

Trends in Energy Efficiency and CO₂ Emissions

Insights from IEA Indicator Analysis

Worldwide Trends
in Energy Use and
Efficiency

Key Insights from
IEA Indicator Analysis

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Overview

- Introduction to the IEA work
- Simple energy efficiency and CO₂ indicators
- Analysing trends and drivers
- CO₂ reduction potentials
- Conclusions

IEA Indicators Work

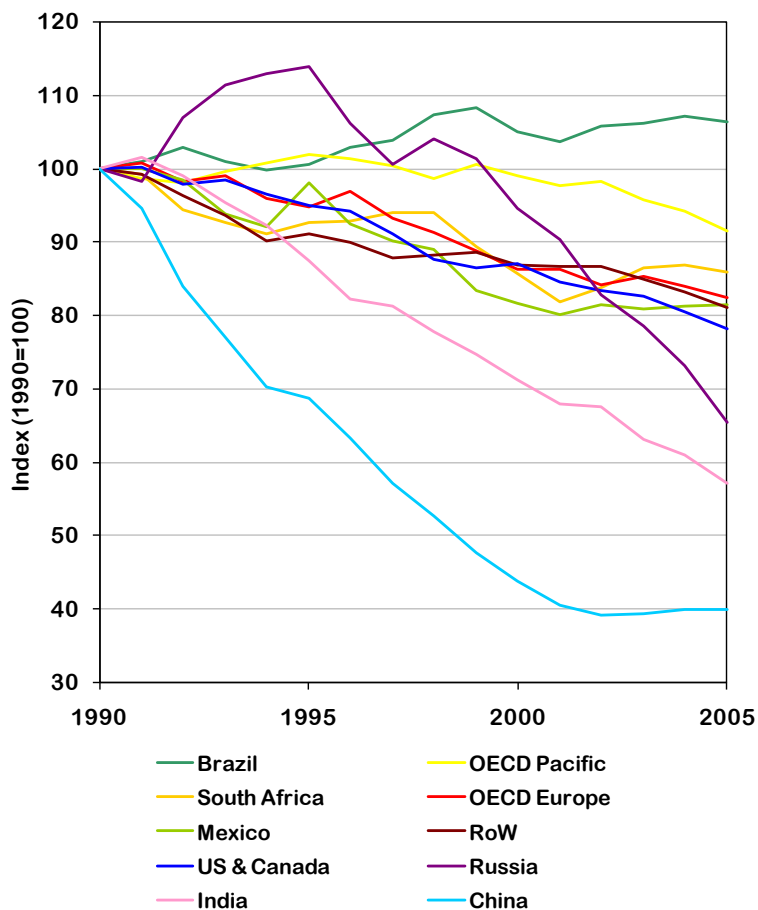
- Establish a harmonised framework for analysis
 - Harmonisation => Comparability
 - Comparability => Understanding of global trends and drivers
- Produce meaningful cross-country analysis to provide guidance to policy-makers on:
 - Underlying drivers (economic activity & structure, income, prices...)
 - Trends in energy use and CO₂ emissions
 - Energy efficiency opportunities and progress
 - Policy effectiveness

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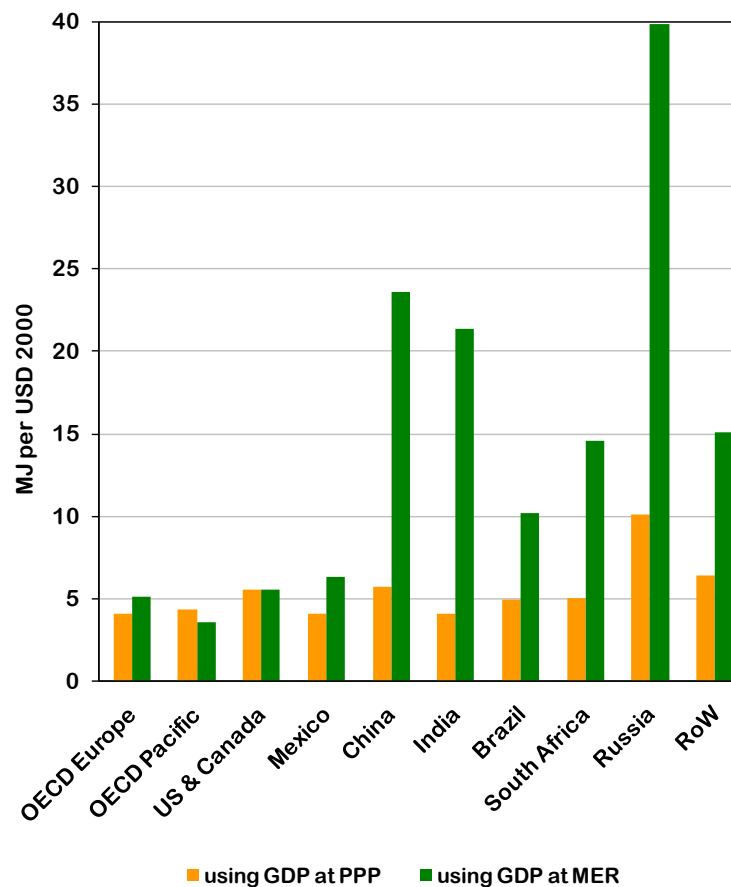
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Final Energy per Unit of GDP

