



Status and Plan for Work on Energy Indicators

**Fridtjof Unander
Indicator Workshop
27 April 2006**



Overview Workshop

- **Session 1: Status and plan for IEA work on energy indicators**
- **Session 2: Energy indicators: A global challenge**
- **Session 3: Collecting the right data**
- **Session 4: Experiences with indicators for energy efficiency policy analysis**
- **Session 5: Future work by sector**
- **Discussion: Moving forward with IEA's indicator work**



What is an Energy Indicator?

- **Relates energy use to activities driving demand for energy services**
- **Two main types:**
 - 1. Indicators following activities that drive energy use**
(e.g. industrial output, building area, appliance ownership, ton-km, car-ownership and use)
 - 2. Indicators following energy intensity developments:**
(e.g. energy/passenger-km, energy/value added by industry branch, space heating energy/floor area)



How to Understand Aggregate Trends? IEA's Decomposition Approach

$$E = A \sum S_j * I_j$$

A sectoral activity

S_j sectoral structure or mix of activities within
a sub-sector *j*

I_j energy intensity of each sub-sector or
end-use *j*

- *Use Laspeyres indices to follow changes over time*
- *Can be extended to economy-wide indices (weighting sector indices at base-year values)*



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Energy Service

Energy Savings

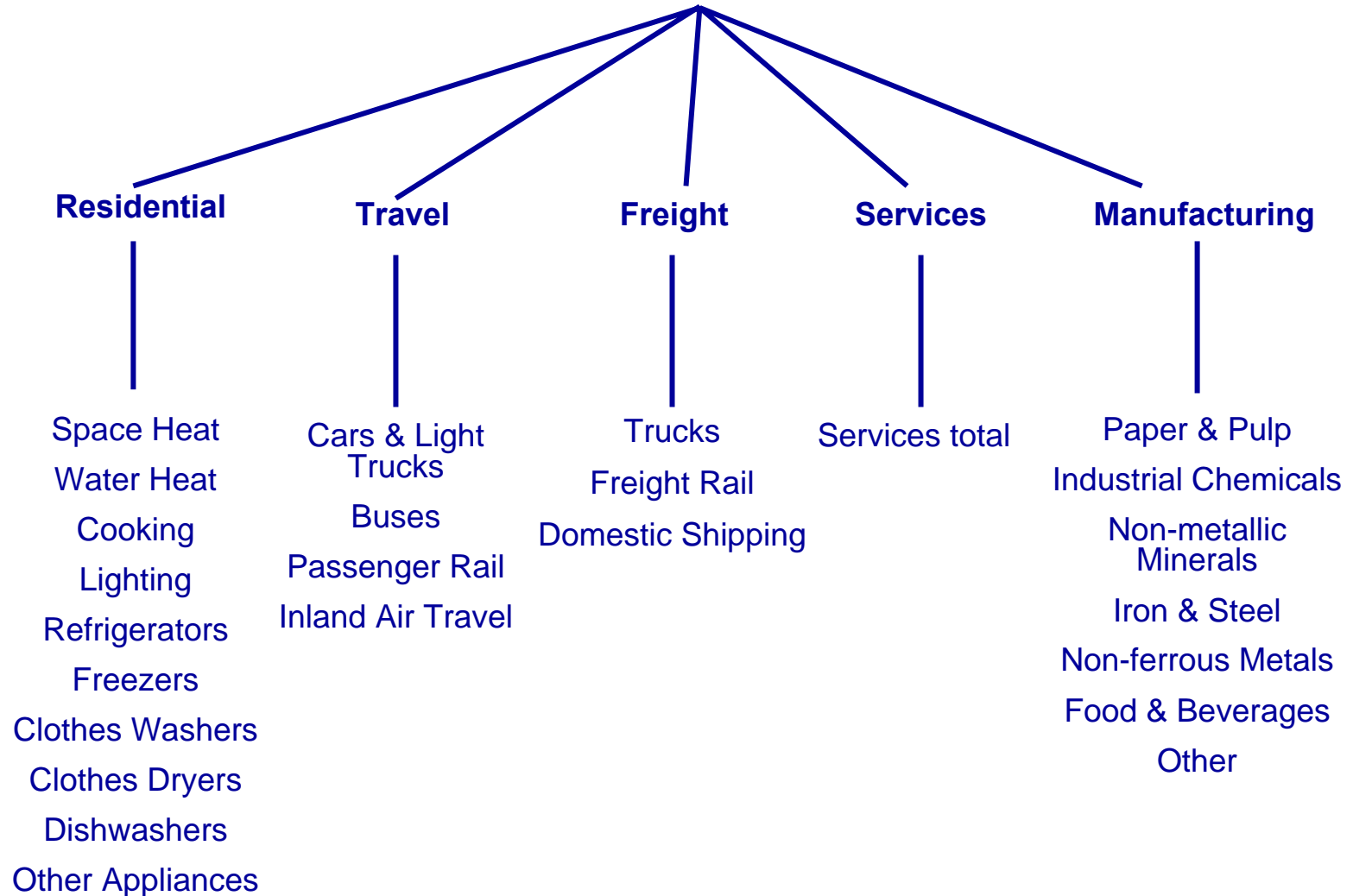
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Sector & End-use Coverage

Total Economy





Oil Crises and Climate Challenges 30 Years of Energy Use in IEA Countries

Oil
Crises &
Climate
Challenges

30
Years

OF ENERGY USE
IN IEA COUNTRIES



INTERNATIONAL ENERGY AGENCY

Oil
Crises &
Climate
Challenges

30
years

OF ENERGY USE
IN IEA COUNTRIES

OECD



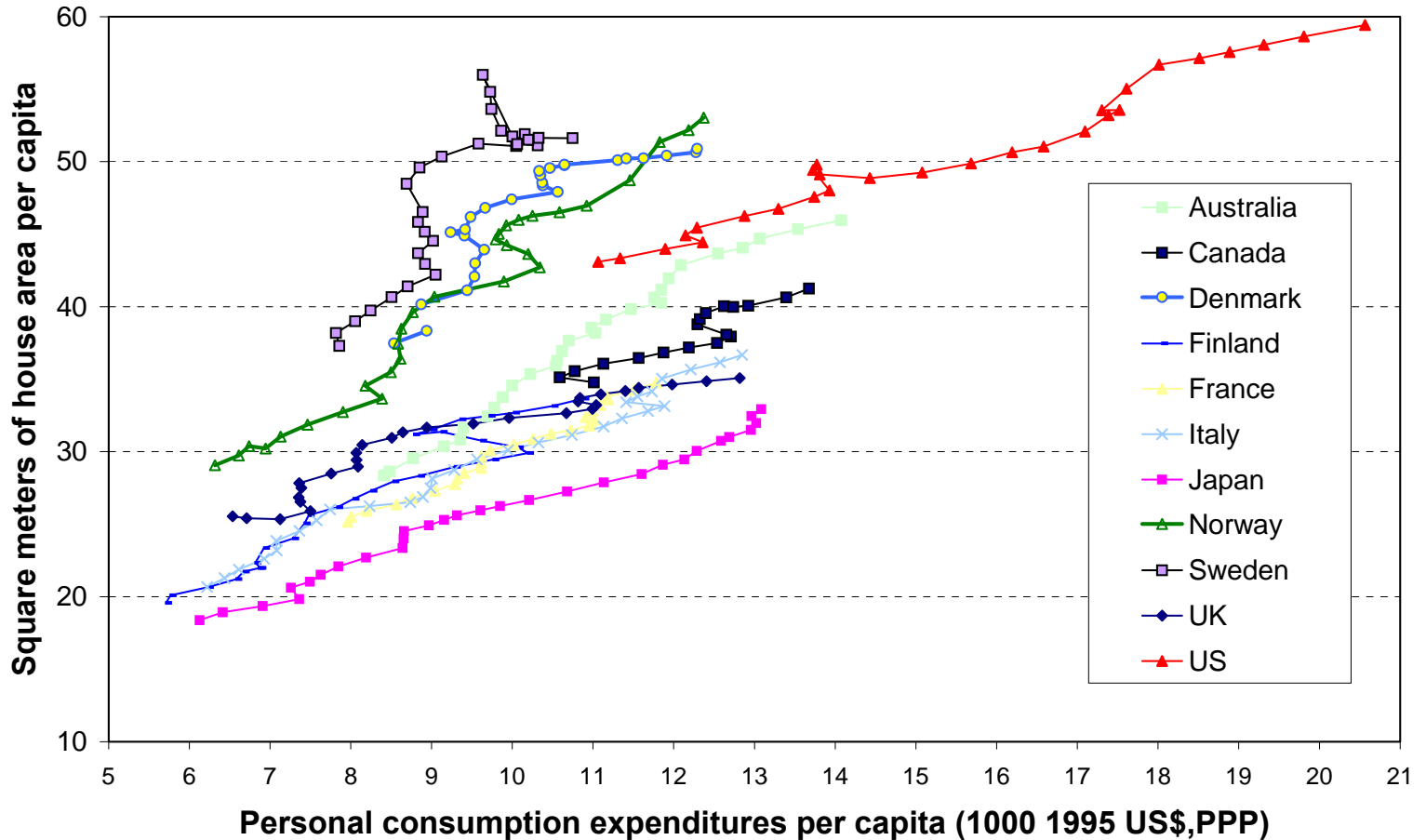
Example: Driving Forces

House Area vs. Income (1973-1998)

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Challenges

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Years

OF ENERGY USE
IN IEA COUNTRIES



Living space gets bigger as we get richer



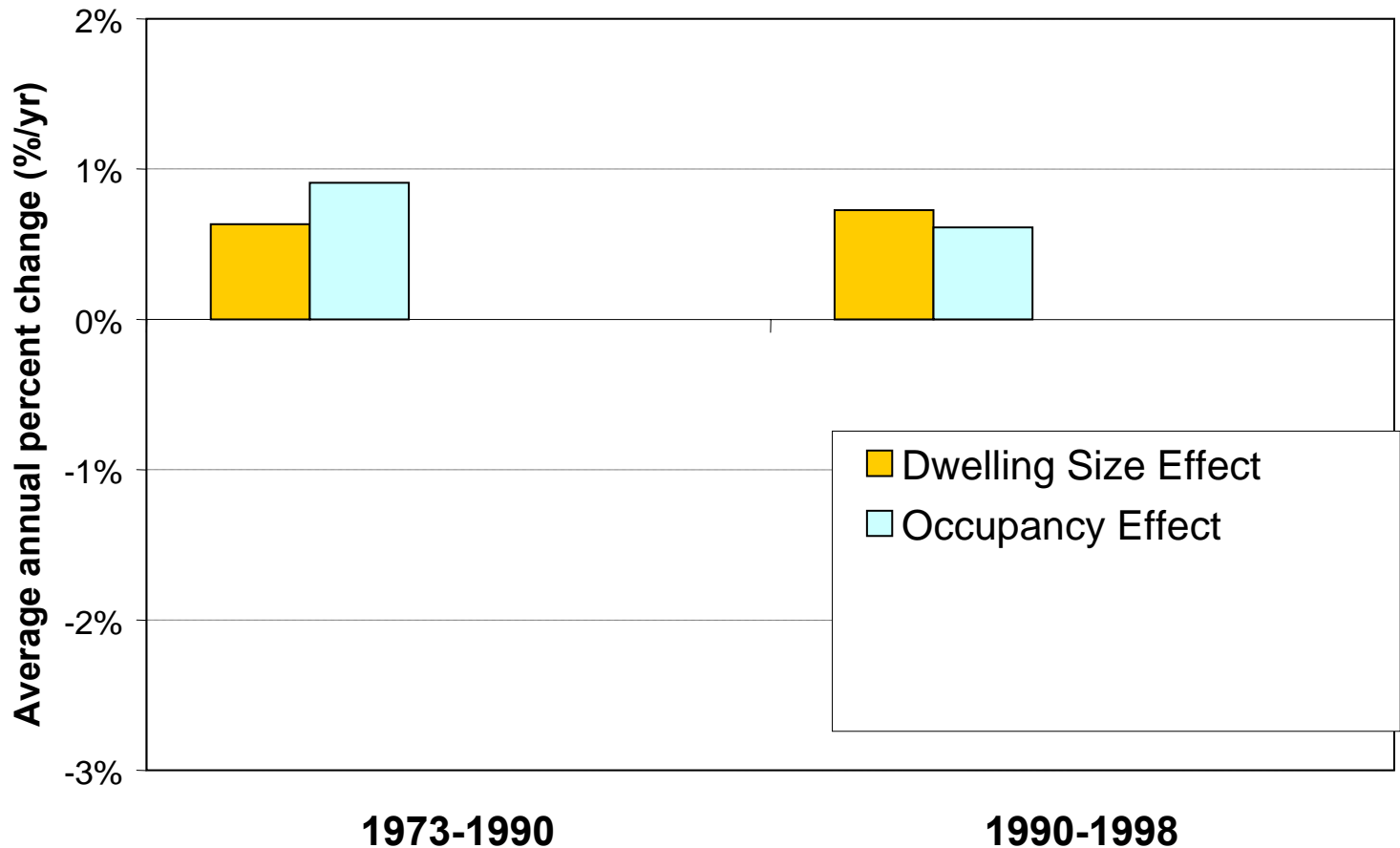
Energy for Space Heating (IEA-11)

