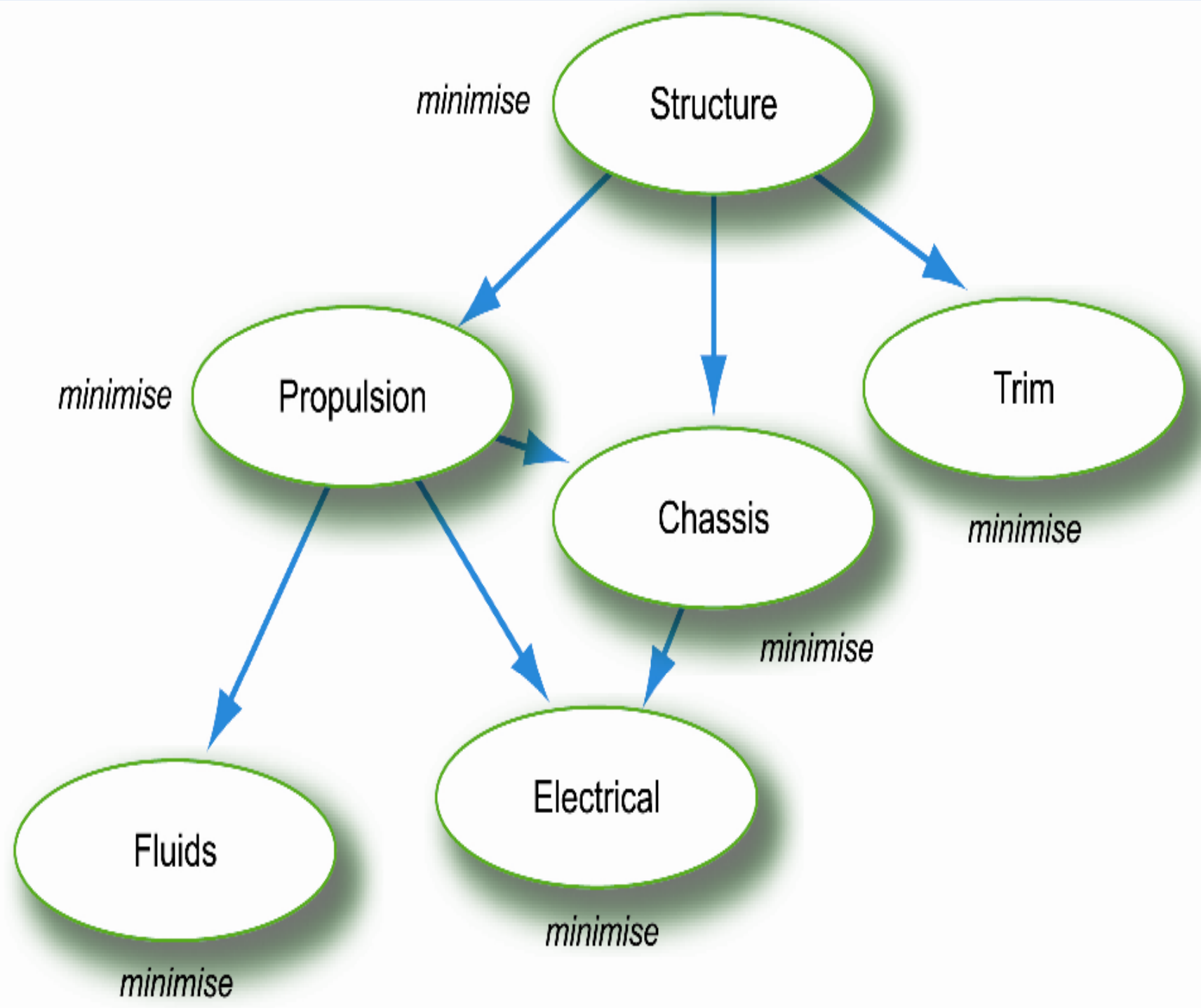


