



# Manufacturing Energy Use in IEA Countries

## *Impacts from Changes in Structure and Energy Intensities*

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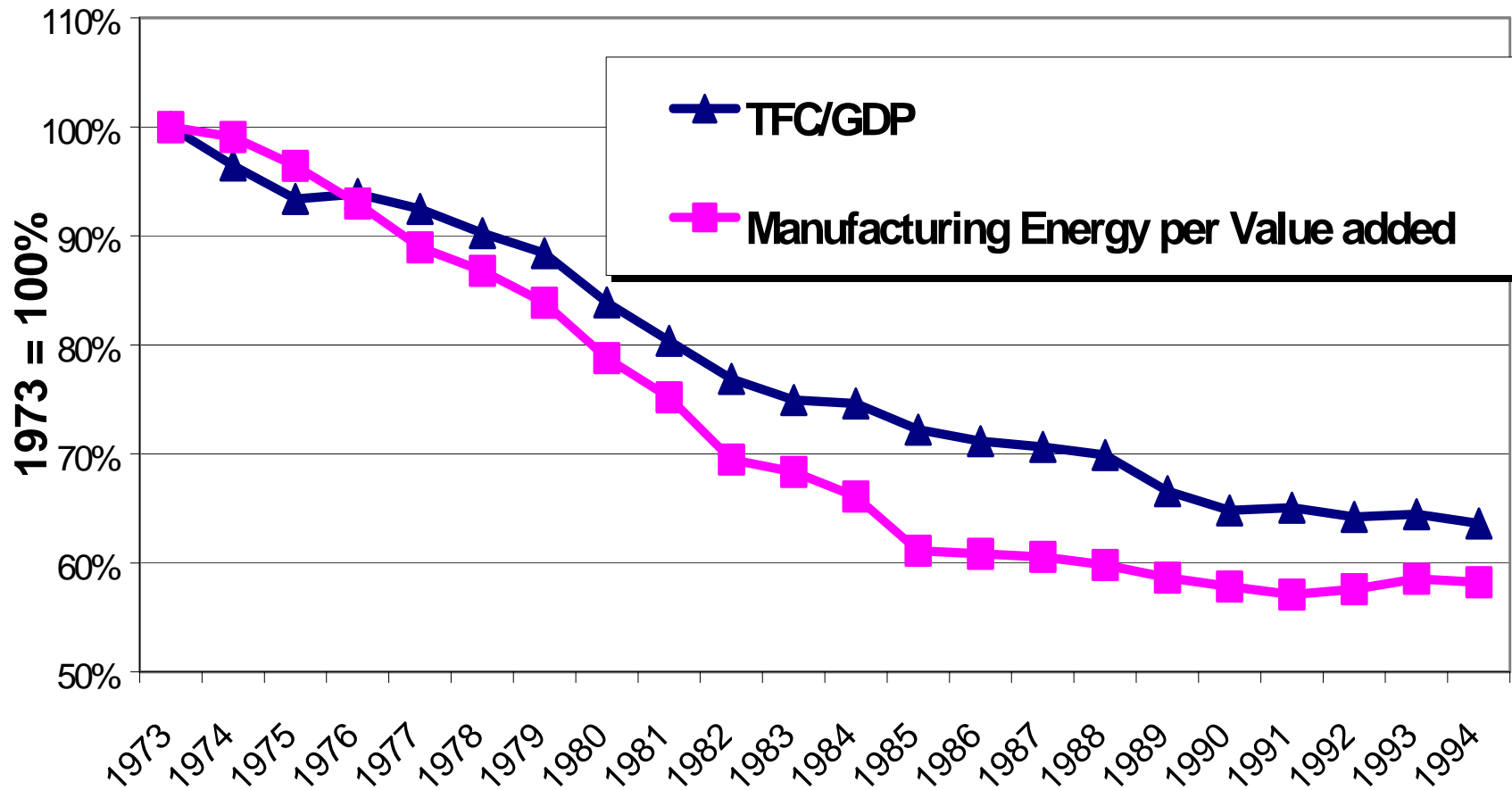
# Manufacturing Energy use

