



# ***Past Work on Energy Indicators for Buildings***

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**Building Workshop**

**IEA, Paris**

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# Presentation Overview

- **Where do we start from?**
- **The IEA approach**
  - **Methodology and examples**
- **Views from a new user**



## Where do we start from?

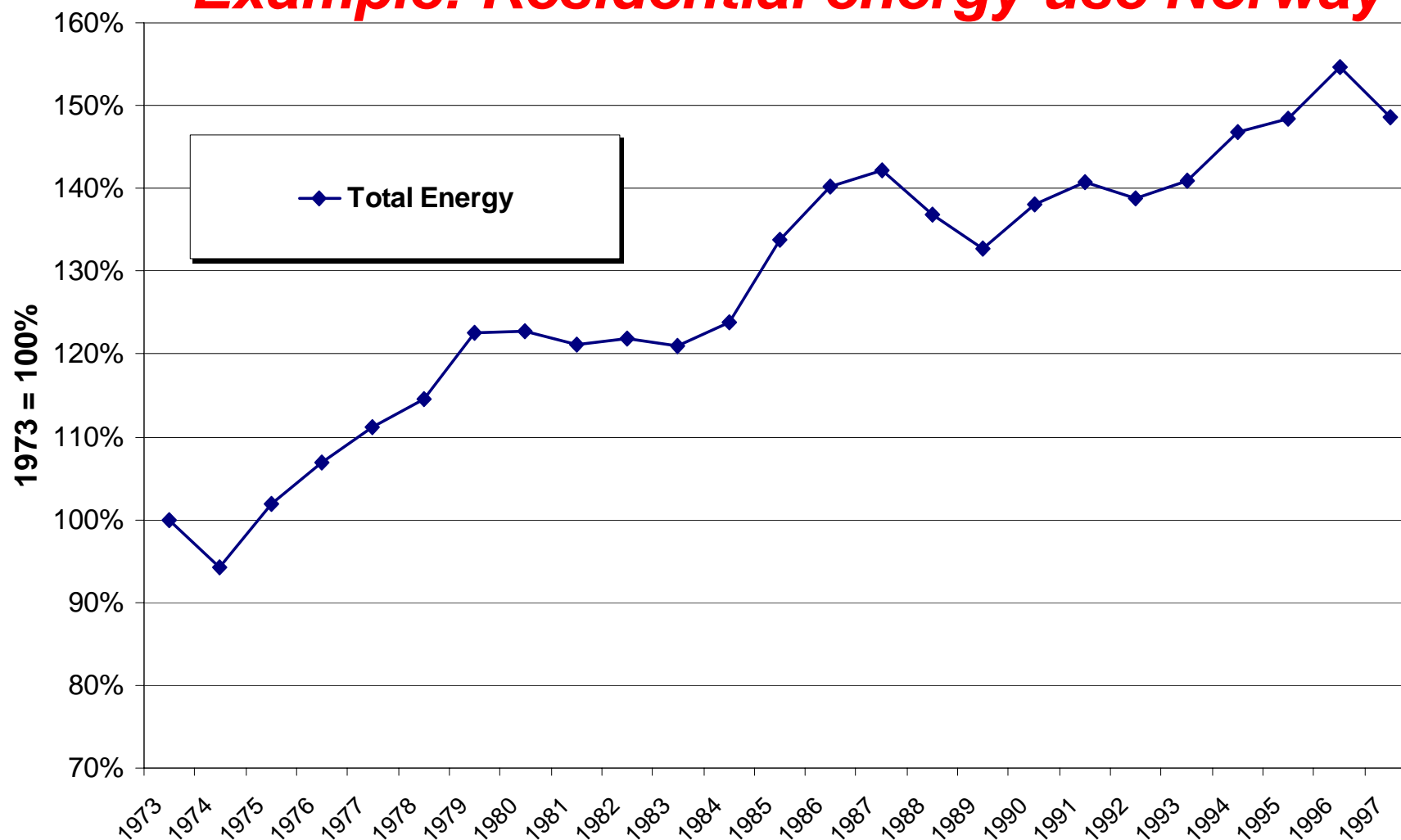
- **Understanding building energy use based on regular national (and IEA) statistics**

**=> Total energy use by fuel for residential and service sector (if lucky)**



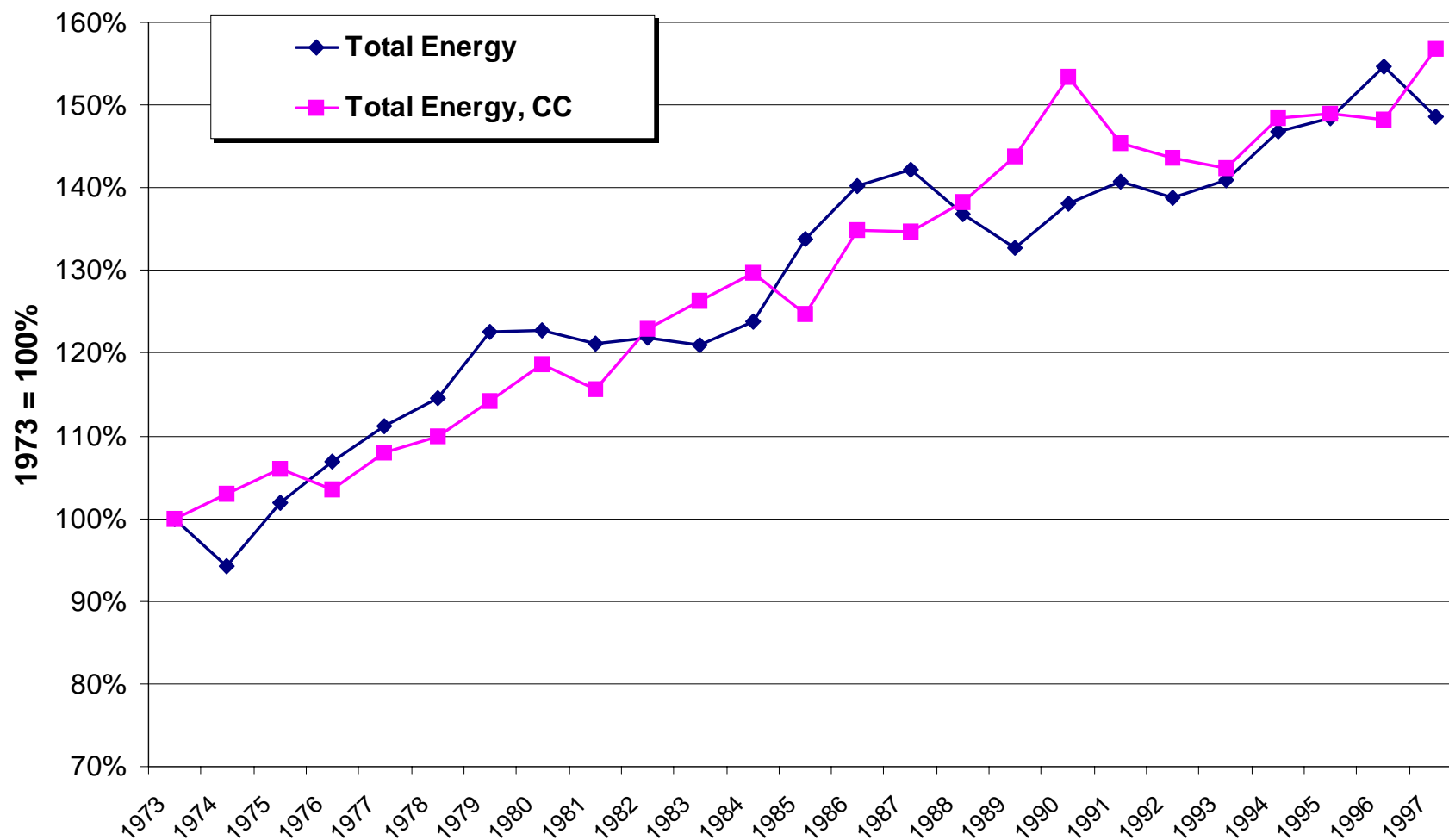
# Indicators following energy developments