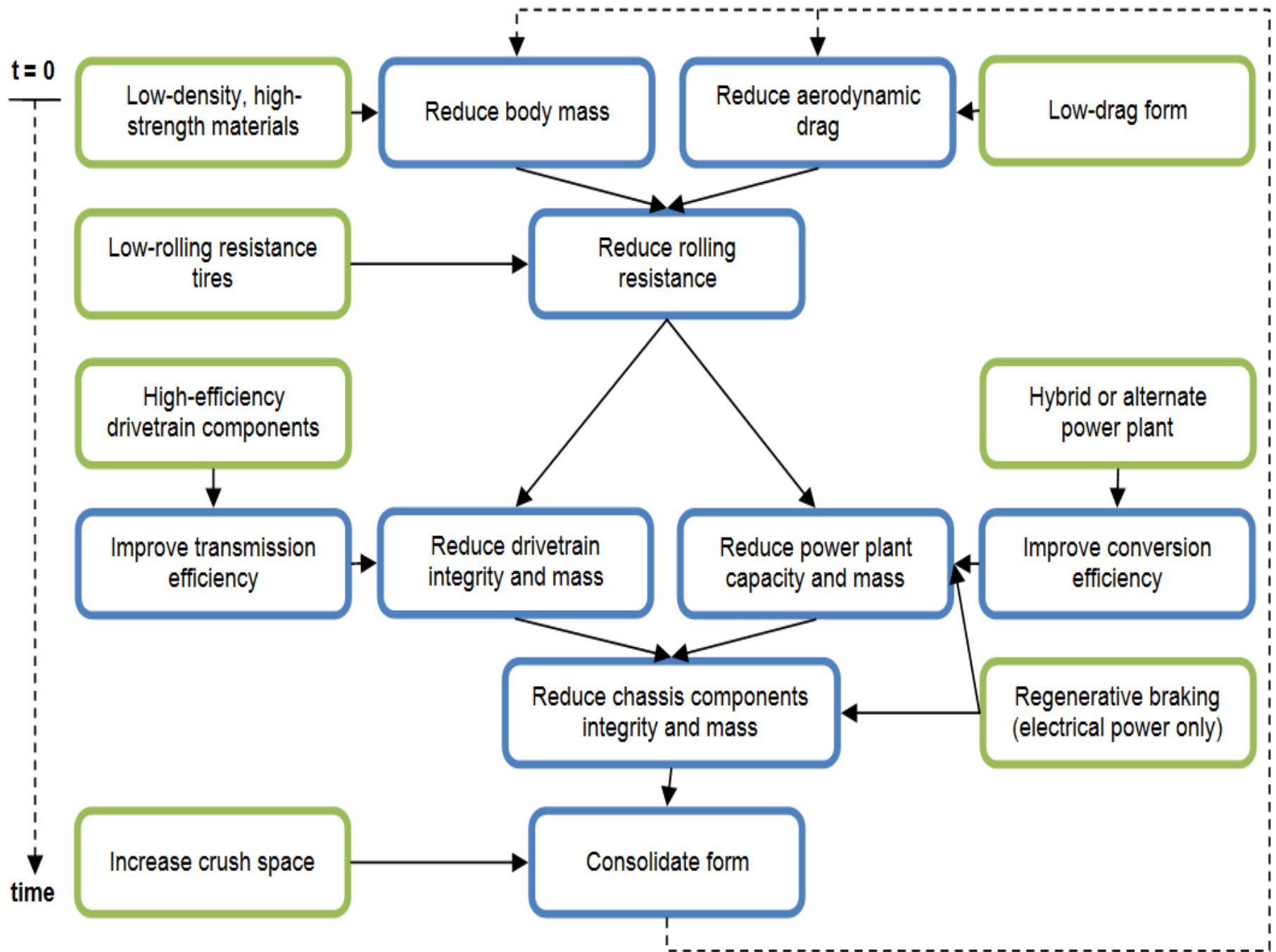


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