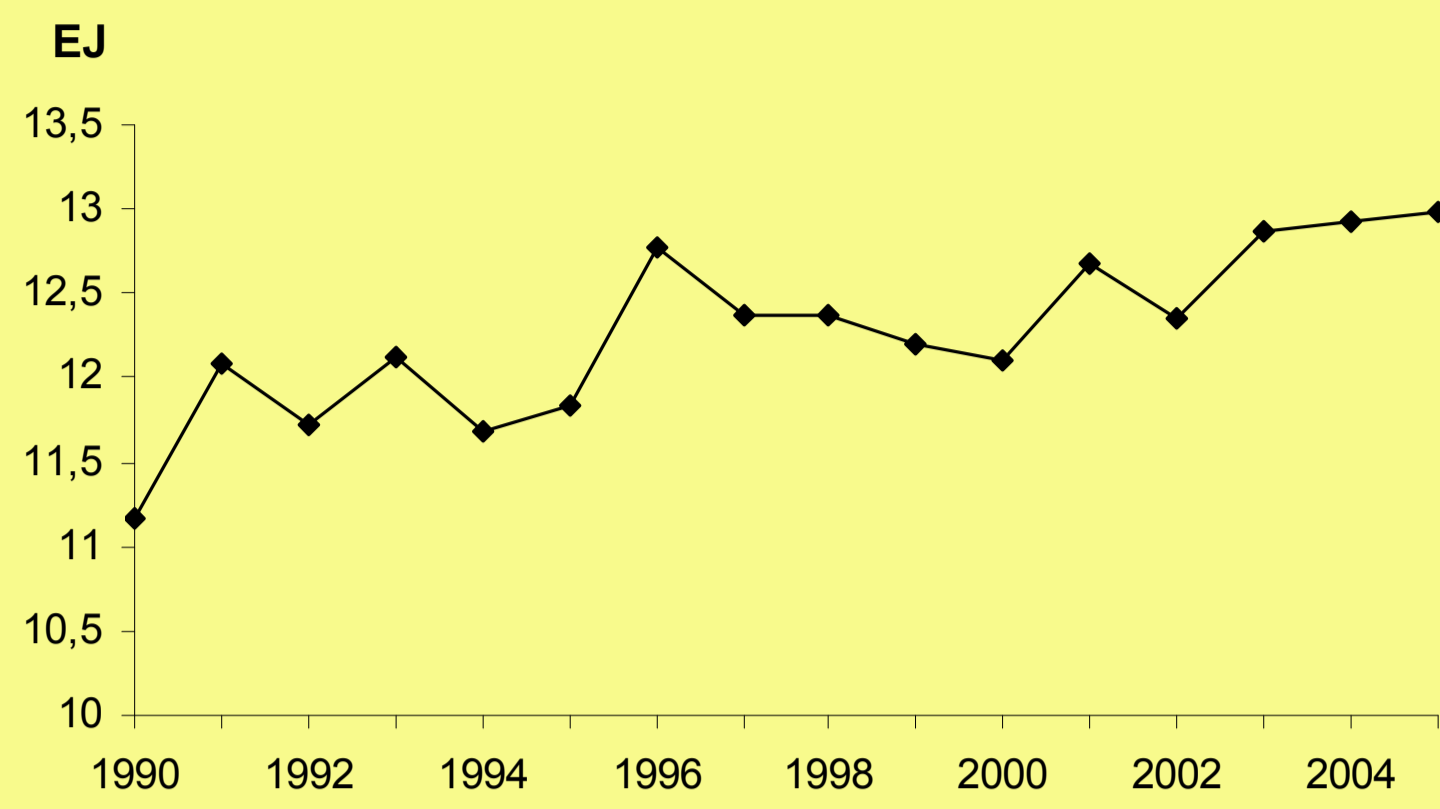


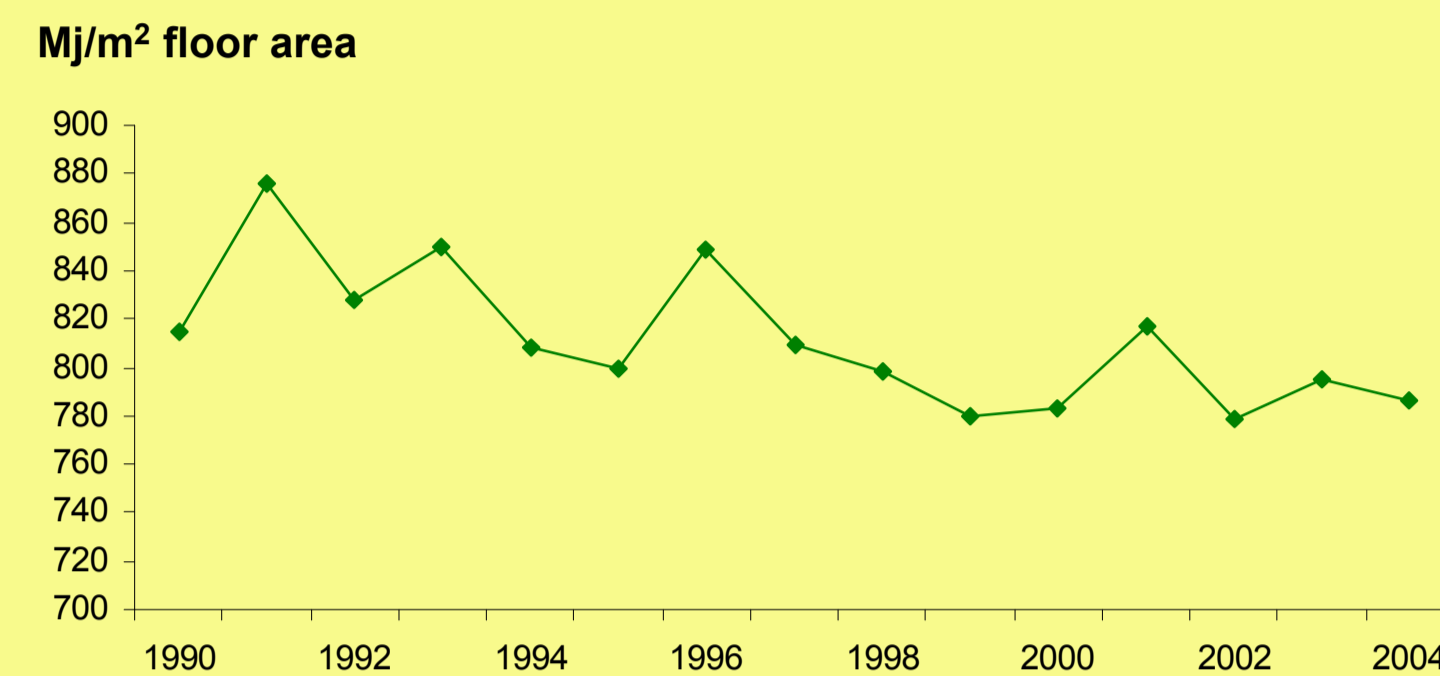
# A disaggregation of the technical and non technical parameters effecting final energy consumption in the EU residential sector between 1990 and 2004