## *Example: Residential energy use Norway*





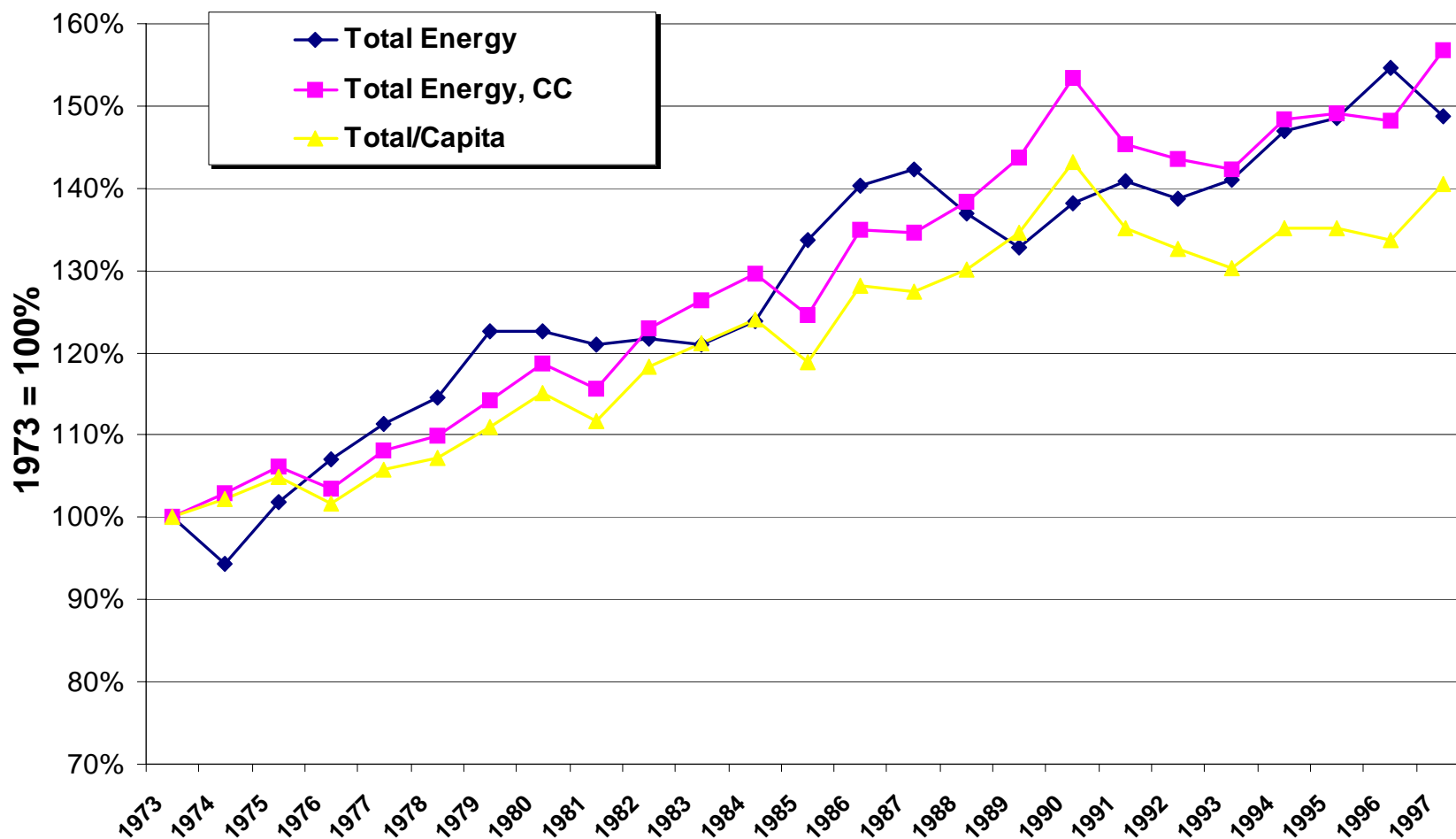
# Indicators following energy developments *With Climate Correction*