Factors shaping development

Oil
Crises &
Climate
Challenges

30
Years

OF ENERGY USE
IN IEA COUNTRIES



Bigger homes and fewer people per home steady drivers of space heating demand

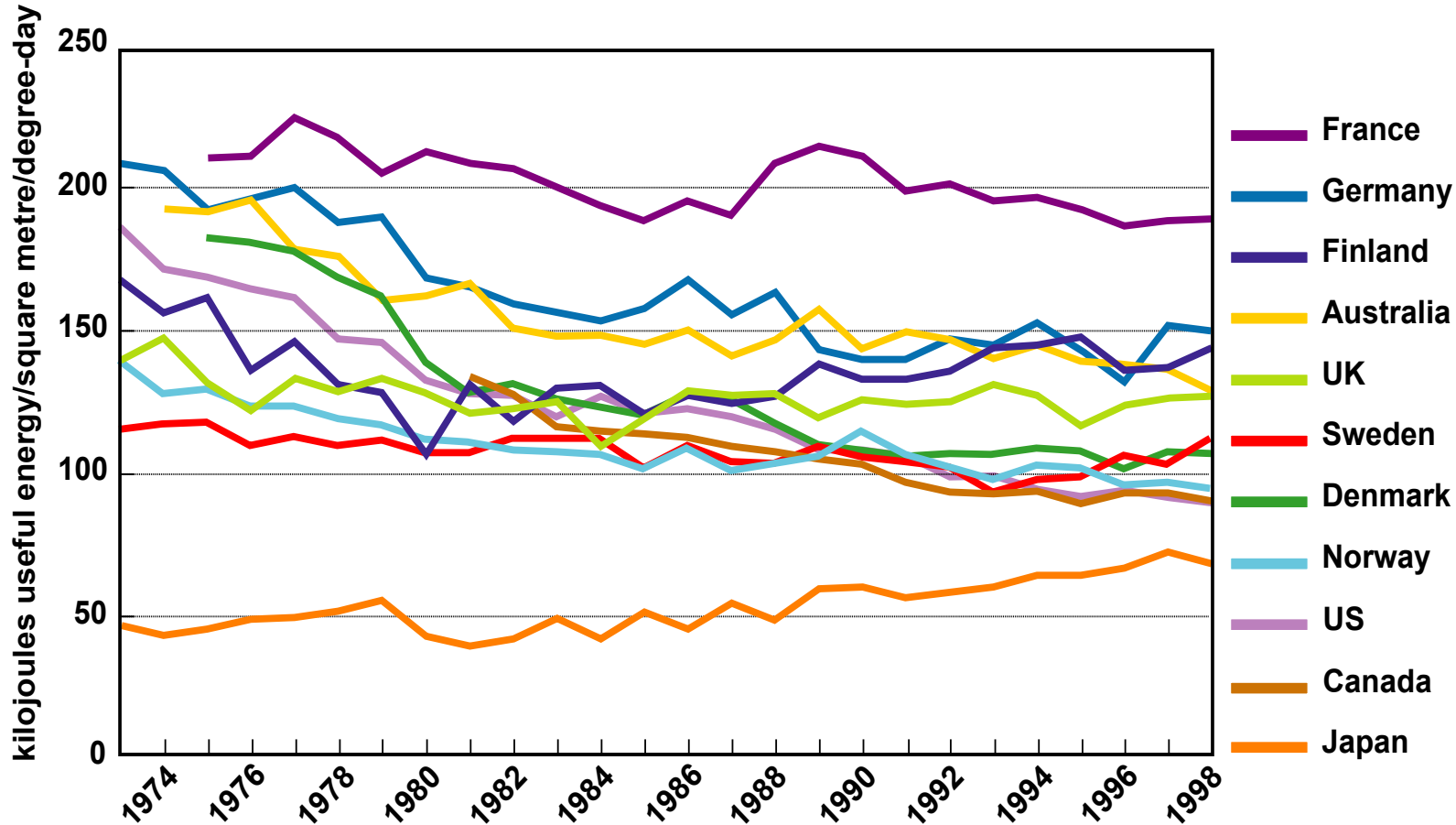


Example: Intensity Indicator Useful Space Heating Intensity

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OF ENERGY USE
IN IEA COUNTRIES



Space heating intensities have declined, but increased comfort levels offset the savings in some countries



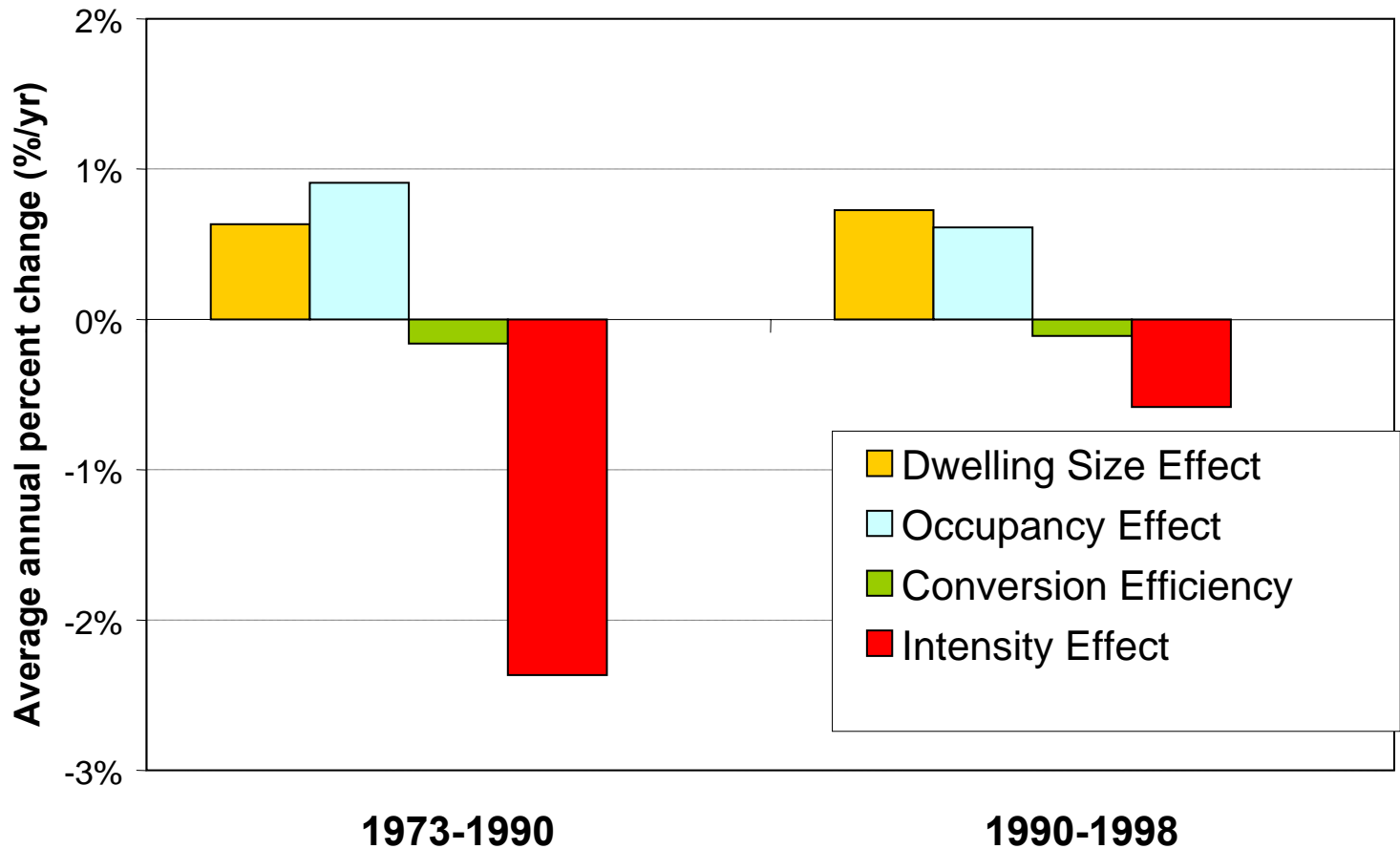
Energy for Space Heating (IEA-11)

Factors shaping development

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Declines in intensities are slowing....