## Introduction

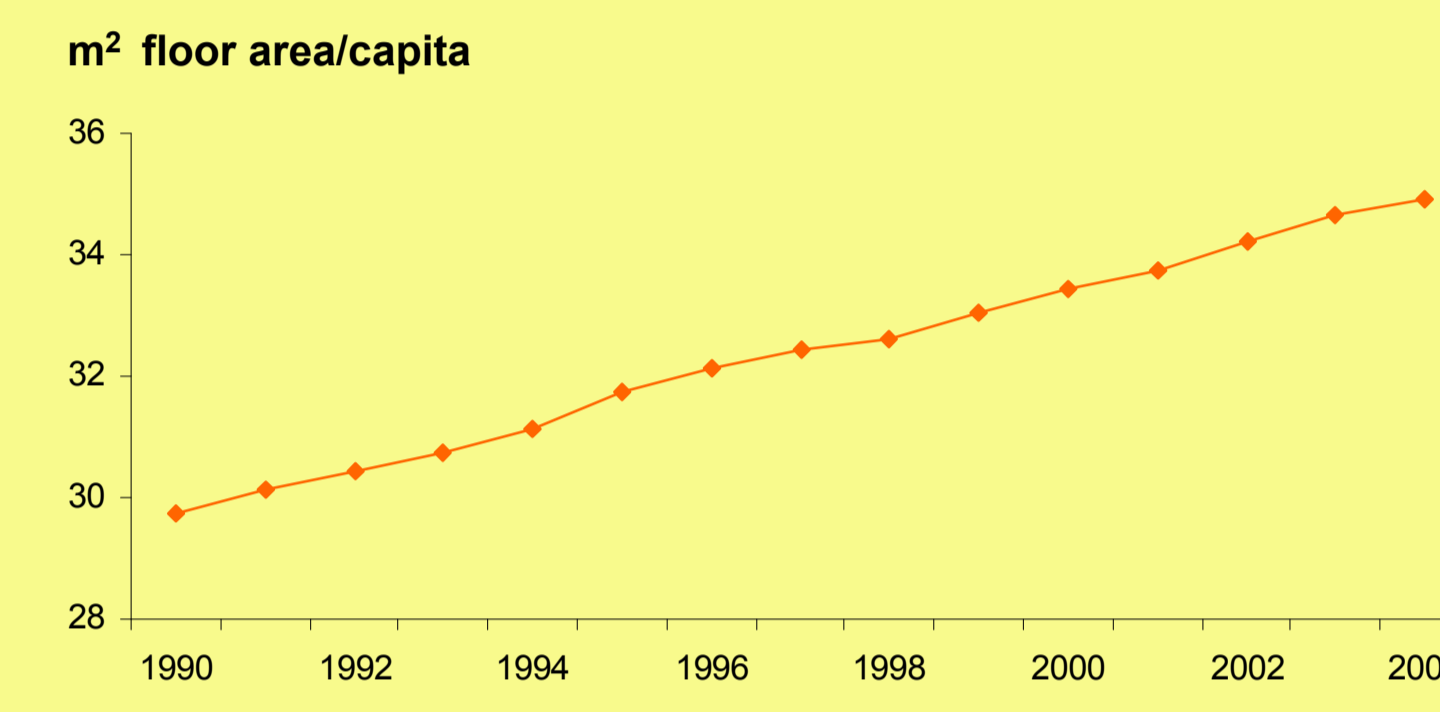
Final energy consumption in the EU Residential Sector has continued to rise between 1990 and 2004.



During this period the energy efficiency of the sector has however improved.



Non technical (lifestyle or population) parameters that influence the absolute level of energy consumption have nevertheless had a greater impact than efficiency, thus resulting in an overall increase in final energy consumption.