# Indicators following energy developments

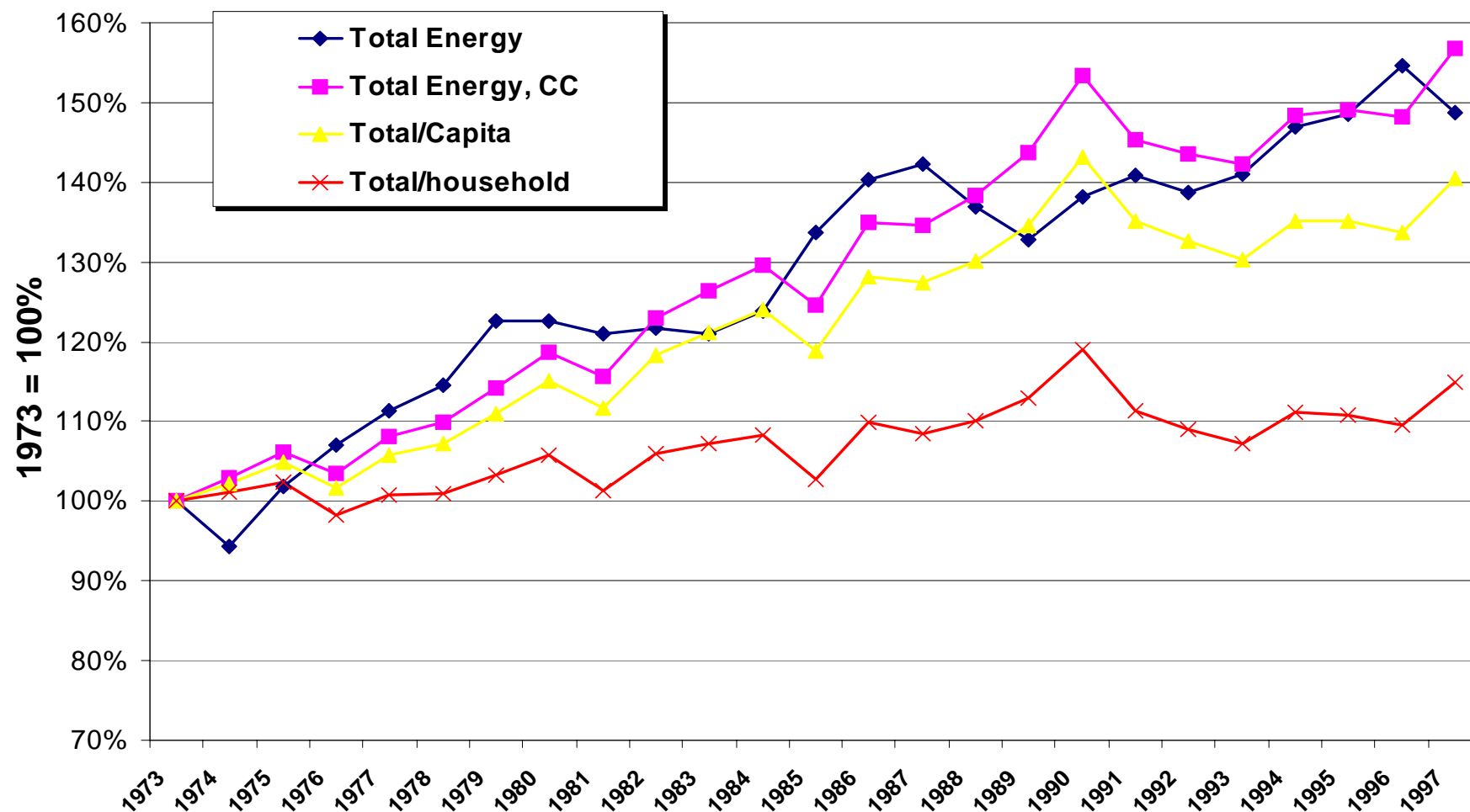
## *Divided by population*





# Indicators following energy developments

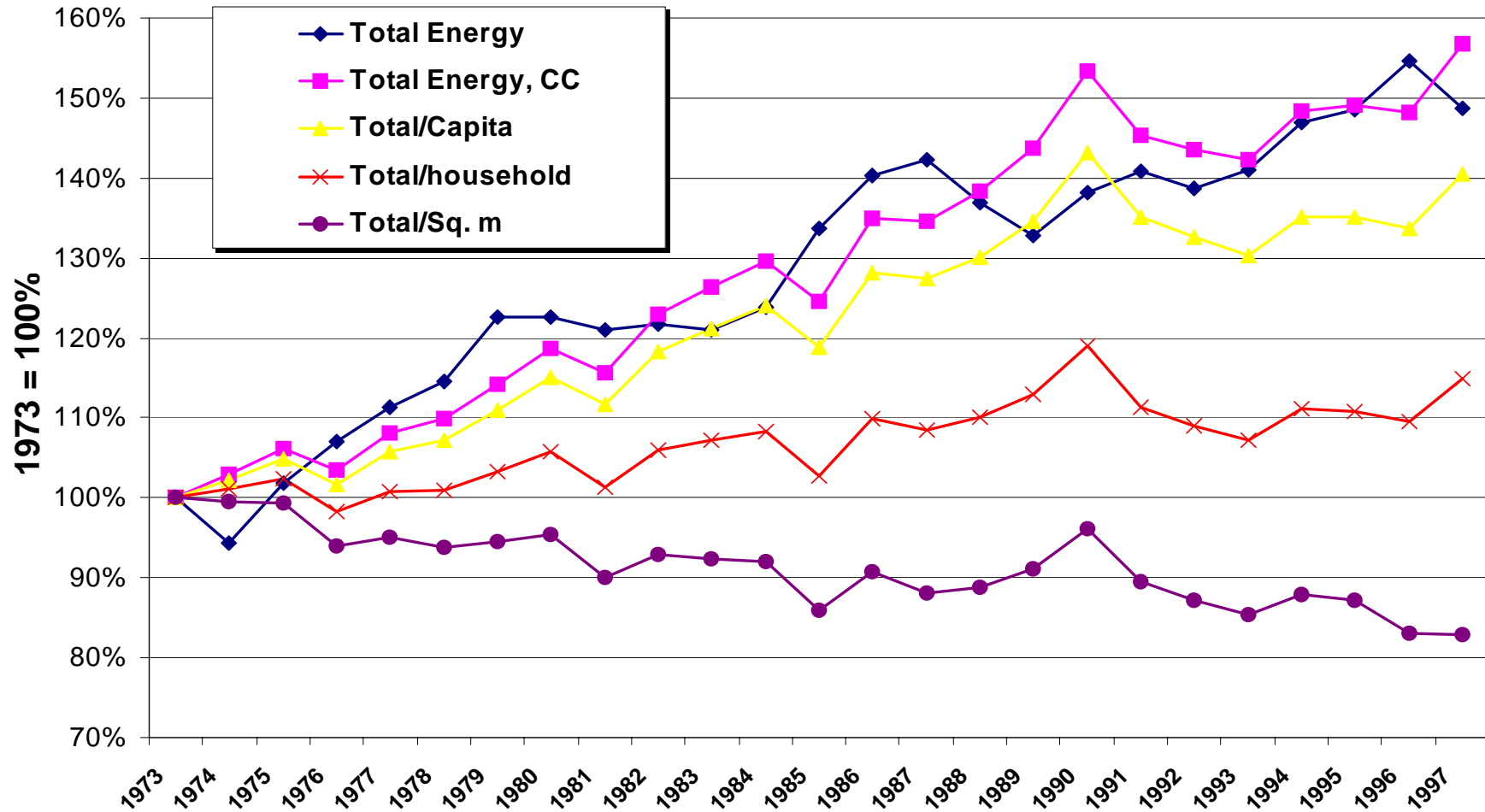
## *Divided by number of households*





# Indicators following energy developments

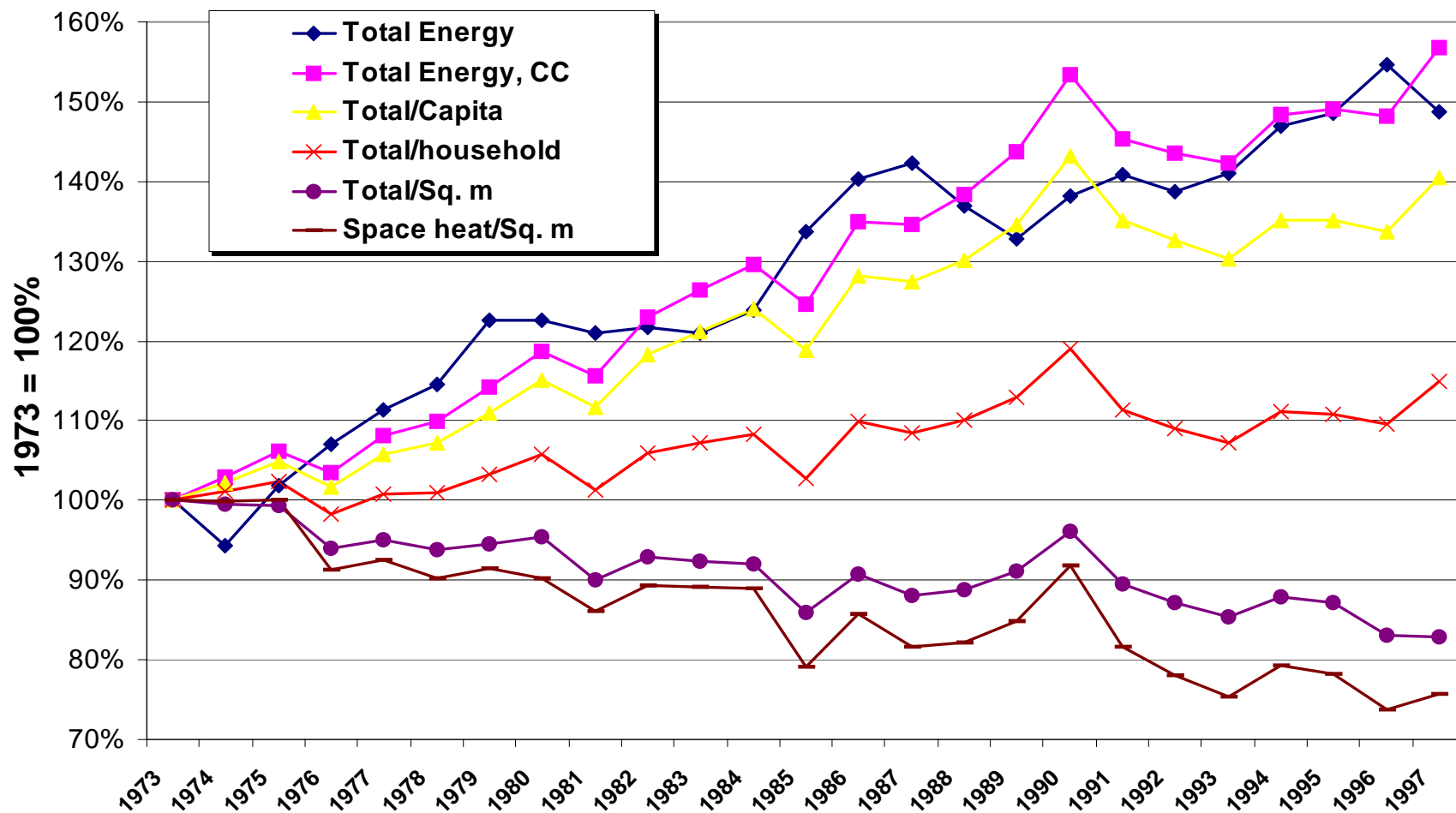
## *Divided by building area*





# Indicators following energy developments

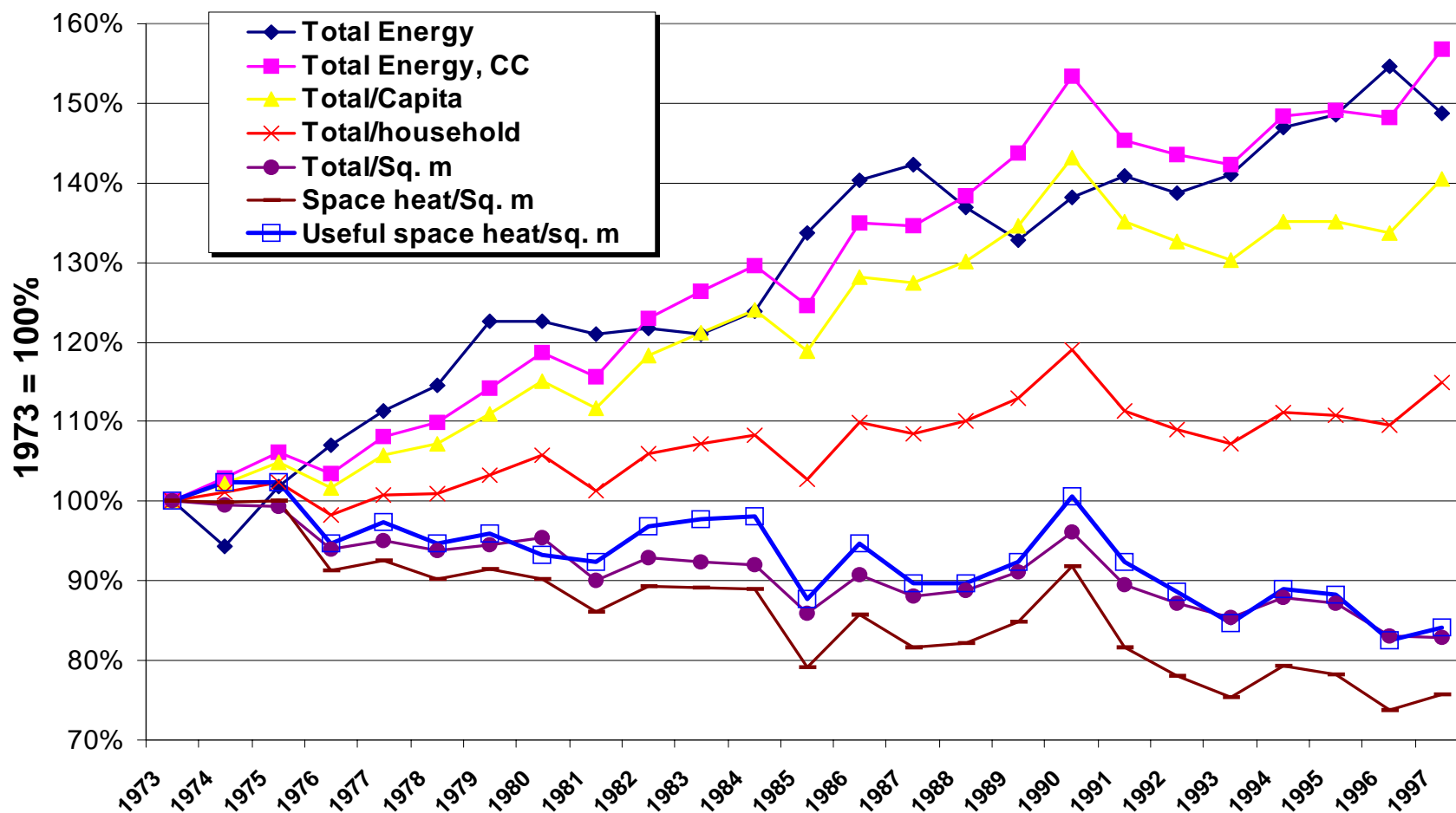
## *Space heat by area*





# Indicators following energy developments

## *Useful space heat by area*



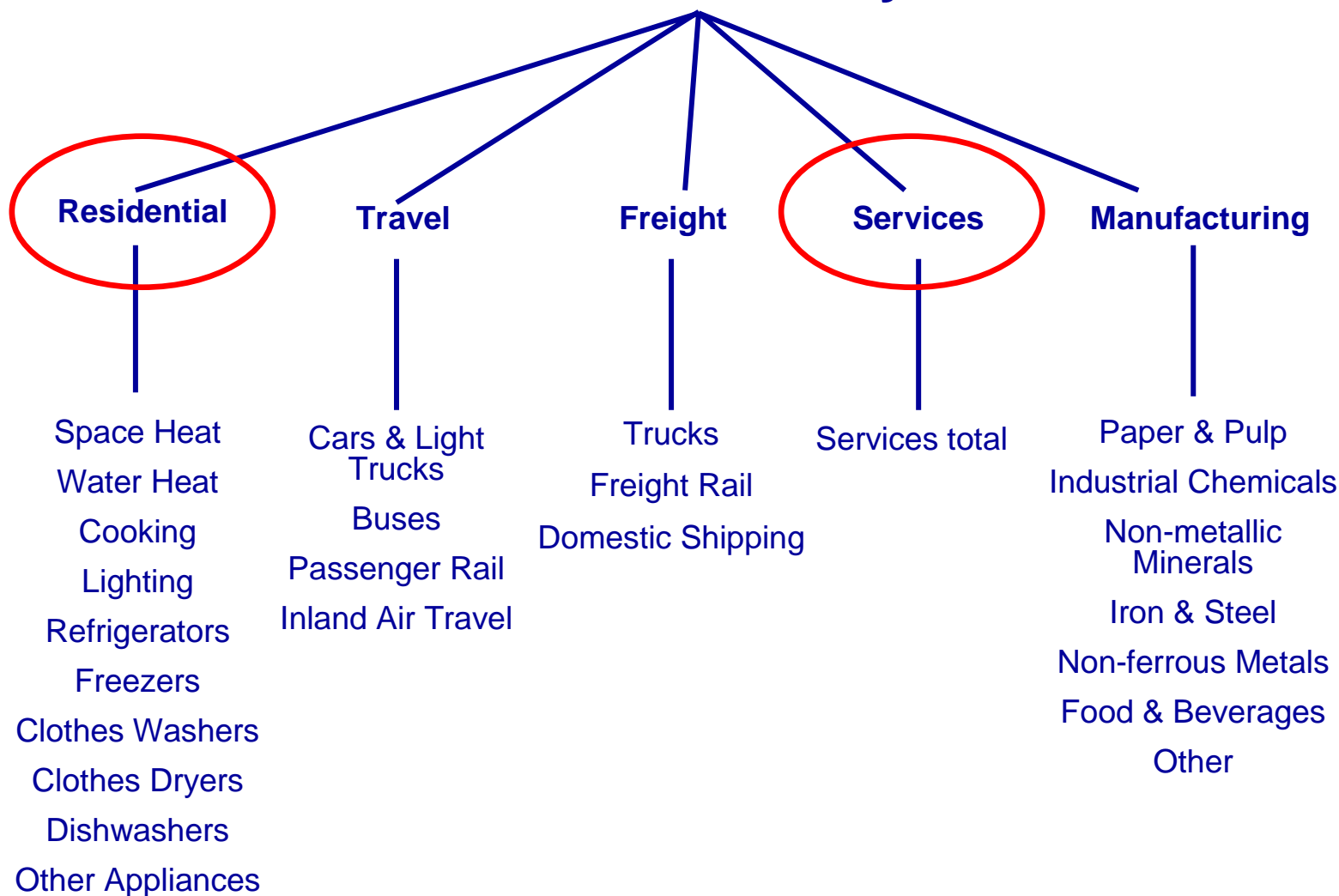