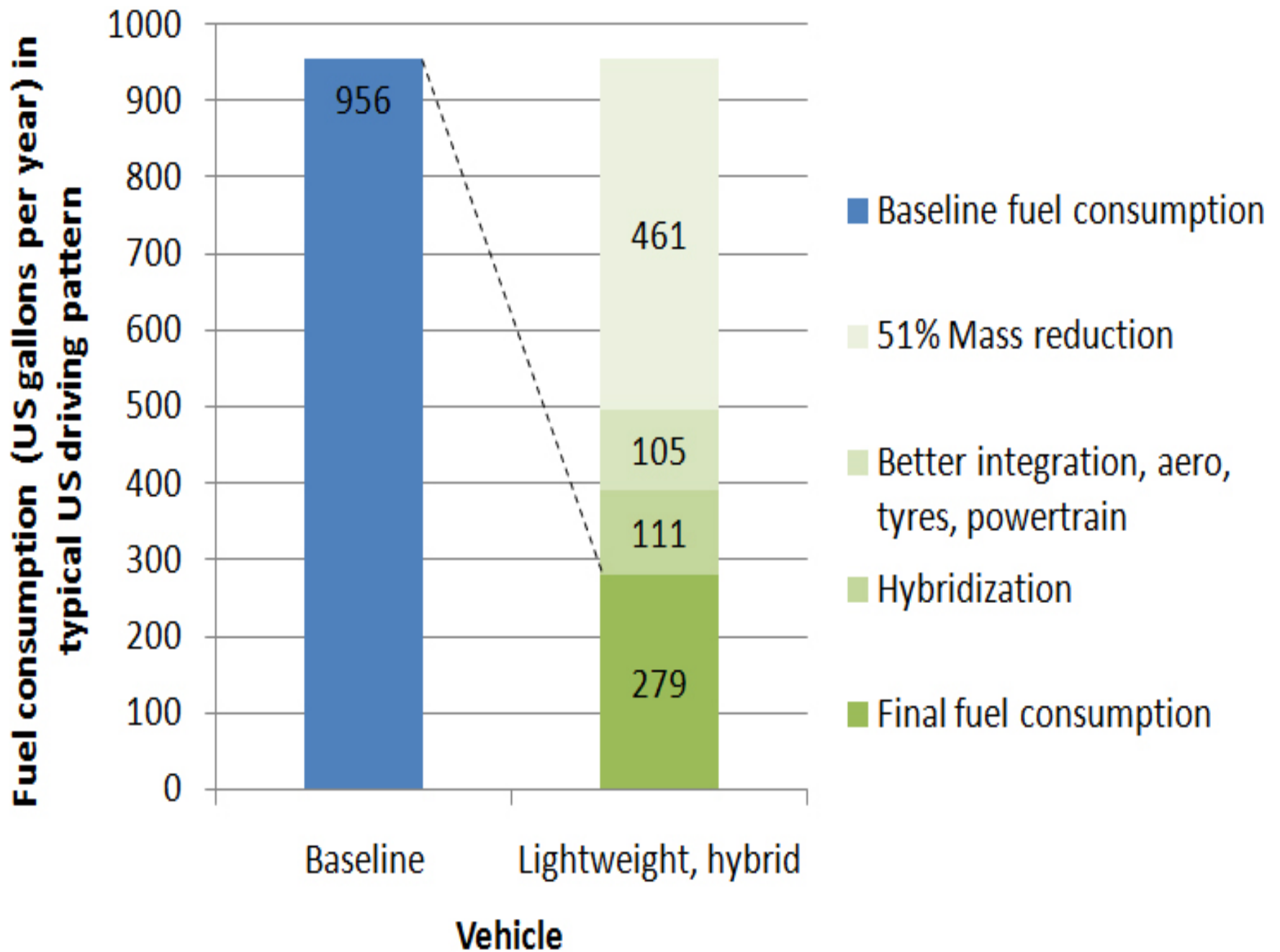


