



Introduction to Energy Indicators

Motivation and Approach

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Indicator Workshop

IEA, Paris

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Overview of Workshop

- **Session 1: Introduction to Indicators – Why What and How**
- **Session 2: Data: The Necessary Raw Material**
- **Session 3: Energy Indicators: Success, Difficulties and Challenges**
- **Session 4: Roundtable discussion:**
 - ◆ **What should be the priority areas for the IEA in helping new countries getting started with energy indicator analysis?**
 - ◆ **How should these efforts best be organised?**
 - ◆ **Should the IEA develop new indicators better suited for specific needs of non-OECD countries?**



Assessing Energy Efficiency Progress:

A call for action from G8 Leaders and IEA Ministers

- **Gleneagles Plan of Action (G8 Communiqué):**
We will [G8 Heads of States]....invite the IEA ...to develop energy indicators to assess efficiency...
- **Communiqué from IEA Ministers May 2005:**
“...instruct the IEA to monitor our efforts to [reinforce our energy efficiency effort]...”



Presentation Overview

- **Why indicators?**
- **What are they?**
- **Examples**
- **Data needs**



Why Indicators?

Indicators can help...

- Understand driving forces behind growth in energy demand
- Separate factors related to energy efficiency from those that are not
- Identify potentials for energy efficiency improvements
- Measure progress of energy efficiency measures



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)

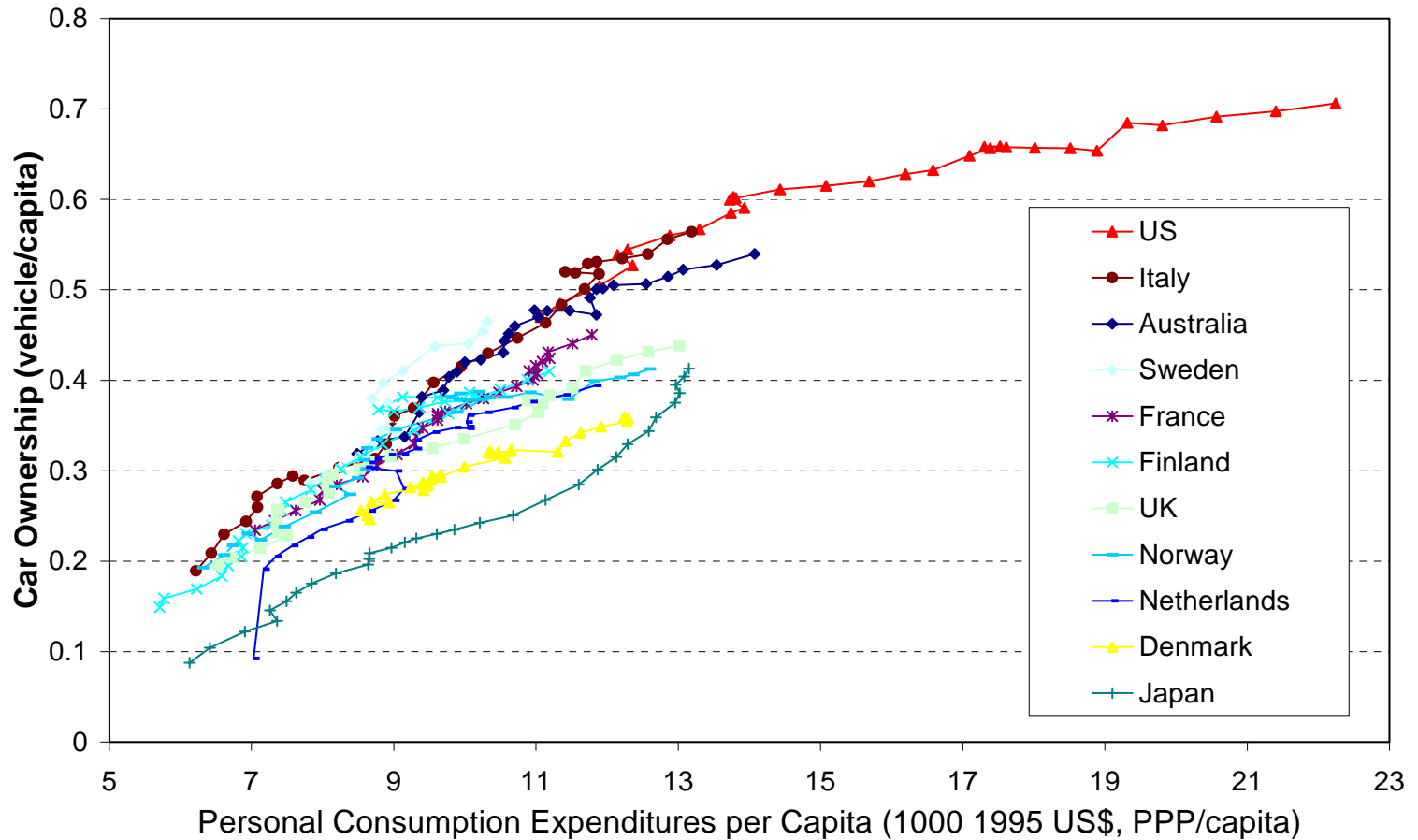


Example of Driving Force Car Ownership and Income 1970-2000

Oil
Crises &
Climate
Challenges

30
Years

OF ENERGY USE
IN IEA COUNTRIES



Strong growth most places, slowly leveling off in the US



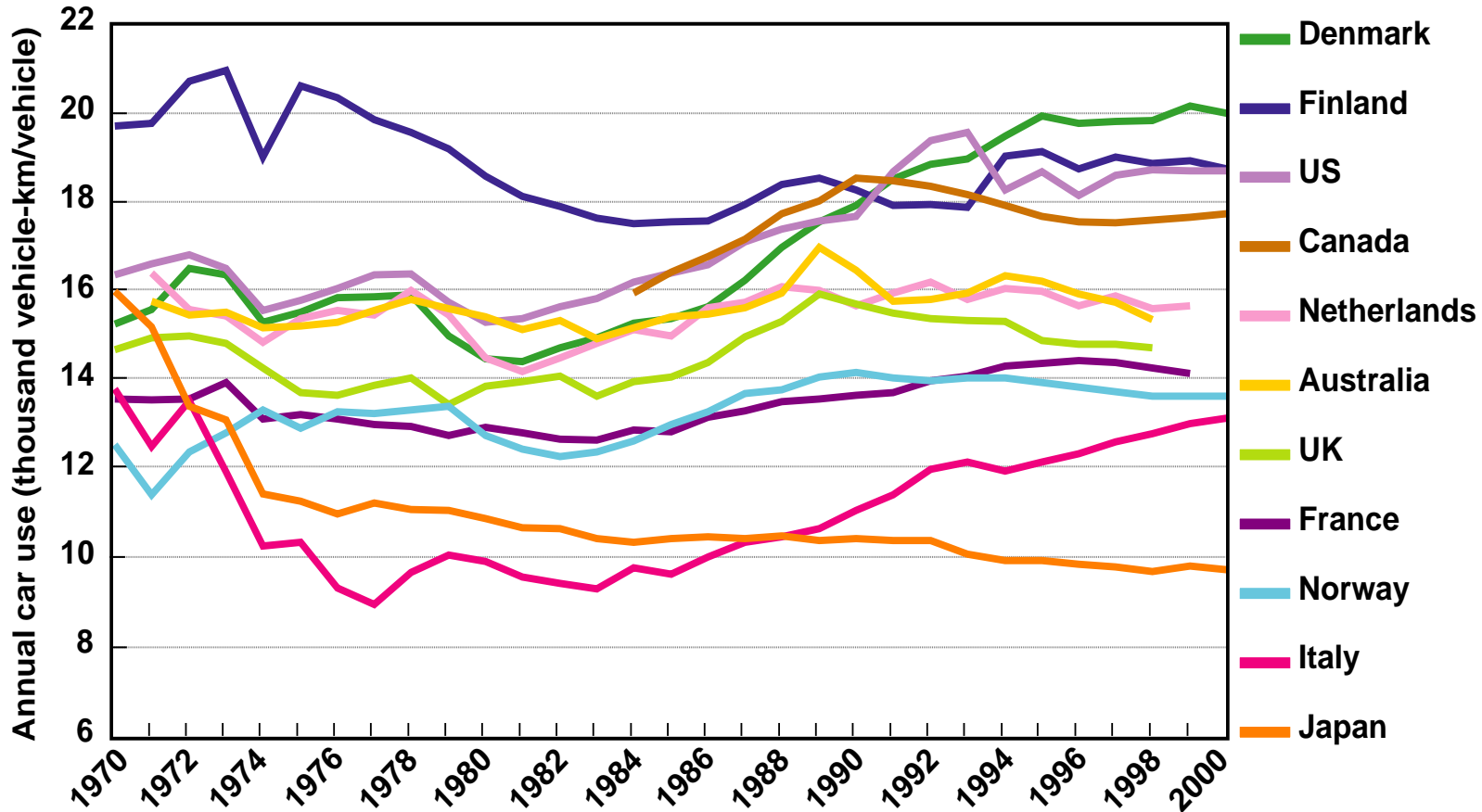
Example of Driving Force

Annual kilometres per Vehicle

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IN IEA COUNTRIES



Travel per vehicle is fairly stable over time



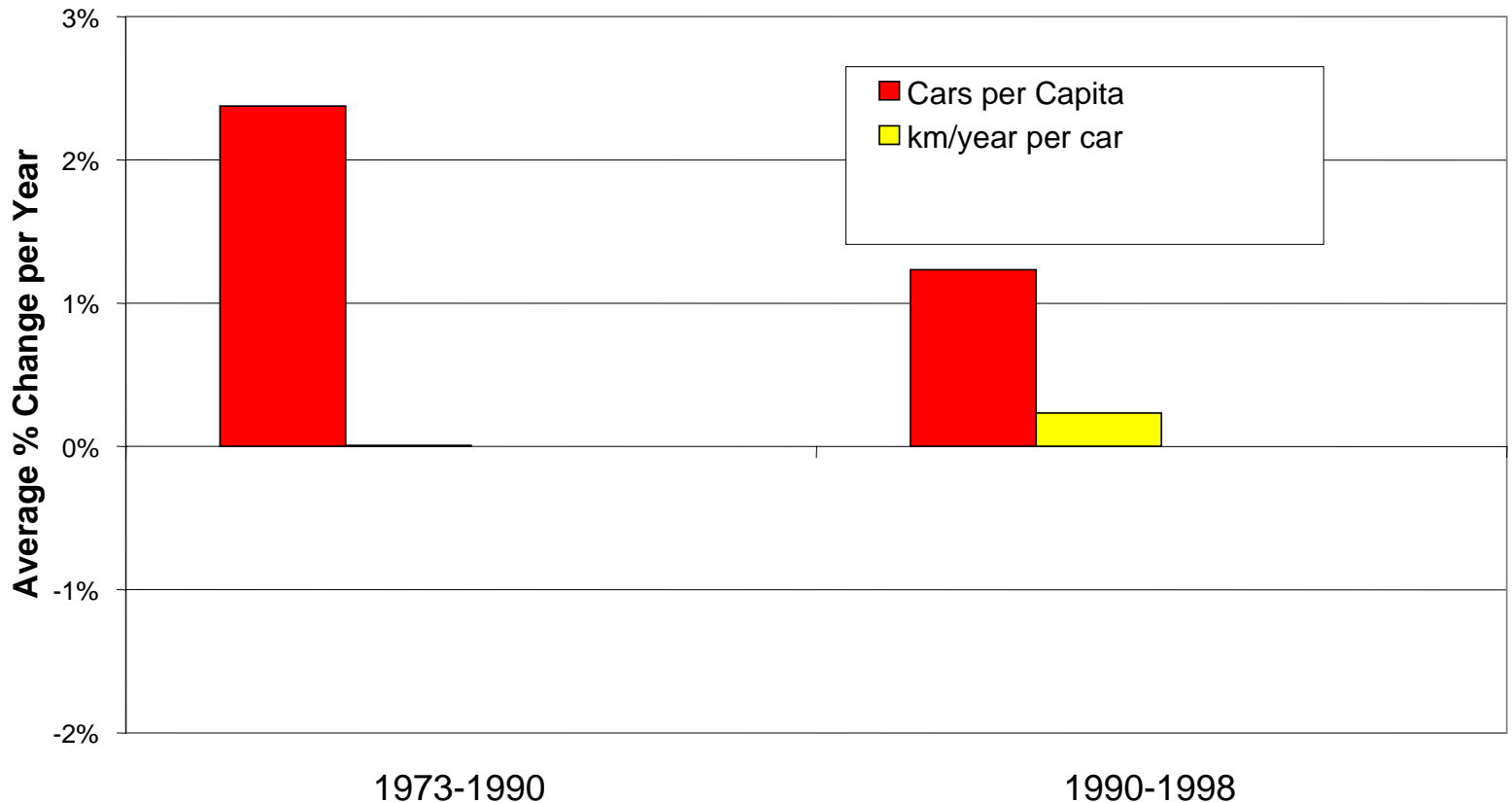
Energy for Cars (IEA-11)

Factors shaping development 1973-1998

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Strong growth in car ownership while the use of each car has changed little