## *Structural Changes and Energy Efficiency*

- IEA manufacturing energy use has declined since 1973
- Energy efficiency and structural changes can both be expected to have contributed to the decline
- The aim of this presentation;
  - ◆ Compare the long-term impact on manufacturing energy use from structural changes to those induced by changes in branch-by-branch energy intensities for a group of eleven IEA countries
  - ◆ Investigate impacts of recent developments in the U.S and Japan

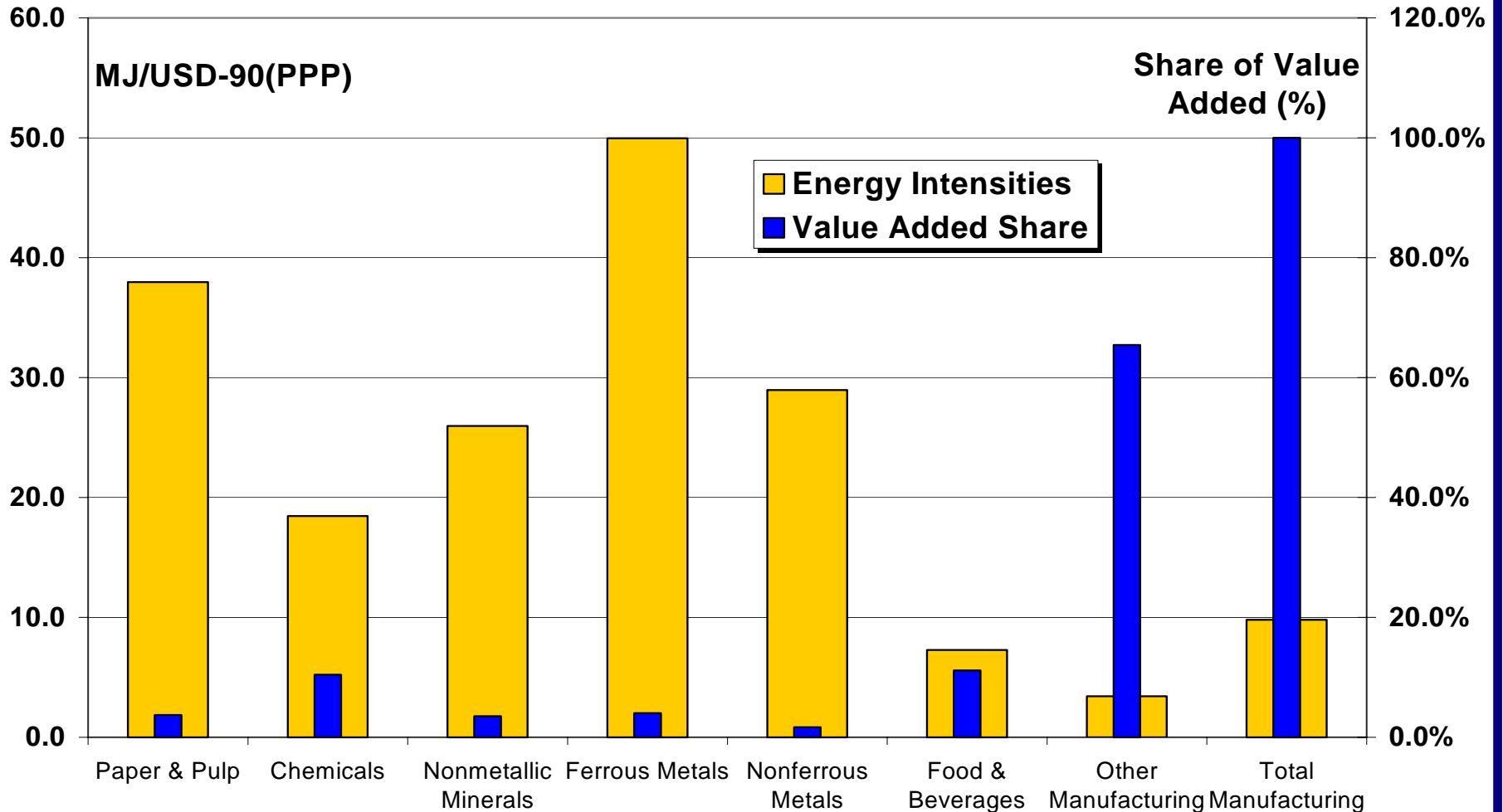


