6. Examples of top down methods:
Electricity end uses in services

ADEME

Enerdata

Top-down estimation of energy savings for electricity end uses in services

➢Indicators to measure savings : unit electricity consumption per employee (excluding electricity for thermal uses when data available) measured :

- from the sum of unit electricity consumption by activity subsector (detailed approach) to clean the changes in the structure of service sector activities ("hidden structure effect") ➔ the best approach but data available only for few countries
- from the total unit electricity consumption for service sector (aggregative approach) if data by subsector are unavailable.

➢Use of unit electricity consumption per employee because

- Physical indicators used and not economical indicators: energy needs related more to work conditions than to production
- Employment data more robust than building surface data

➢Change in unit electricity consumption can generally be explained by the following variables:

- Autonomous trend
- Electricity price
- Energy efficiency facilitating measures (subsidies, fiscal incentives, VA, taxes) (After / before 1995)

} **Defines the baseline**

Modelling of the baseline unit electricity consumption of services

- Identification by country of a period over which policy measures either are negligible or have a limited impact ➔ over that period changes in unit electricity consumption mainly linked to autonomous trend, electricity prices

- Modelling over that period of the indicator through regression analysis with two variables:
  - Time to capture an autonomous trend
  - Electricity price

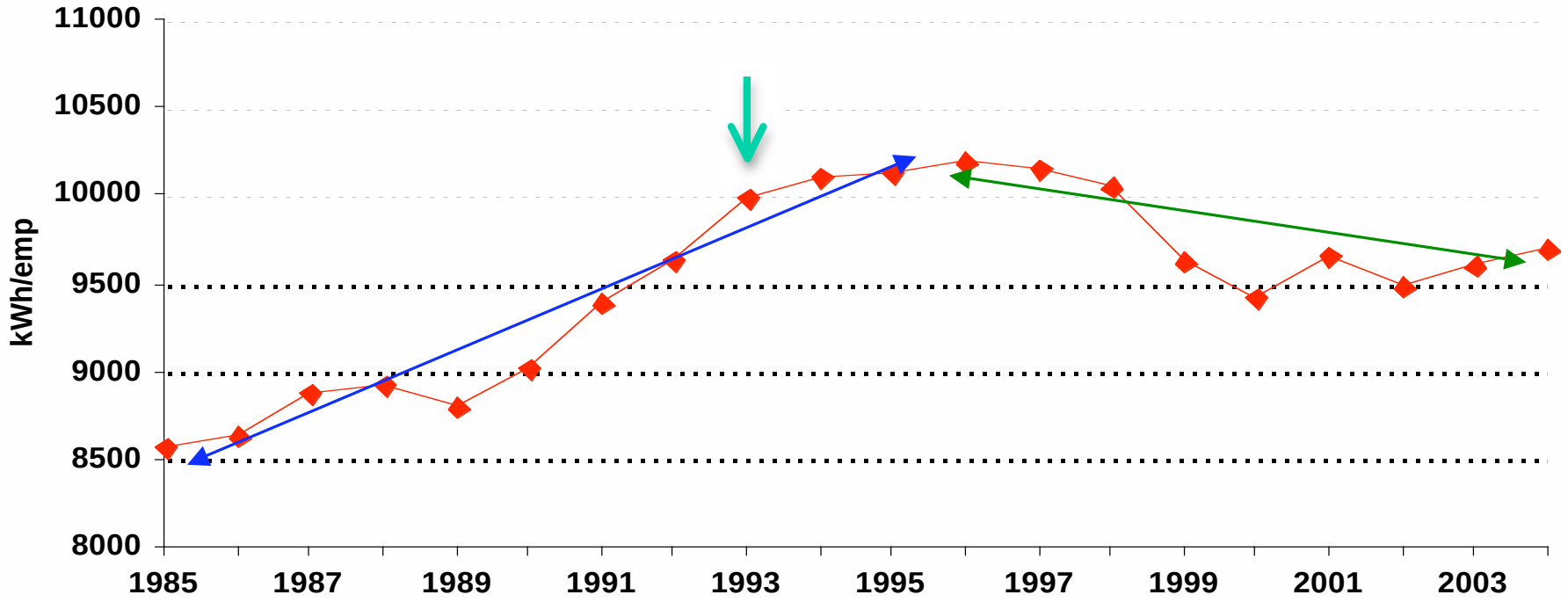
$$Ln(UC) = T \times t + A \times \ln(P) + K$$

  - ✓ T: trend
  - ✓ A: price elasticity (<0)
  - ✓ P: electricity price

- The price effect was generally not validated by statistics test as electricity prices did not change enough in the past