time



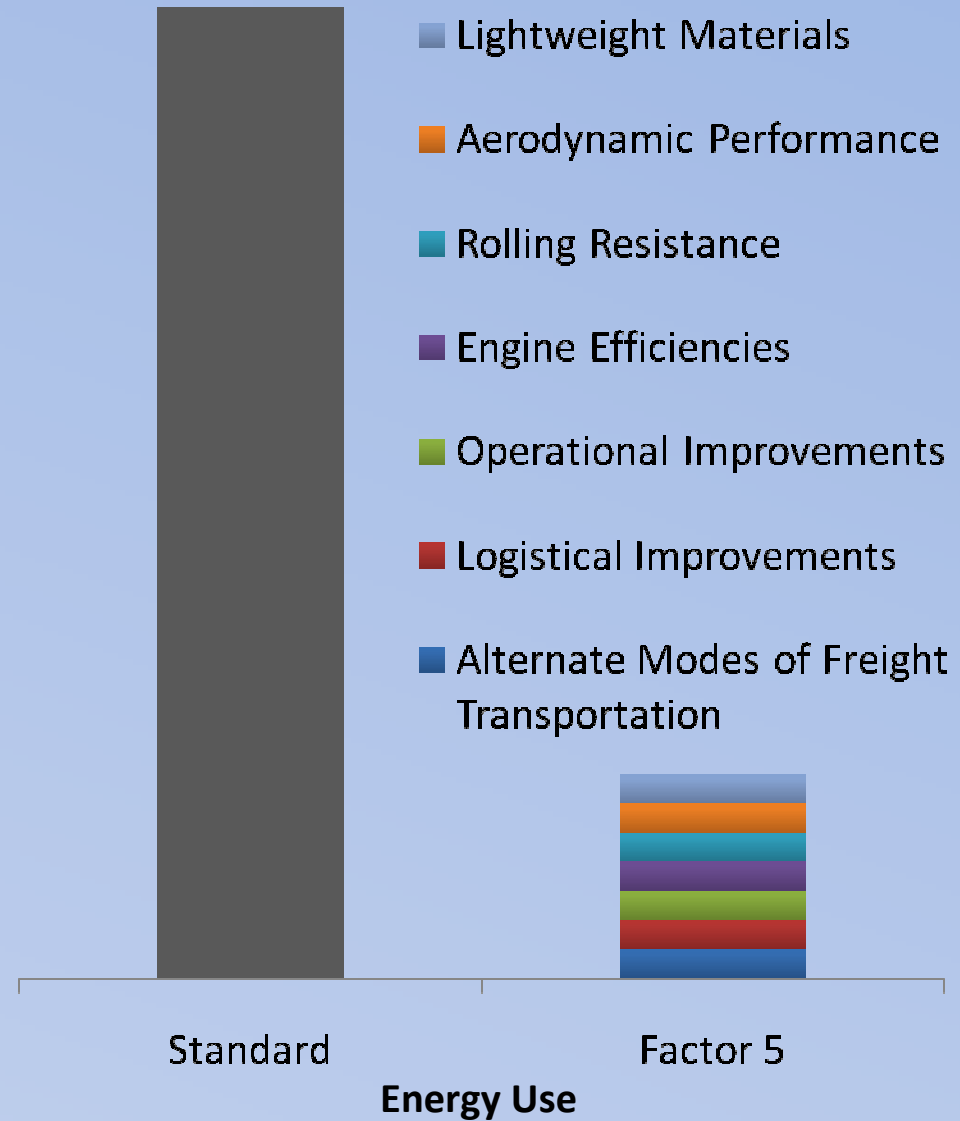


Source: Rocky Mountain Institute , 1998 (Cited in 'Factor Five')