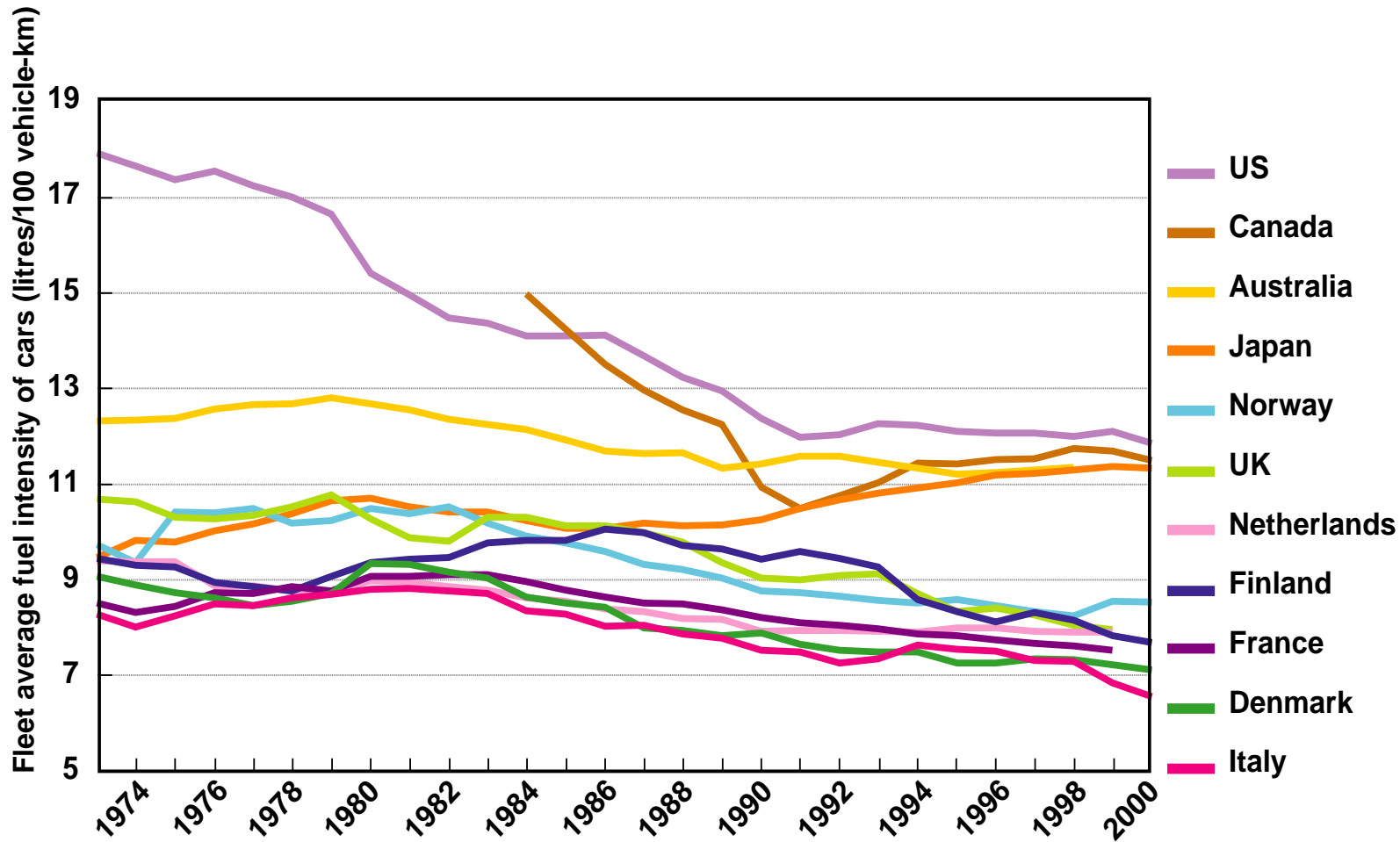


Example of Intensity Indicator Car Stock-average Fuel Intensity

Oil
Crises &
Climate
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Strong decline in the US until 1990, no change since then



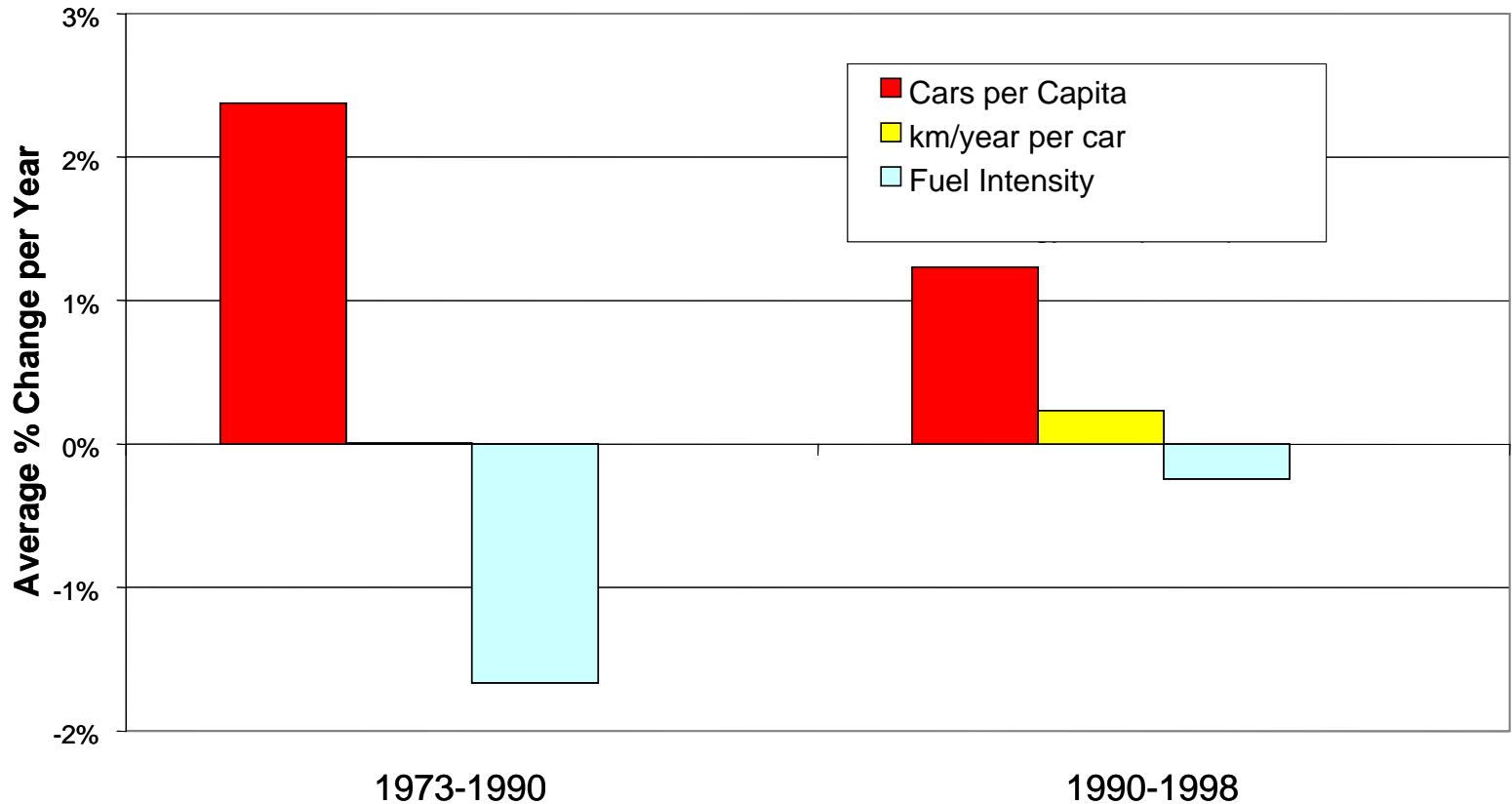
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Decline in fuel intensity has slowed....



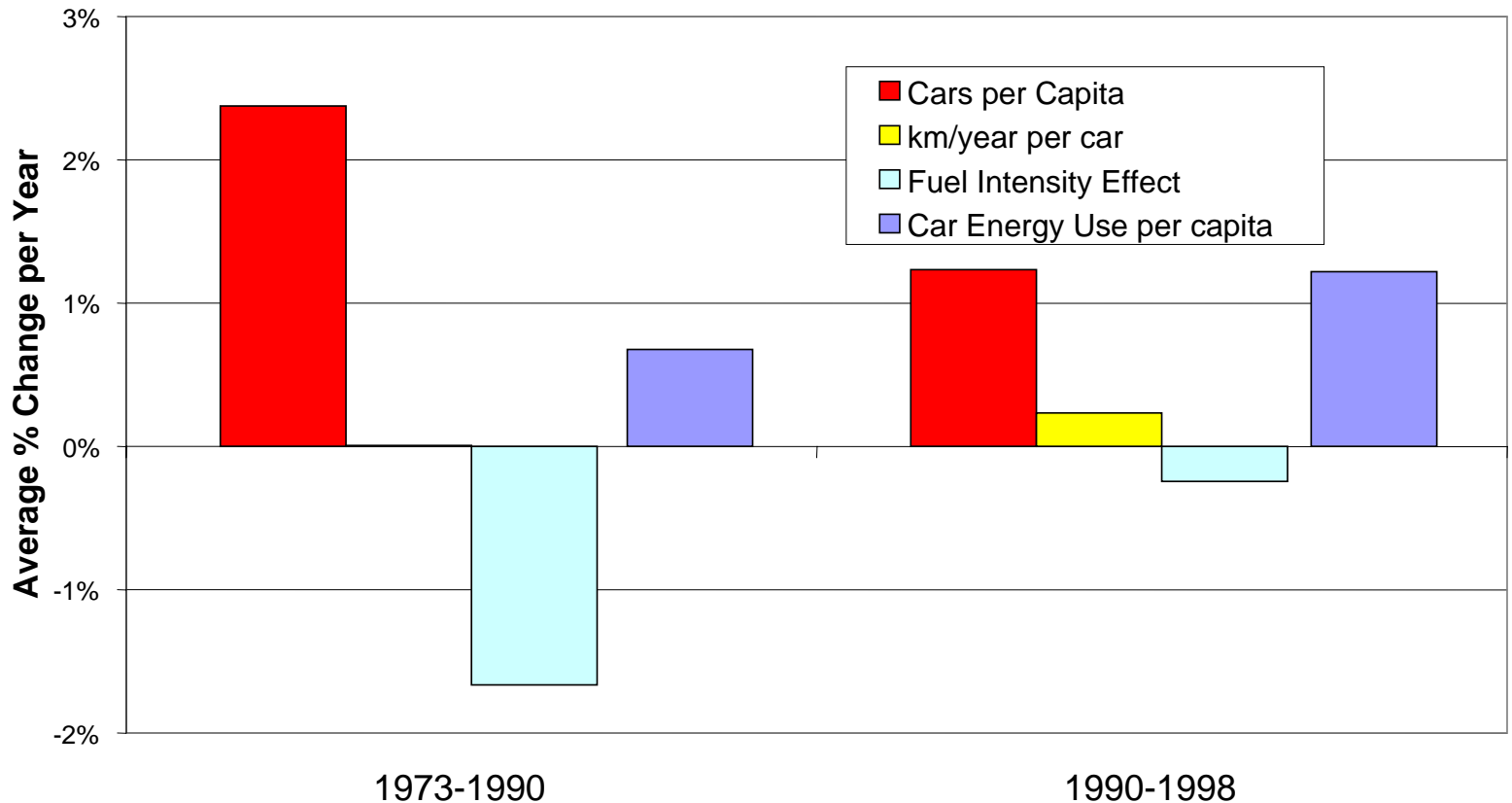
Energy for Cars (IEA-11)

Factors shaping development 1973-1998

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Net result is more rapid growth in fuel demand after 1990 despite lower growth in car ownership