## The IEA Indicator Approach

- A decade of efforts to collect and systematise available data to better understand end-use developments in IEA countries (and some non-Member countries)
- Extensive collaboration with national and international experts
- Covers long-term trends (1973 and on) in all end-use sectors
- Focus on both energy efficiency and other factors that can explain demand trends
- Decomposition approach to separate driving forces from energy efficiency impacts



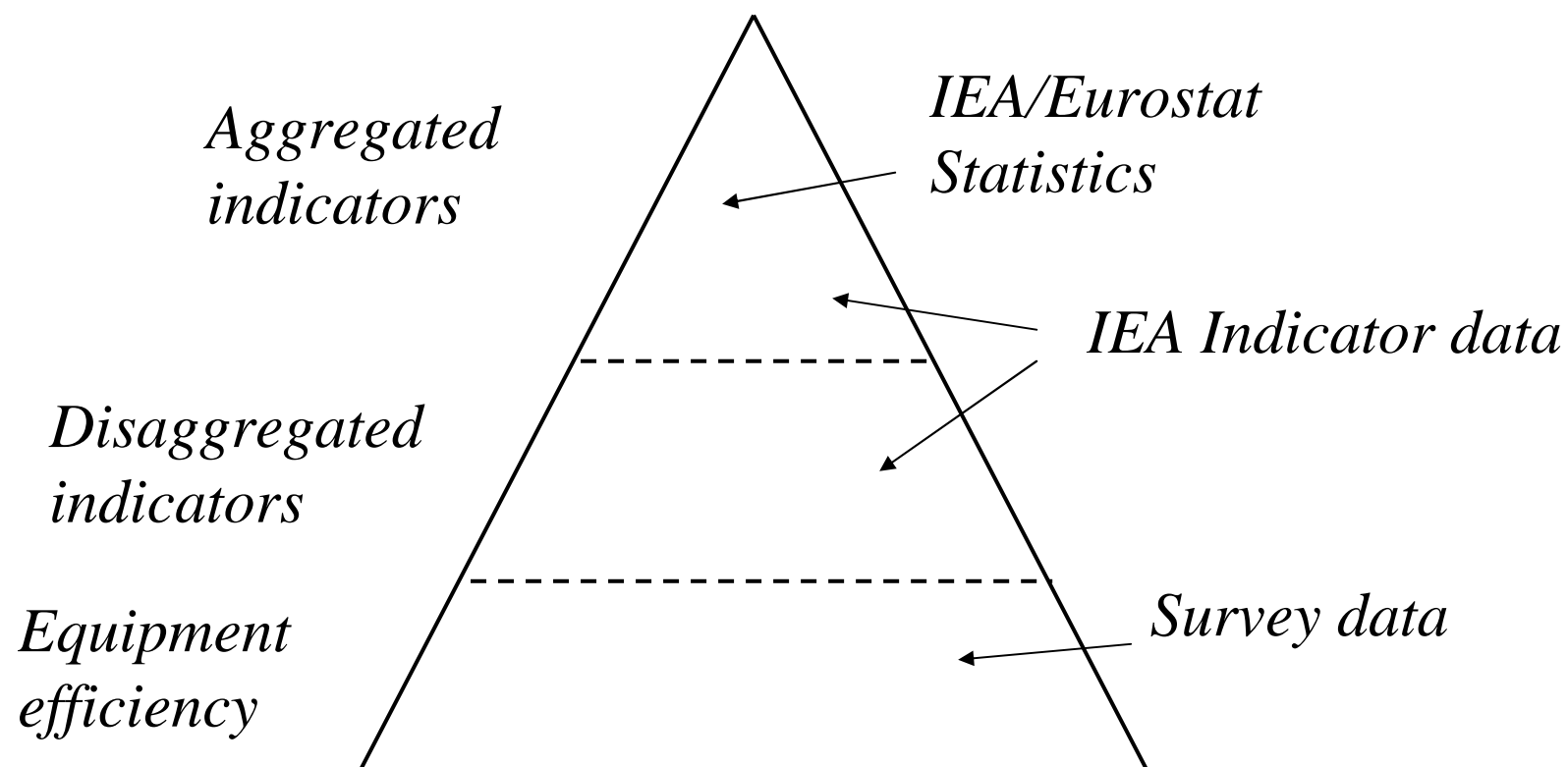
# IEA Approach Sector & End-use Coverage Total Economy