Index for 1990 to 2005



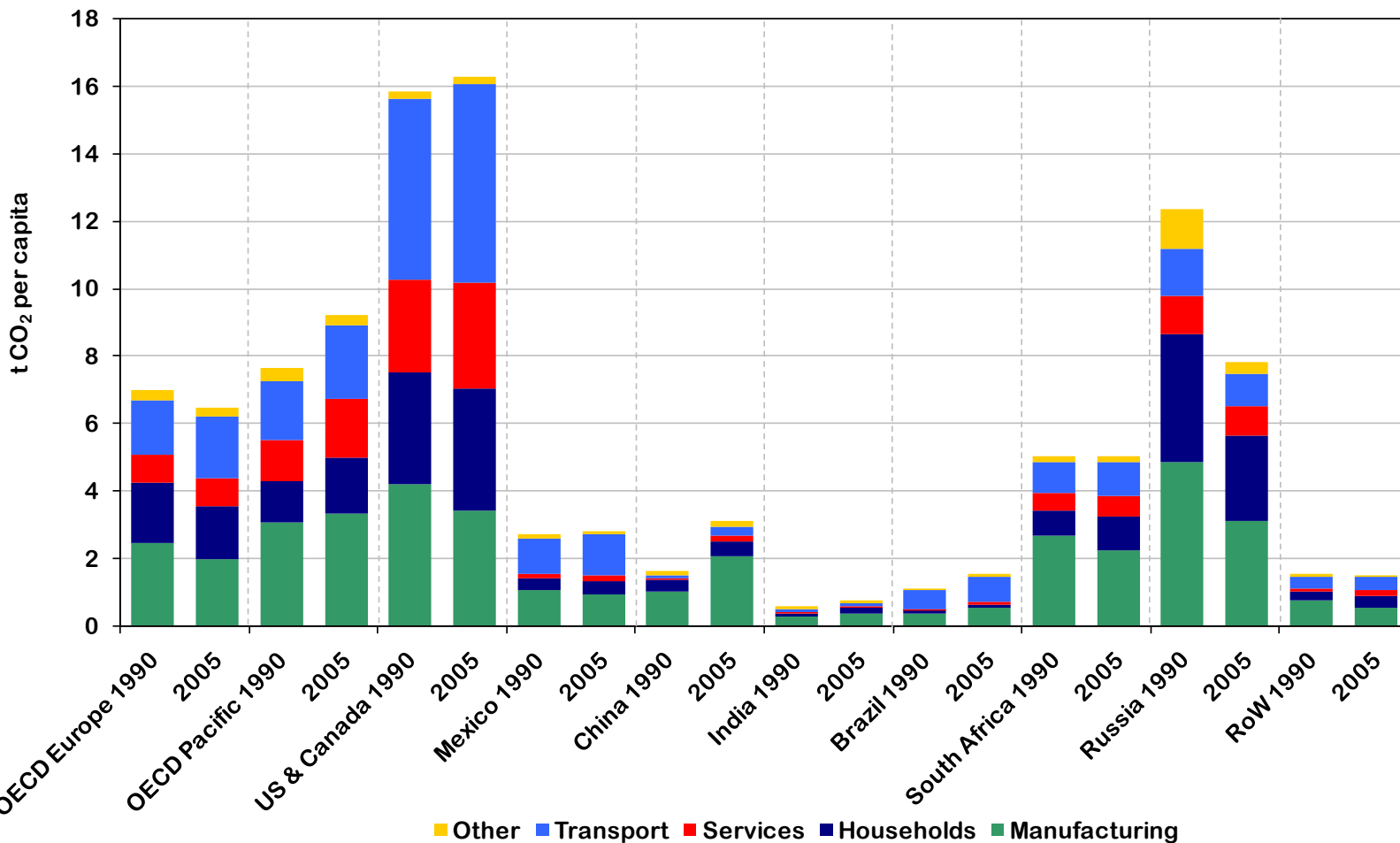
Absolute Values in 2005



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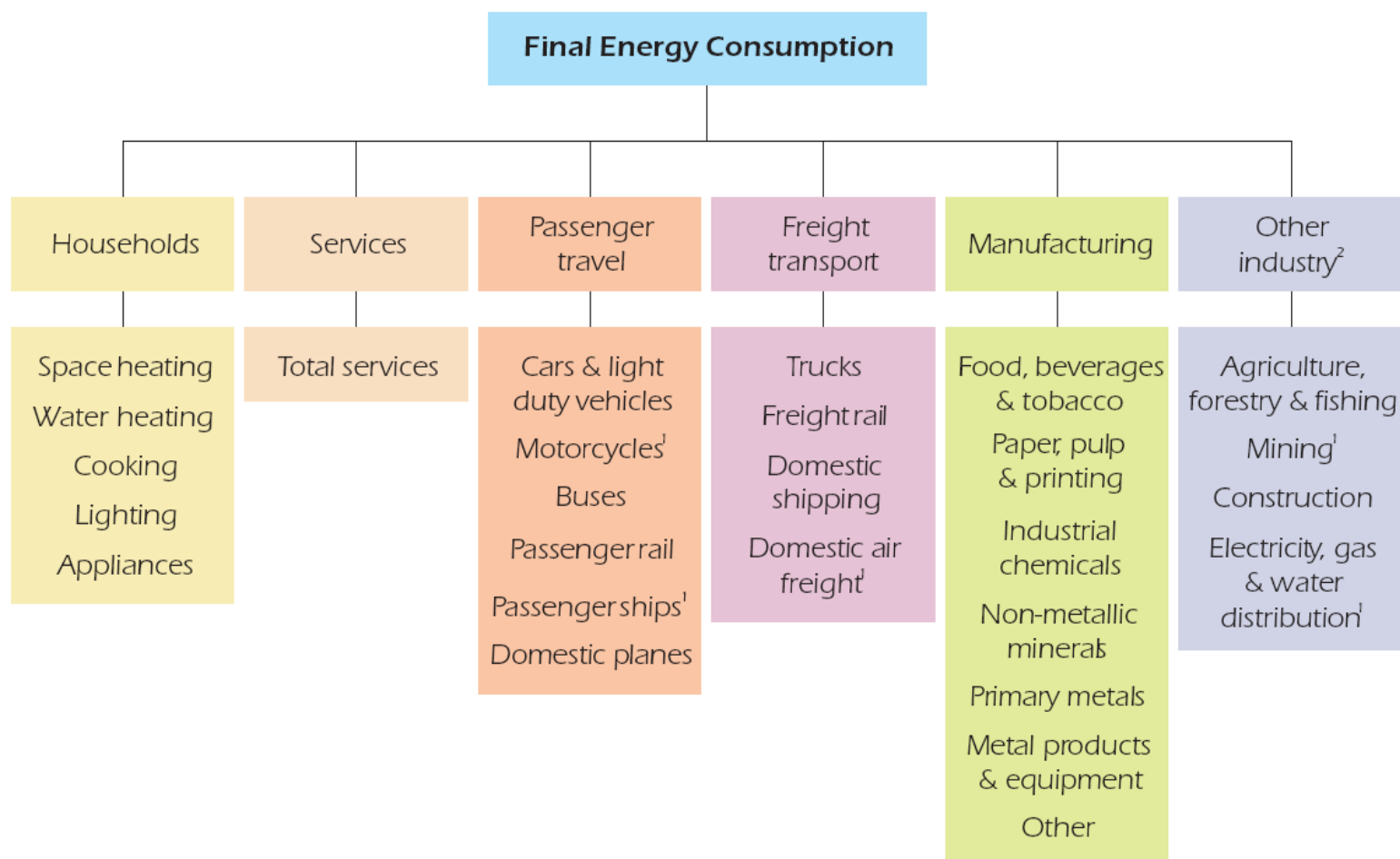
CO₂ Emissions per Capita



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End-Use Coverage for Indicators



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¹ Not included in this study due to lack of consistent and reliable data series.

² Other Industry is included in the analysis only in the chapter Overall Trends and is not analysed separately.

Factors Affecting Energy-Related CO₂ Emissions

■ Level of Energy Use

- Activity
- Structure (mix of activities)
- Energy intensity of each activity

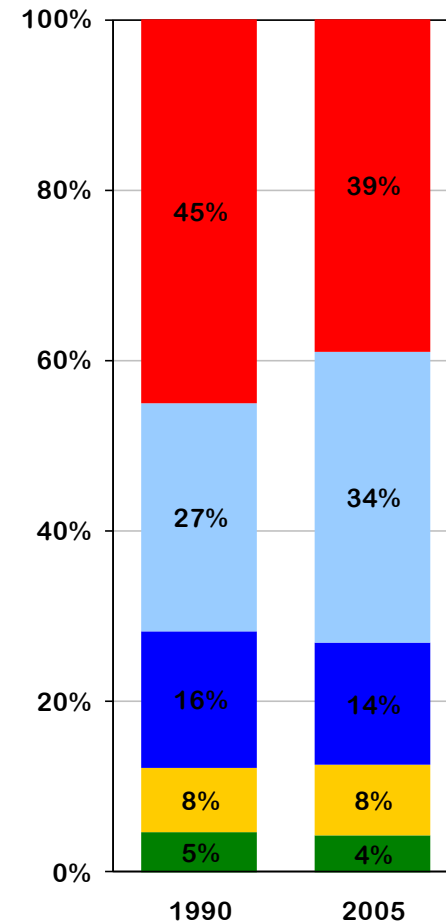
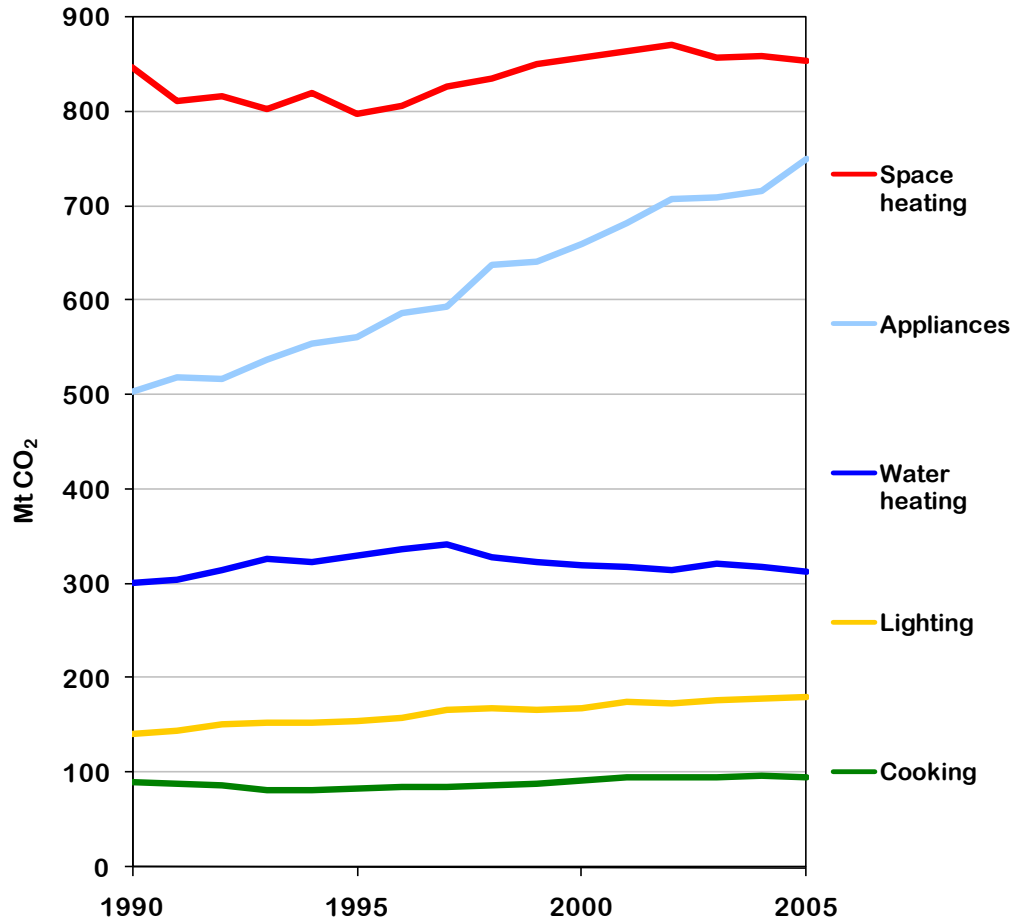
■ Carbon Intensity of Energy Use