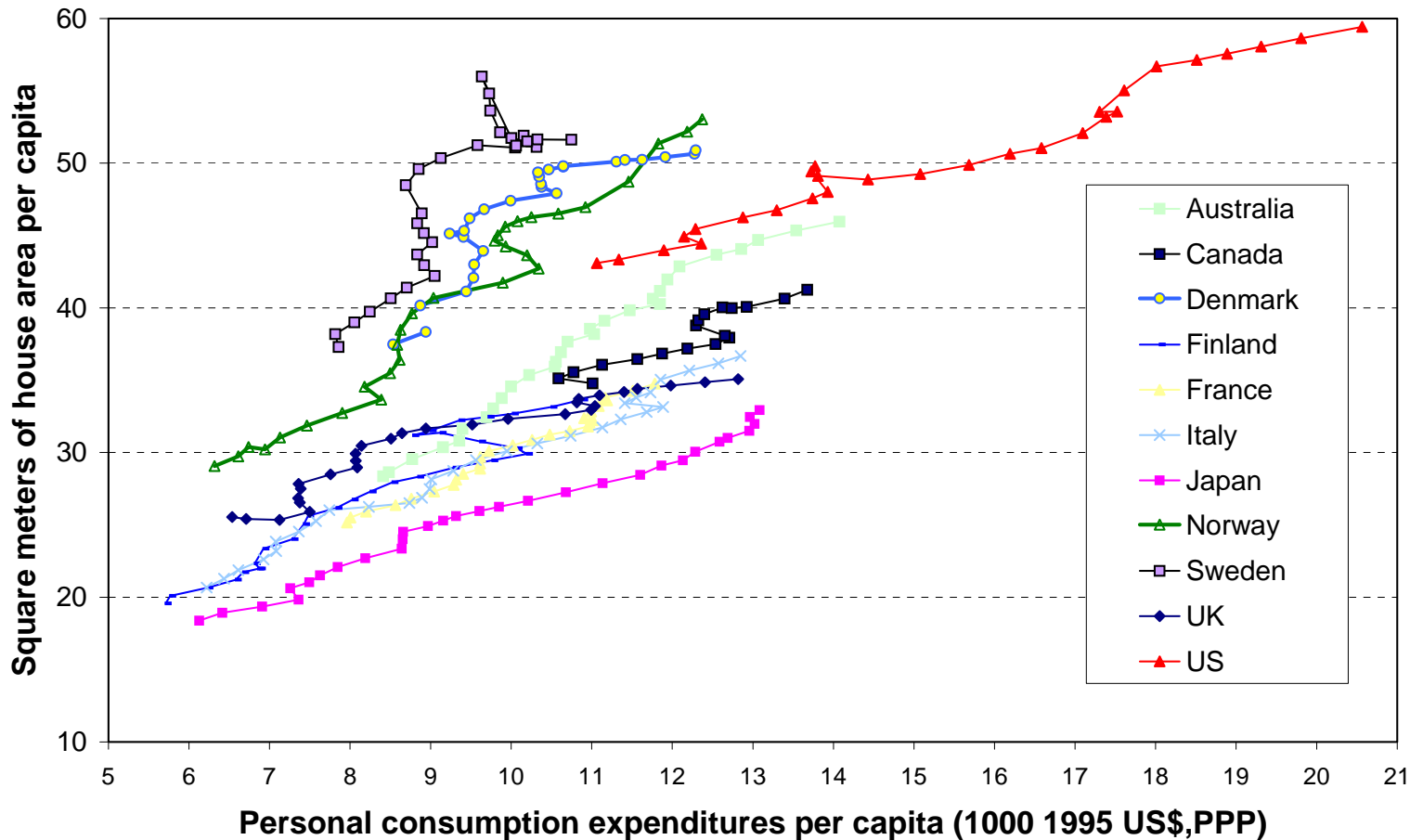
Example of Driving Force

House Area vs. Income (1973-1998)

Oil
Crises &
Climate
Challenges

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OF ENERGY USE
IN IEA COUNTRIES



Living space gets bigger as we get richer



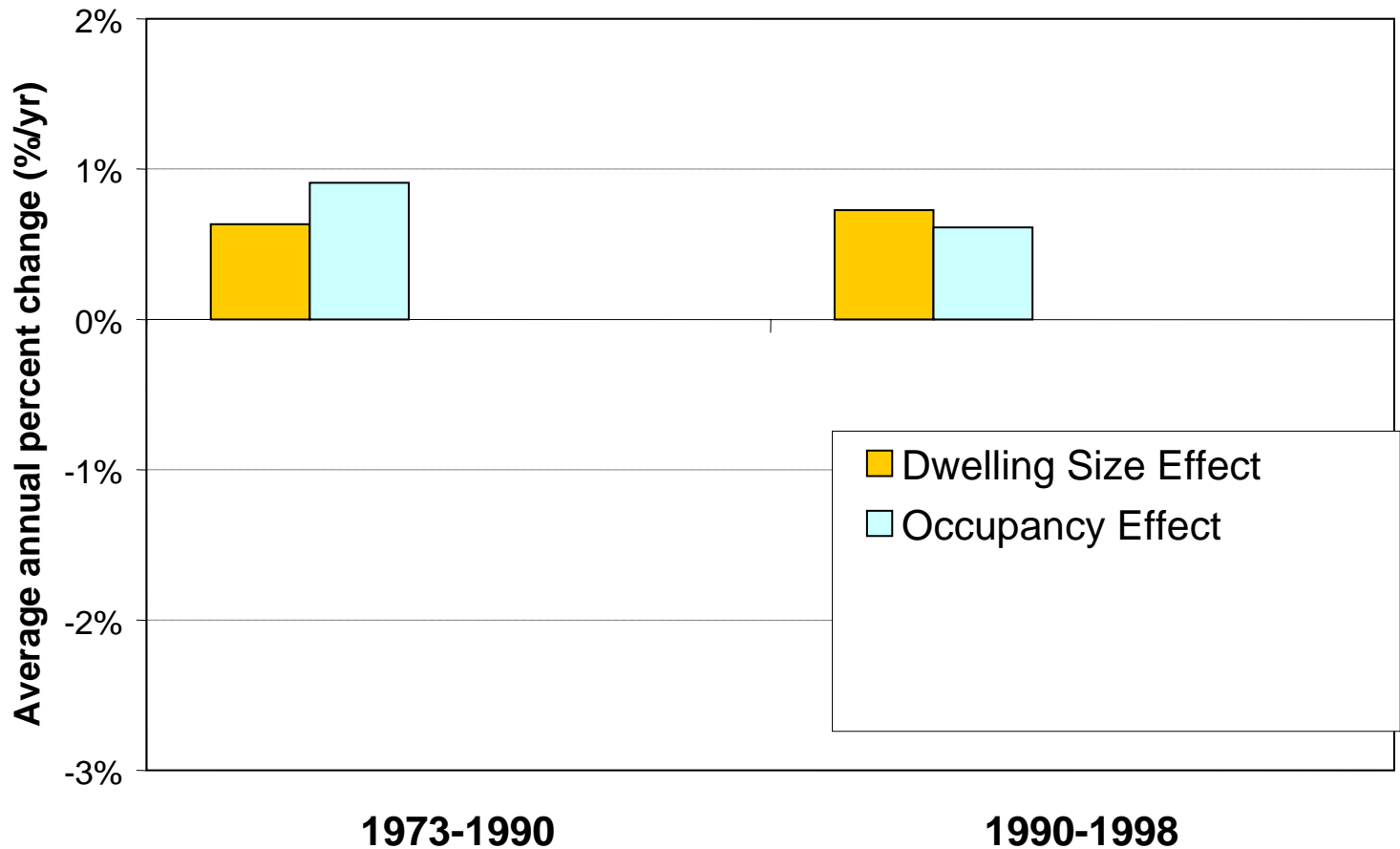
Energy for Space Heating (IEA-11)

Factors shaping development

Oil
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Climate
Challenges

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Years

OF ENERGY USE
IN IEA COUNTRIES



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

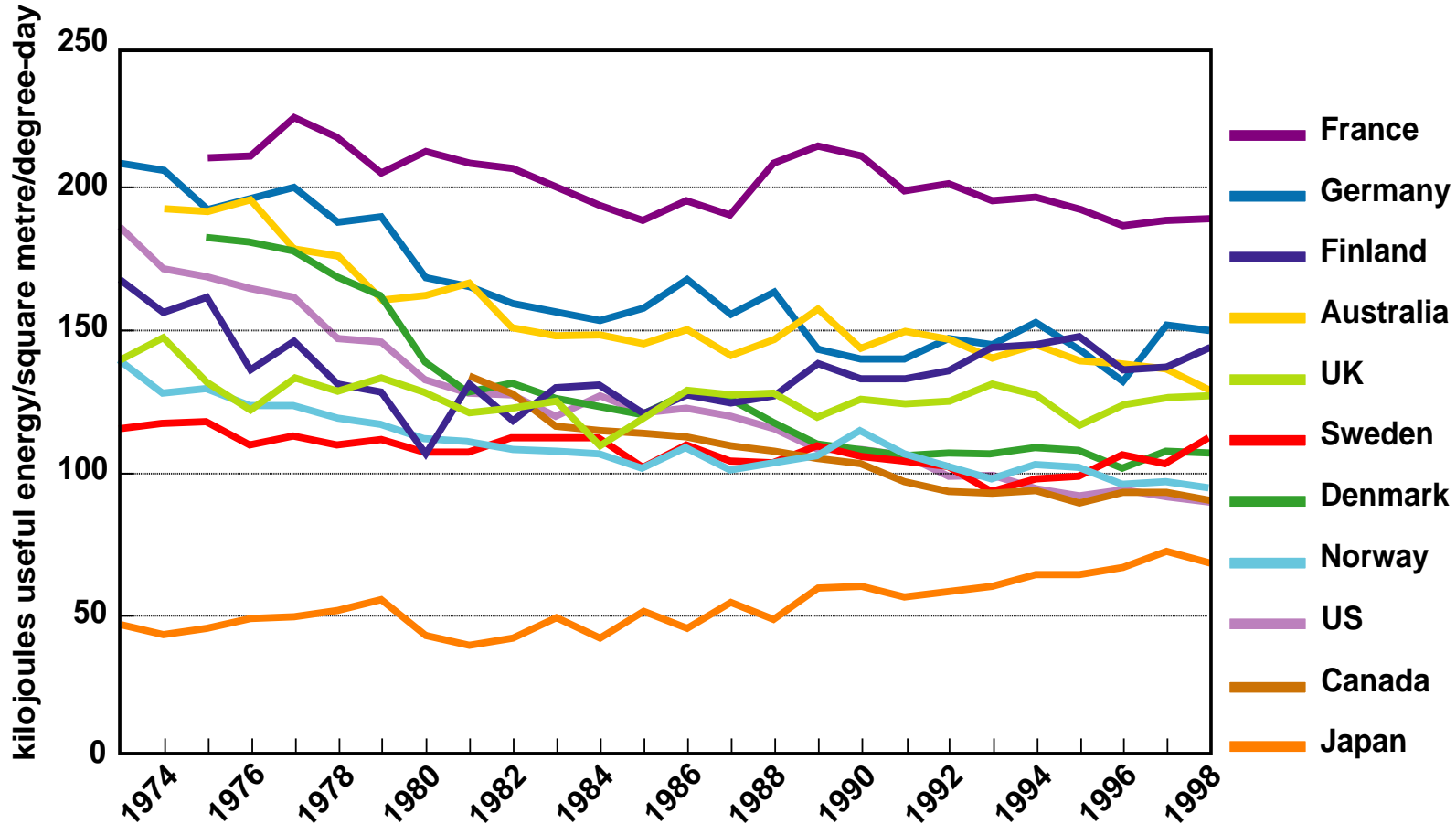


Example of Intensity Indicator Useful Space Heating Intensity

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IN IEA COUNTRIES



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

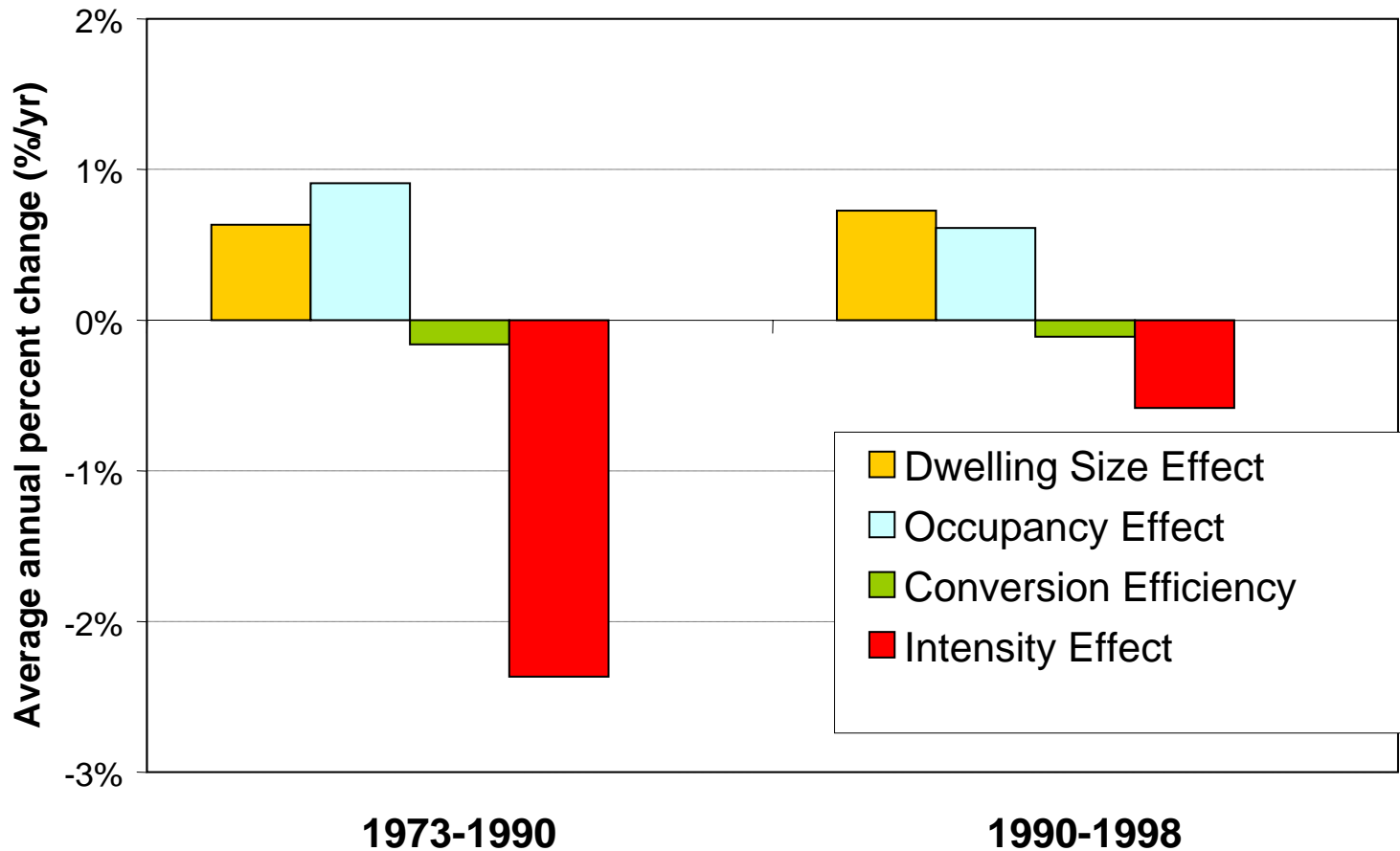


Energy for Space Heating (IEA-11) Factors shaping development

Oil
Crises &
Climate
Challenges

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OF ENERGY USE
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Declines in intensities are slowing....