# Matching Analysis and Data

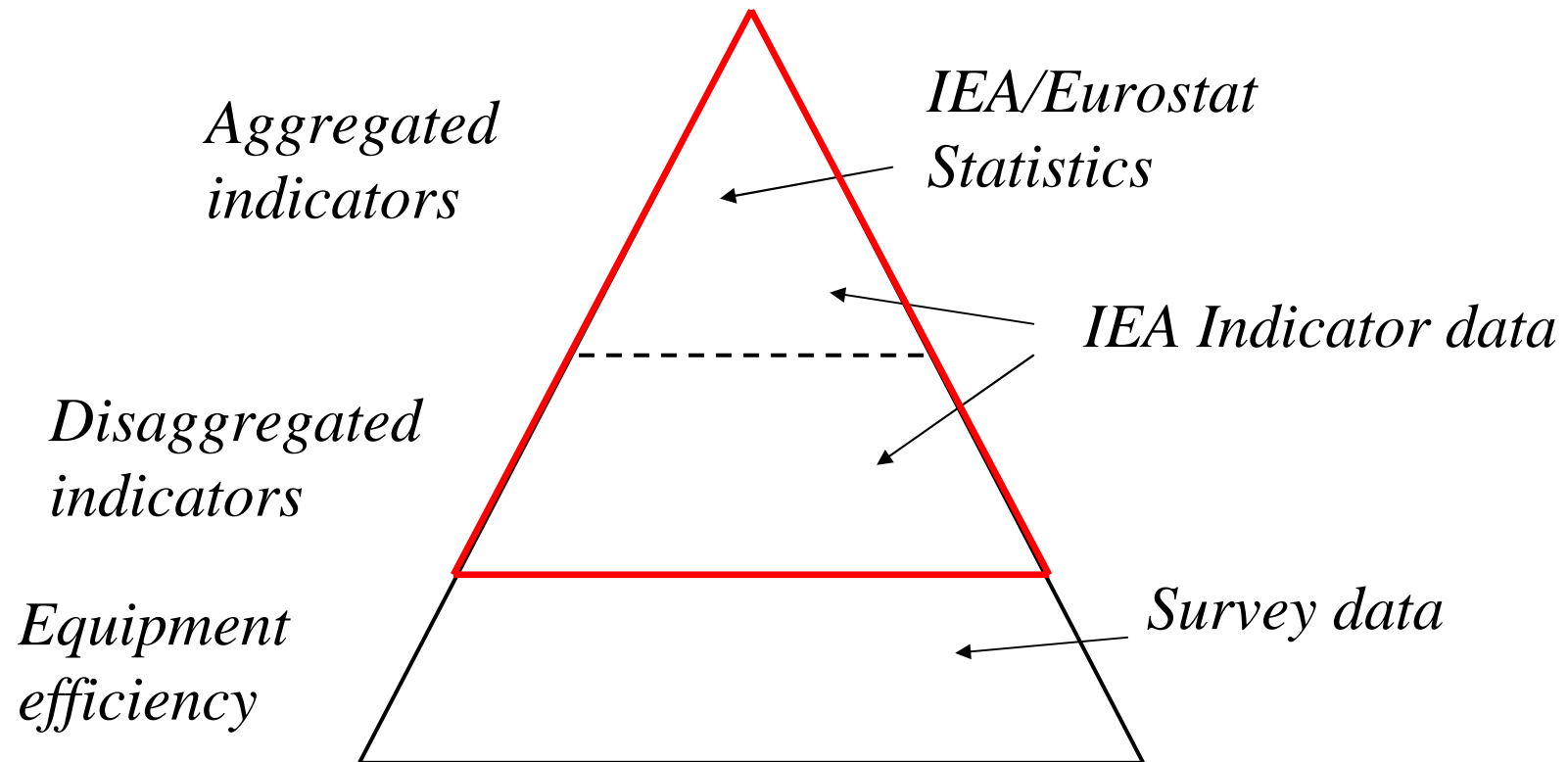
## The Indicator Pyramid





# Matching Analysis and Data

## The Indicator Pyramid





# IEA Decomposition Approach of Building Energy Use

Sector	Sub-sector	Activity	Structure	Intensity
<b>Household</b>				
	Space Heat	Population	Floor area/capita	Heat <sup>1</sup> /floor area
	Water Heat	“	Person/household	Energy/capita <sup>2</sup>
	Cooking	“	Person/household	Energy/capita <sup>2</sup>
	Lighting	“	Floor area/capita	Electricity/floor area
	Appliances	“	Ownership <sup>3</sup> /capita	Energy/appliance <sup>3</sup>
<b>Service</b>				
	Total Services	Services Value added	(not defined)	Energy/Value Added

<sup>1</sup>Adjusted for climate variations and for changes in the share of dwellings with central heating systems.

<sup>2</sup>Adjusted for dwelling occupancy (number of persons per household).

<sup>3</sup>Includes ownership and electricity use for six major appliances.



# IEA Decomposition Approach of Building Energy Use

Driving Forces

Energy Efficiency

Sector	Sub-sector	Activity	Structure	Intensity
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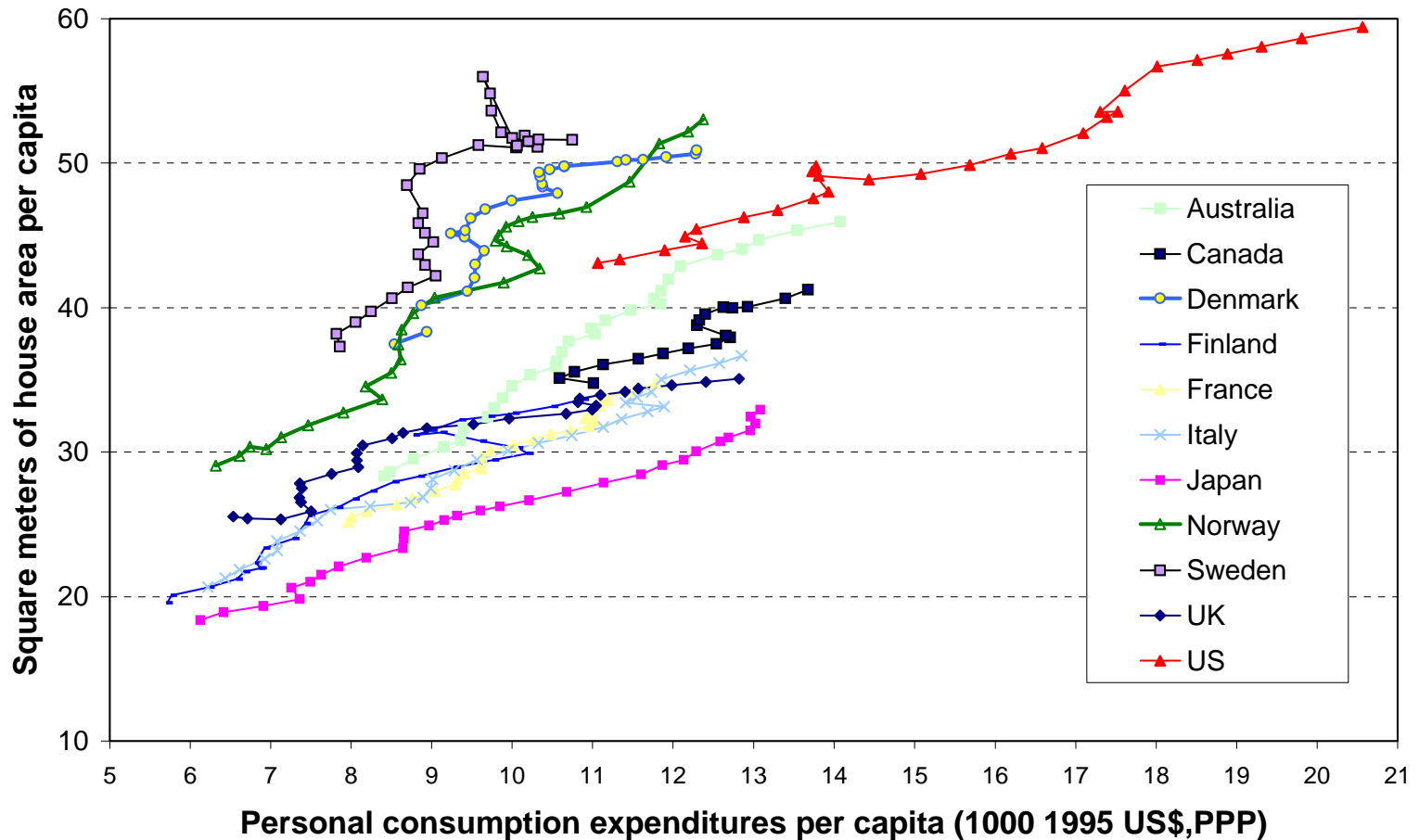
Oil  
Crises &  
Climate  
Challenges

30  
Years

OF ENERGY USE  
IN IEA COUNTRIES

# Example of Driving Force

## *House Area vs. Income (1973-1998)*



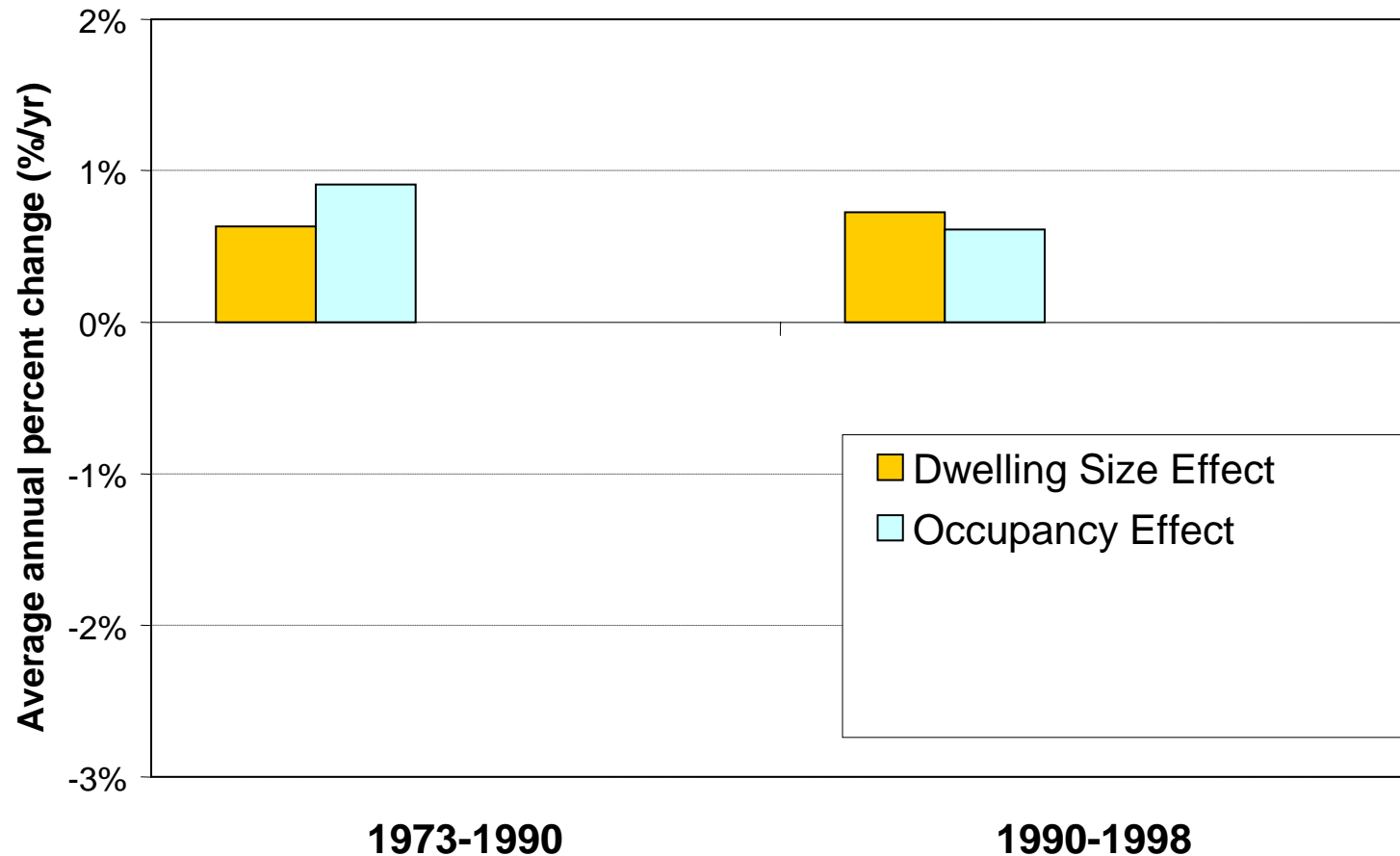
***Living space gets bigger as we get richer***