# IEA-11 TFC per GDP and Manufacturing Energy Use per unit of Value Added





# IEA-11 Sectoral Manufacturing Energy Intensities and Value Added Shares, 1994





## Changes in Manufacturing Energy use

*Decomposing changes in Energy Into three Components*

$$E = A * S_i * I_i$$

**E :** Manufacturing Energy

**A :** Sectoral Activity (value added)

**S<sub>i</sub> :** Sectoral Structure (sub-sector *i* share of value added)

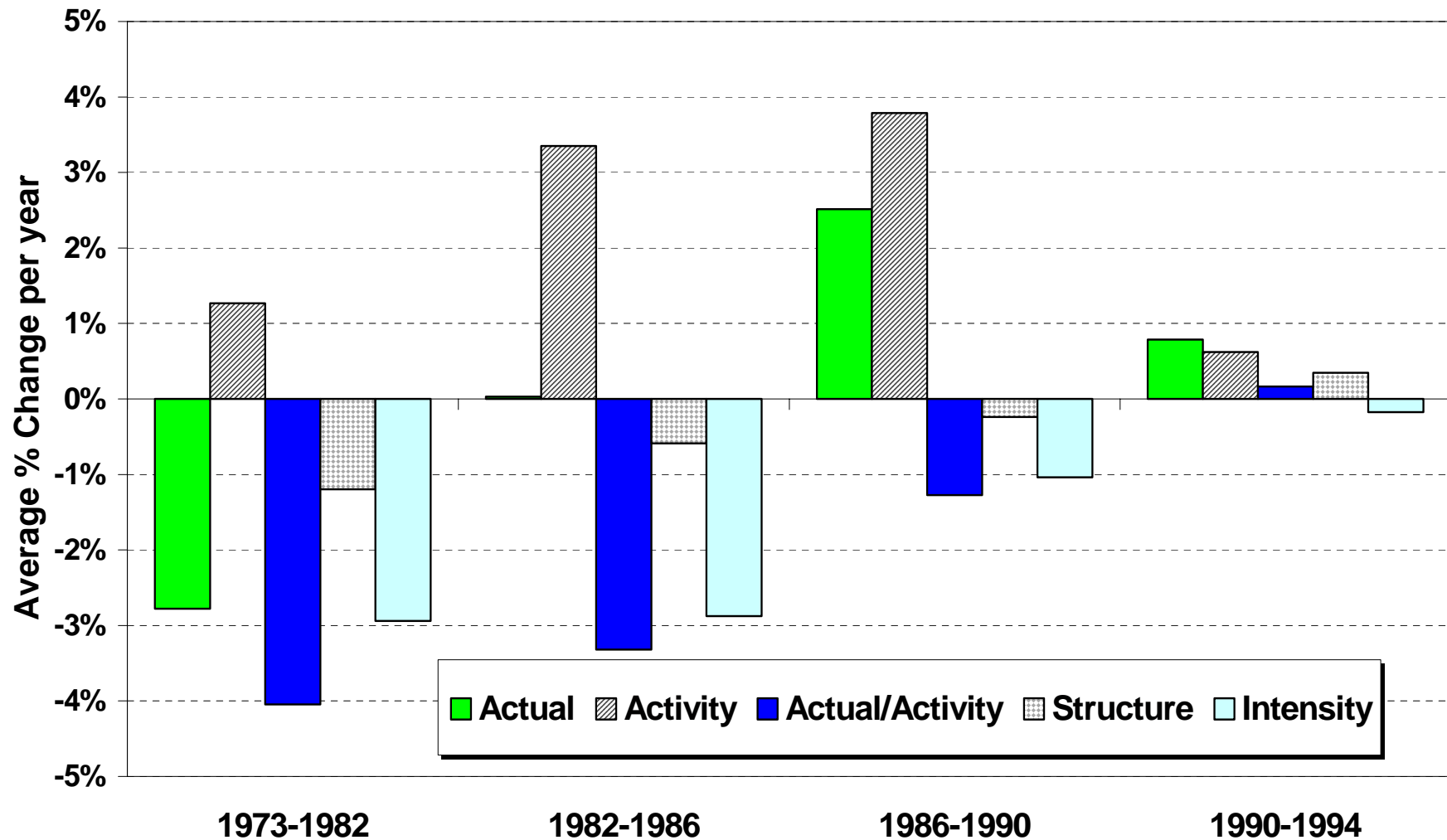
**I<sub>i</sub> :** Energy Intensity in sub-sector *i* (energy per value added)