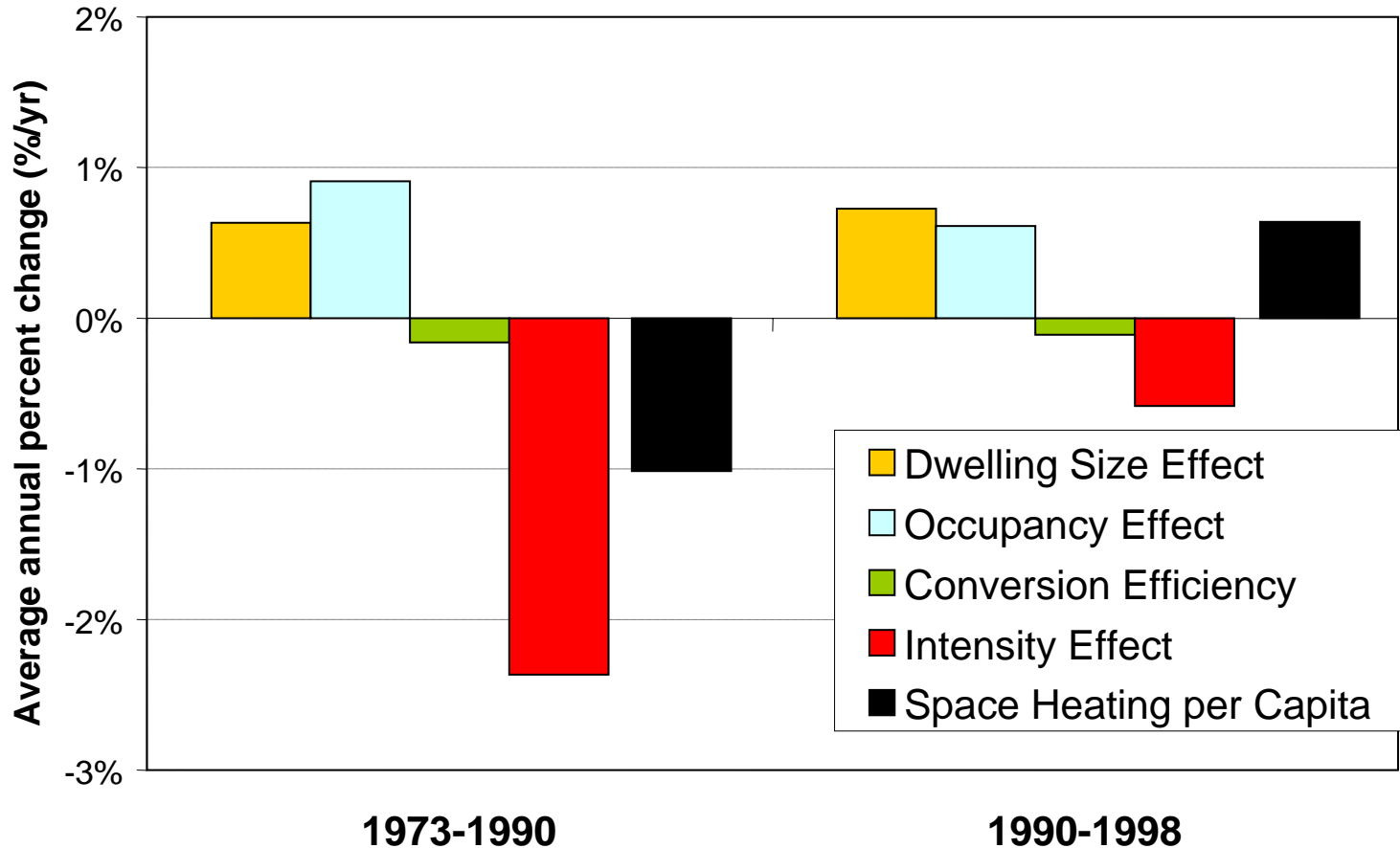
Energy for Space Heating (IEA-11)

Factors shaping development

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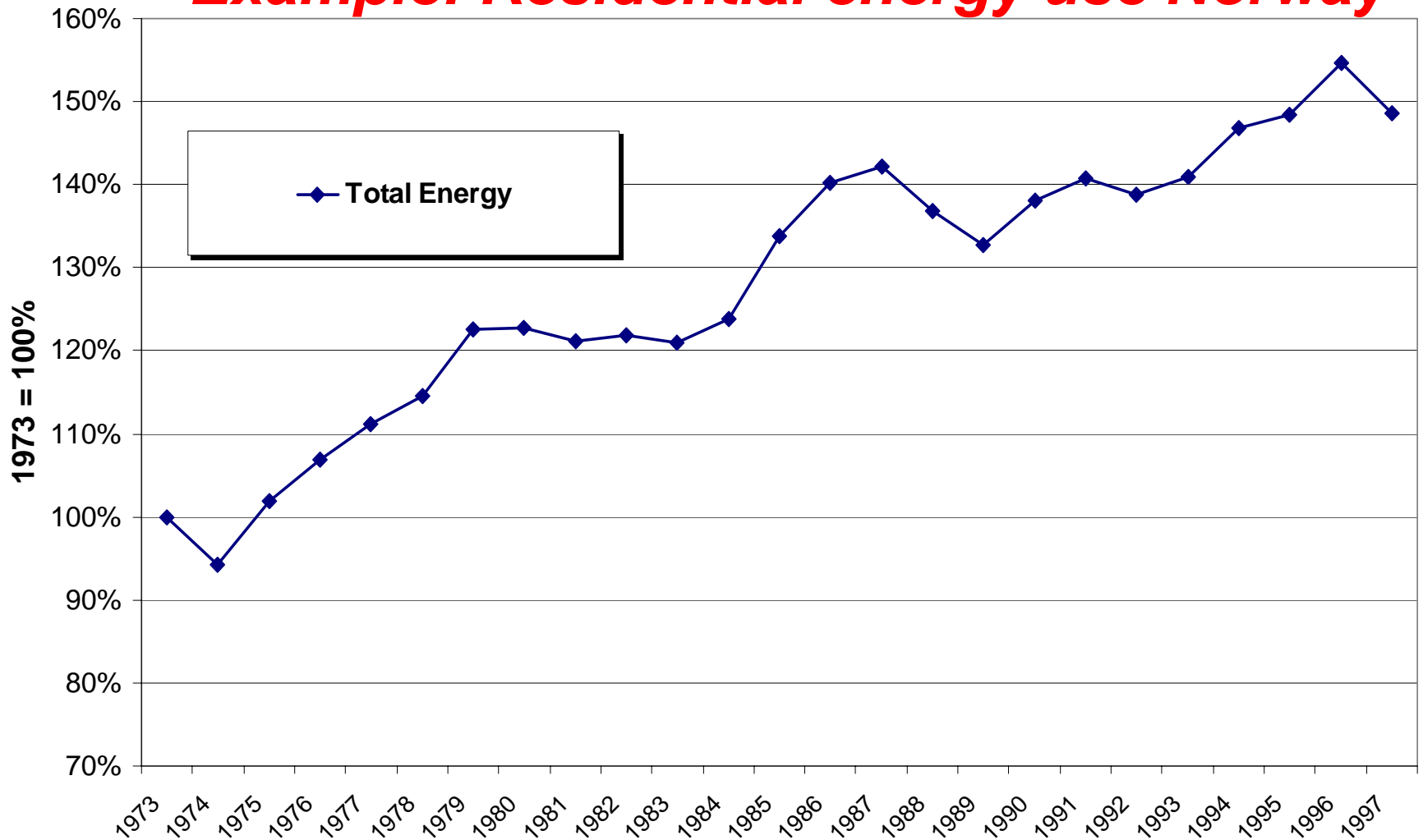