- Fuel mix
- Carbon intensity of each fuel

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Household CO₂ Emissions by End-Use, IEA19



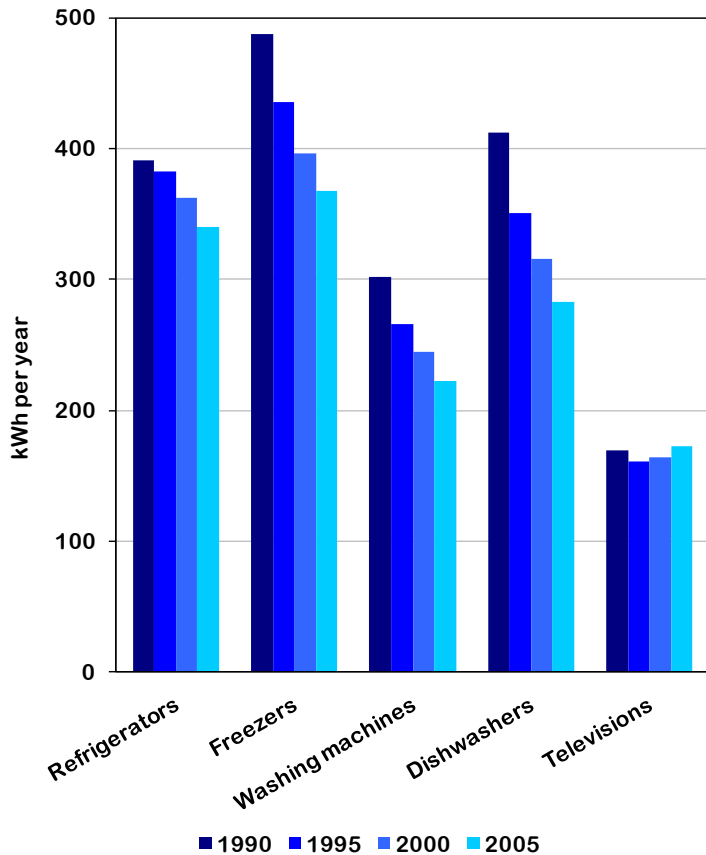
Note: Energy use for space heating has been climate corrected

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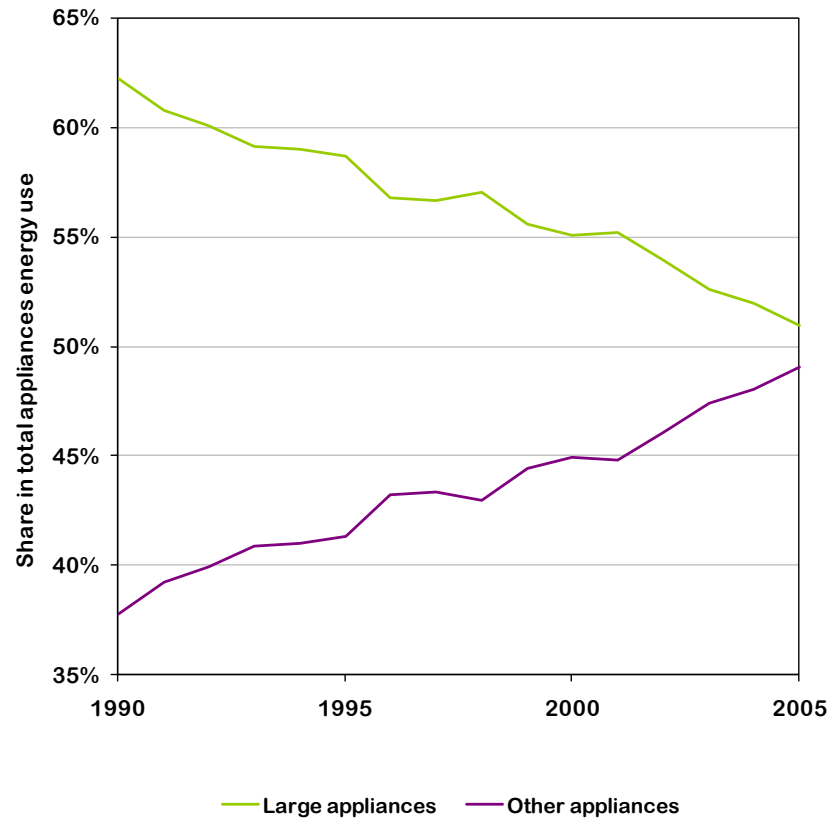
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Energy consumption of Appliances, EU15