# 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***

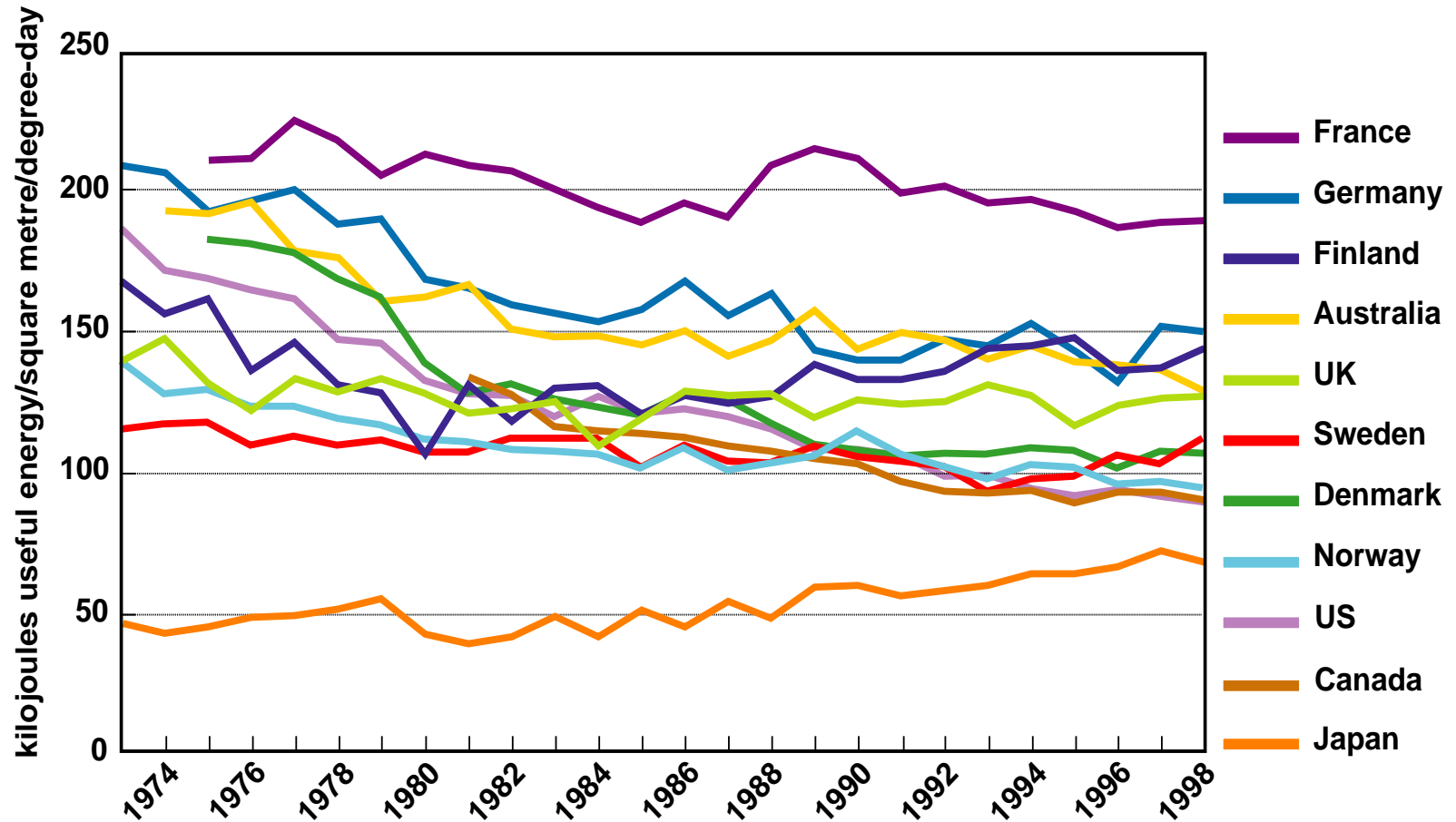


Oil  
Crises &  
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Years

OF ENERGY USE  
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## Example of Intensity Indicator Useful Space Heating Intensity



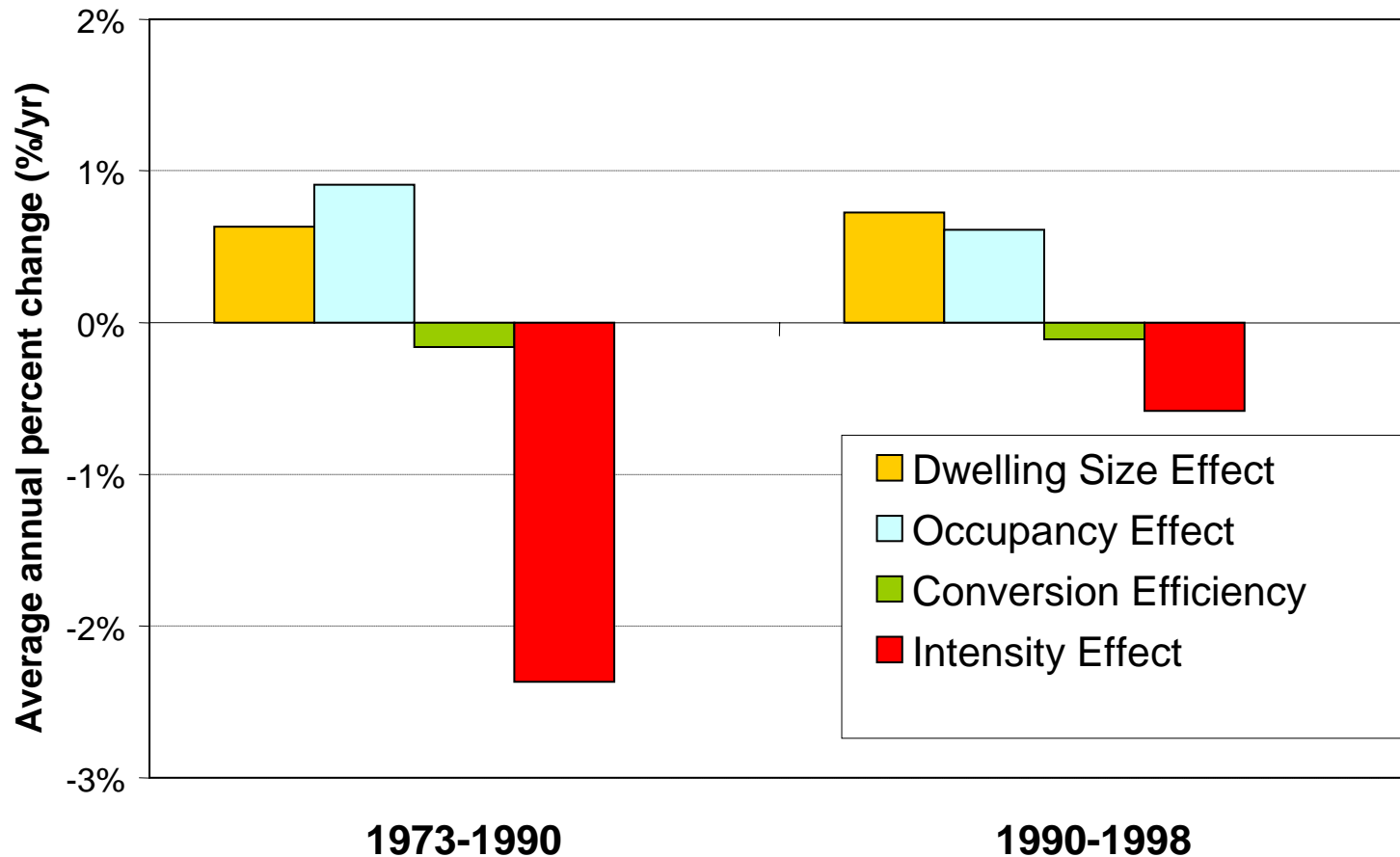
*Space heating intensities have declined, but increased comfort levels offset the savings in some countries*