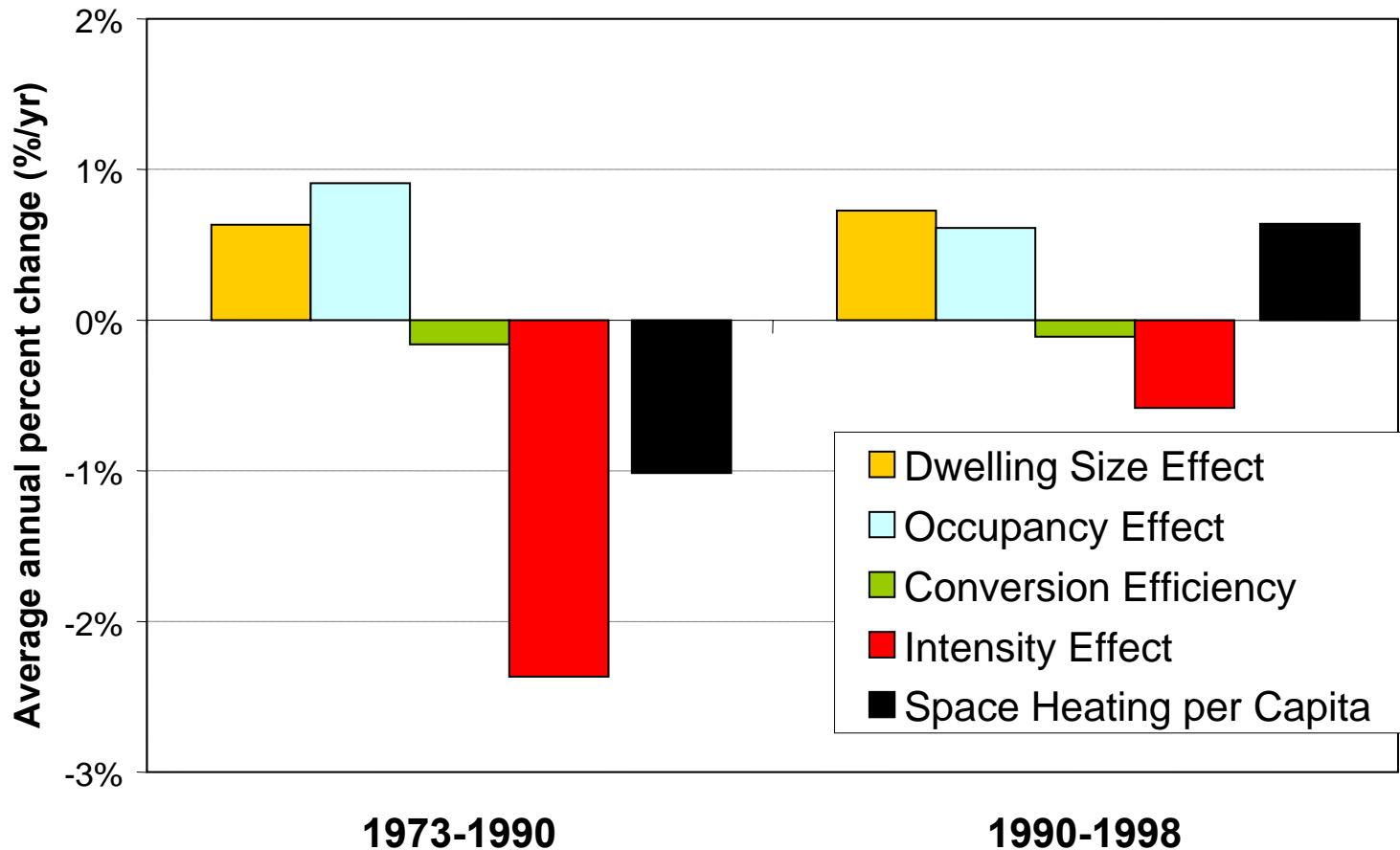
Energy for Space Heating (IEA-11)

Factors shaping development

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Net result is an increase in per capita heating demand after 1990

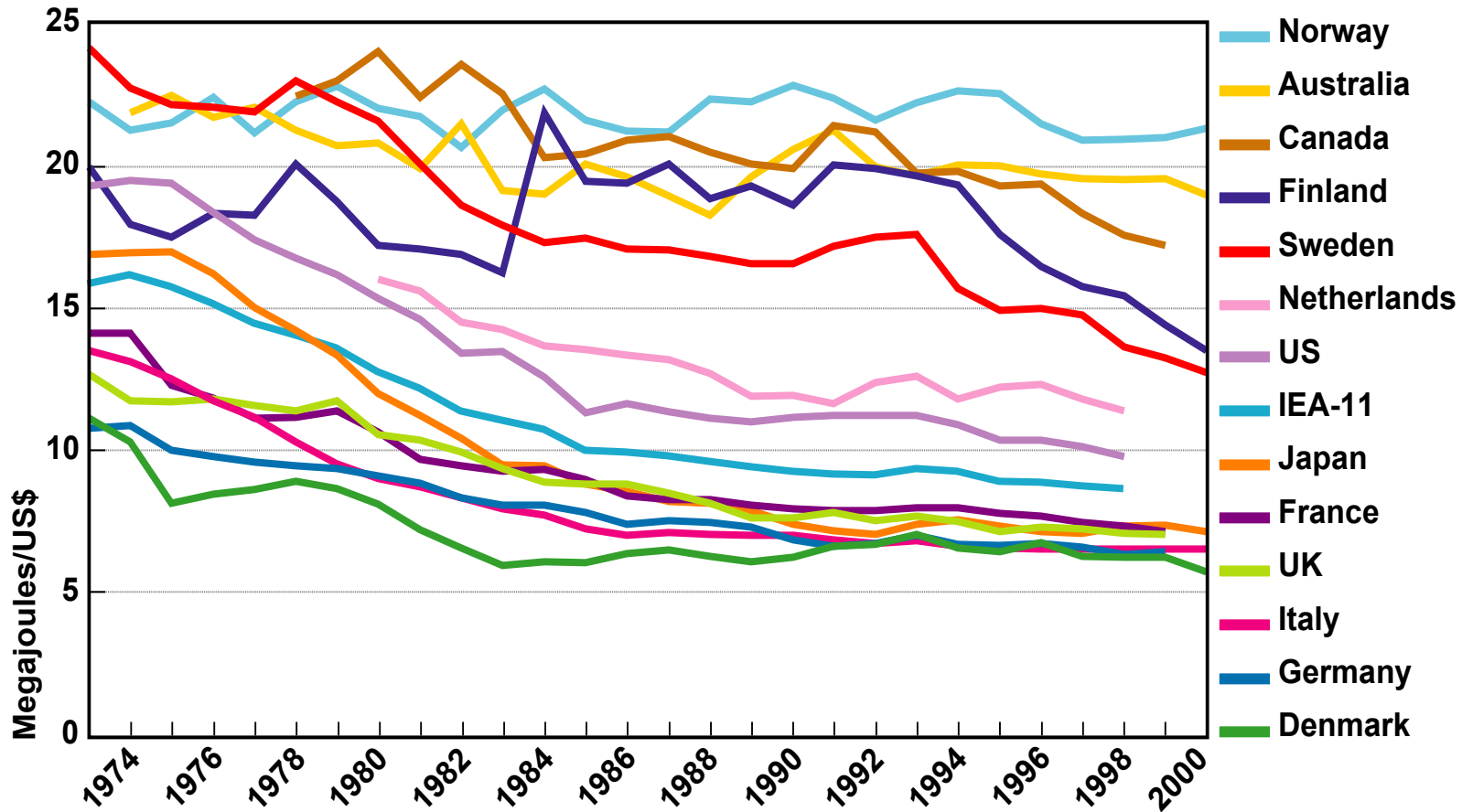


Energy Use per Unit of Manufacturing Value-added

Oil Crises & Climate Challenges

30 Years

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IN IEA COUNTRIES



In the aggregate, the energy intensity of IEA manufacturing production is only about half of what it was in 1973

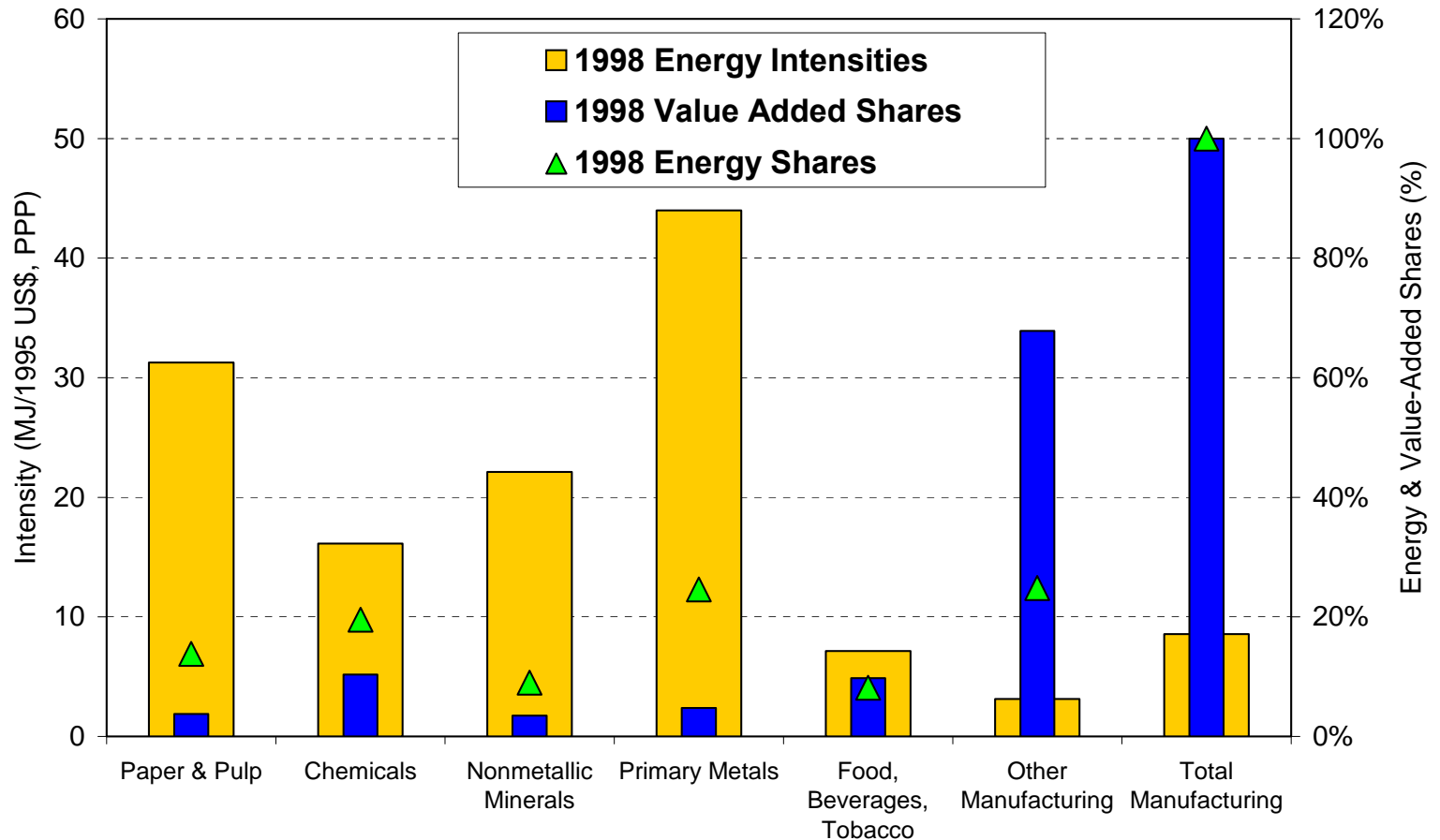


IEA-11 Energy Intensities, Value-Added and Energy Shares

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Energy-intensive industries contribute little to overall output, but has a large share of total energy use