Average Unit Energy Consumption



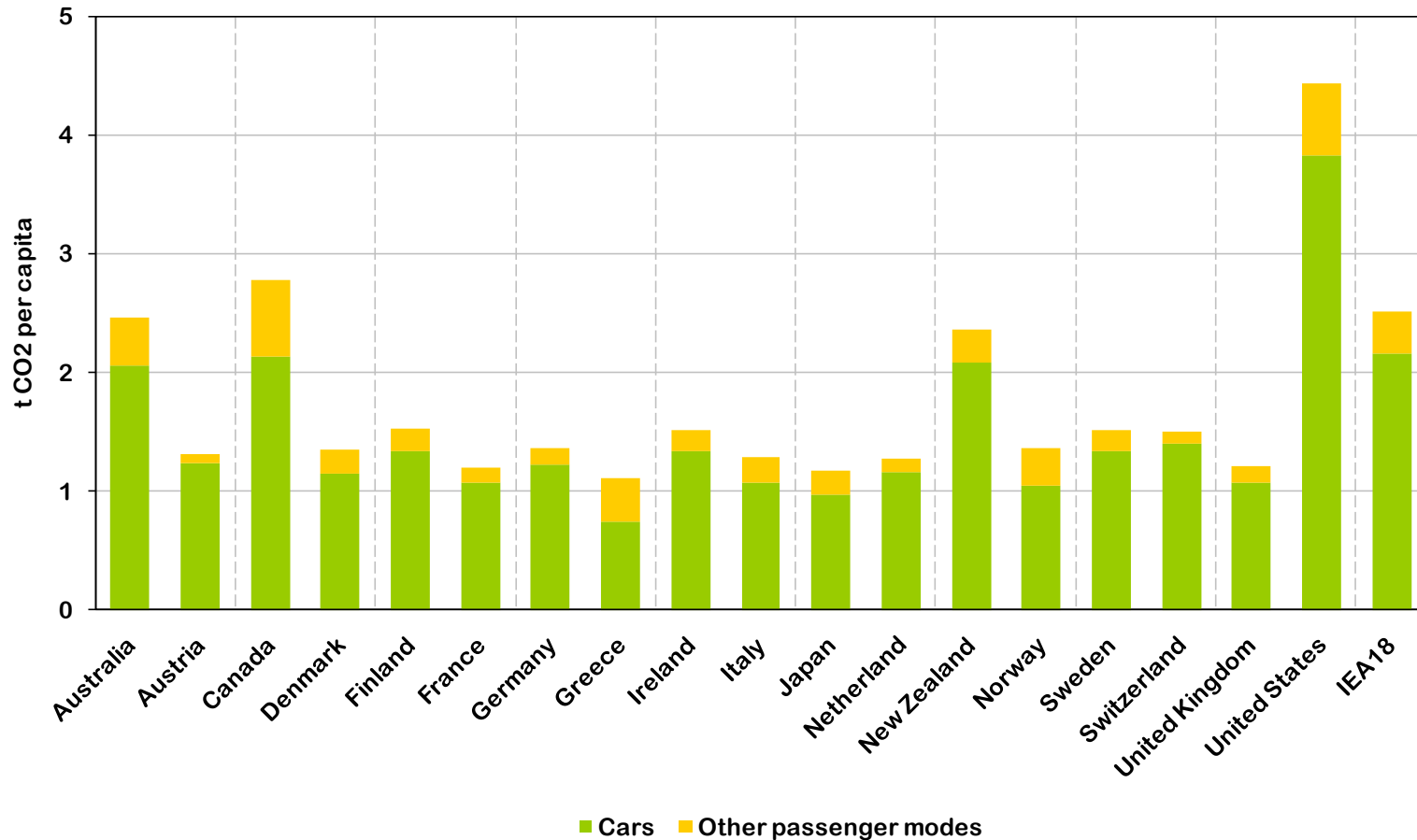
Share of Large and Small Appliances



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Passenger Transport CO₂ Emissions per Capita, 2005

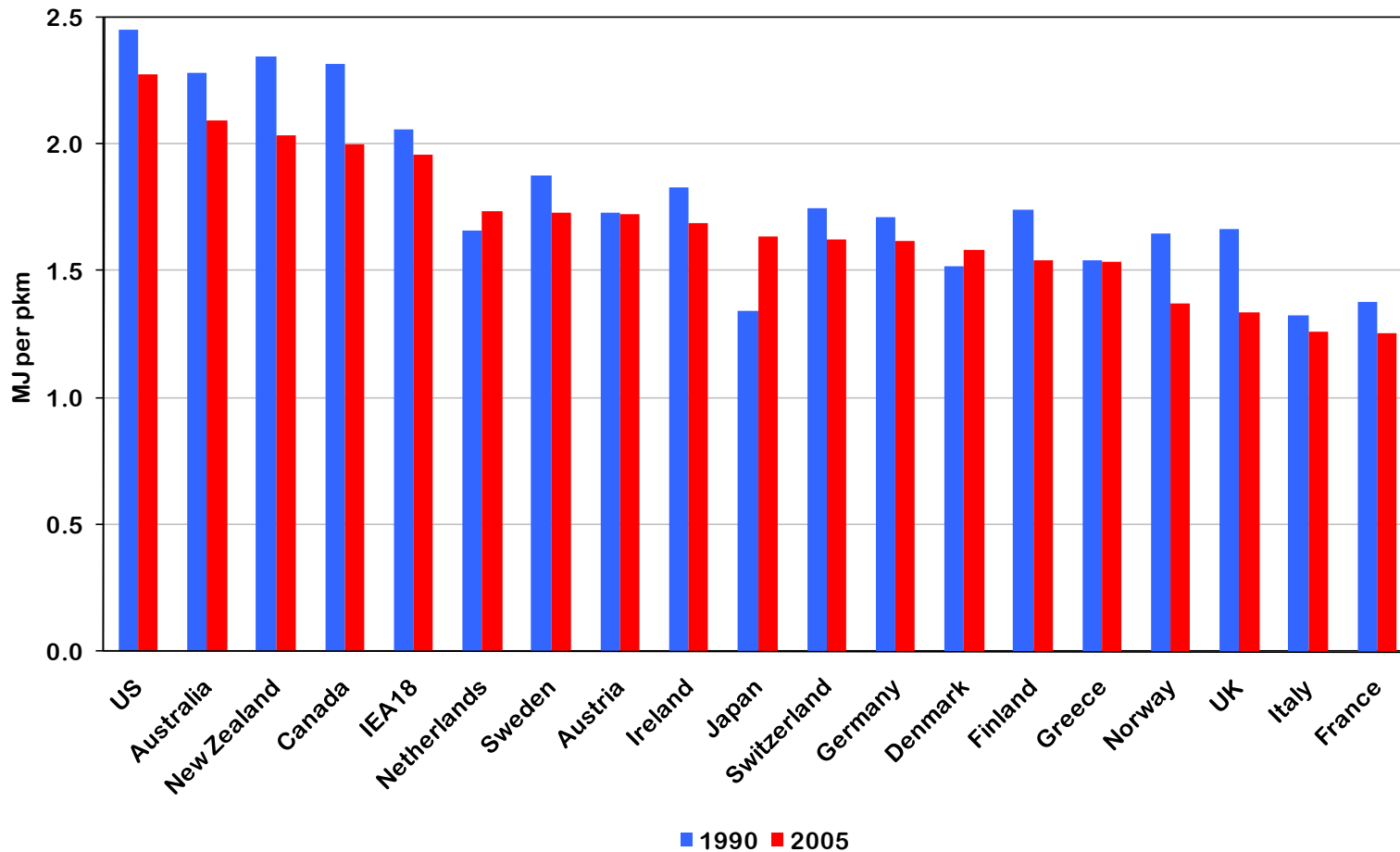


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Energy Use per Passenger-Kilometre (All Modes)