Net result is an increase in per capita heating demand after 1990



Indicators following energy developments

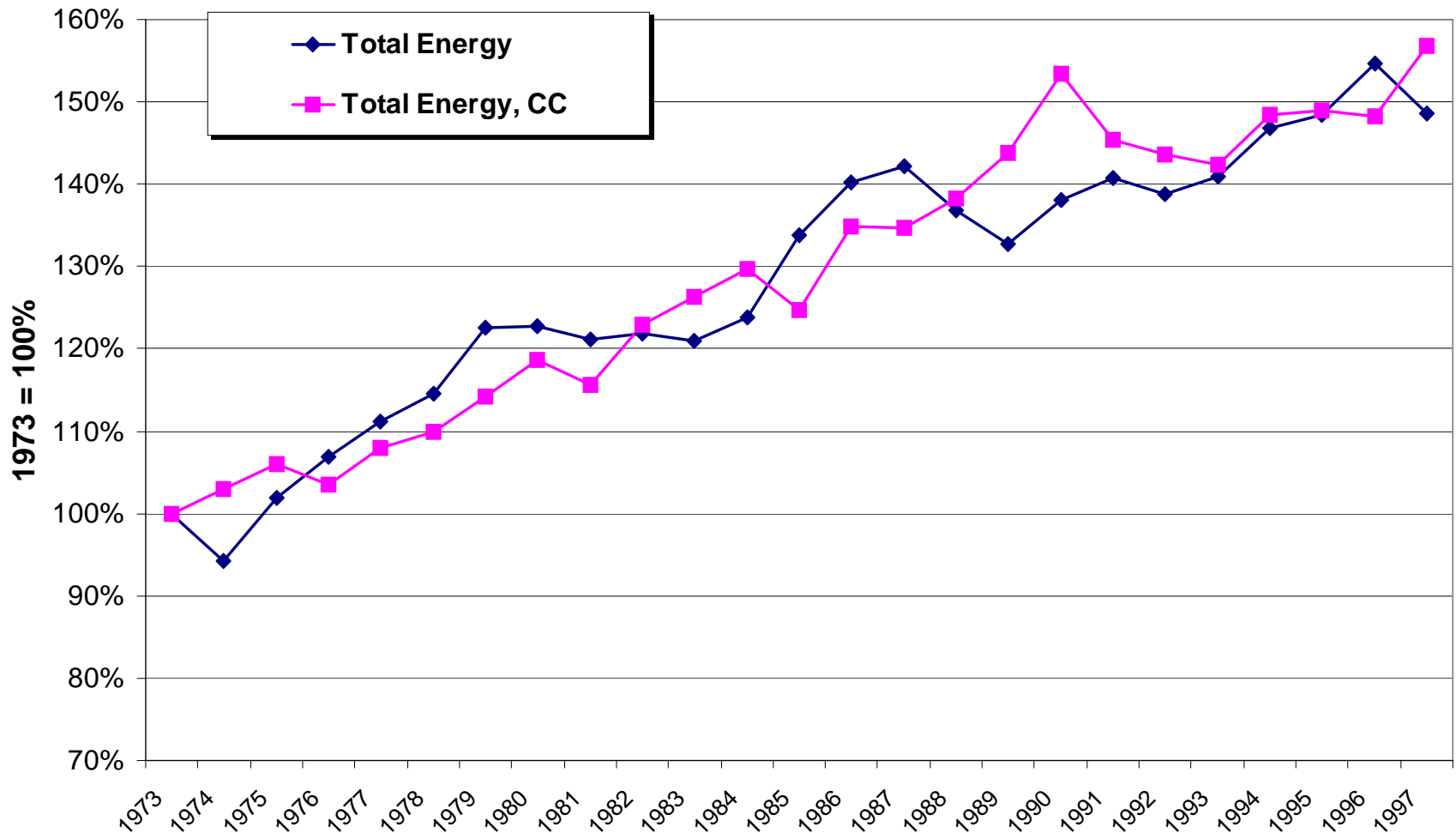
Example: Residential energy use Norway





Indicators following energy developments

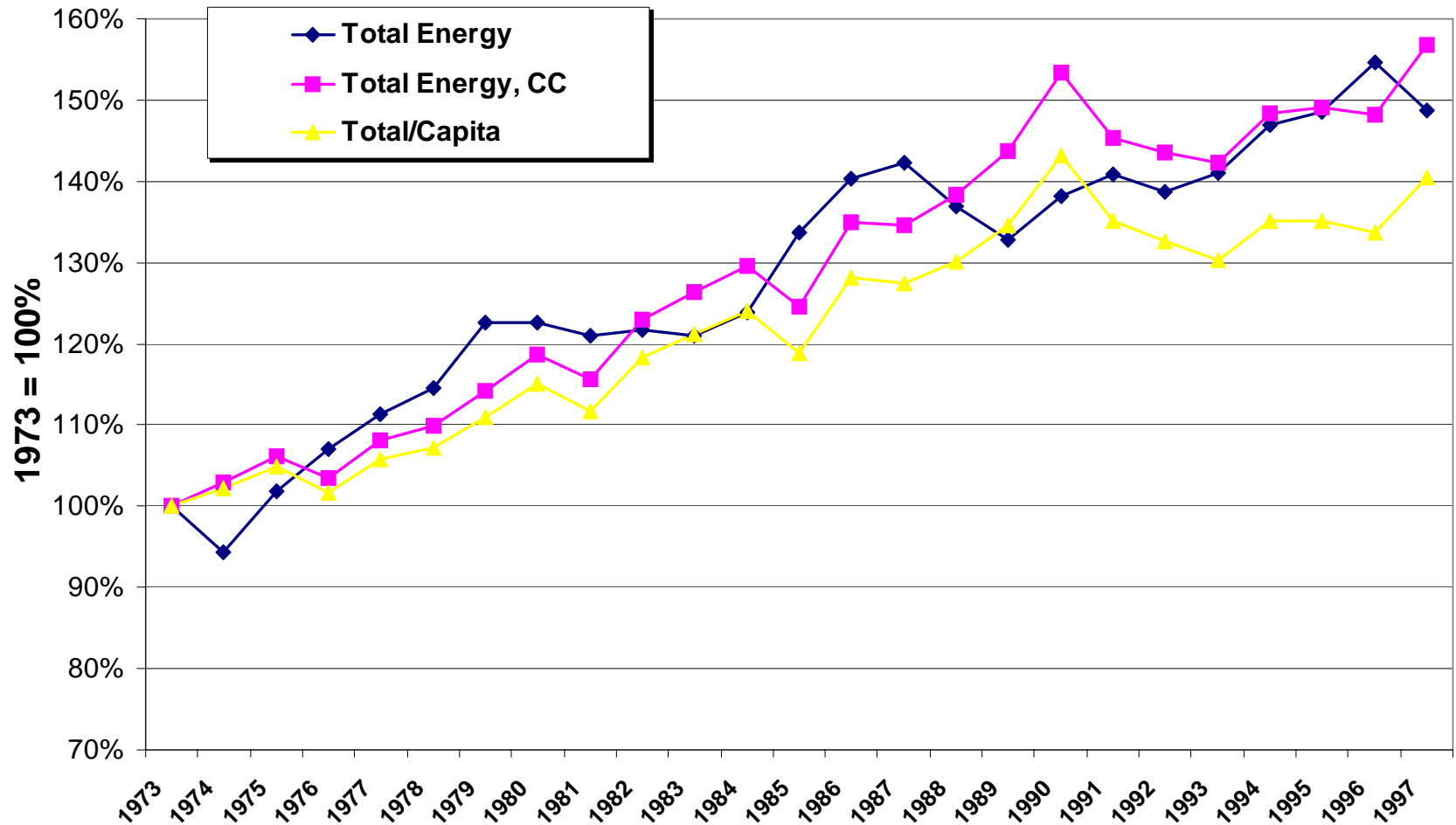
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Indicators following energy developments