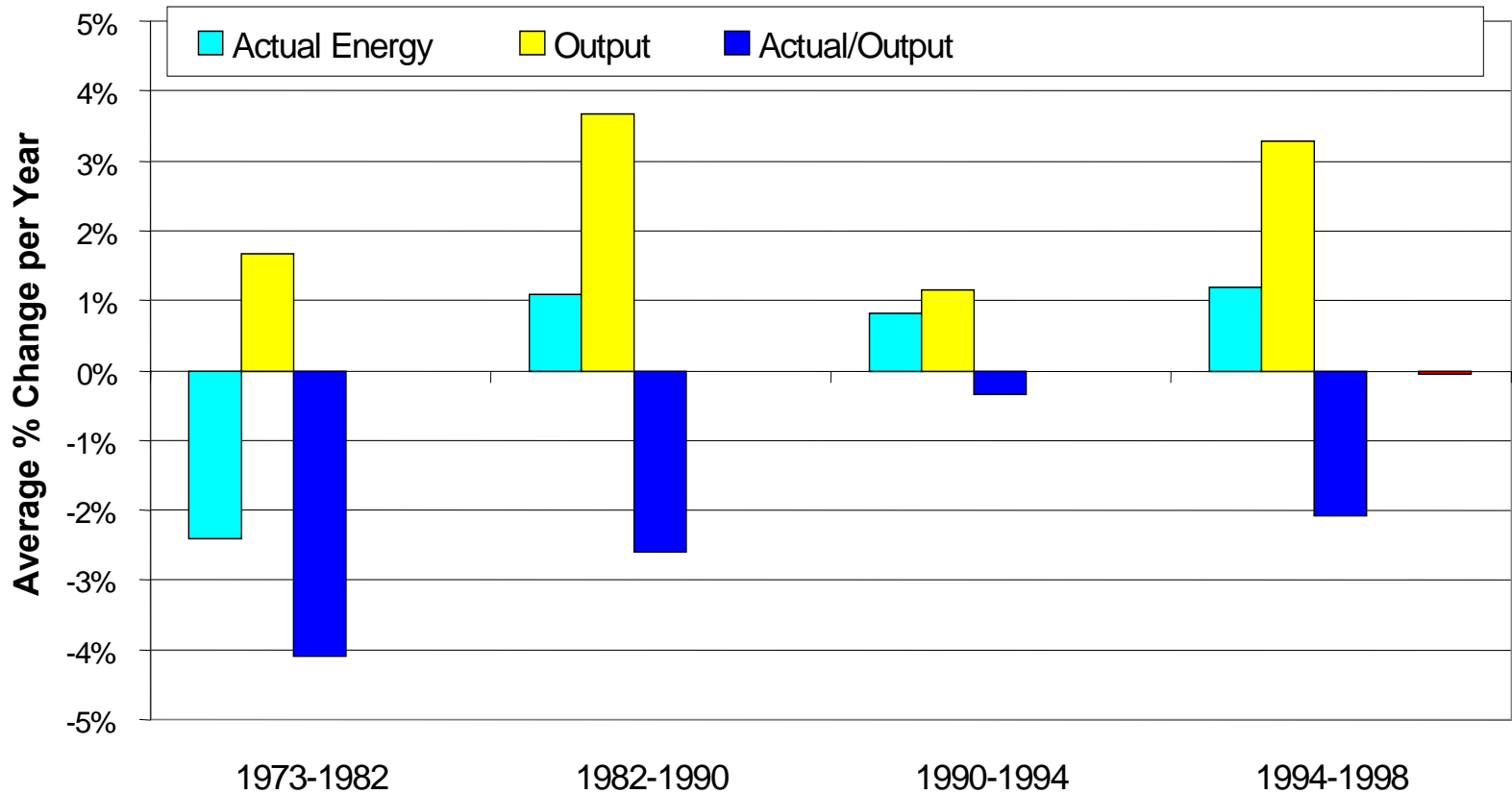


Energy Savings and Structural Change IEA - 11 Manufacturing

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Challenges

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Years

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IN IEA COUNTRIES



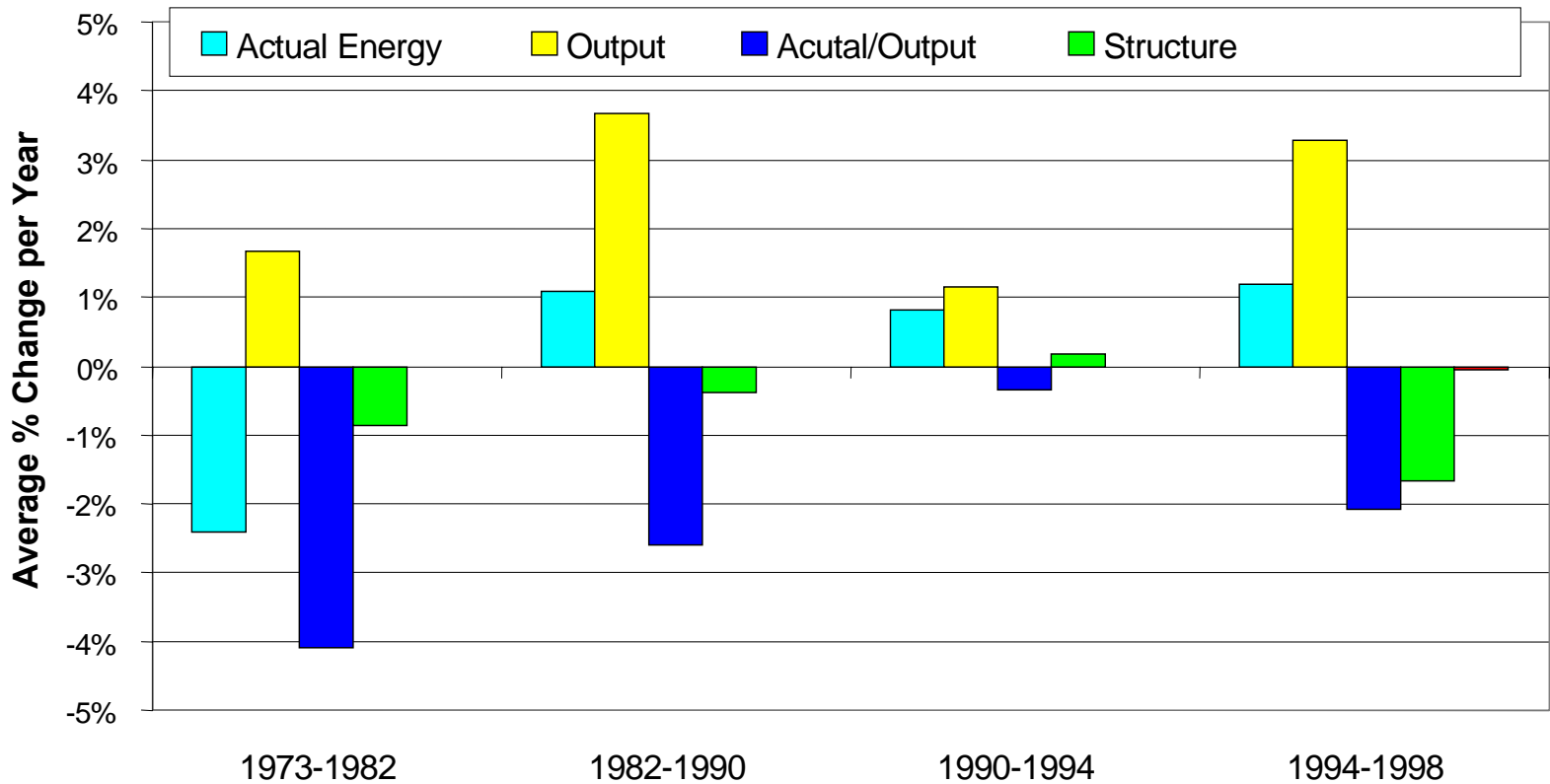


Energy Savings and Structural Change IEA - 11 Manufacturing

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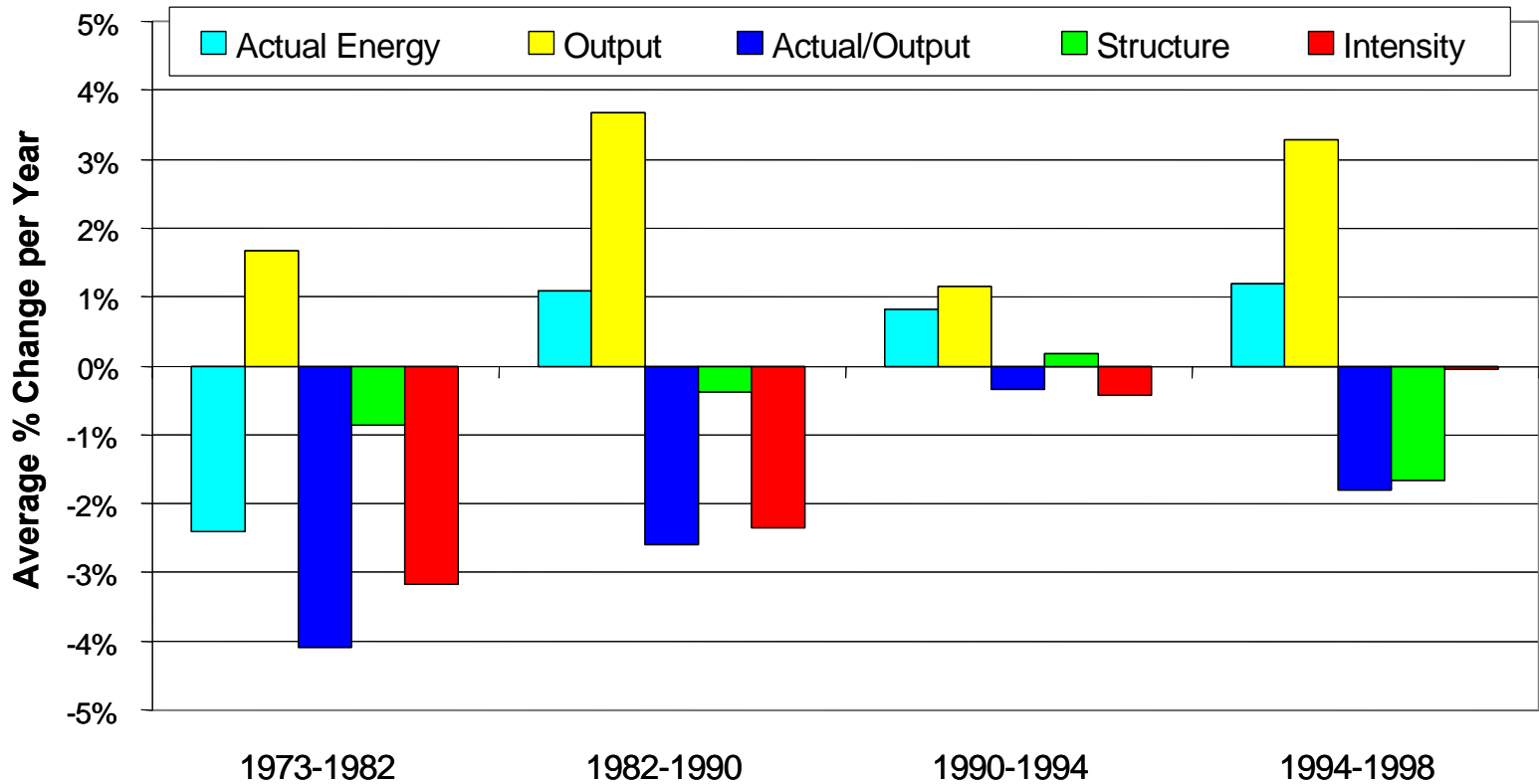


Energy Savings and Structural Change IEA - 11 Manufacturing

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IN IEA COUNTRIES



Recent trends: Slowing decline in intensities, but important impact from structural changes