**Using Laspeyres or Adaptive Weighting Divisia Index Method (AWD) to study trends over time**



# Changes in Manufacturing Energy Use

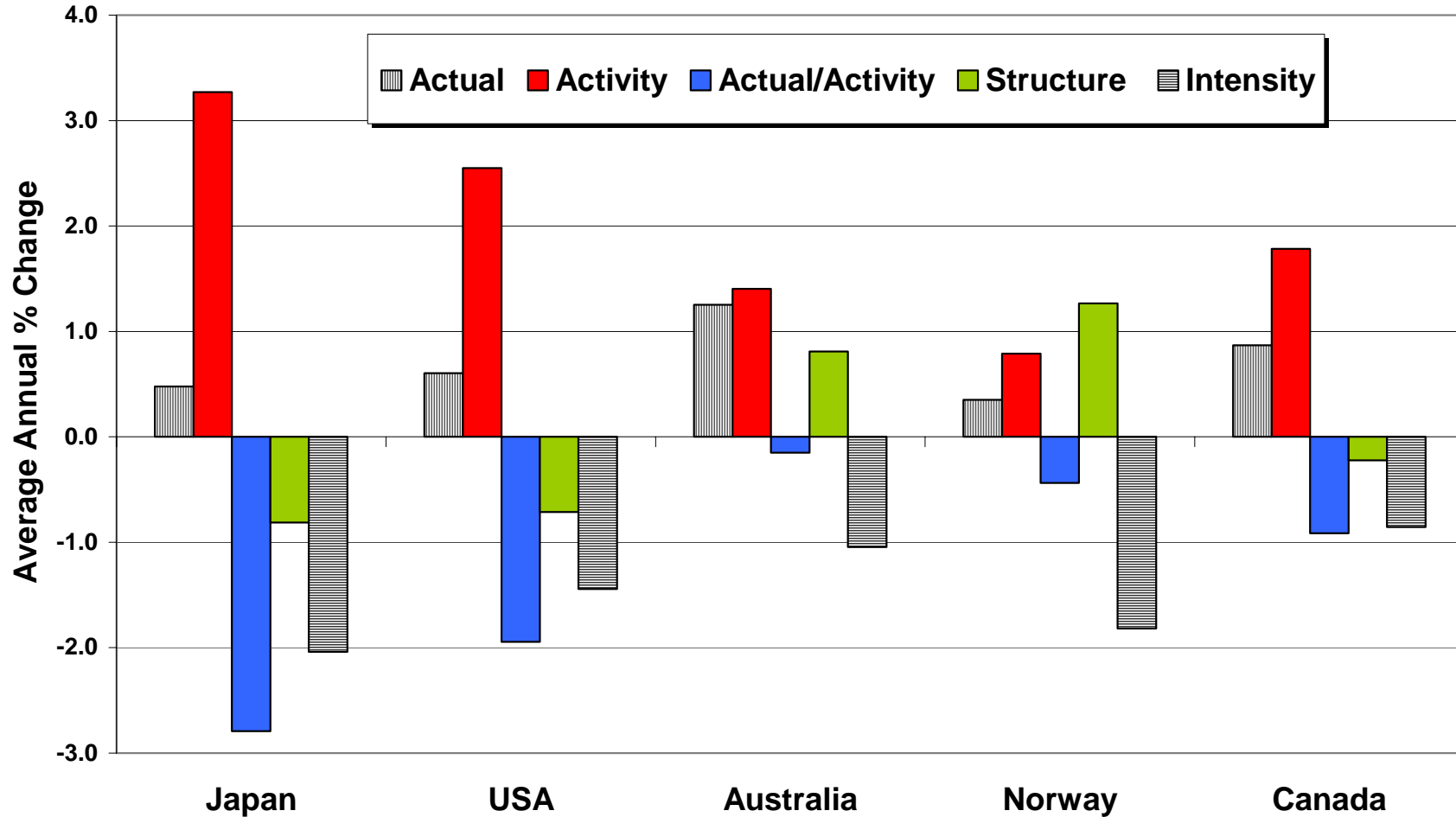