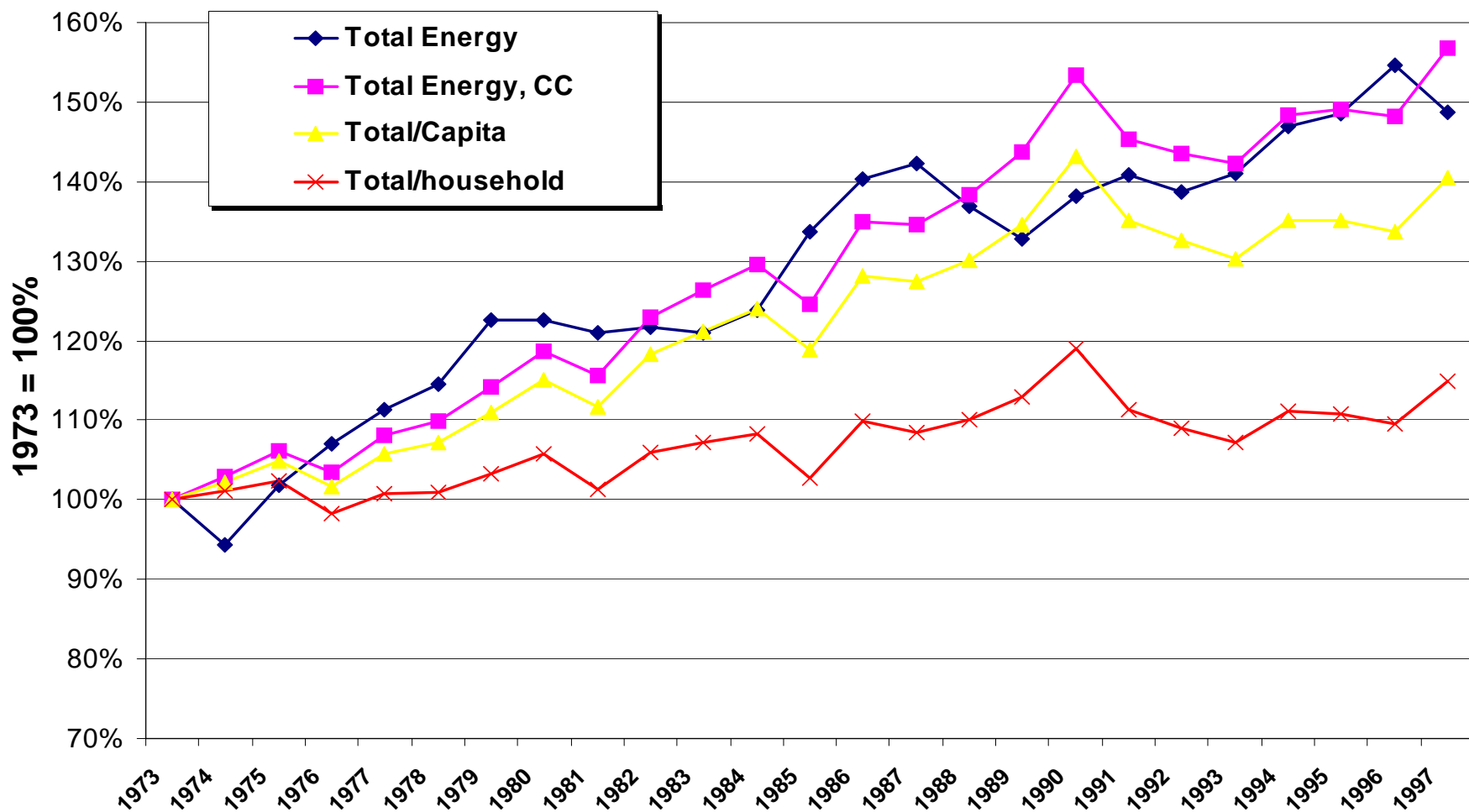
Example: Residential energy use Norway





Indicators following energy developments

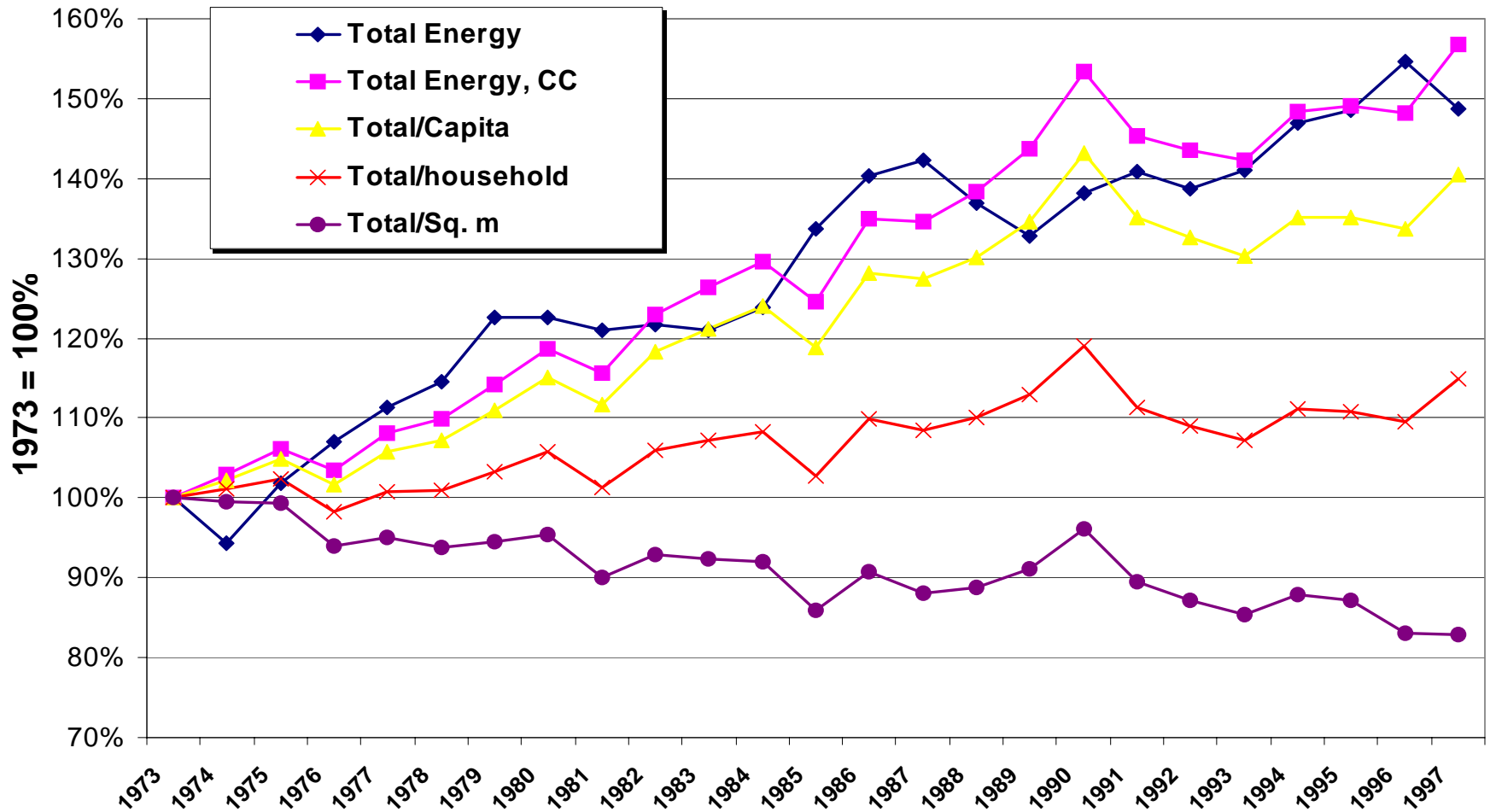
Example: Residential energy use Norway





Indicators following energy developments

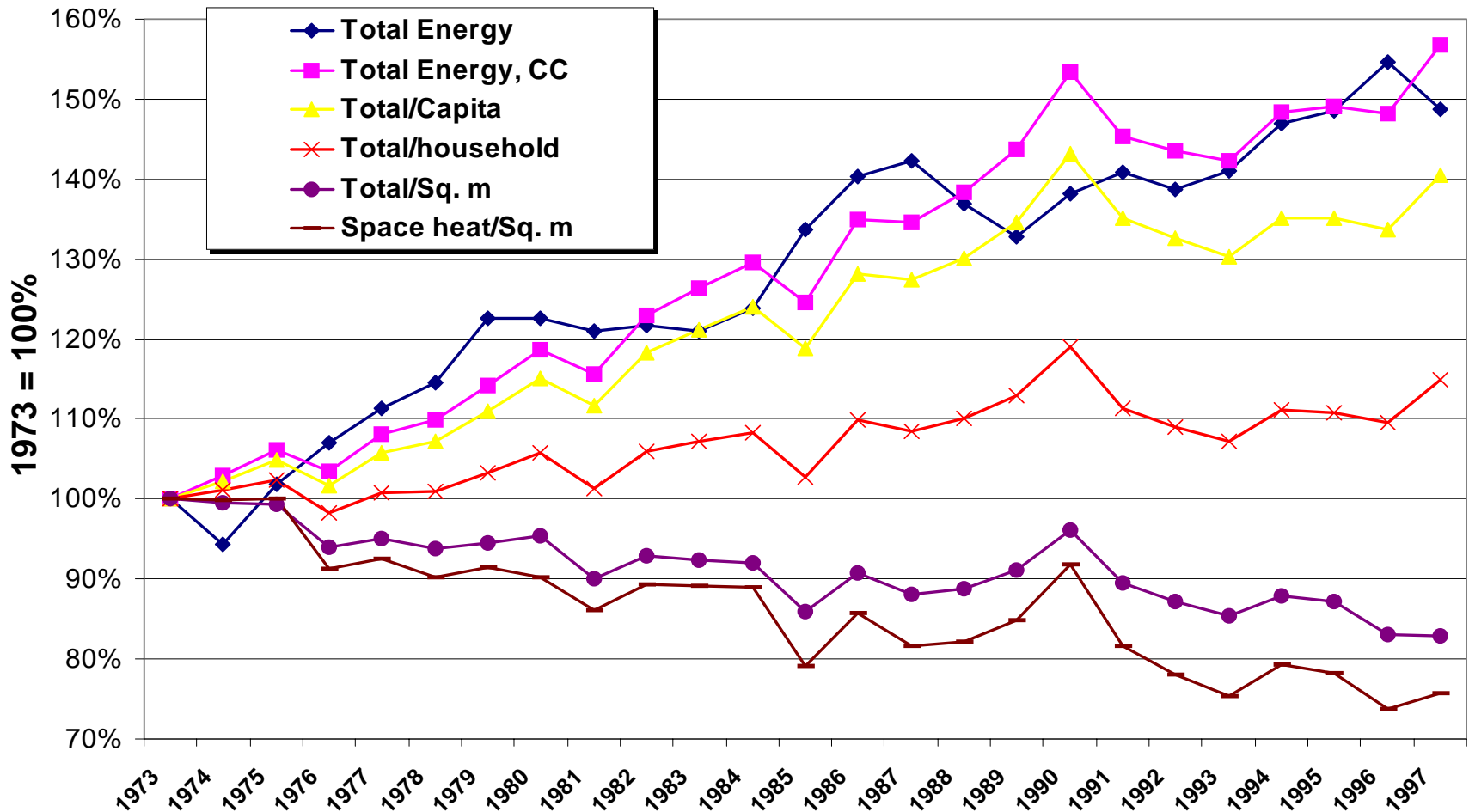
Example: Residential energy use Norway





Indicators following energy developments

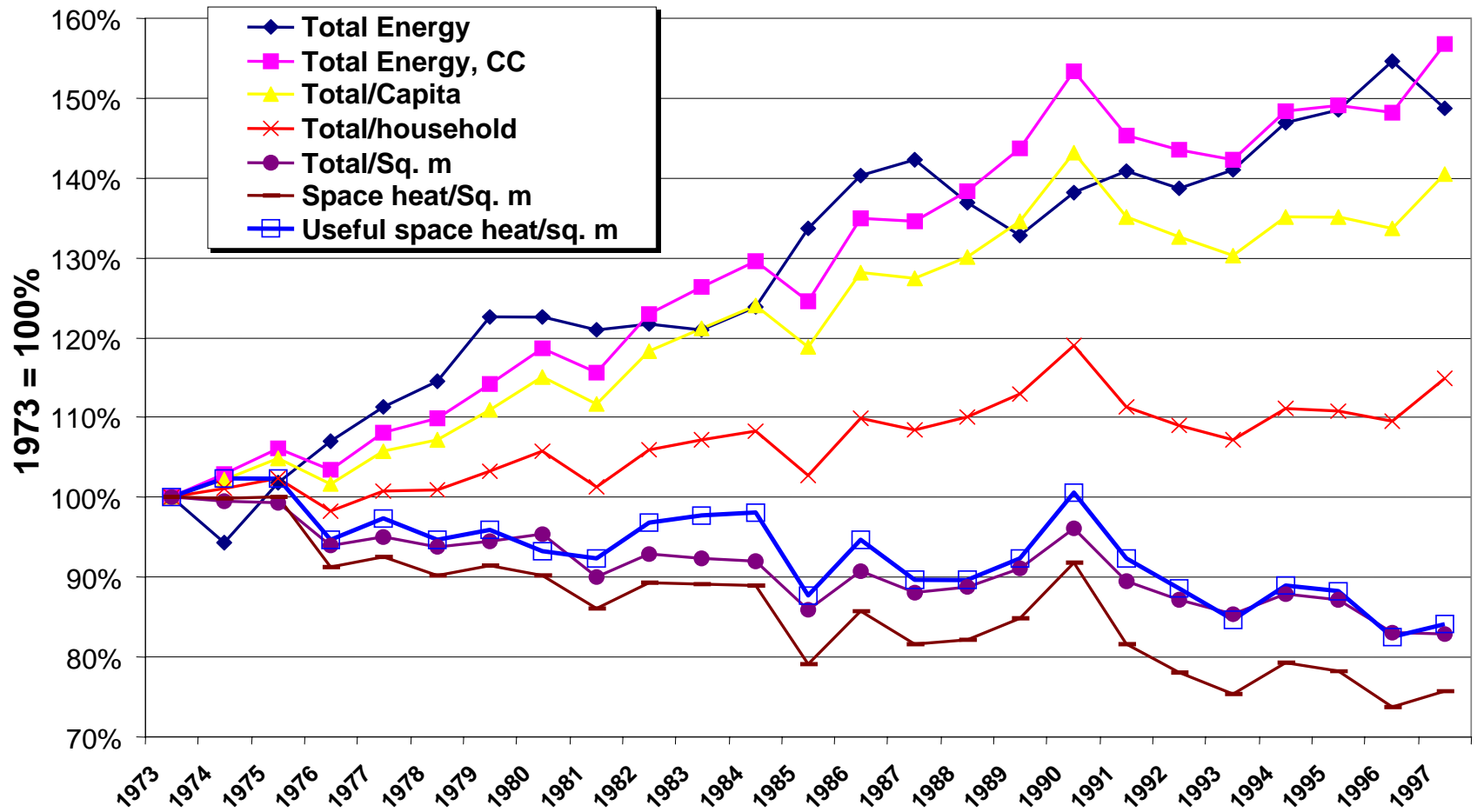
Example: Residential energy use Norway





Indicators following energy developments

Example: Residential energy use Norway





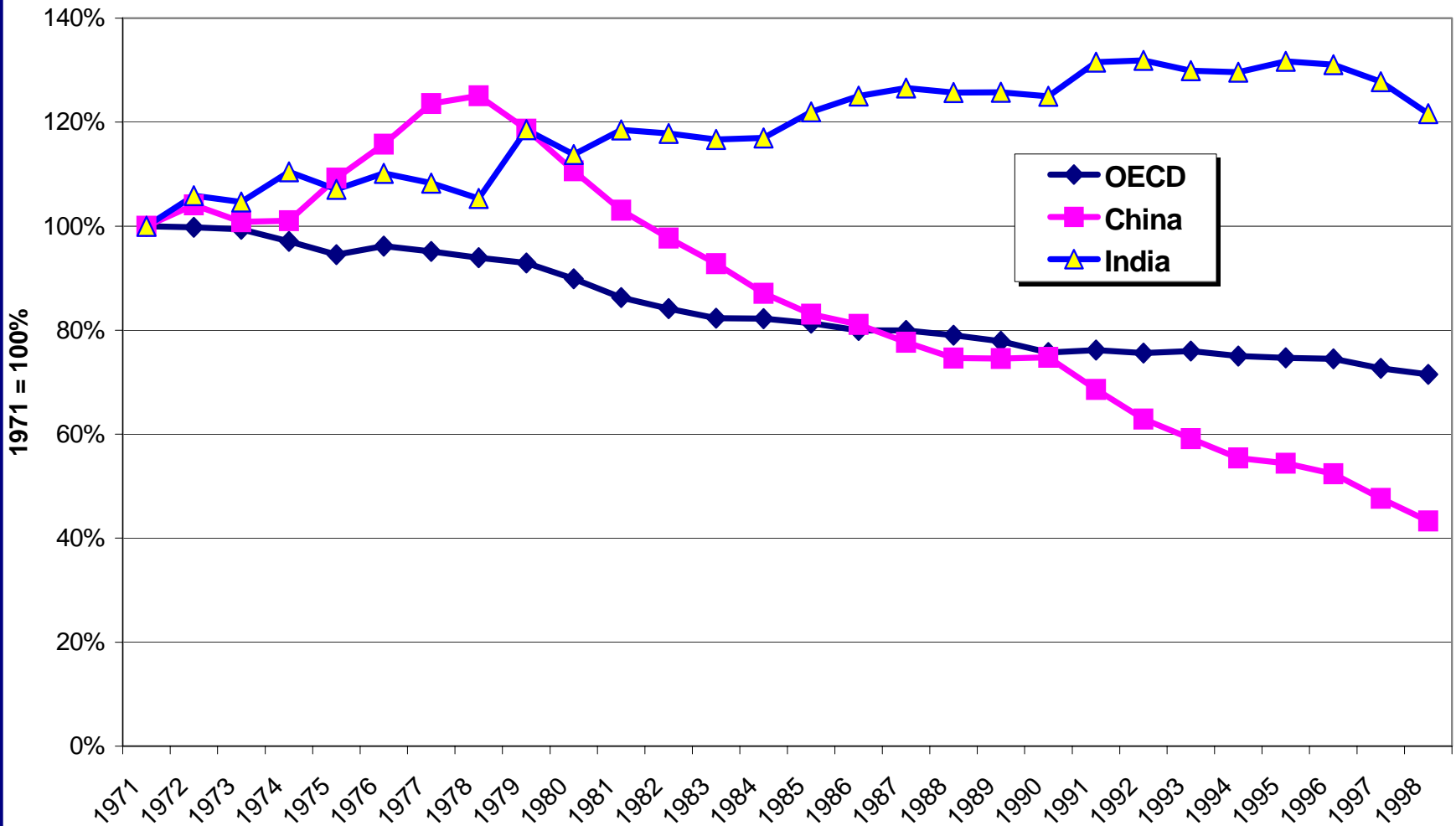
Disaggregated energy indicators are data intensive

Why not simpler aggregated measures?



Example: Energy per GDP India, China and OECD

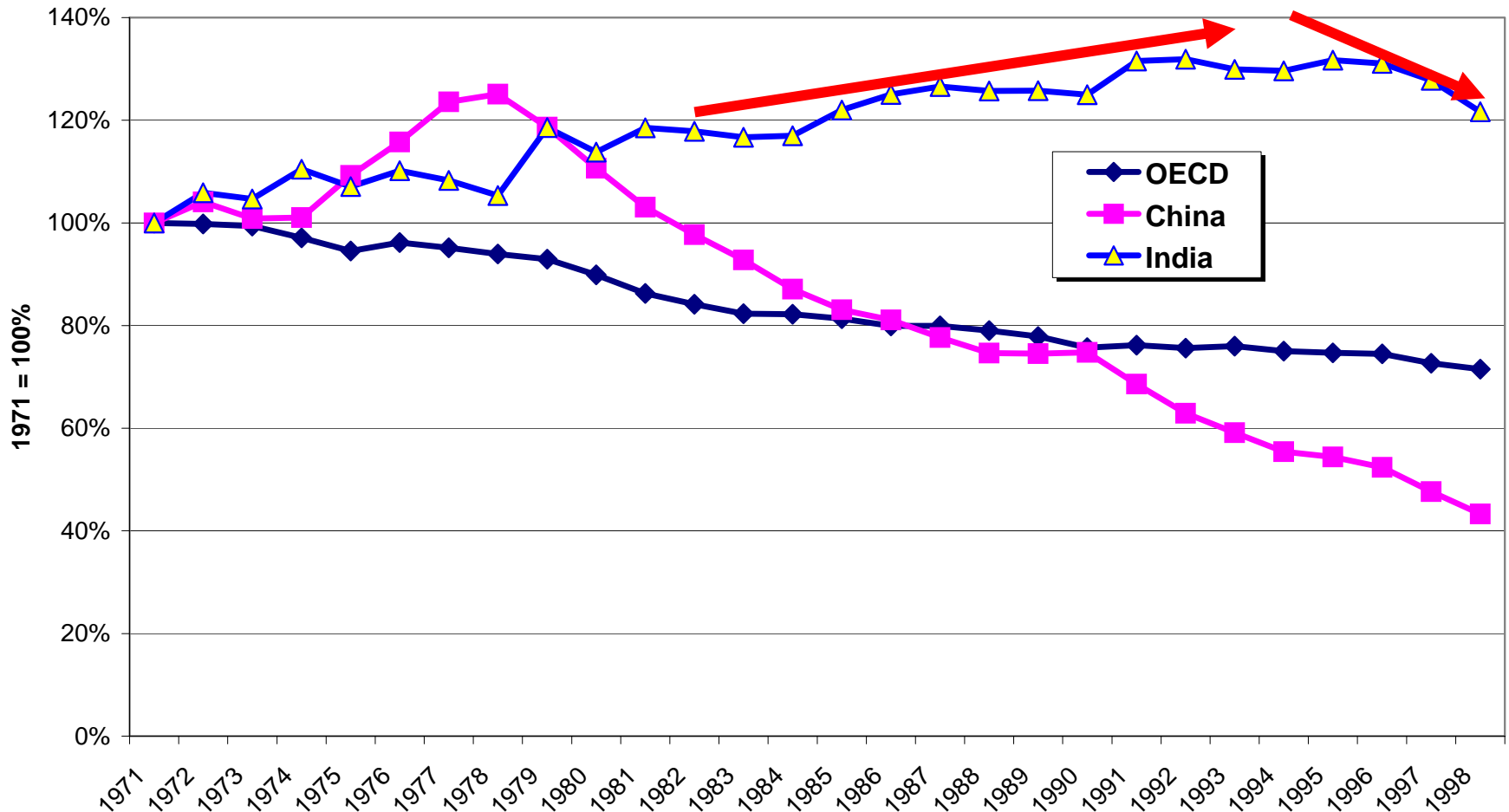
Total Primary Supply of commercial energy per unit of GDP