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

Oil  
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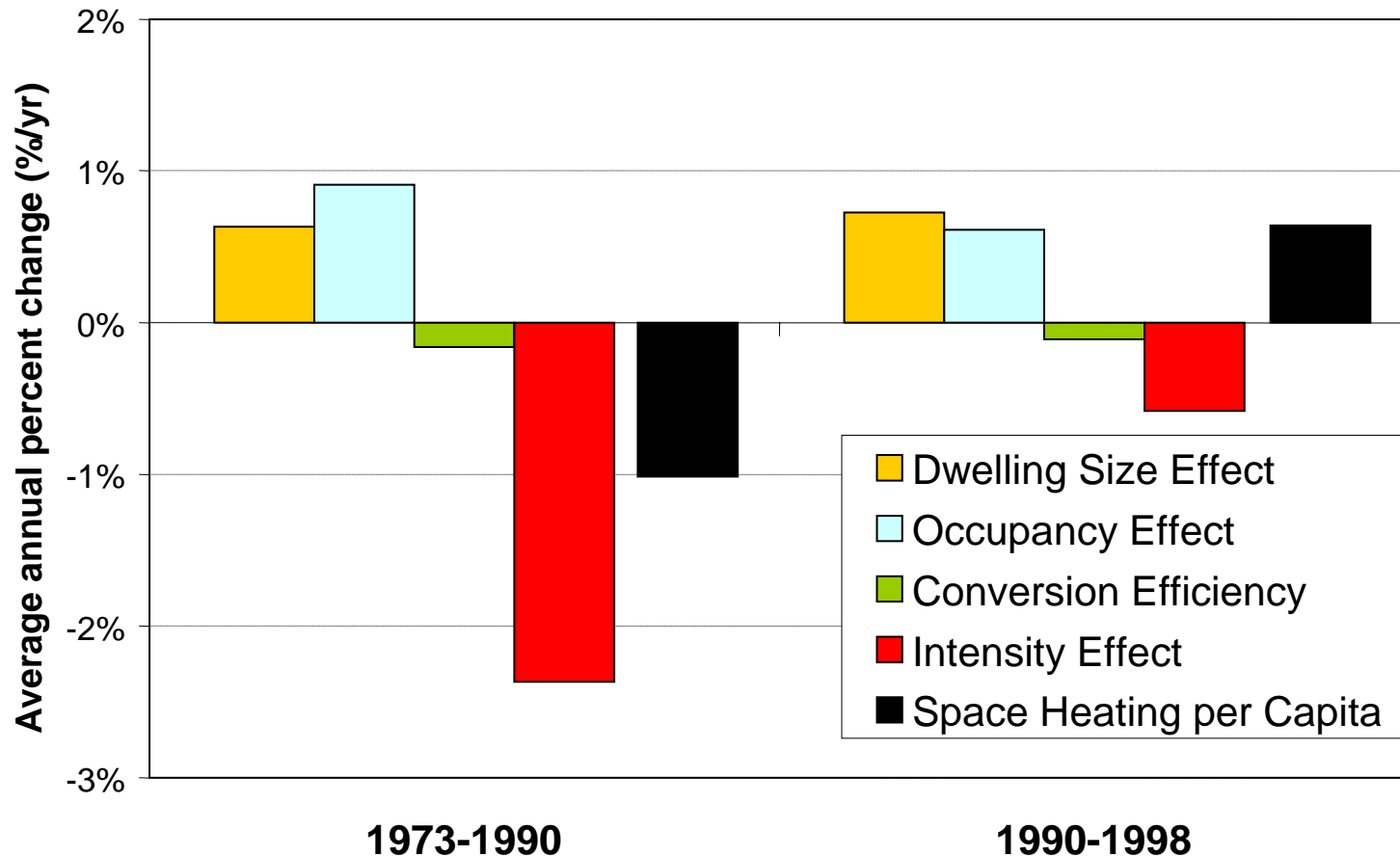
***Declines in intensities are slowing....***



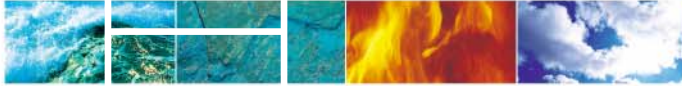
# Energy for Space Heating (IEA-11) Factors shaping development

Oil  
Crises &  
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OF ENERGY USE  
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***Net result is an increase in per capita heating demand after 1990***

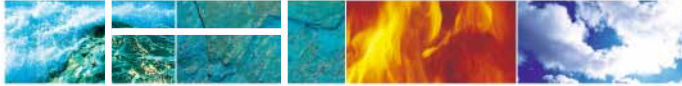


Drivkraft for fremtidsrettede energiløsninger



# Energy Indicators

## Norway's perspective

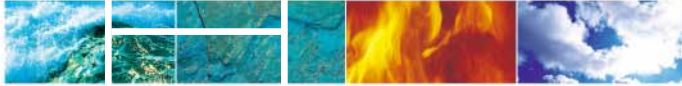


Drivkraft for fremtidsrettede energiløsninger



## Enova – the Norwegian Energy Fund

- Governmental enterprise owned by the Ministry of Petroleum and Energy
- Operational as of 1 January 2002
- Manages the Norwegian Energy Fund
- Current annual budget of approx. € 90 million
- Proposed to increase to 200 € million by 2010 (~100€ per household per year)
- Each € to release three-four times as much in total investment

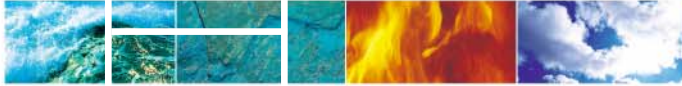


Drivkraft for fremtidsrettede energiløsninger



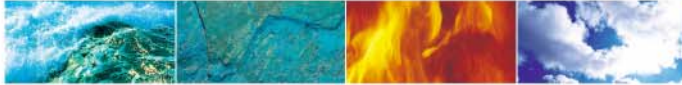
## Enova's Overall Objective

- Contribute to an environmentally friendly transformation of energy generation and use
- Enova's success is measured against agreed quantitative targets

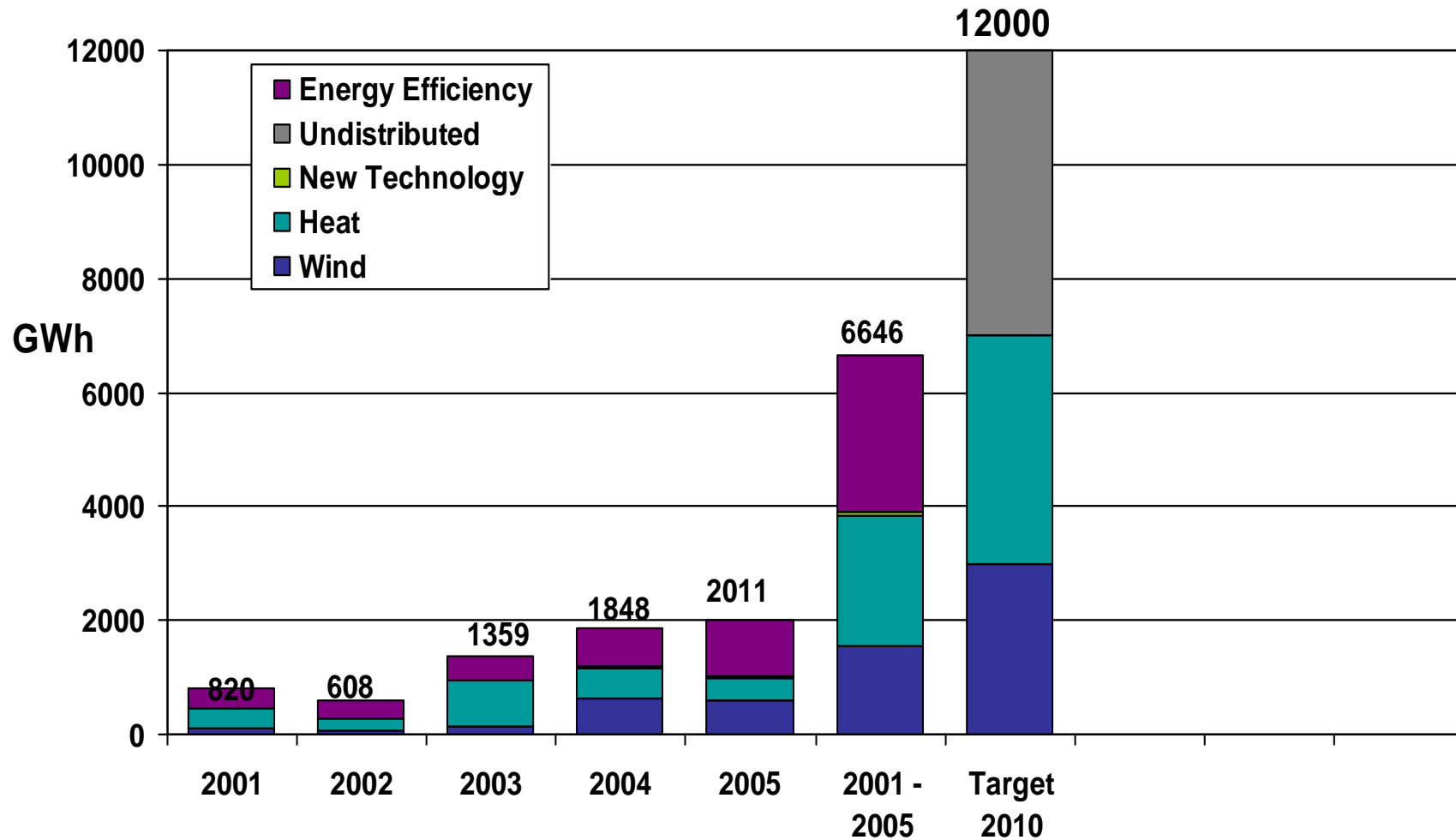


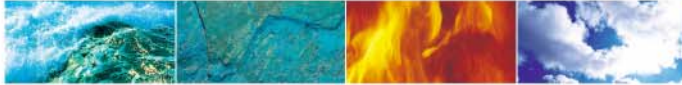
## Enova's Targets

- Achieve 12TWh/year in energy savings or new renewable energy by 2010
  - Decrease dependency on electricity for heating and increase use of heating from renewable energy sources, heat pumps and waste heat by 4 TWh
  - Increase wind power generation by 3 TWh/year
  - Limit energy use considerably more than if developments were allowed to continue unchecked
- Increase environmentally sound stationary use of natural gas
- Increase uptake of new technologies through demonstration programs