## Methodology

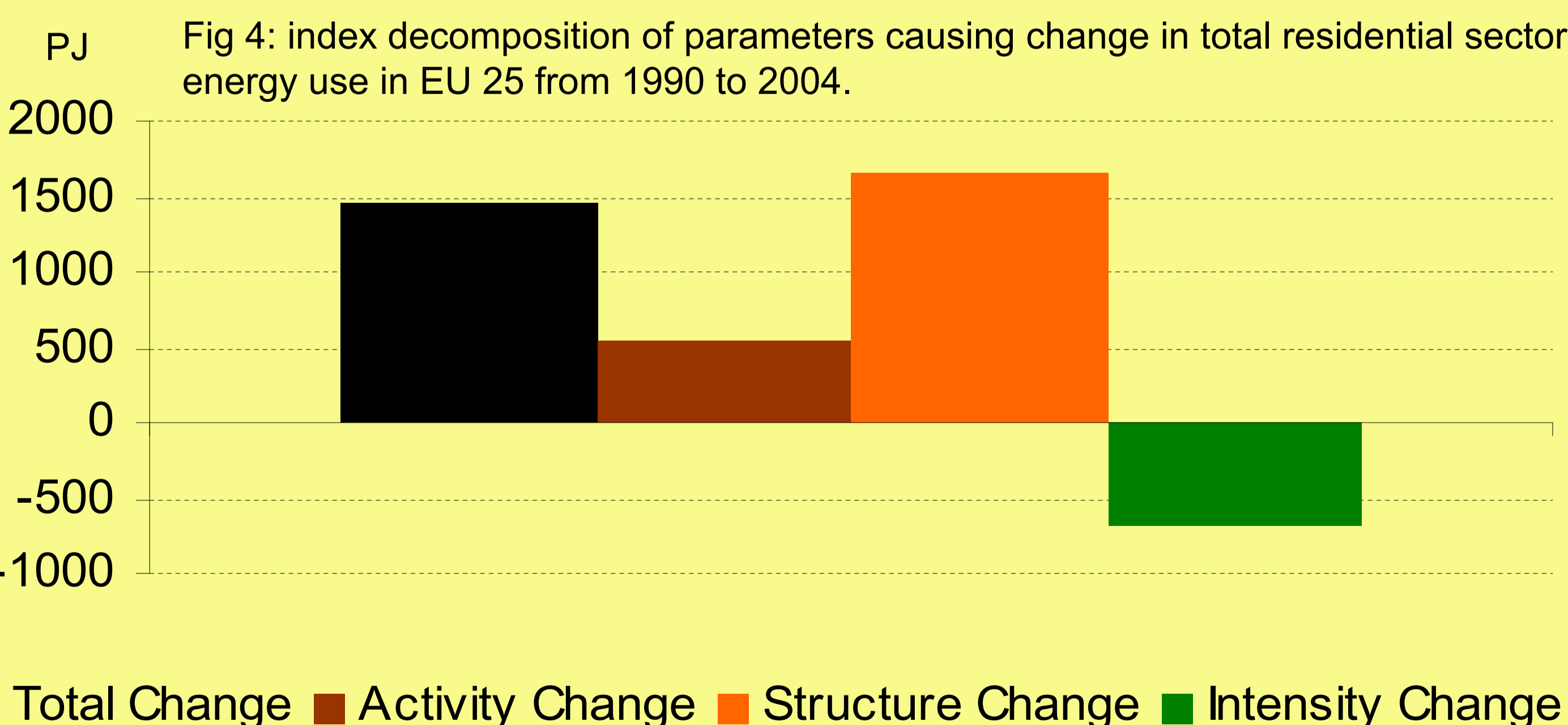
- Index Decomposition is used to quantify the partial influences on final energy consumption of technical parameters such as heating efficiency and non technical parameters, such as population growth.

- Subsequently, the ODEX (Odyssee Energy Efficiency Index) is used to isolate and focus on technical parameters, in order to ascertain how and why energy efficiency has itself developed as it has over the time period.

The Odex has been developed by the Odyssee Network of National Energy Agencies in Europe and has been recommended by the EU for use in assessing progress with the Energy End Use and Energy Services Directive whereby member states have an indicative target to reduce final energy consumption by 1% per year from 2008 to 2017. The index itself is an aggregation of the annual change in unit consumption for four residential sector end uses (space heating, water heating, cooking and electrical appliances) weighted by their respective share of total energy consumption.

## Index Decomposition

Figure 4 shows that the combined contribution of the non technical parameters of population increase (activity change) and lifestyle (structural change) towards total final energy consumption was significantly greater than the contribution of technical parameters (intensity) thus leading to a net rise in total final energy consumption.



- | Non Technical Parameters  | Technical Parameters  |
|---|---|
| <ul style="list-style-type: none"> <li>- Population Growth</li> <li>- More appliances</li> <li>- More lighting</li> <li>- Higher indoor temperature</li> <li>- Switch to central heating</li> </ul> | <ul style="list-style-type: none"> <li>- Smaller household sizes</li> <li>- Larger appliances</li> <li>- Longer lighting period</li> <li>- Longer heating period</li> <li>- Larger floor area</li> <li>- More insulation</li> <li>- More efficient appliances</li> <li>- More efficient lighting</li> <li>- More efficient boilers</li> <li>- Fuel Switching</li> </ul> |

## Energy Efficiency

Figure 5 shows the ODEX calculated for the EU 25 Residential Sector. Note:

- Stagnation of efficiency across Europe from 1995 to 2004.
- Efficiency of space heating flat lined from 1995 to 2004
- Efficiency of electrical appliances improved over entire period.
- As space heating accounts for such a large amount of overall energy use, its trend has had a significant bearing on the shape of the energy efficiency index for the residential sector.
- Significant efficiency improvements in a number of countries due to fuel switching (see Figure 6.)
- **If the 1990 to 1995 efficiency trajectory had continued, could energy efficiency alone have offset the increases that occurred due to population and structural changes?**