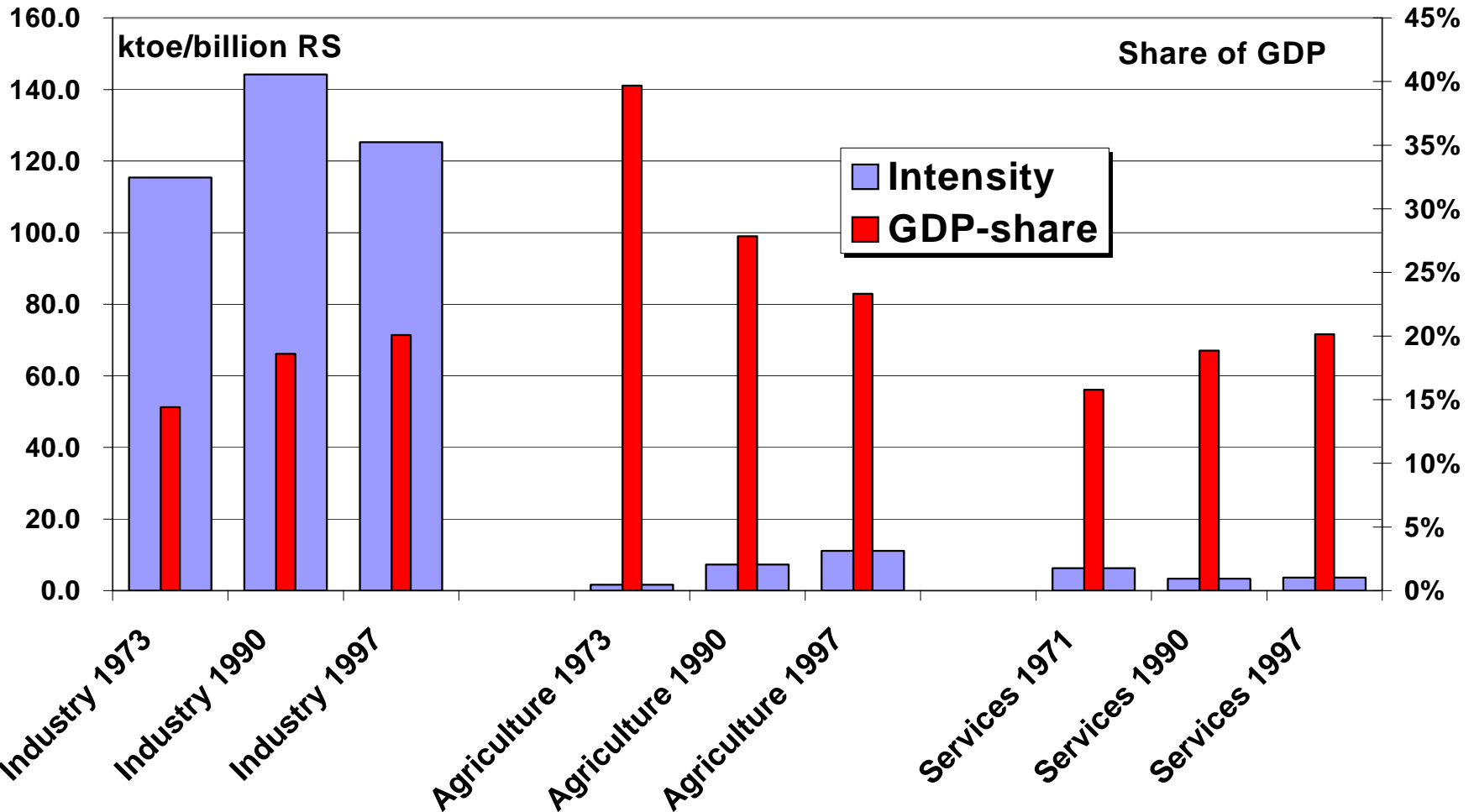
Example: Energy per GDP India, China and OECD

Total Primary Supply of commercial energy per unit of GDP





The beginning of an explanation

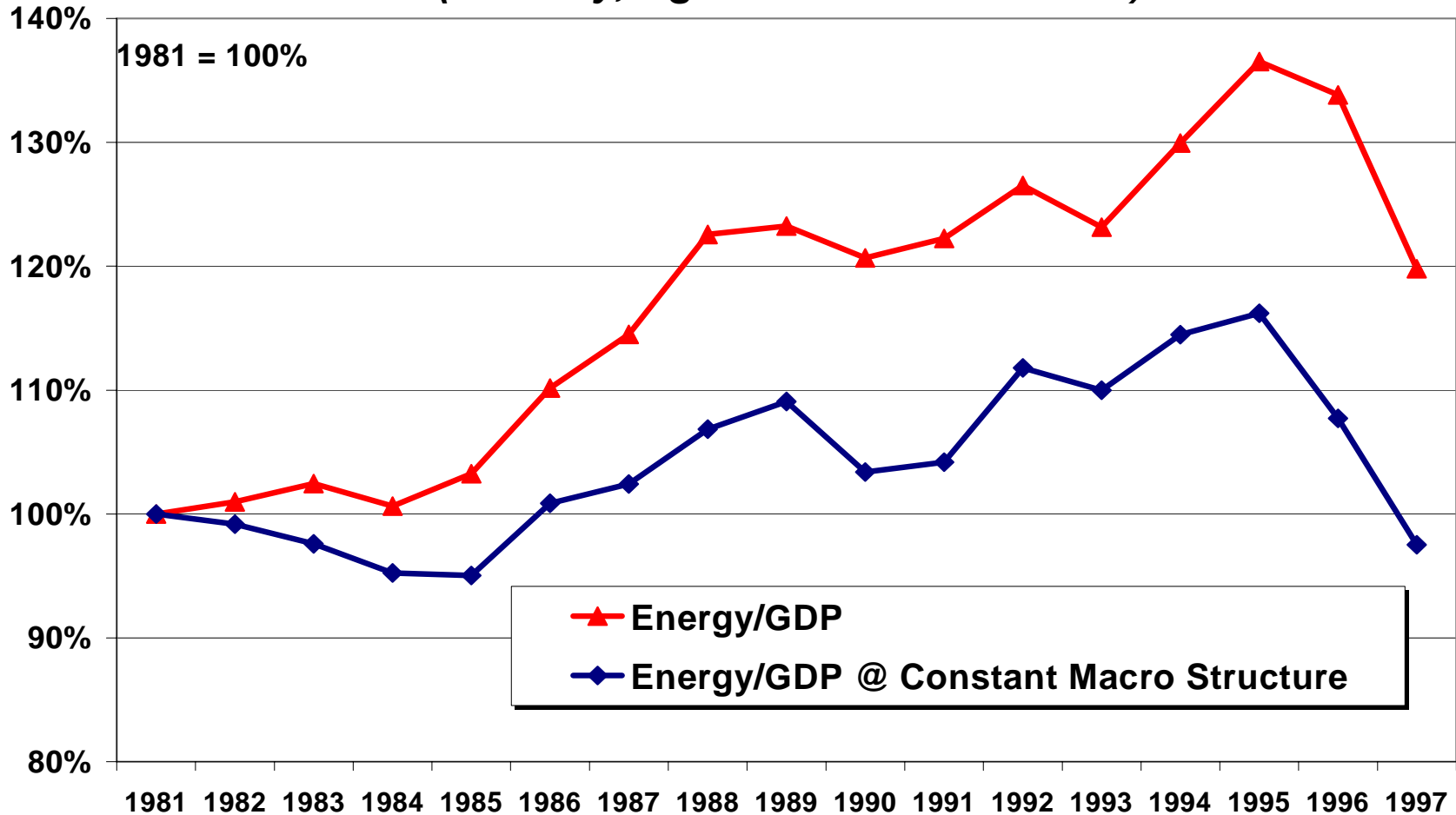




Impact of Changes in Macro Structure

Changes E/GDP vs. Changes in Sector Intensities

(Industry, Agriculture and Services)



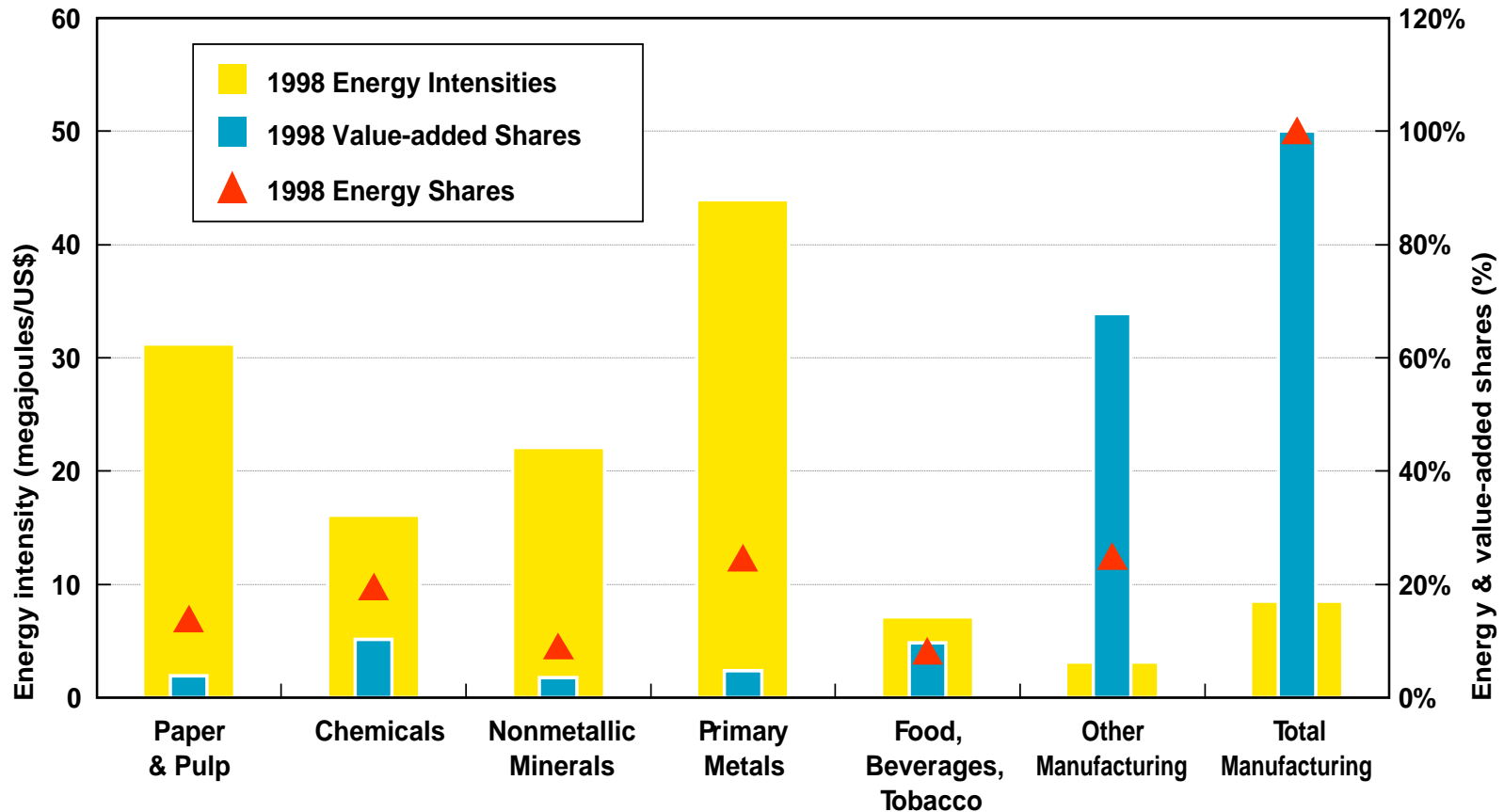


Sub-sector Energy Intensities, Value-added and Energy Shares, IEA-11

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Energy-intensive sub-sectors contribute little to overall manufacturing output, but account for a large share of energy consumption

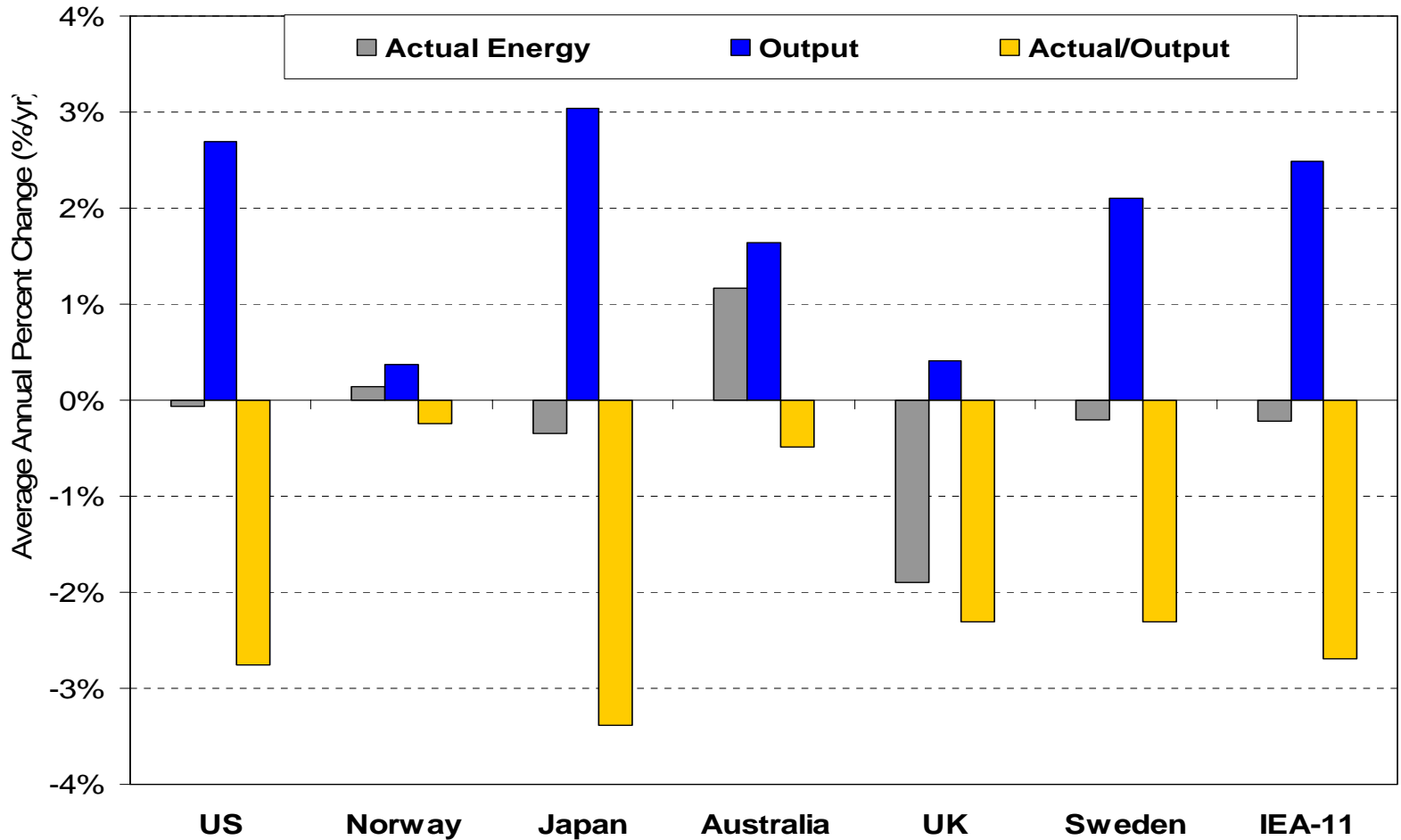


Energy Savings and Structural Change IEA - 11 Manufacturing, 1973-1998

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Strong reduction in energy per \$ produced almost everywhere