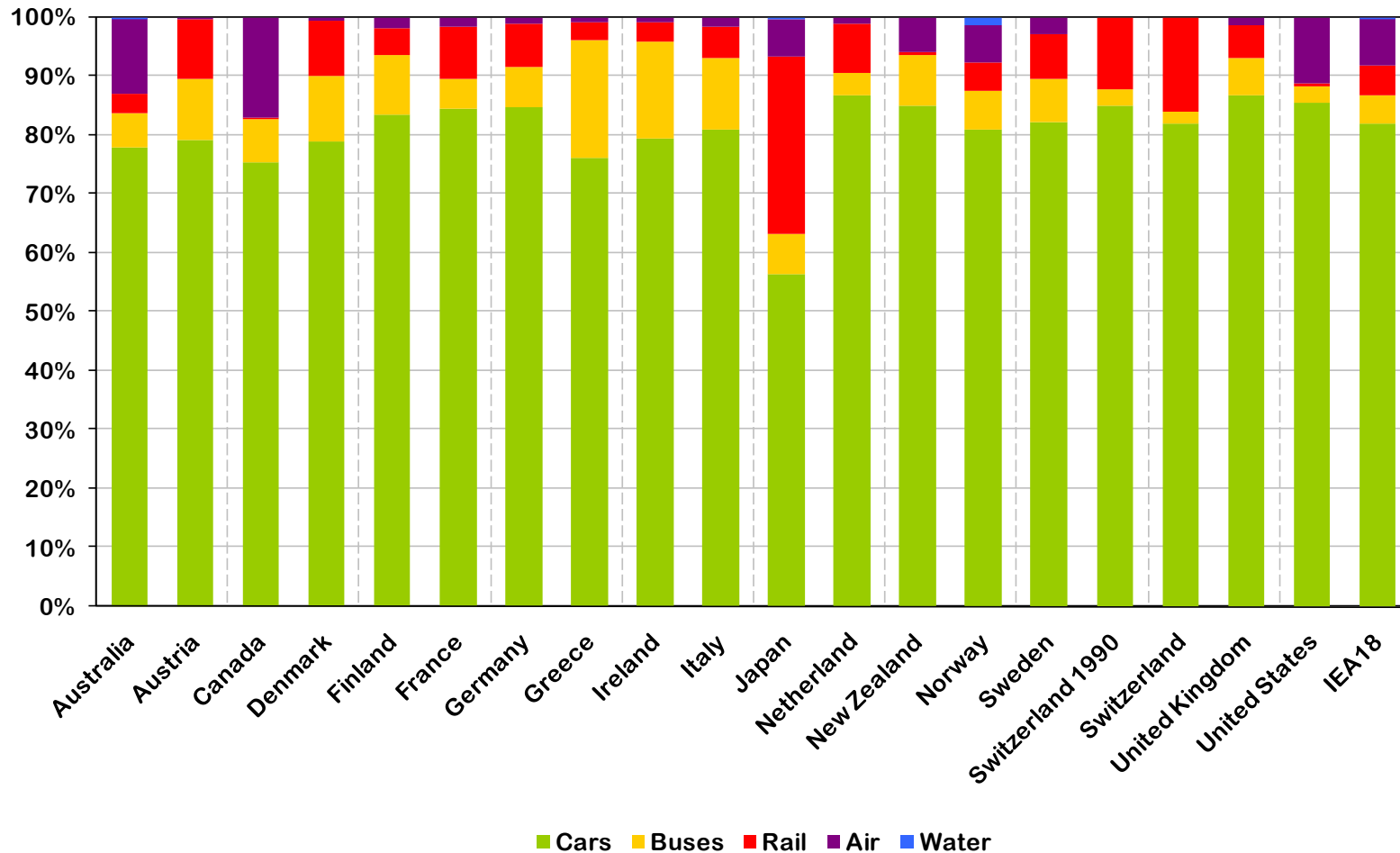
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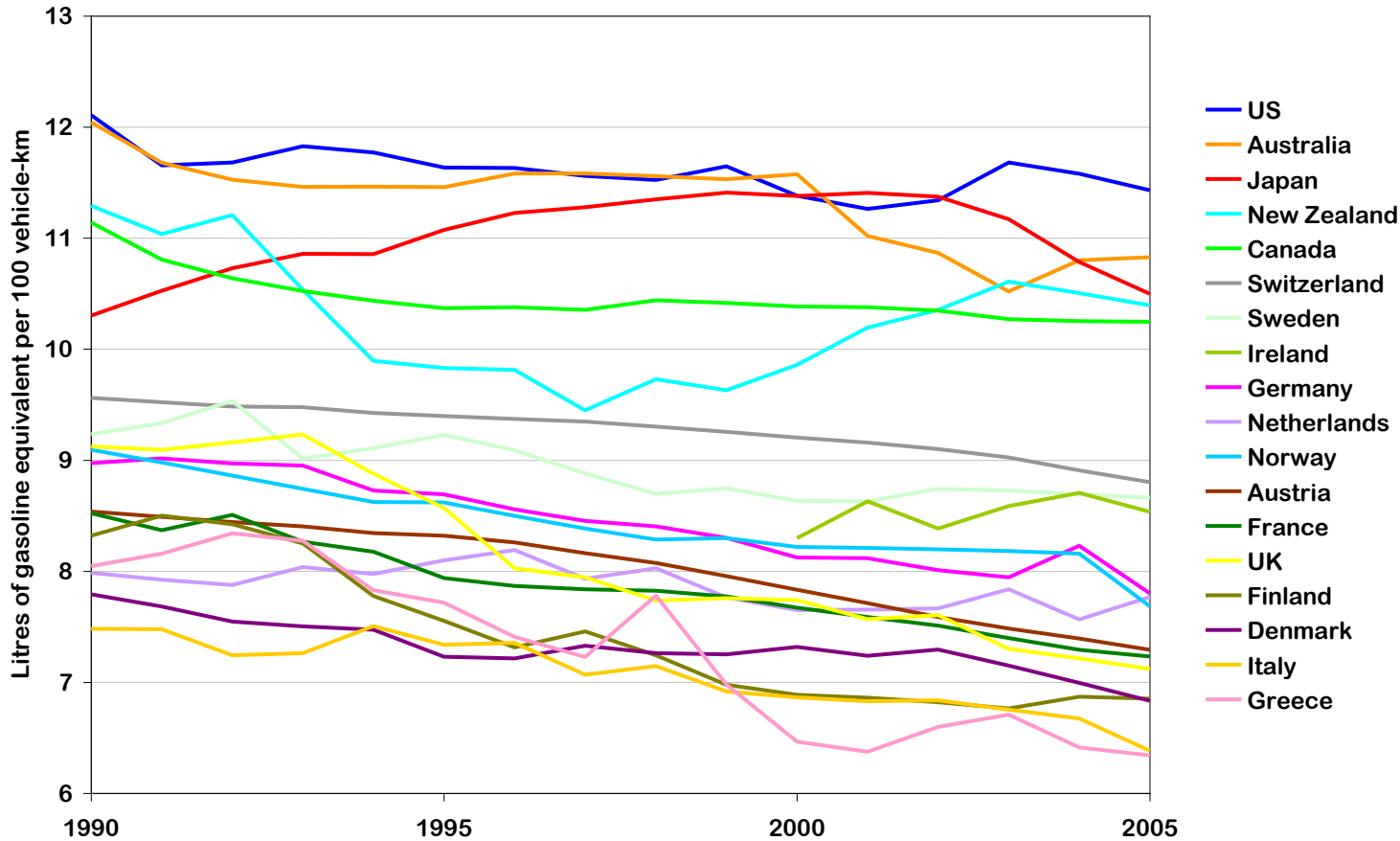
Share of Total Passenger Transport by Mode, 2005