IEA-11





# Manufacturing Energy Use 1981-1994

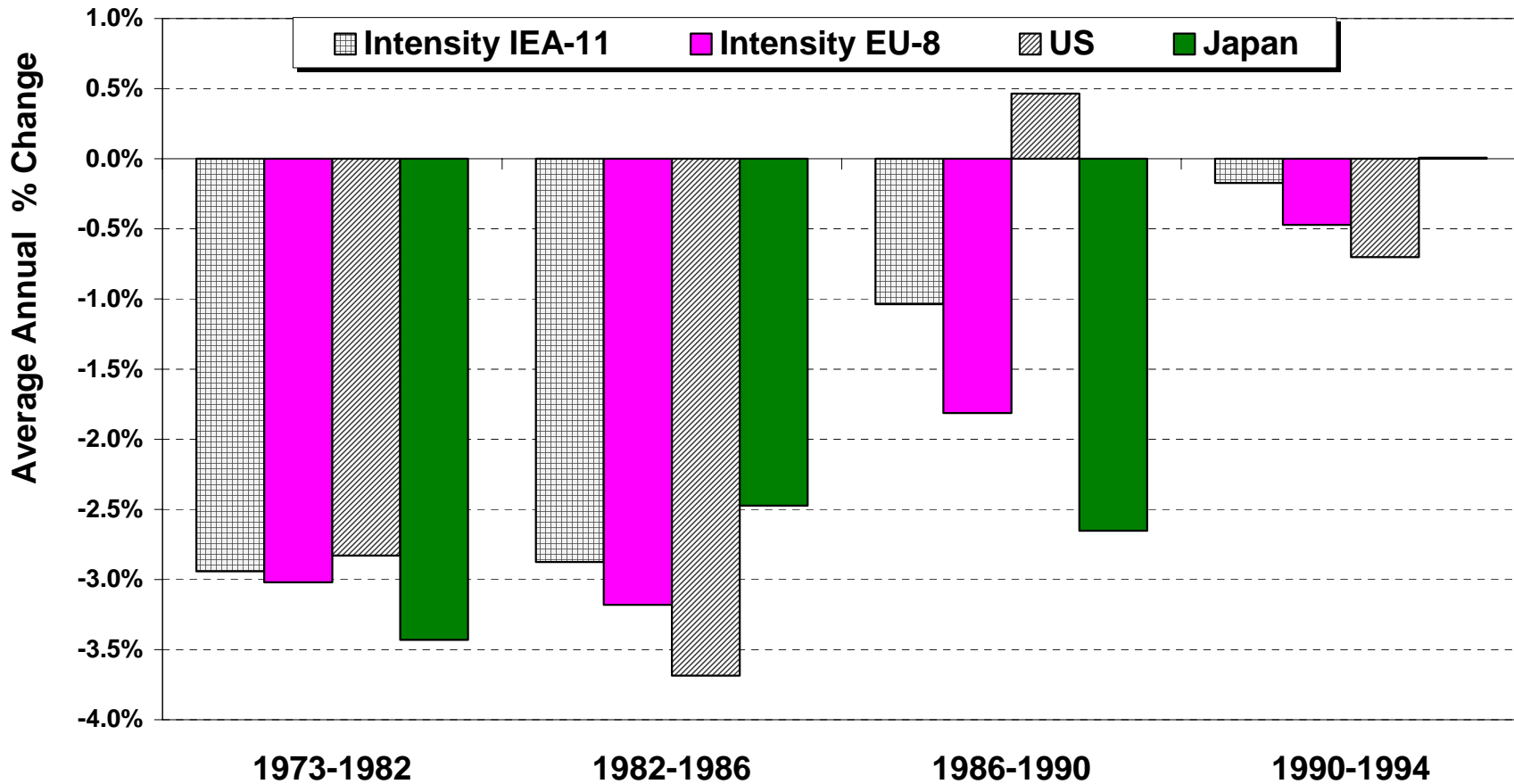
## *Impact of changes in Structure and Energy Intensities*