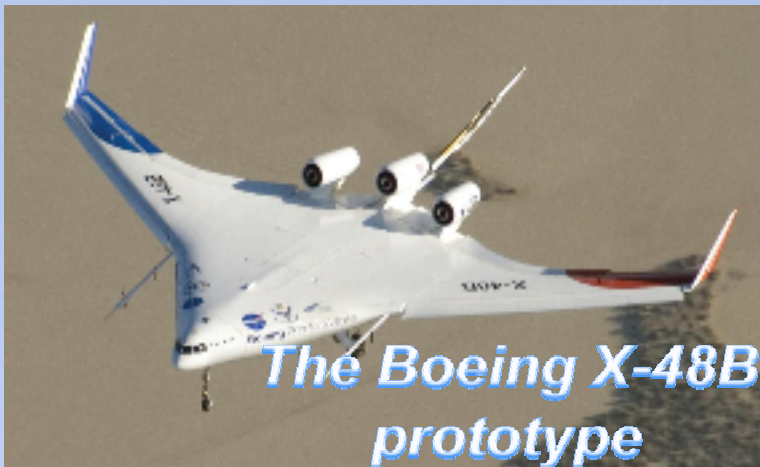
Source: Rocky Mountain Institute , 2007 (Cited in 'Factor Five')