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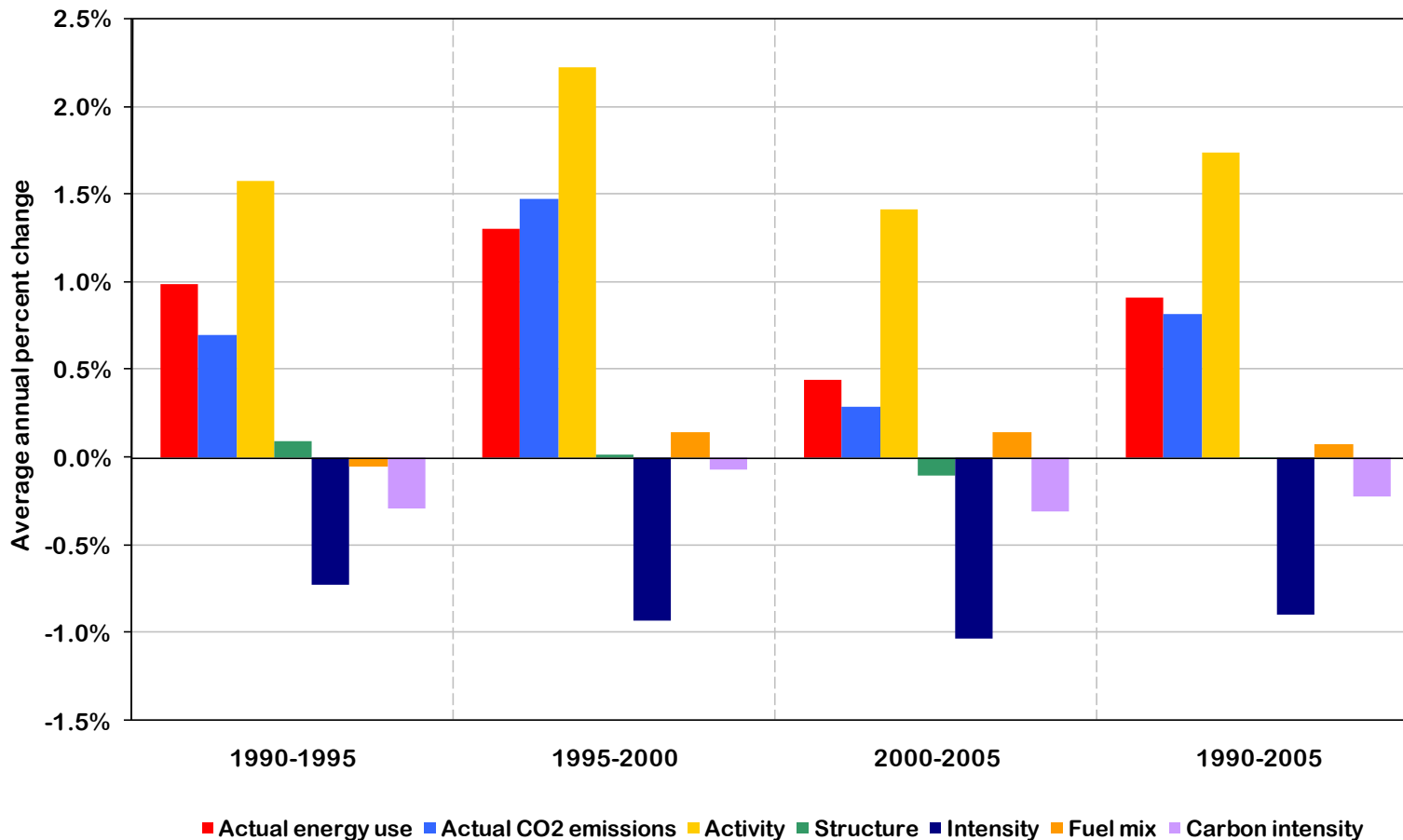
Average Fuel Intensity of the Car Stock



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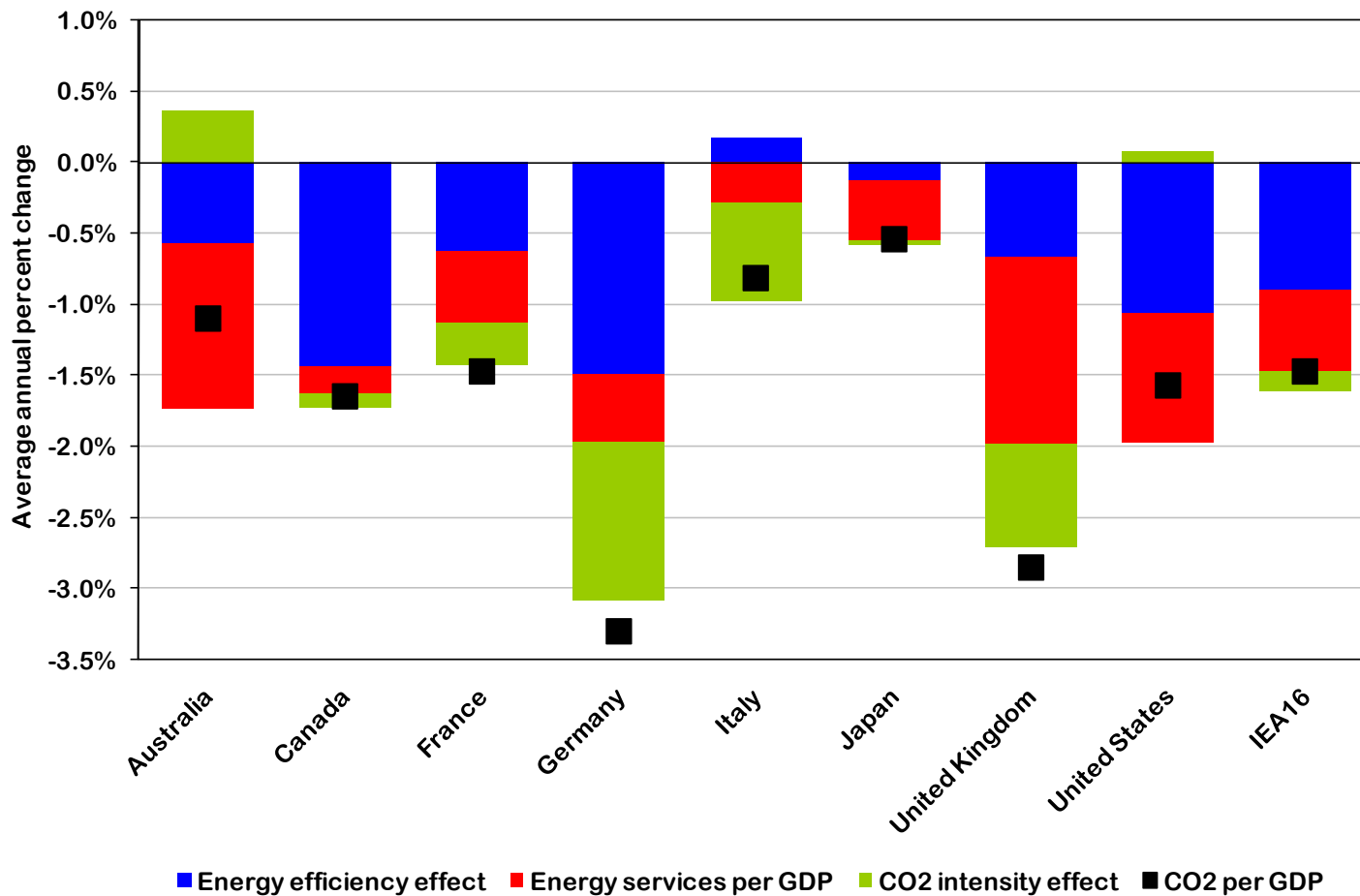
Decomposition of Trends in Overall CO₂ Emissions, IEA16



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Decomposition of Trends in CO₂ per Unit of GDP, 1990 - 2005