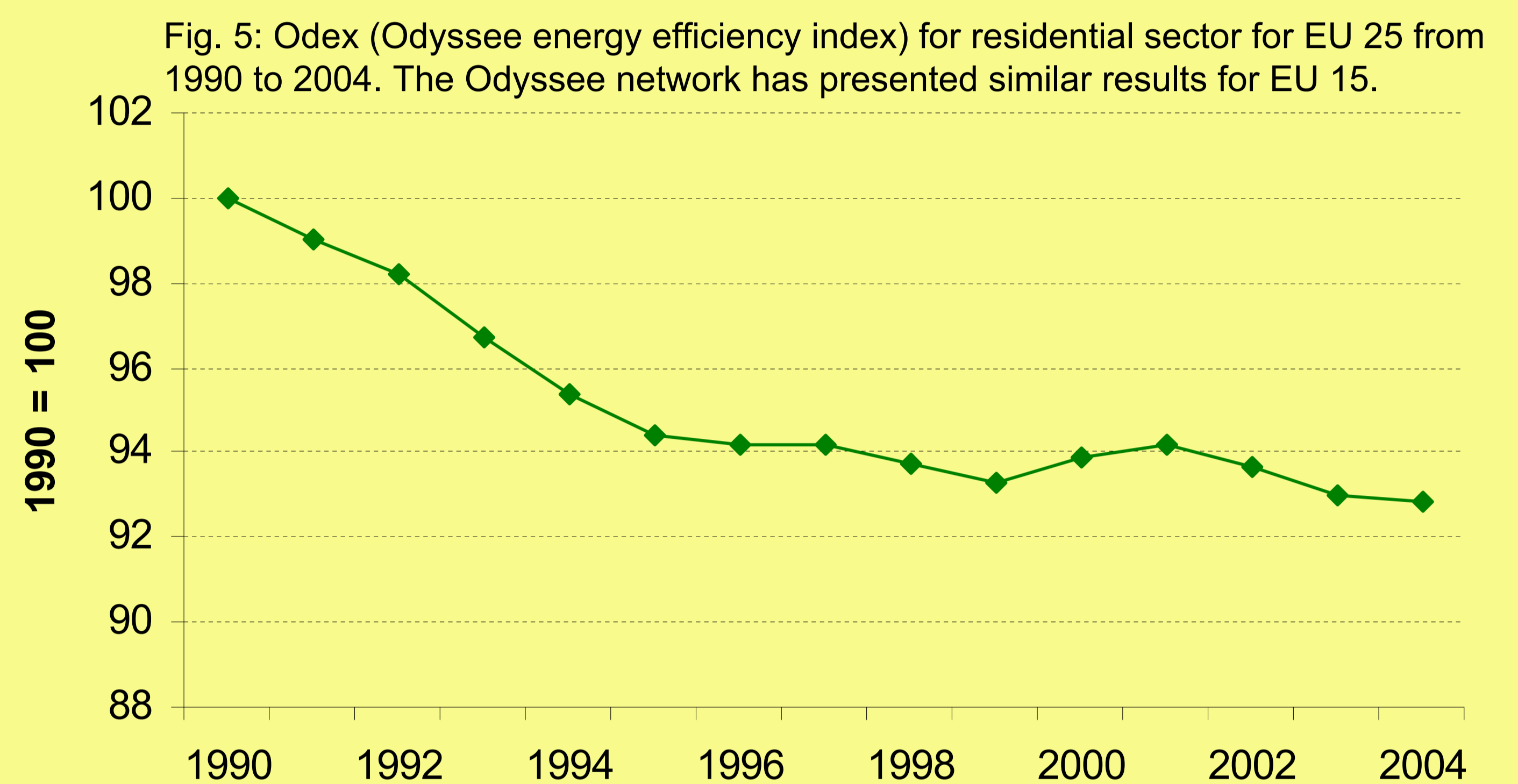
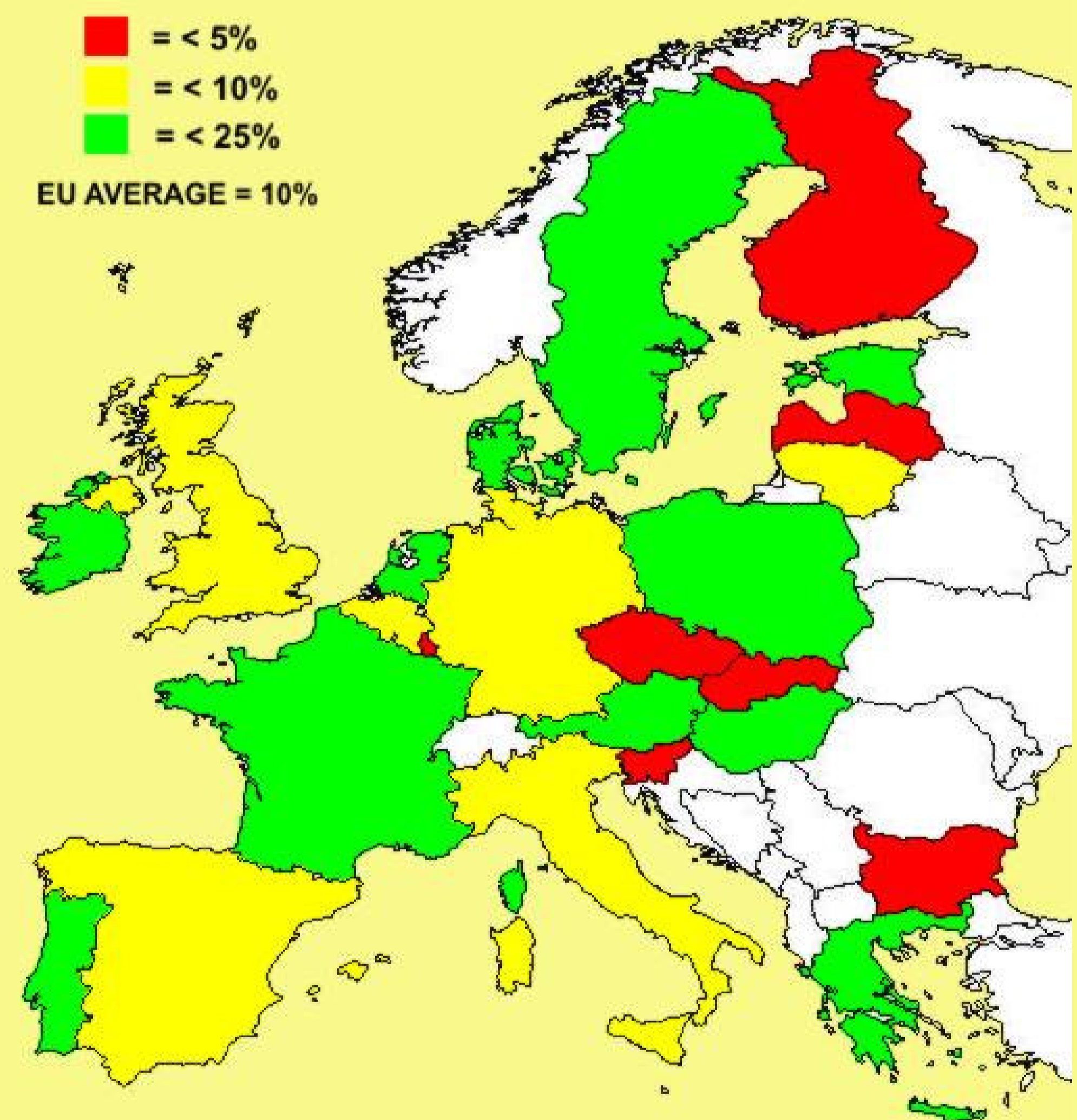


Fig. 6: Diagram depicting improvement in energy efficiency of residential sector per EU member state from 1990 to 2004. Measured as difference in residential sector Odex for 1990 from that of 2004. Data from Odyssee Network (2007).



## Conclusion

The non technical parameters listed, which over time have offset the improvements in energy efficiency, are mostly related to rising standards of living brought about by rising affluence. These are now the main drivers of increasing energy consumption in the residential sector. Given that increased affluence and improved living standards are universal goals sought by all developed and developing countries, something has to change in order to address rising energy use. The European Environmental Agency states that the trajectories of energy consumption drivers need to be decoupled from those of energy use. In other words rising affluence and living standards without a related rise in energy consumption. This can occur through further improvements in energy efficiency or through a reappraisal of living standards that are appropriate to the respective energy supply and carbon emission constraints.