# Freight Trucks

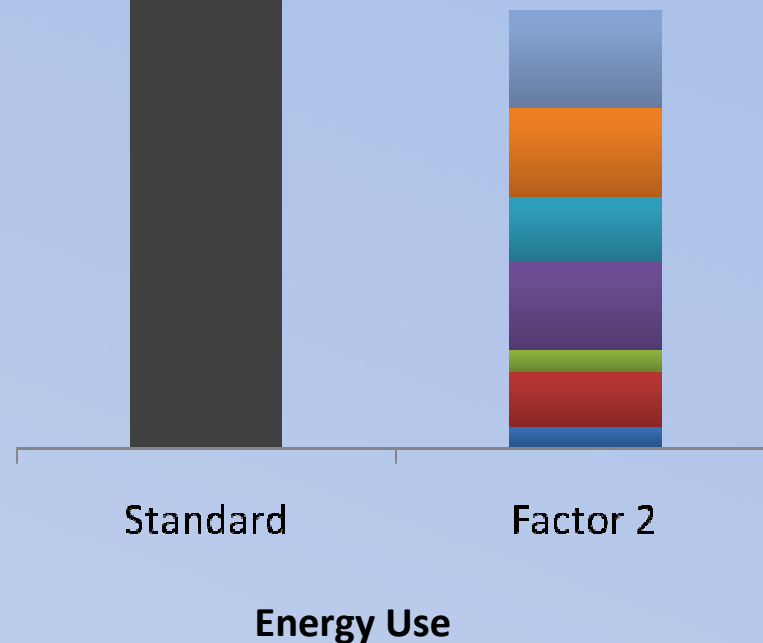




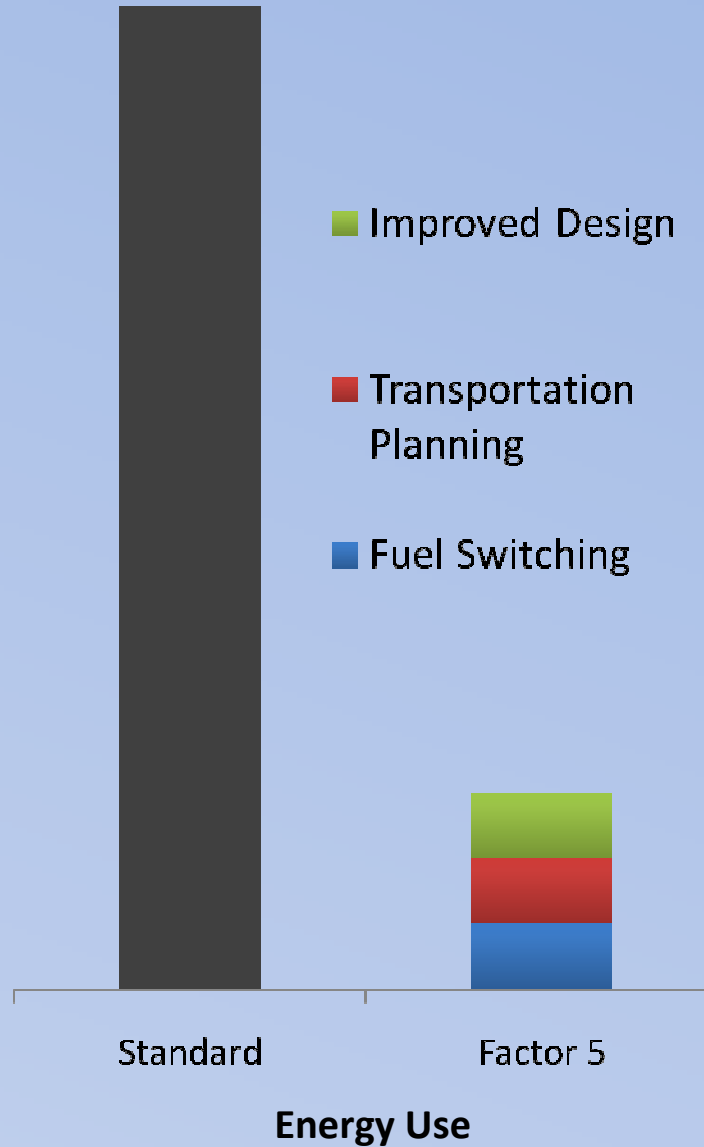
# Air Transport



- Improved Logistics
- Alternatives to Air Transport
- Engine Efficiency
- Aerodynamic Performance
- Advanced Propulsion
- Advanced Composites
- Alternate Fuels



# Transport (General)



*“The exciting thing about Factor Five is the combination of boldness and realism.”*

**Lester R. Brown**

*“This exciting synthesis combines a powerful efficiency toolkit with farsighted policy insights.”*