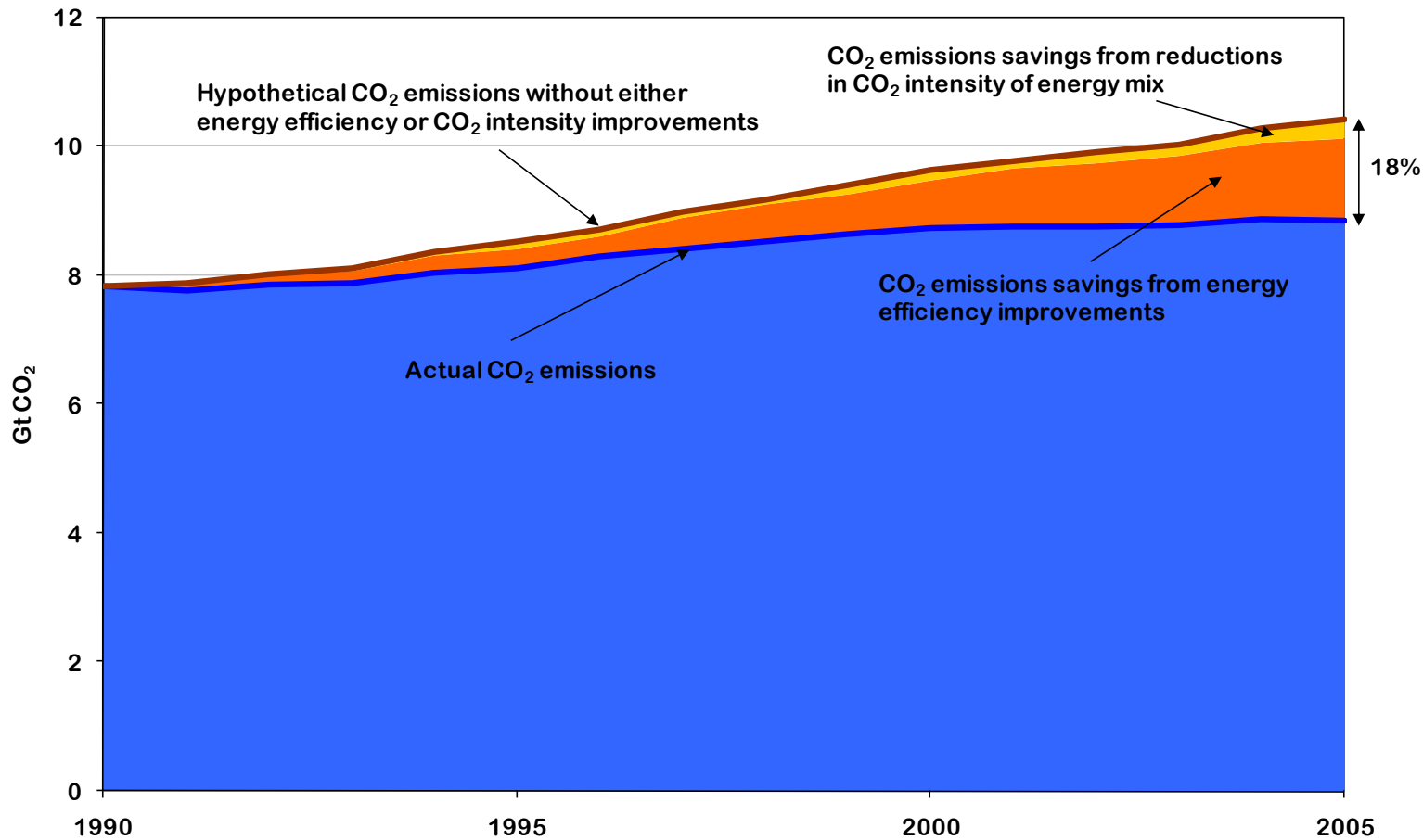


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Factors impacting CO₂ emissions from final energy use, IEA16

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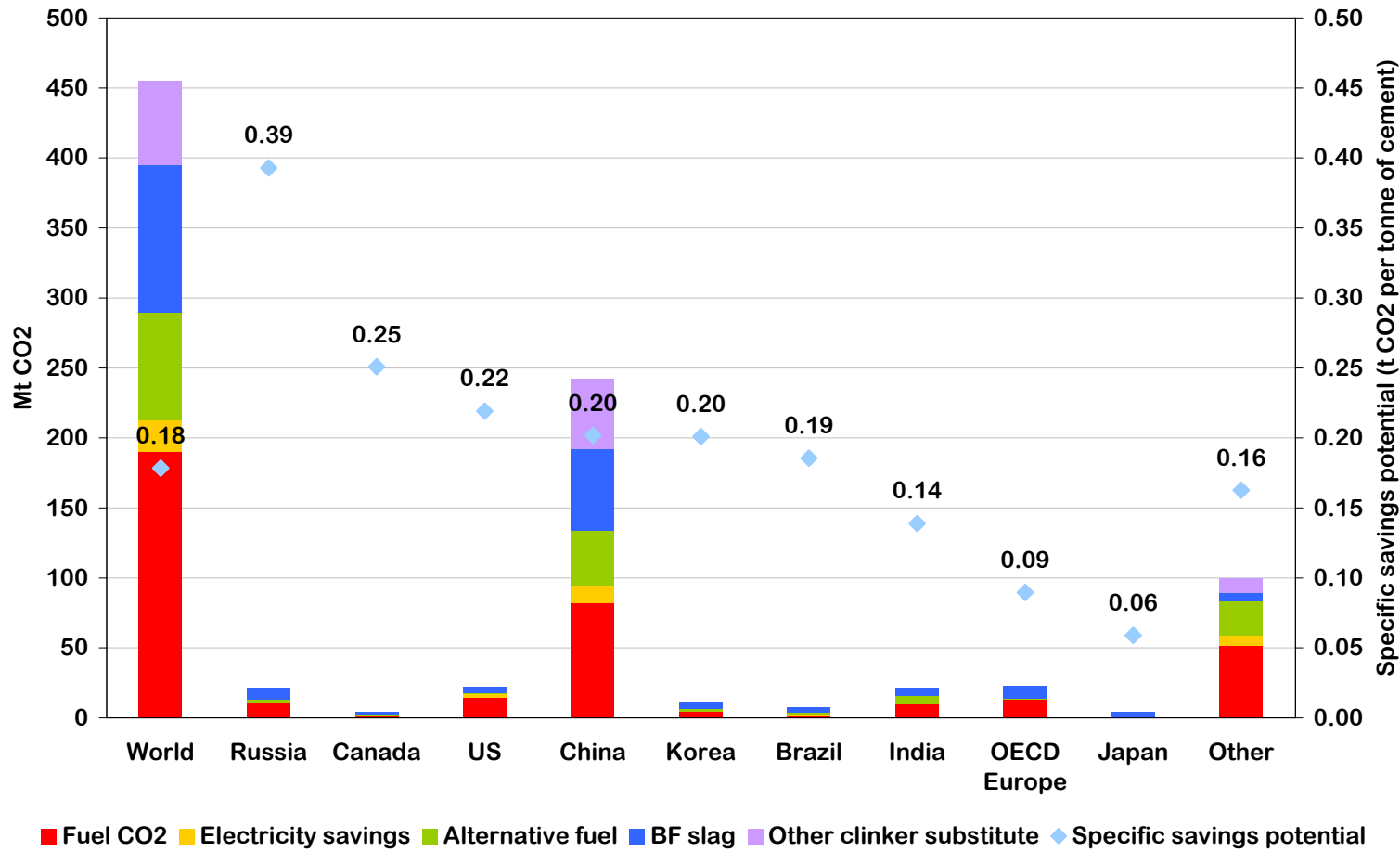
Using Indicators to Calculate Reduction Potentials for CO₂ Emissions

- Use of BAT/BPT to assess potential in the industrial and electricity generation sectors
- These indicators are useful for showing:
 - To what extent existing technology can achieve further savings
 - Where the potential lies (countries and processes)
- However, there are limitations to the use of the indicators:
 - Assess instantaneous technical potential
 - Do not take into account practical constraints
 - Not suitable for short-term target setting
- But calculated potentials are easy to understand