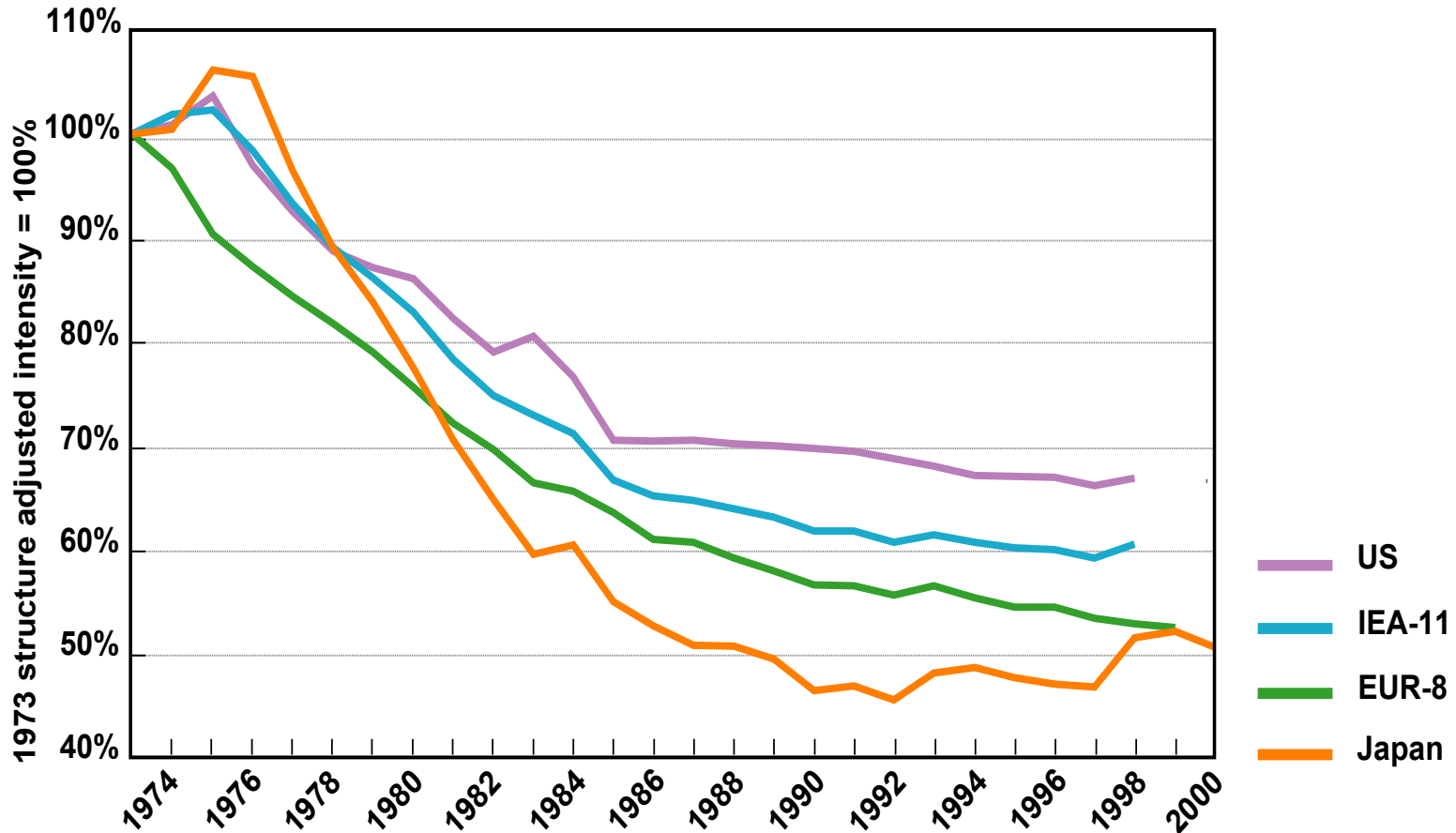


Manufacturing Energy Intensity (Adjusted for Structural Changes)

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Declines in energy intensities slowed markedly since late-1980s



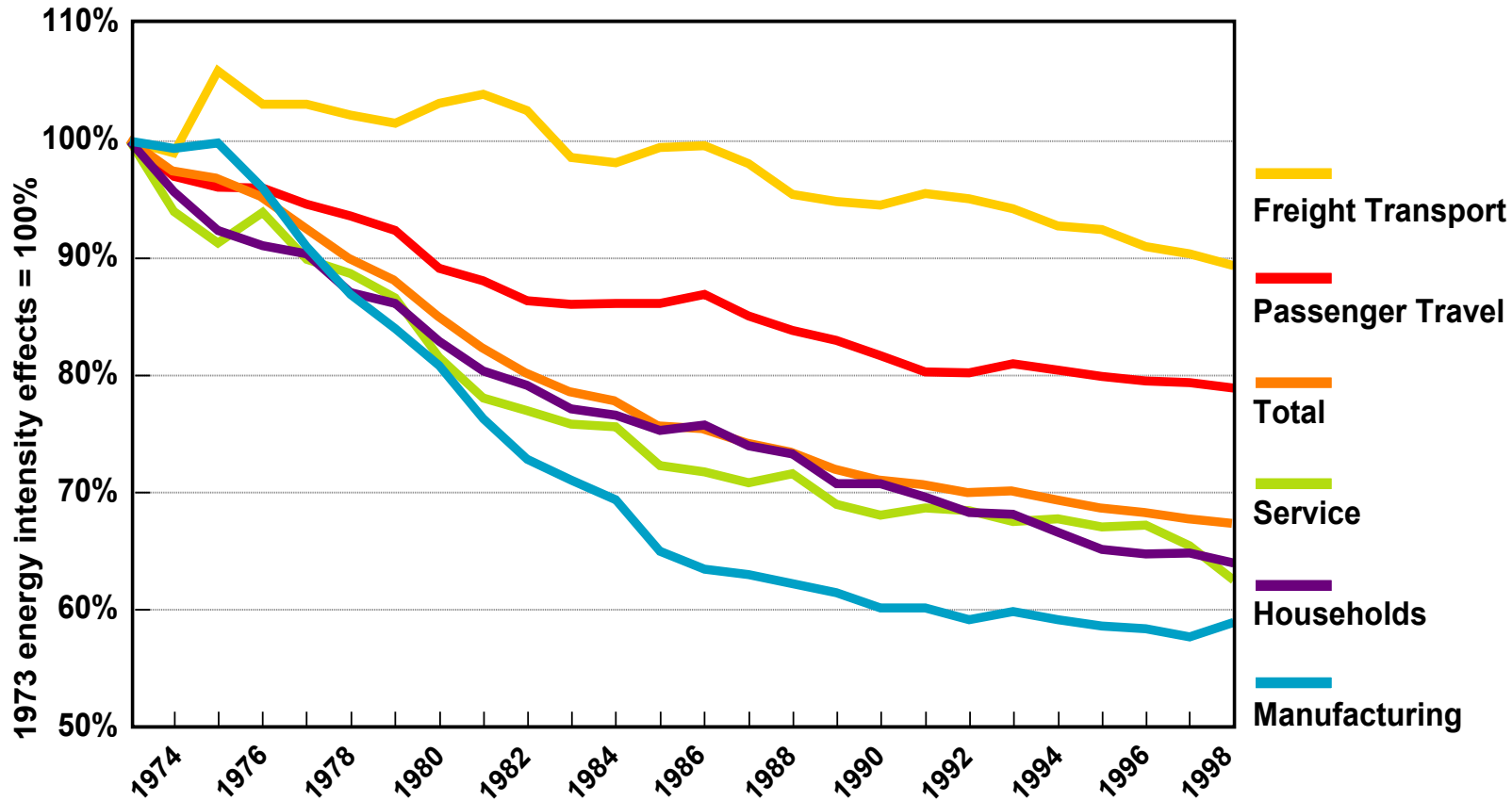
Energy Intensity Effects by Sector

IEA - 11

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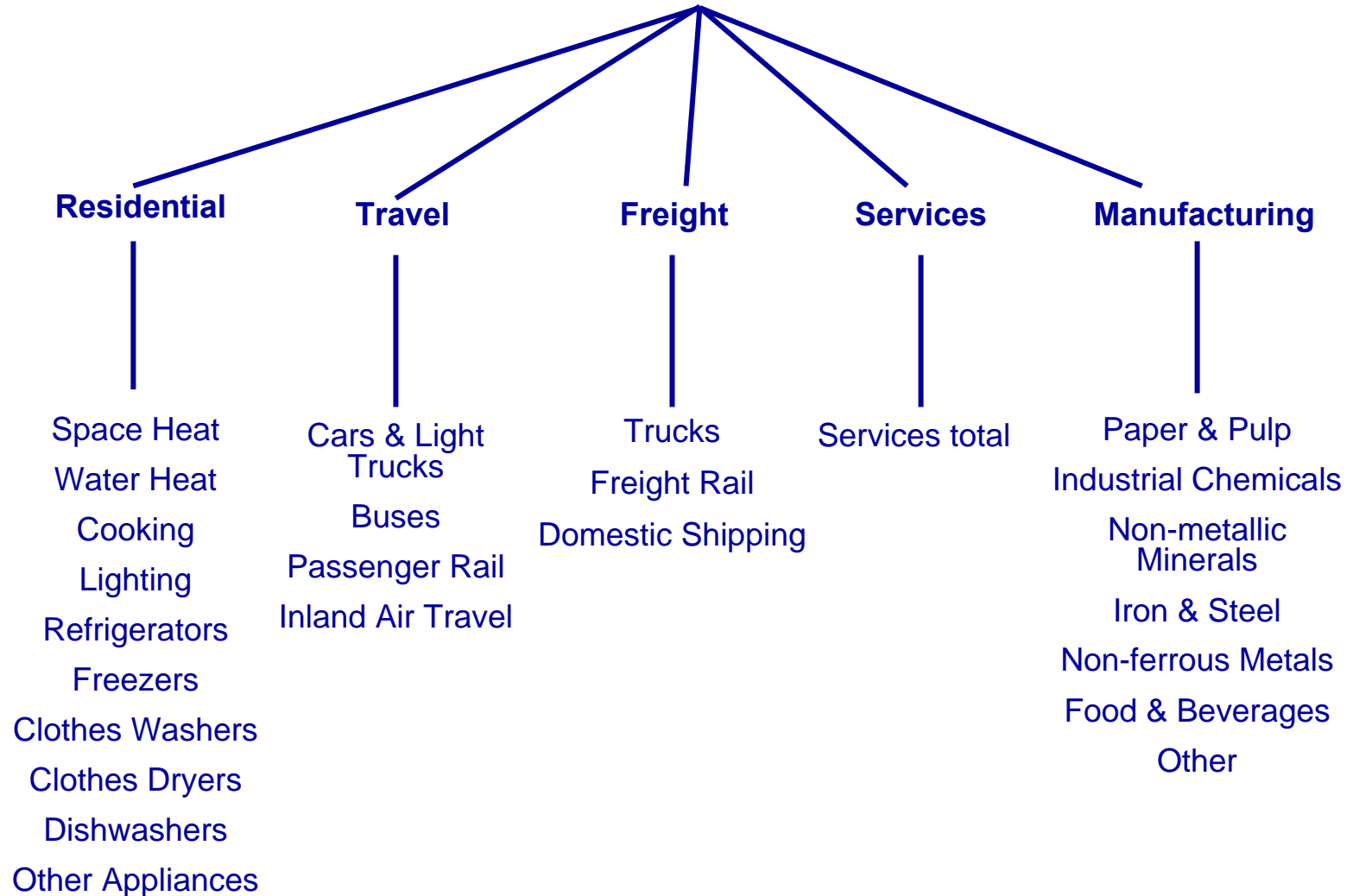