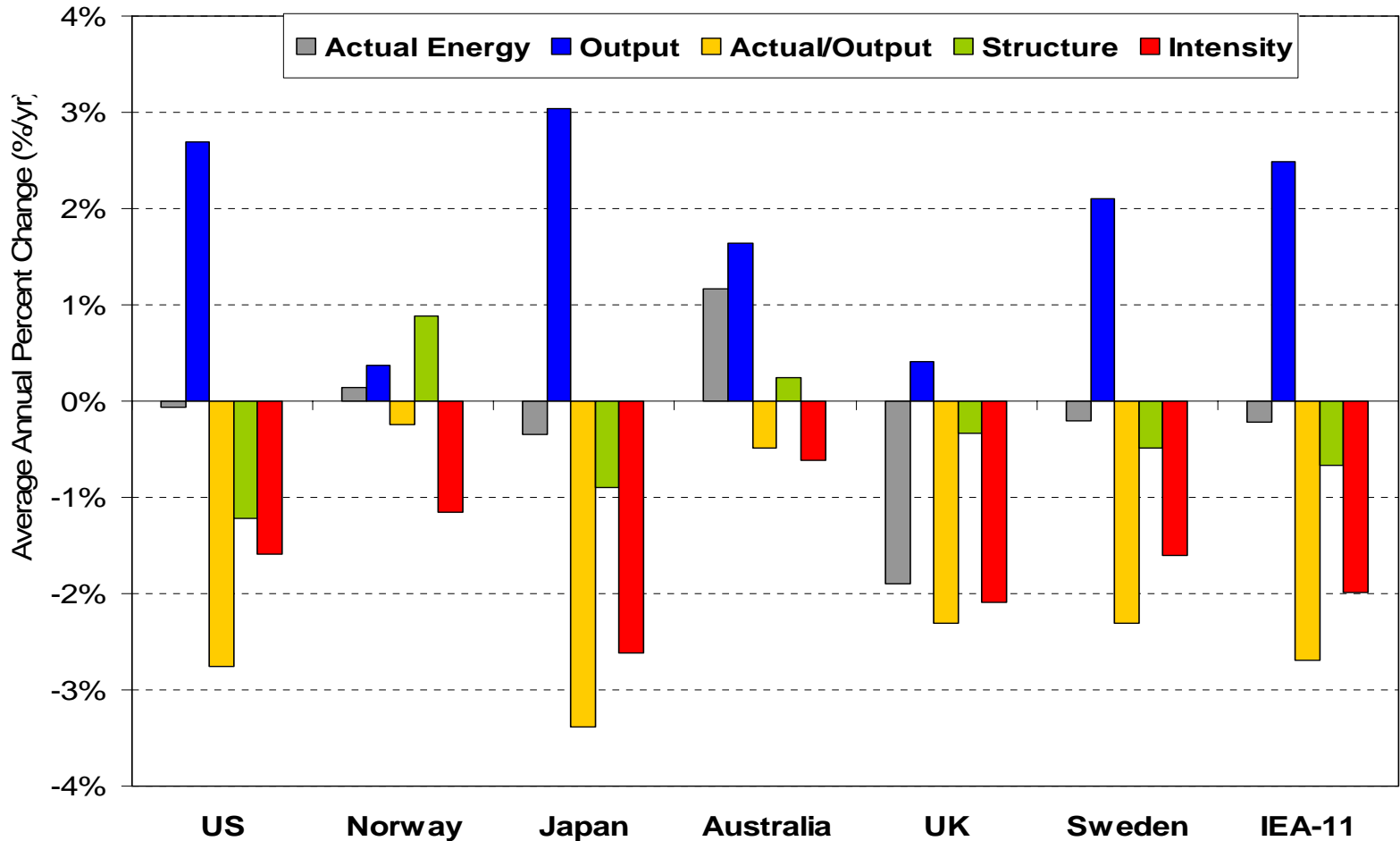


Energy Savings and Structural Change IEA - 11 Manufacturing, 1973-1998

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Structural changes explain some of the country difference in aggregate intensity



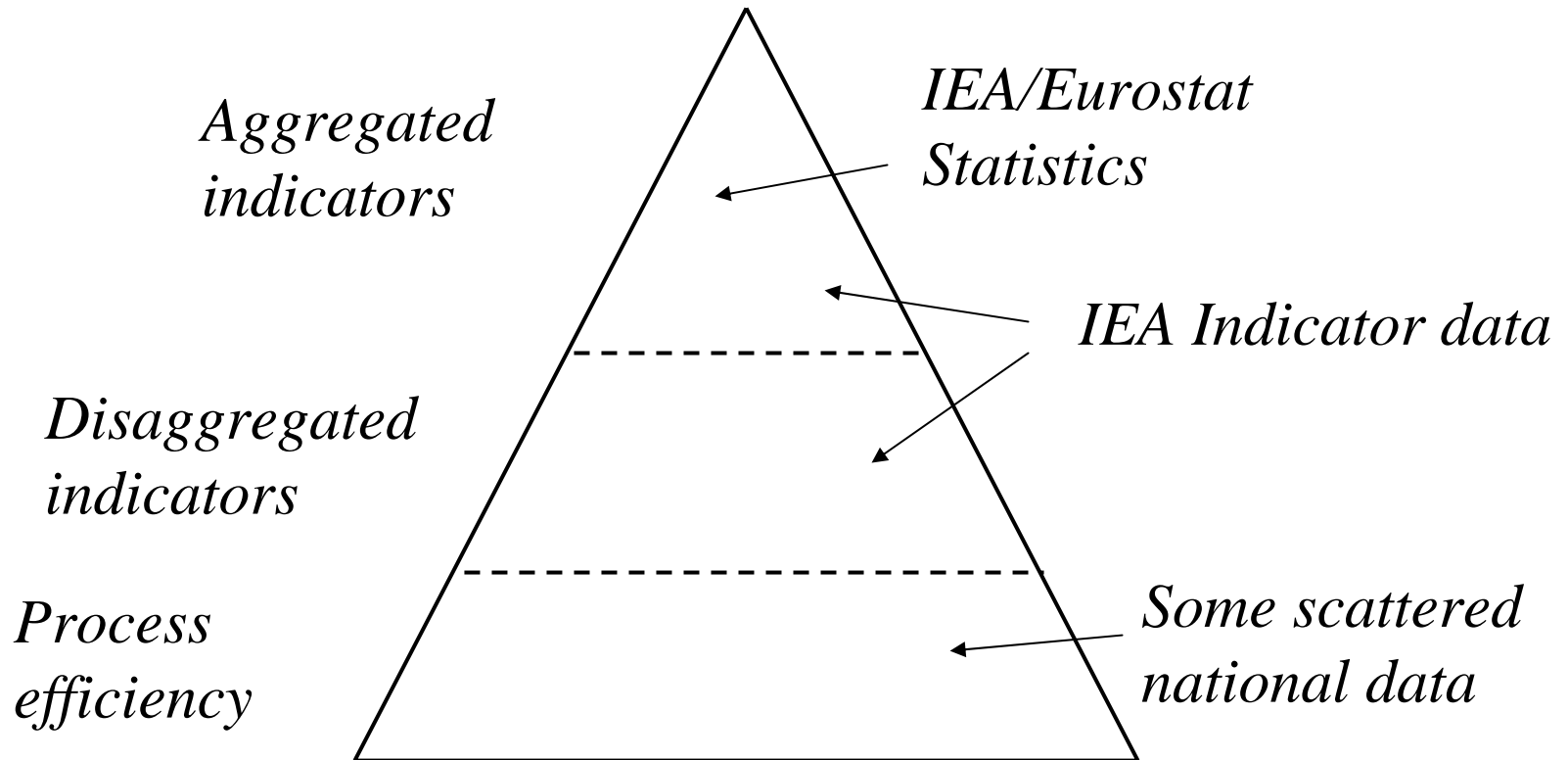
Data

The Painful Necessity



Matching Analysis and Data

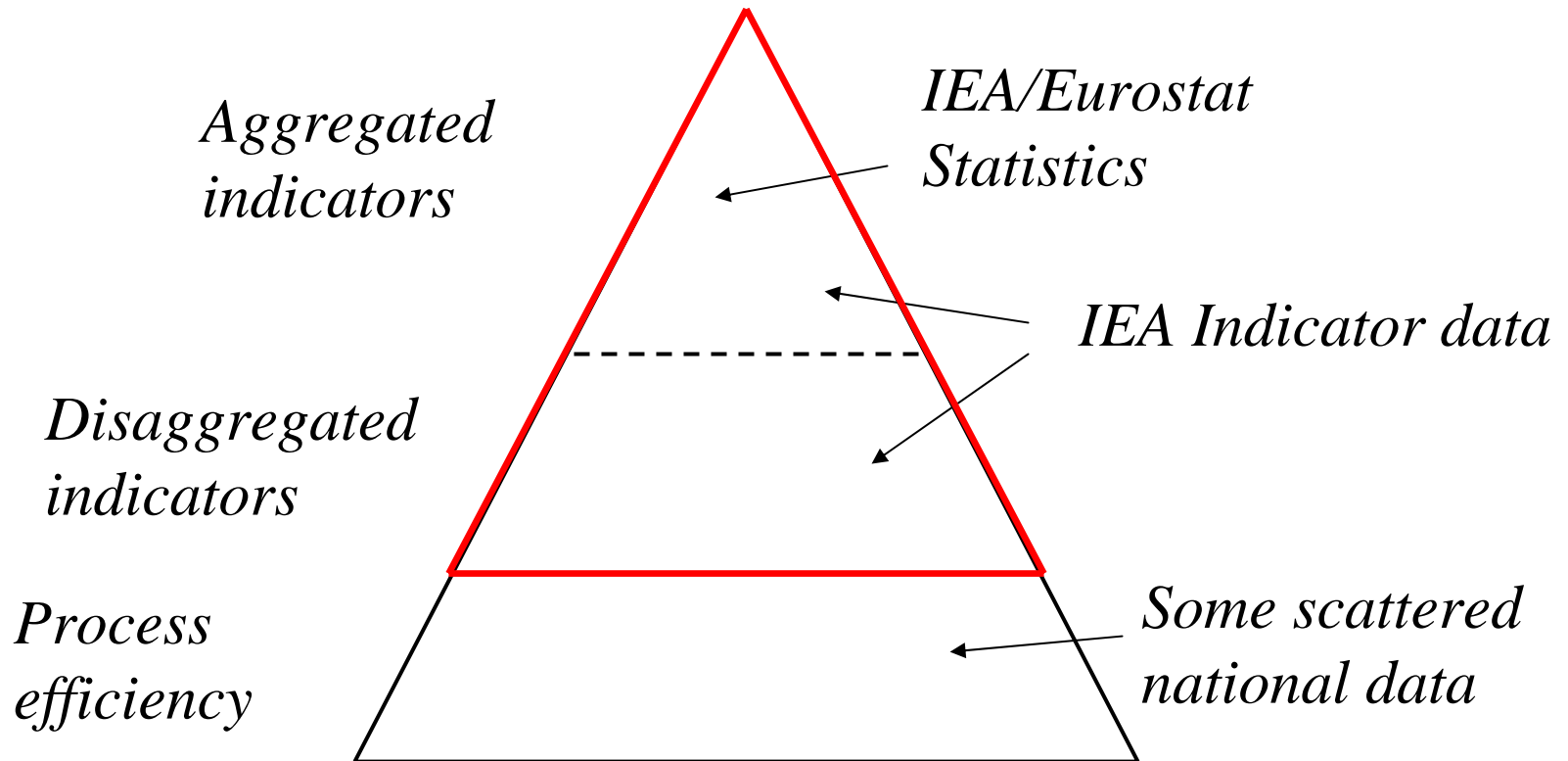
The Indicator Pyramid





Matching Analysis and Data

The Indicator Pyramid





Developing Indicators

Collection of data is the starting point

- **Analysing energy demand developments requires**
 - ⇒ Disaggregated data
 - ⇒ of good quality
 - ⇒ consistent over time and
 - ⇒ consistent with international standards
- **Improving availability and quality of data requires national efforts**
- **Participation in international efforts adds value but require submission of consistent data**