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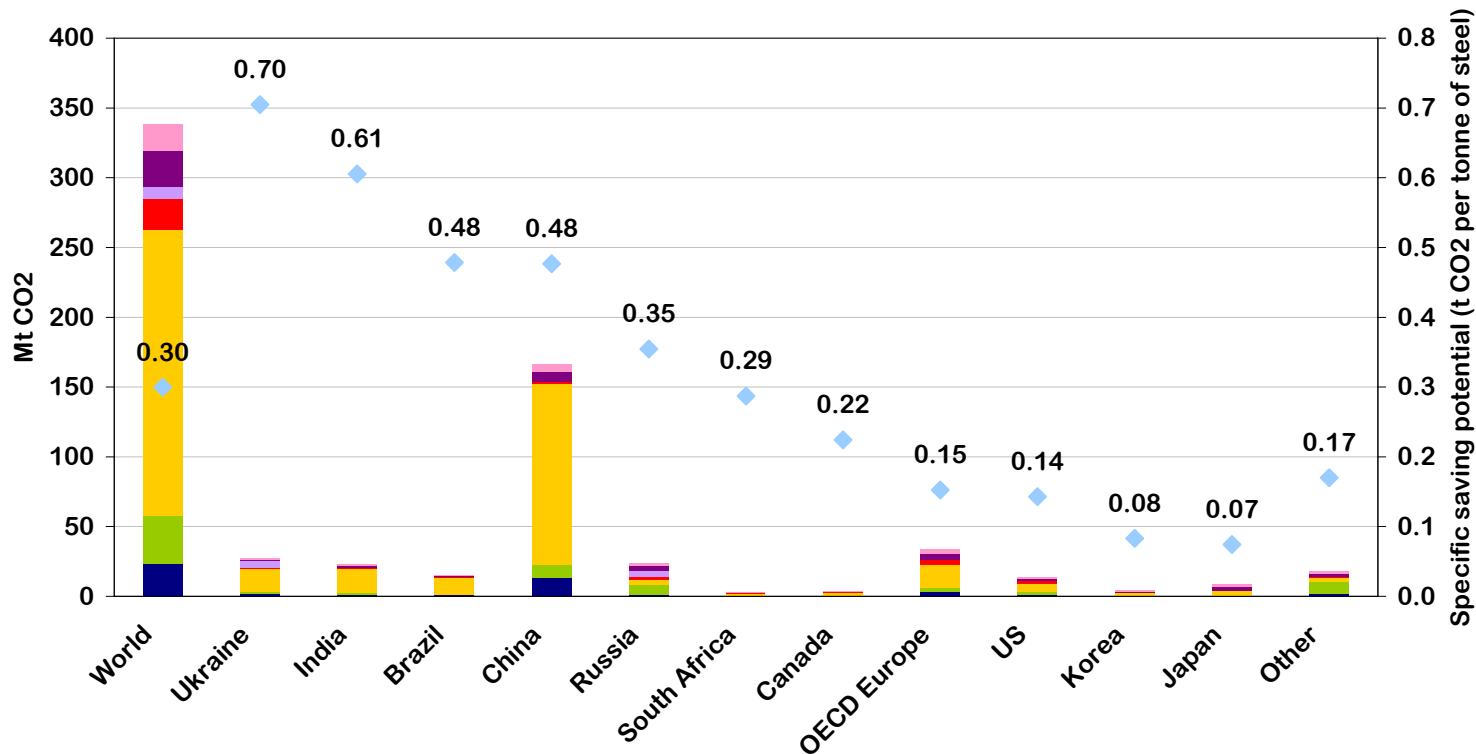
CO₂ Reduction Potential in Cement, Based on Best Available Technology



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CO₂ Reduction Potential in Iron and Steel, Based on Best Available Technology

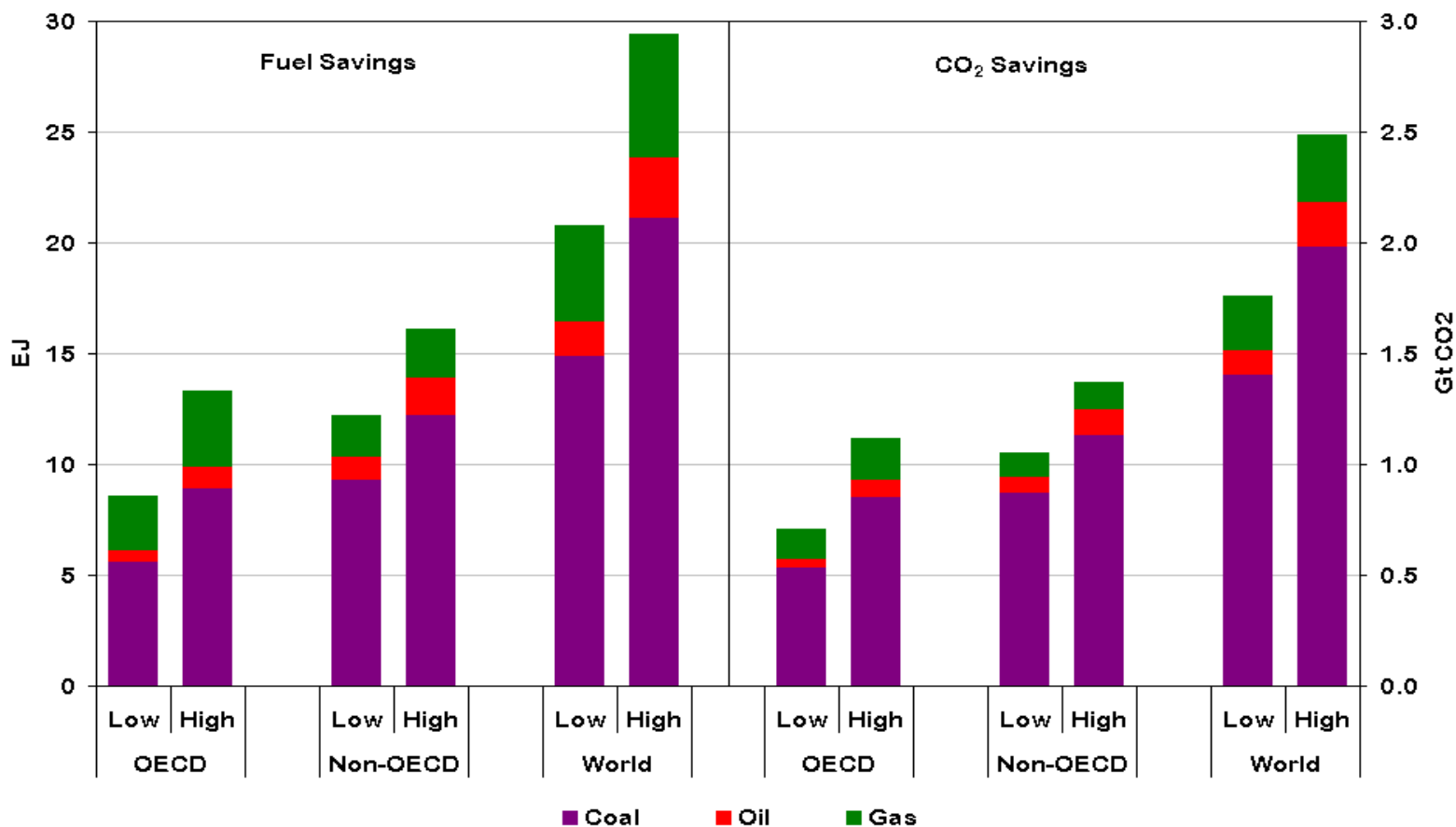


- CDQ (or advanced wet quenching)
- Blast furnace improvements
- Switch from OHF to BOF
- Steel finishing improvements
- COG recovery
- Increased BOF gas recovery
- Efficient power generation from BF gas
- ◆ Specific savings potential

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Technical Fuel and CO₂ Savings Potential from Improving the Efficiency of Electricity Production



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Key Conclusions and Policy Messages

- Indicators are a powerful tool for analysing trends in energy use and CO₂ emissions, and calculating potentials for further savings
- Results show the important role of energy efficiency in shaping patterns of energy use and CO₂ emissions in IEA countries, but gains are often offset by other factors
- Large potential for further energy and CO₂ savings in many industries and power generation (and other sectors)
- CO₂ emissions growth can and must be decoupled from economic growth, but will require strong policy-action from Governments
- Urgent need for governments to enhance framework for monitoring end-use energy consumption and address the gaps in available statistical data

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Thank you !

[contact: energyindicators@iea.org](mailto:energyindicators@iea.org)

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