Declines in energy intensities have slowed in all sectors since the late 1980s



Sector & End-use Coverage

Total Economy





How to Understand Aggregate Trends? IEA's Decomposition Approach

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Energy Service

Energy Savings

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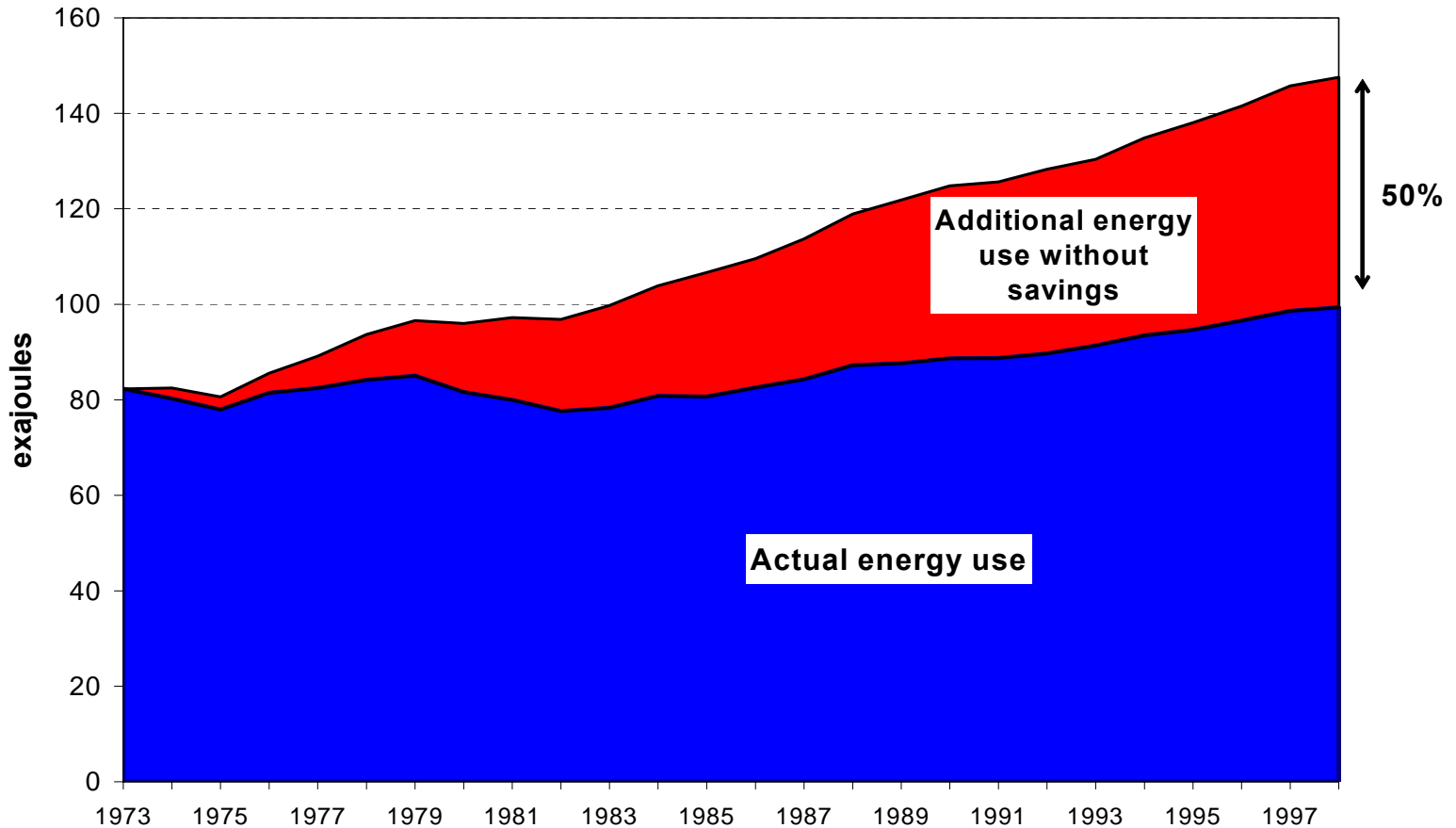


Energy Savings: The most Important Fuel in IEA-11

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Years

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Without energy savings achieved since 1973 energy demand in 1998 would have been 50% higher

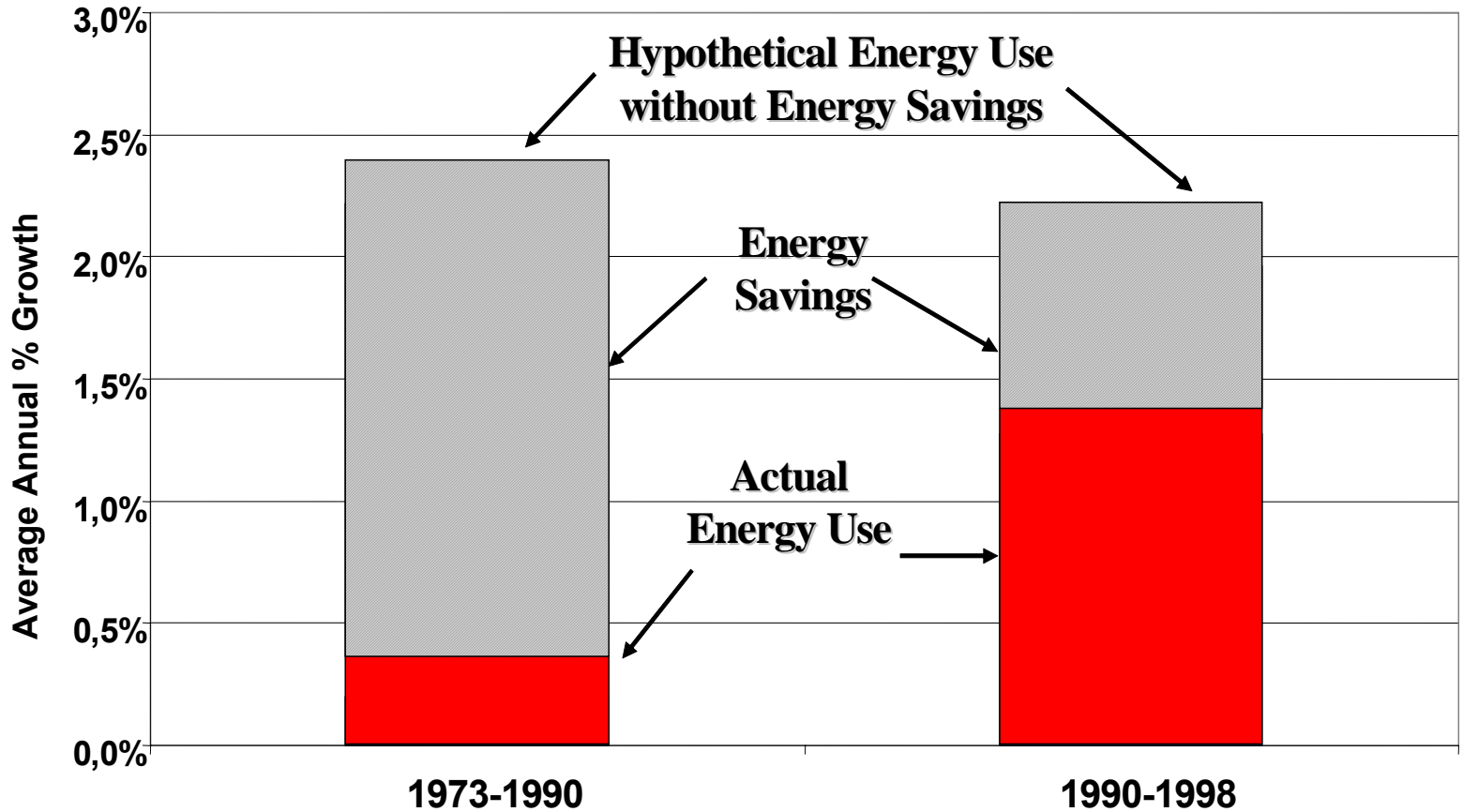


IEA-11 Energy Use Impact of Energy Savings

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Rates of energy savings have slowed significantly after 1990, leading to rapid demand growth

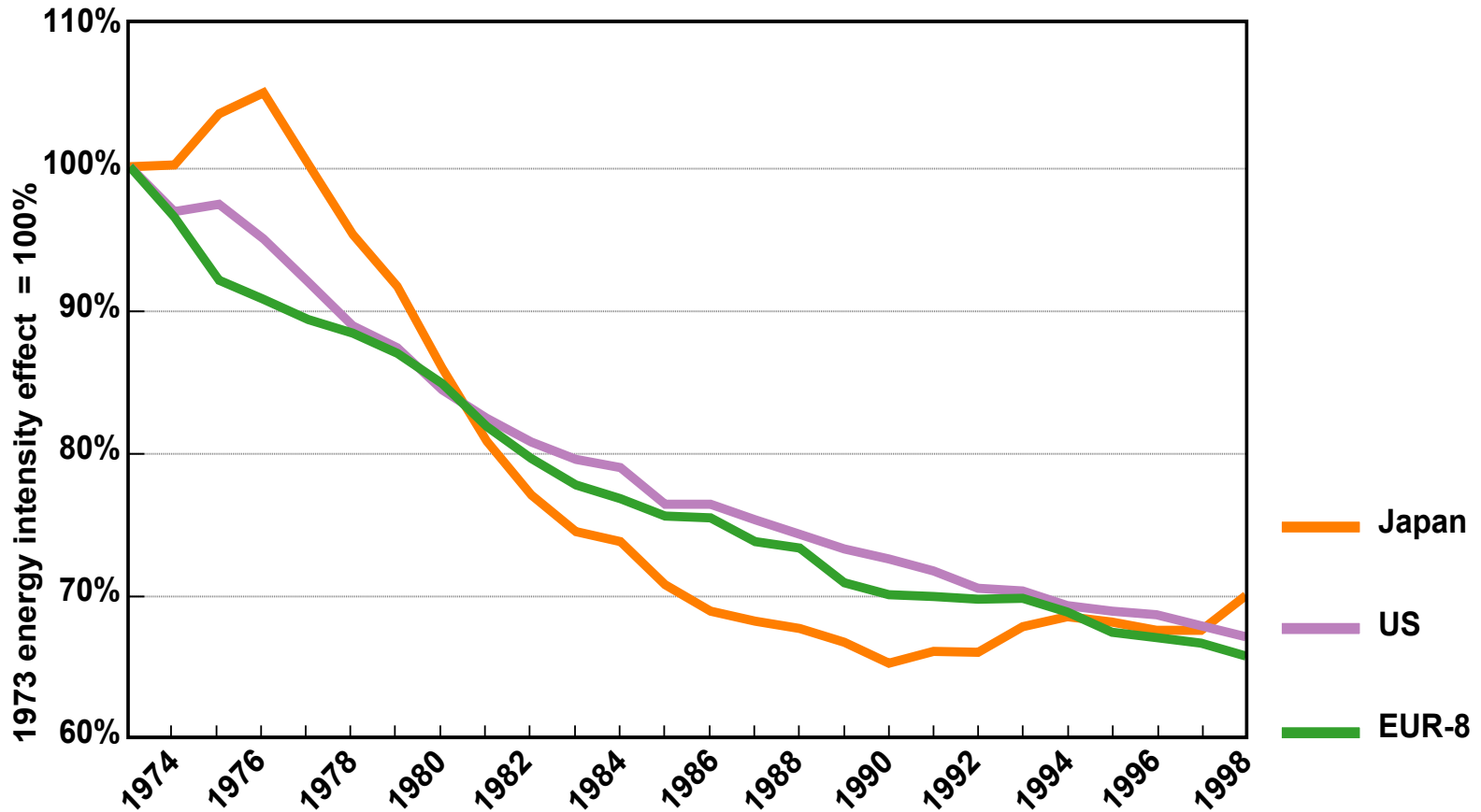


Economy-wide Intensity Effect

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Years

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Intensity effect fell by about 30% in all three regions