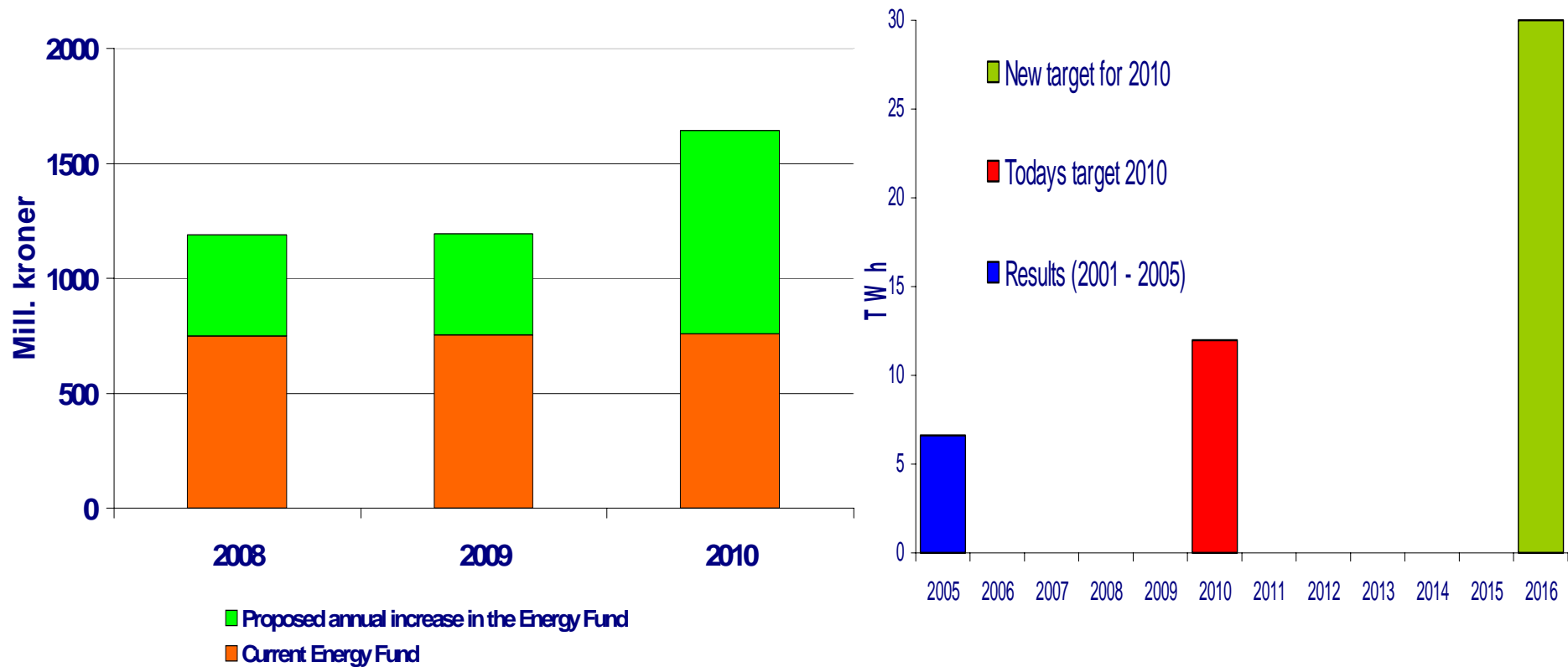


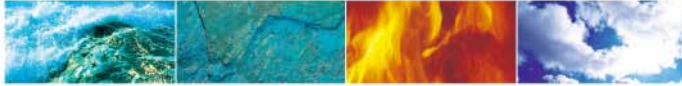
# Results so far and target for 2010



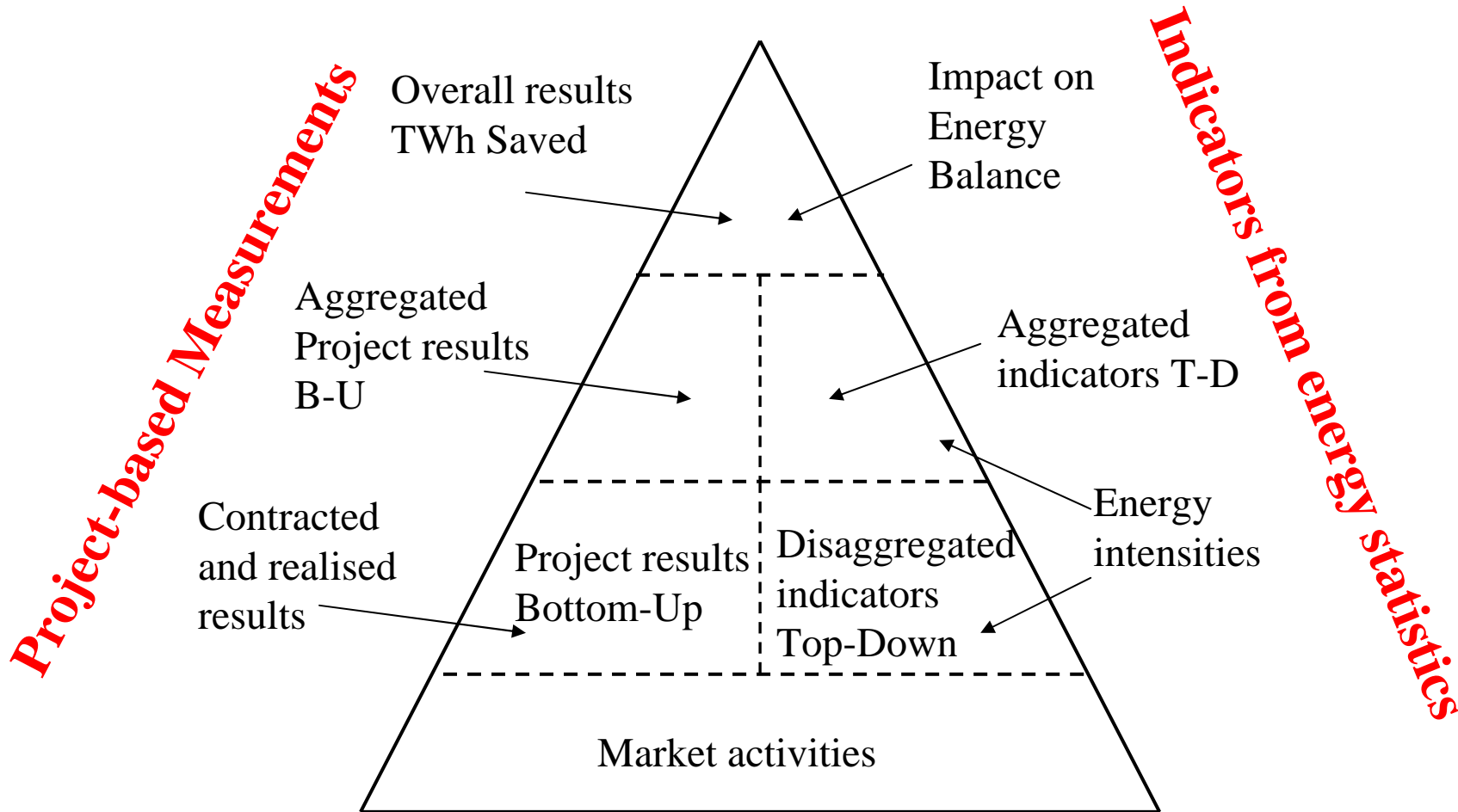


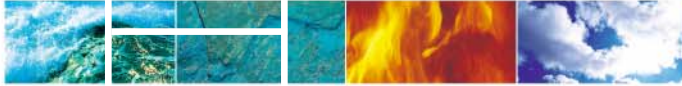
# Increased funding – New target for 2016





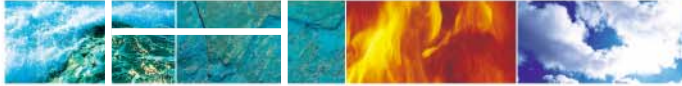
# How to Measure Progress Towards Targets? Project Measurements vs. Indicators





## How to Measure Progress Towards Targets? Project Measurements vs. Indicators

- Project based measurements
    - Leads to focus on project oriented measures
    - Risk that savings are not reflected in the energy balance
  - Intensity indicators
    - Allow for capturing market impacts and thus encourage broader market measures
    - Risk that impact of measures are hidden by other factors impacting the intensity indicators
- ⇒ Enova will use a combination of measurements and indicators



## International Energy Indicator Collaboration

- Availability of international indicator analysis provides increased insights and important benchmark of national efforts
- Requires national submission of data that are consistent over time and among countries
- Improving availability and quality of data requires national efforts
- Conclusion from IEA G8 Indicator Workshop April 2006:

*IEA should be a “clearing house”/coordinator for international indicator and data collaboration*