# Changes in Manufacturing Energy Intensities

## *Constant Structure*

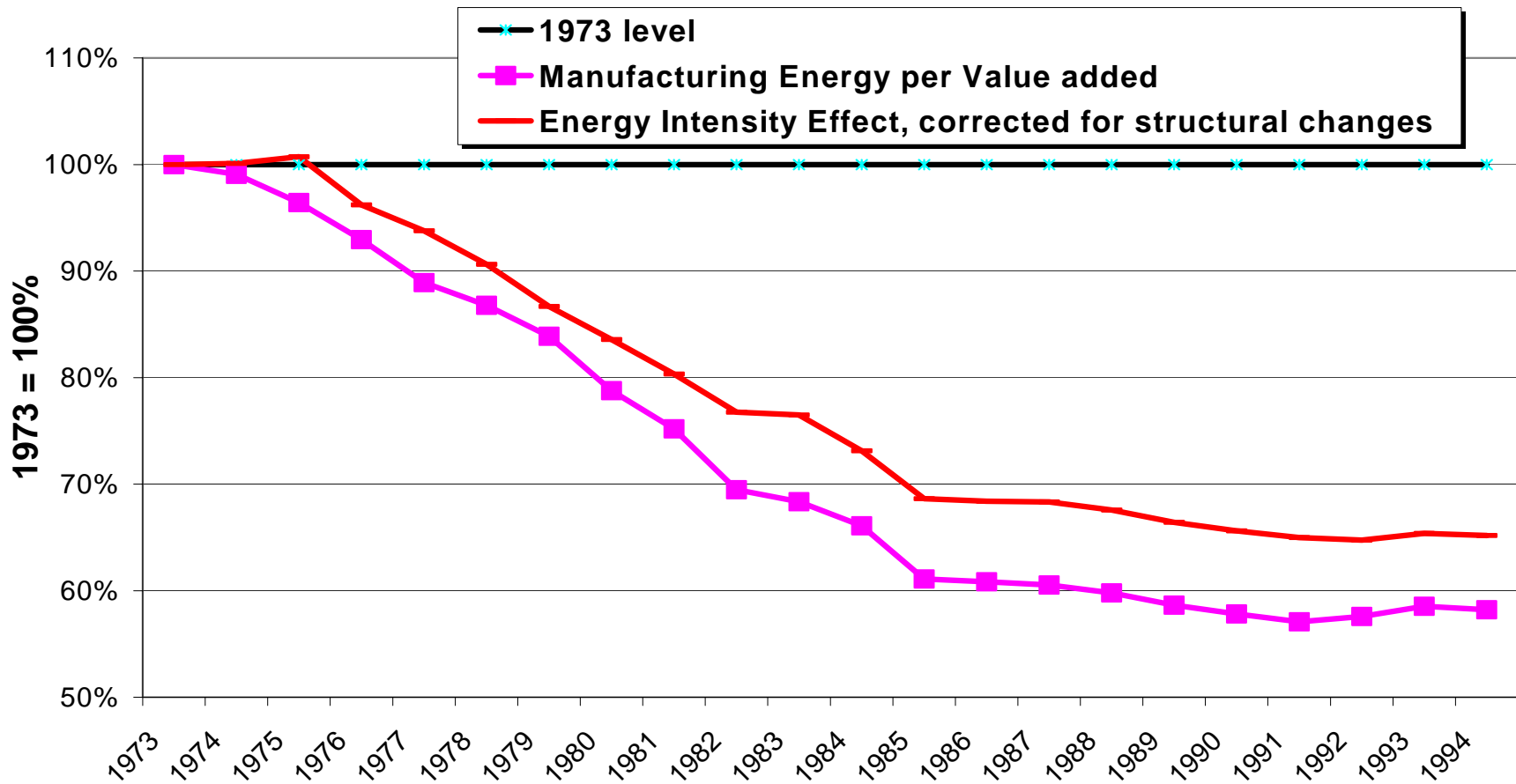






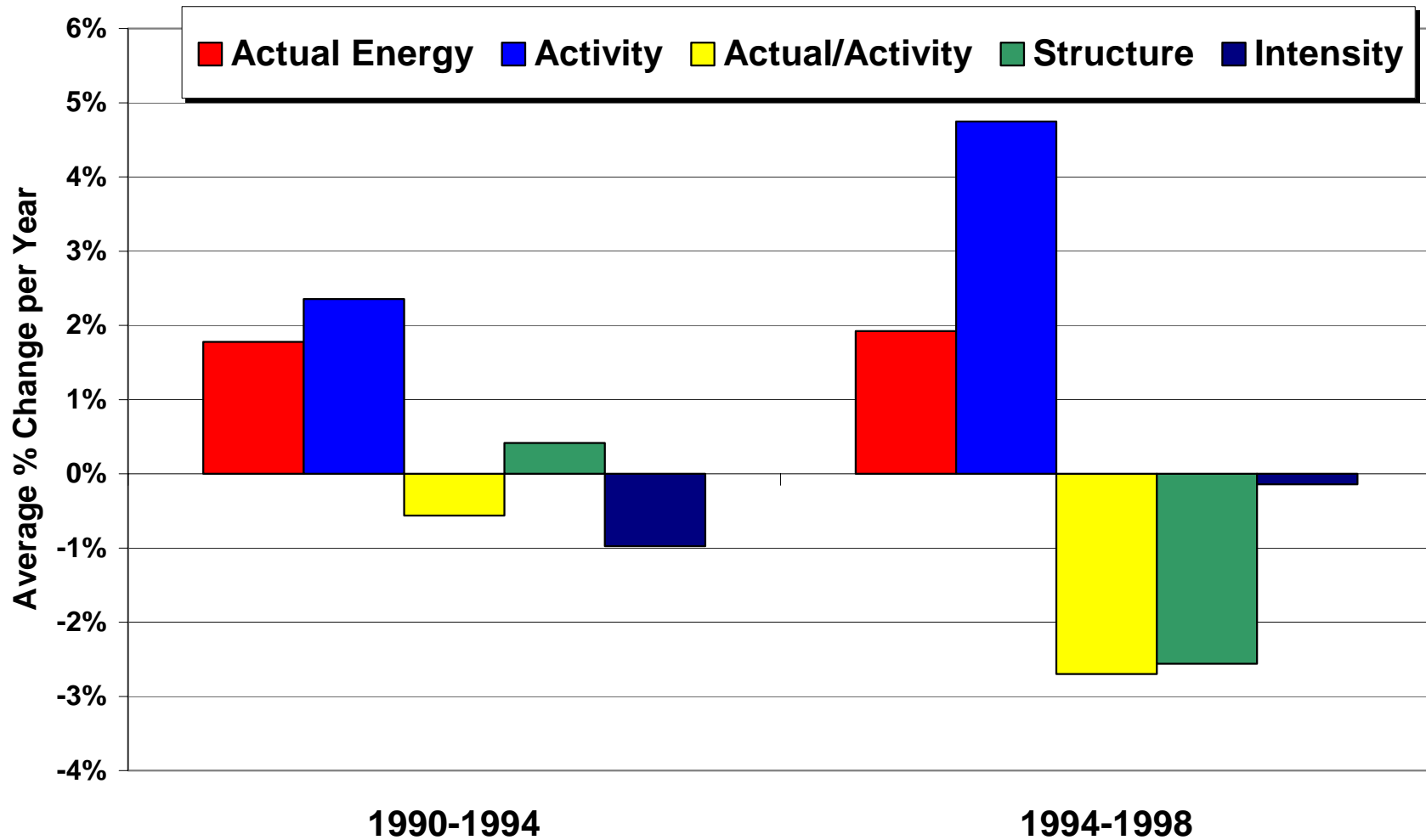
# IEA-11 Manufacturing Energy Intensity

## *With and without correction for Structural Changes*



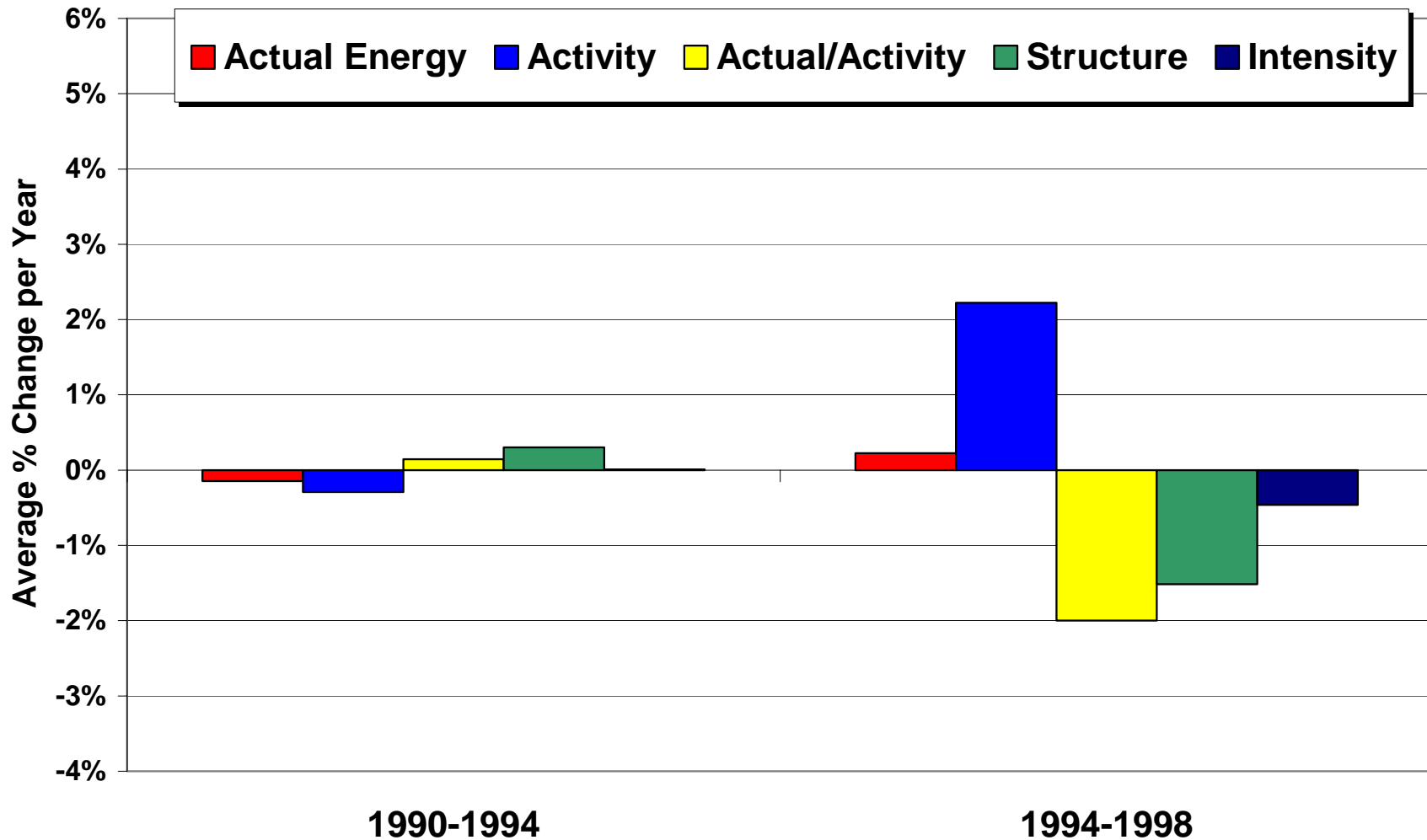


# Changes in U.S. Manufacturing Energy Use 1990 - 1998





# Manufacturing Energy Use in Japan 1990 - 1998





# Conclusions

## *Long term trends*

- **Structural changes can explain about a quarter of the reduction in IEA-11 manufacturing energy use per unit of value added between 1973 and 1994**
- **In a few countries structural changes drove up energy use in the same period**
- **The decline in branch-by-branch energy intensities has slowed everywhere since the late 1980's**



## Conclusions

### *Recent trends in the U.S and Japan*

- Virtually no effect from declining intensities
- The significant reduction in manufacturing energy use per value added since 1994 is mostly due to structural changes
- In the U.S growth in the production of electronics induced a shift in manufacturing structure, restraining growth in energy use by some 10% between 1994 and 1998