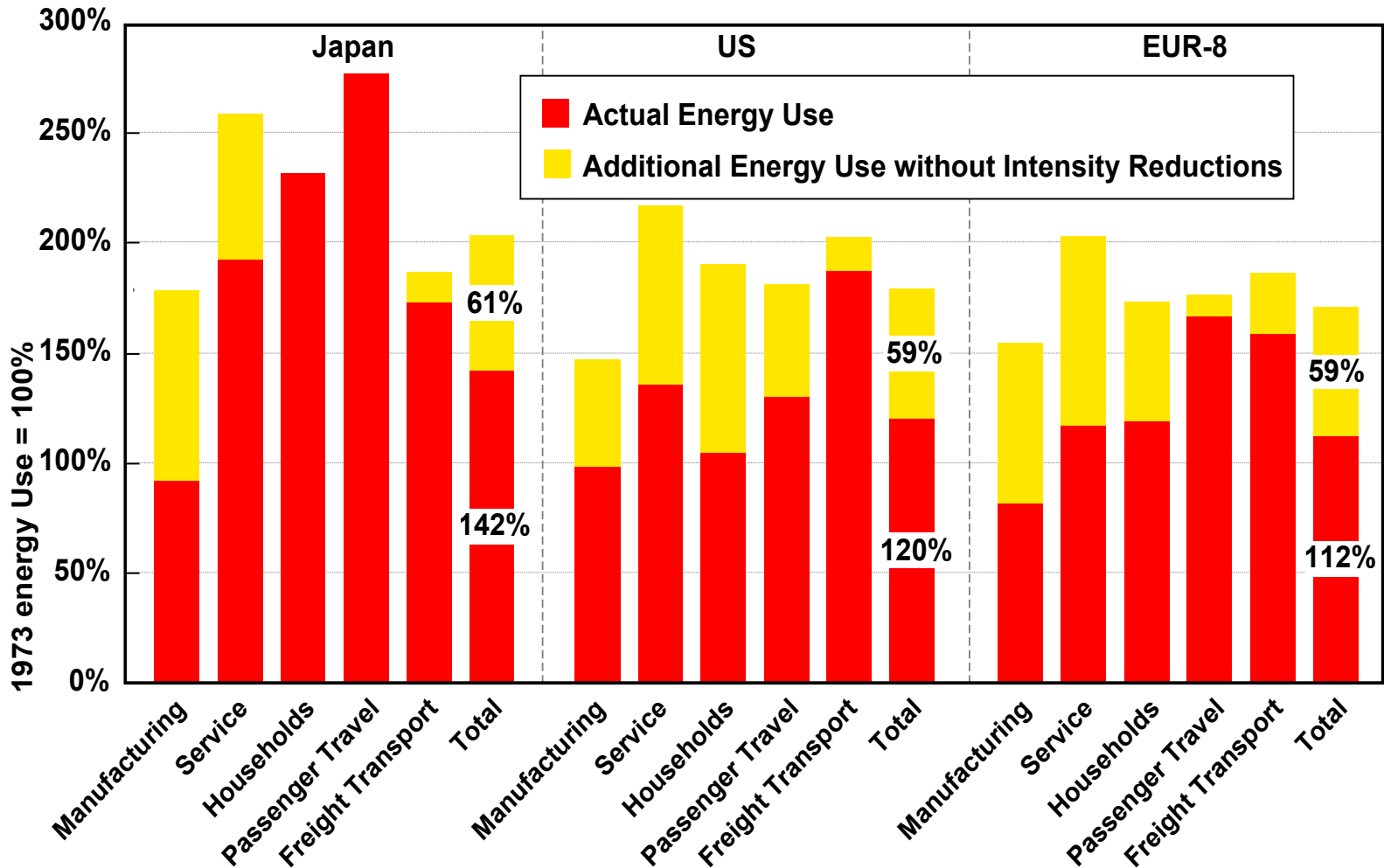


Actual Energy Use and Energy Savings by Country & Sector

Oil Crises & Climate Challenges

30 Years

OF ENERGY USE IN IEA COUNTRIES



Total energy savings across the three regions are similar, but there are important differences by sector

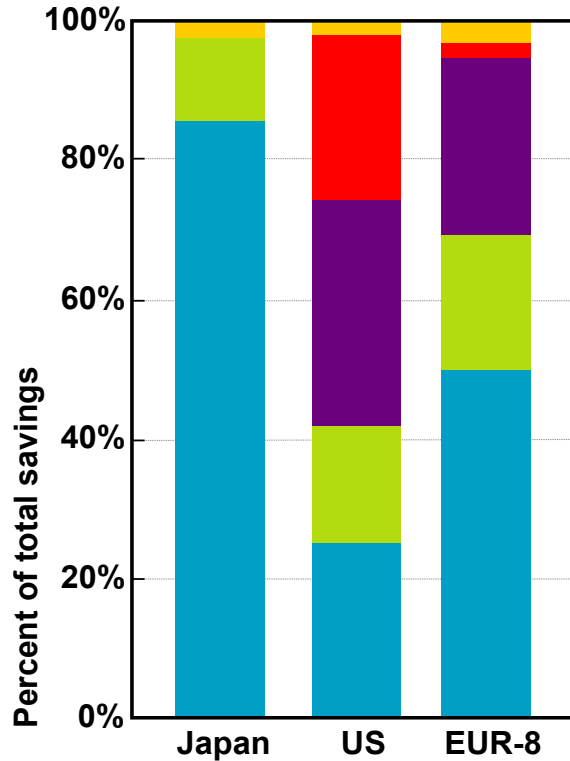


Contribution to Energy Savings from Sectors and End Uses

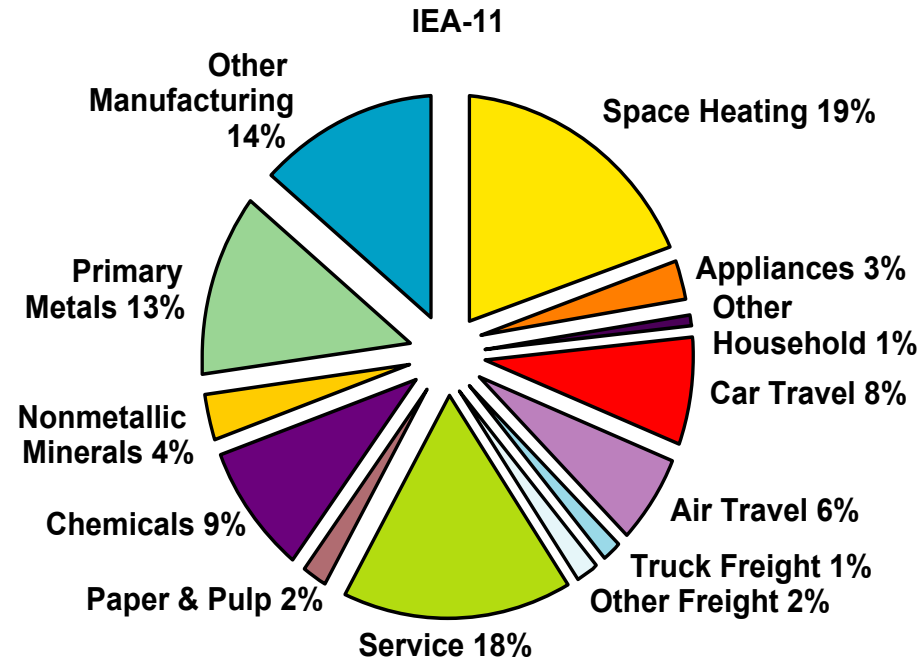
Oil Crises & Climate Challenges

30 Years

OF ENERGY USE IN IEA COUNTRIES



Freight Transport Passenger Transport
Households Service Manufacturing



Outside the United States, transport has contributed little to overall savings

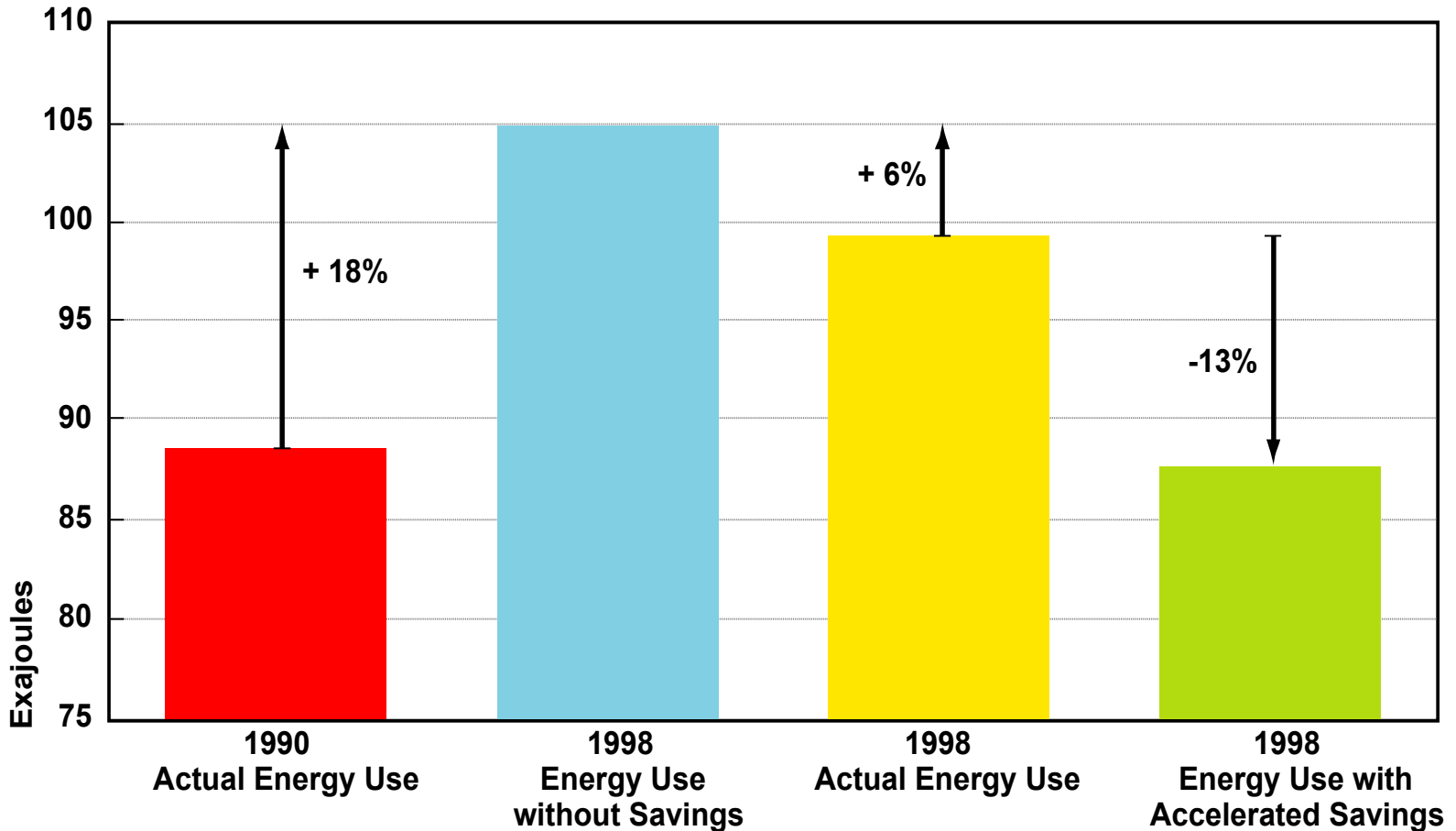


Actual Energy Use & Two Savings Cases, IEA-11

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If savings rates had followed “the second best” IEA-11 could have saved 13% more energy between 1990 and 1998