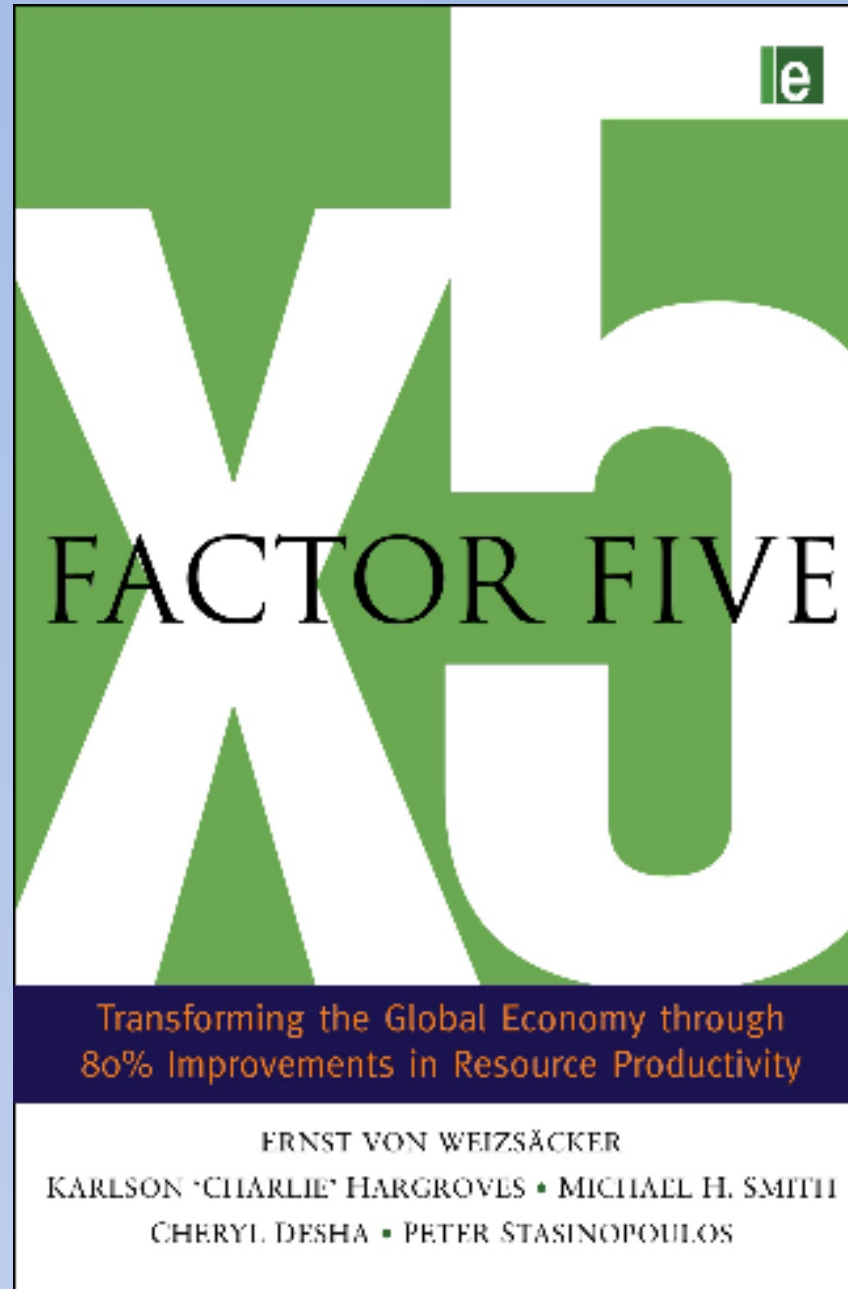
**Amory B. Lovins**

*“Factor Five provides numerous win-win strategies.”*

**R K Pachauri**

*“Factor Five shows the potential for major resource intensive sectors to significantly reduce greenhouse gas emissions in a cost-effective manner.”*

**Richard L. Sandor**



*“The arrival of Factor Five couldn't be more timely - or more significant.”*

**Jonathon Porritt**

*“This publication makes a significant contribution in responding to the global change imperative and should be required reading.”*

**Andrew Johnson** (CSIRO)

*“We need this book ...urgently.”*

**Brice Lalonde**

*“We should embrace the strengthened message of Factor Five.”*

**Bedrich Moldan**



**The Natural Edge**  
PROJECT



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Our Books & Companions

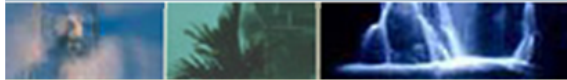
Curriculum & Course Notes

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## The Natural Edge Project



The Natural Edge Project (TNEP) is a partnership for research, education and strategy on innovation for sustainable development.

TNEP's mission is to contribute to and succinctly communicate leading research, case studies, tools and strategies for achieving sustainable development across government, business and civil society.

Driven by a team of early career Australians, the non-profit Project receives mentoring and support from a range of experts and leading organisations in Australia and internationally, through a generational exchange model.

Our generation has an obligation - and an exciting opportunity - to be part of the solution in restoring the balance.

Imagine... if organisations could improve their bottom line while being planetary caretakers...

Imagine... if national economies could grow more than business as usual and contribute positively to society and the environment...

TNEP is about making these visions a reality - we rely on mentoring and collaboration, using lessons from the last 30 years to ensure the next 30 make our children proud.

Welcome to our website - we look forward to involving you in our journey.

### TNEP PARTNERS IN RESEARCH, EDUCATION AND PRACTICE



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The Natural Edge Project was awarded the [2005 Banksia Award for Environmental Leadership, Education and Training](#).