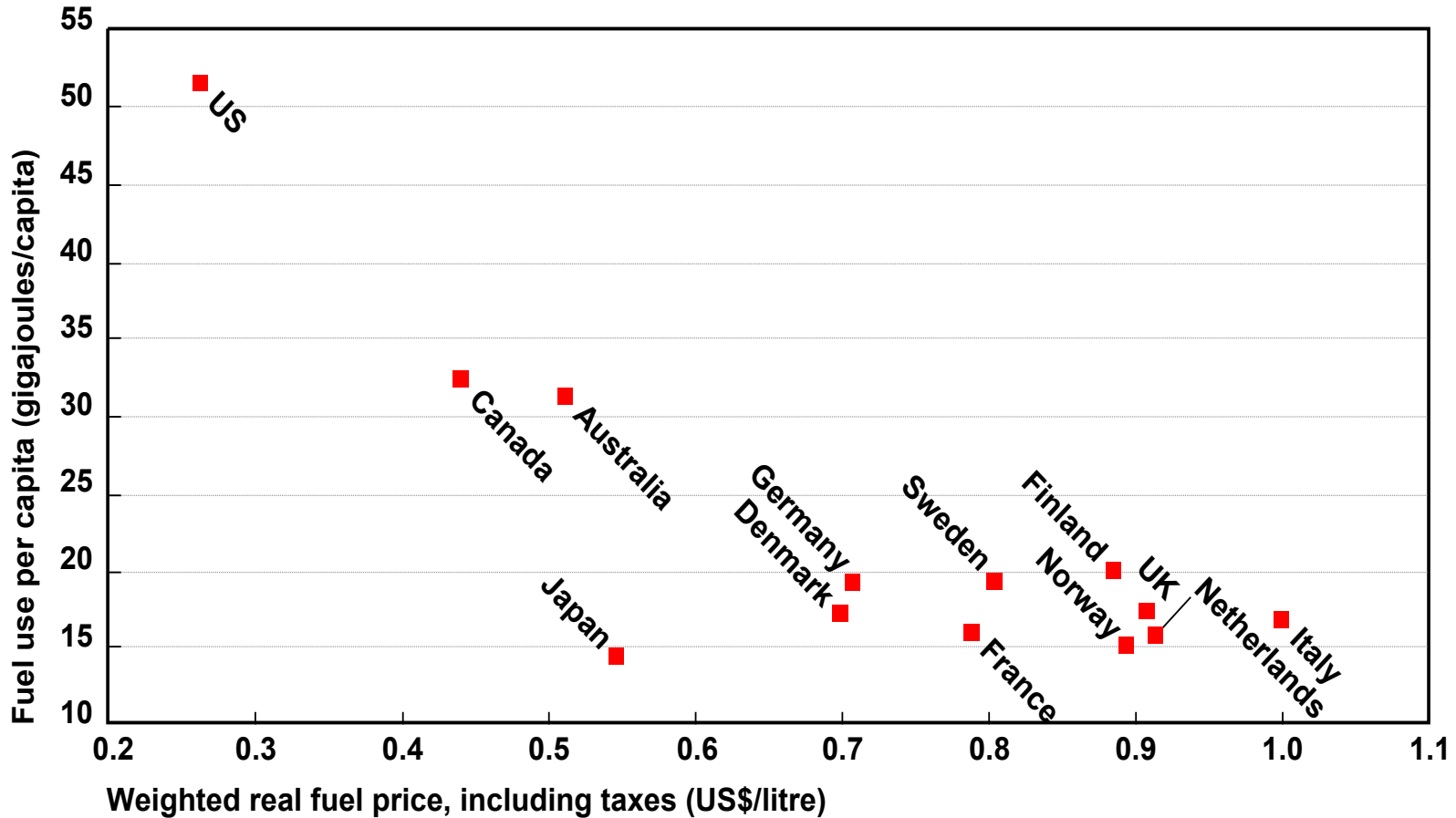


Car Fuel Use per Capita vs. Price, 1998

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Challenges

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Years

OF ENERGY USE
IN IEA COUNTRIES



Energy use for cars is higher where prices are lower

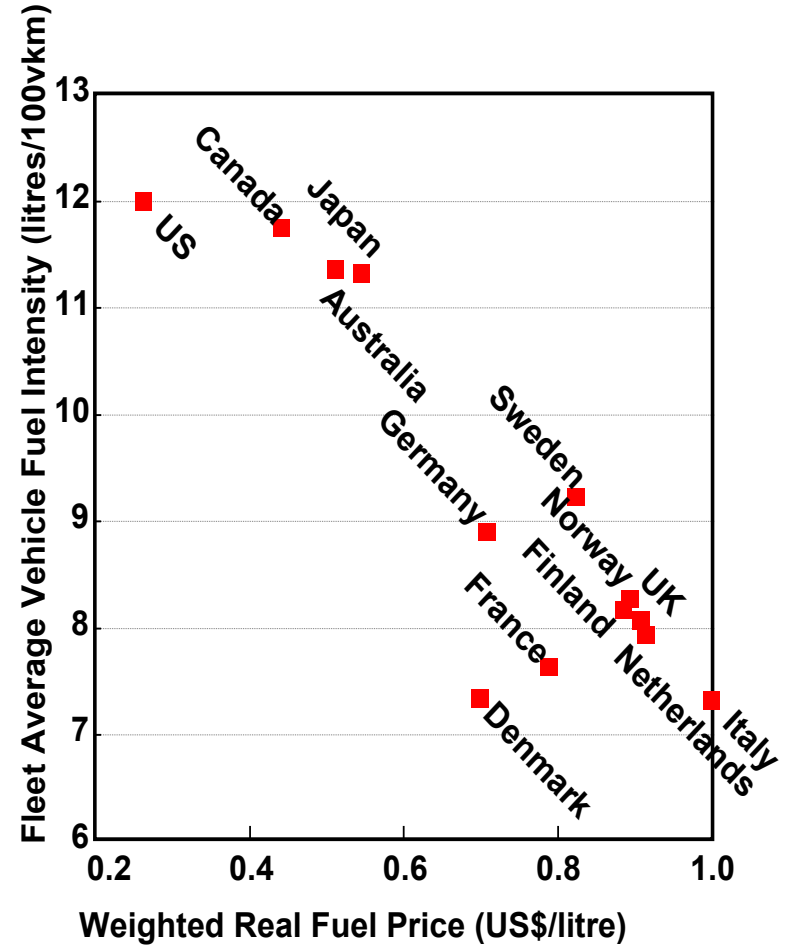
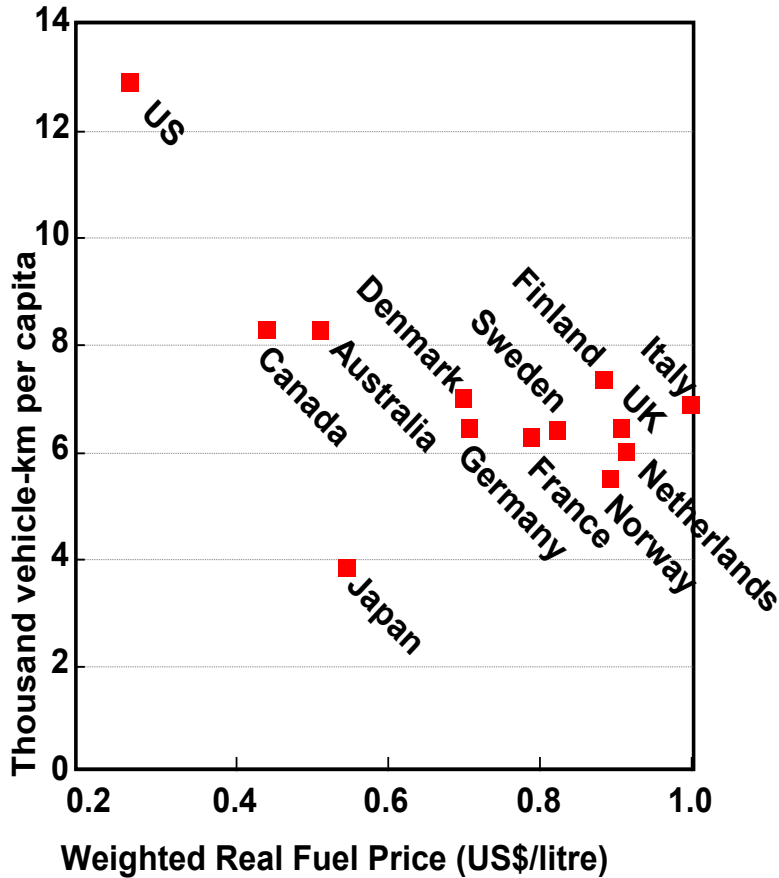


Travel and Intensities vs. Fuel price

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Climate
Challenges

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Years

OF ENERGY USE
IN IEA COUNTRIES



Higher fuel prices correlate with lower fuel intensity



Energy Indicators

What's Next?



IEA Energy Indicator Project: Next Steps

- **Update:**

- ◆ IEA Indicator database to most recent year

- **Expand:**

- ◆ Cover more IEA Countries
- ◆ Non-OECD Countries

- **Deepen:**

- ◆ New indicators to improve assessment of energy efficiency progress in all sectors, e.g. for industry:
 - Use physical production, not value added as activity measure
 - More disaggregated to capture production of key energy intensive materials



IEA Energy Indicator Project: Deliverables

- Continued update of IEA indicator database (next version mid 2006)
- Update of IEA's "30 Years" Indicator publication, presenting trends for all sectors through 2001/2002/2003 (planned for 2006)
- Expanded indicator database with key non-OECD countries (2007-2008)
- Develop more detailed indicators to address the G8 tasks on buildings, transport and industry (2006-2007)
- Workshops focused on non-OECD countries and on development of new indicators (2006-2007)
- Publication on trends in energy use and efficiency in IEA and key non-OECD countries (Spring 2008)



Taking Indicators Forward

Issues Discussed Yesterday

- **Data and methodology go together**
- **Indicators motivate need for data**
- **Indicators a tool for checking data**
- **Help to understand what you don't understand**
- **Short-term analytical needs vs. long-term data collection efforts**
- **What to do when data is missing?**
- **Communication between statisticians, analysts and policy makers needed**



Taking Indicators Forward

Issues Discussed Yesterday (cont.)

- **National efforts crucial to feed data to IEA and to help assessing trends**
- **The need for assessing new indicators by sector**
- **Sector specific issues, e.g. household surveys**
- **Expand IEA indicator project to non-OECD countries**
- **Collaboration to improve definitions, e.g. energy efficiency vs. conservation**



Taking Indicators Forward

Means Discussed Yesterday

- **Formalised international collaboration on harmonisation and capacity building**
- **Workshops**
- **Develop glossary/guidelines**
- **IEA a “clearing house”/coordinator for international indicator and data collaboration**