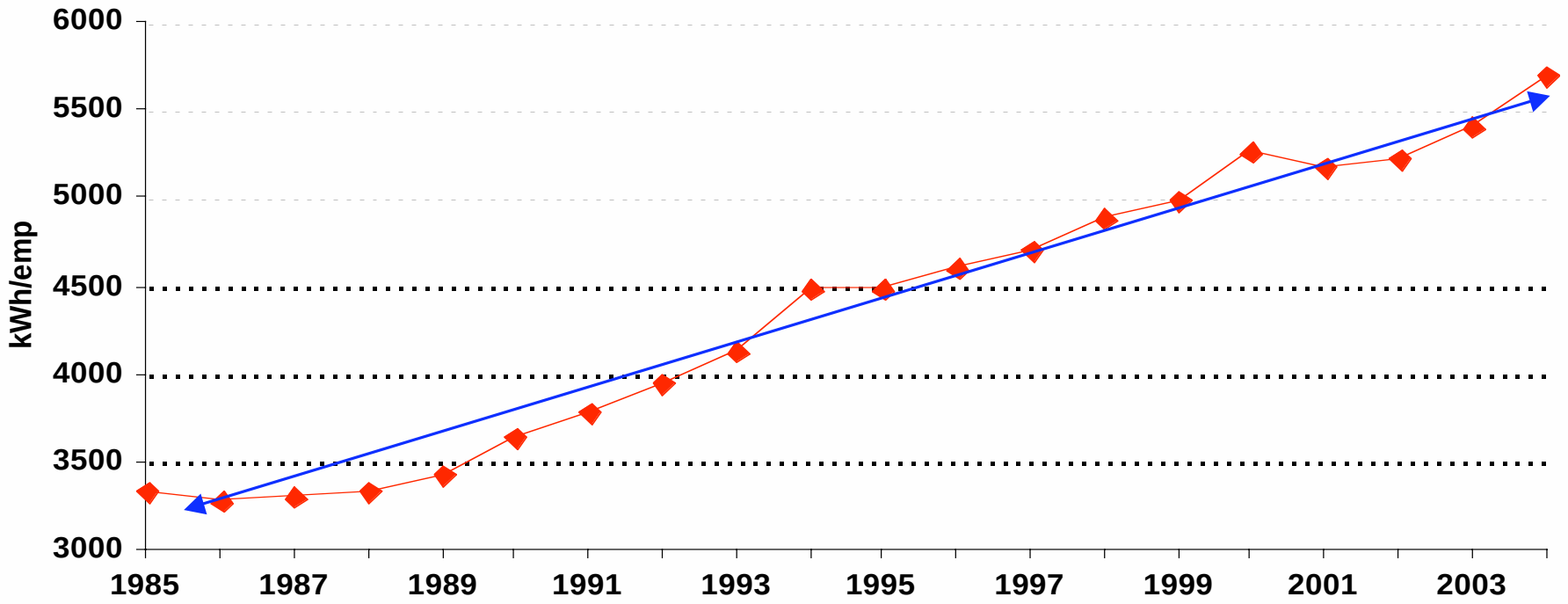
Countries with national measures and slower increase, stabilisation or decrease of the unit consumption after measures implementation : case of Sweden

- Implementation of voluntary agreements in 1993. Which trend to take? Before 1993? Or after 1993? Or somewhere in between (saturation of autonomous change?)?



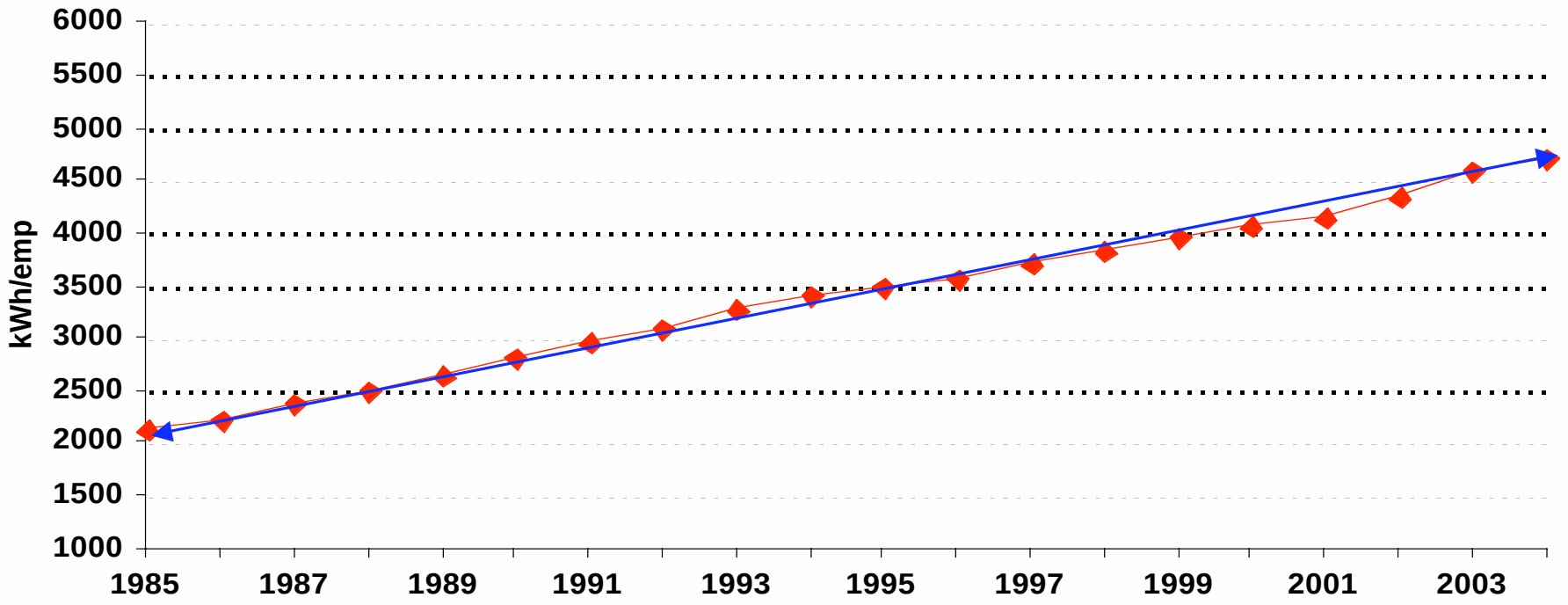
Countries with national measures and steady increase of the unit consumption despite measures implementation : case of Spain

➢Trend easy to measure. Impact of measures not visible, probably measures with low impact ➔ any deviation in the future compared to the trend can be linked to measure



Countries without national measures and steady increase of the unit consumption : case of Italy

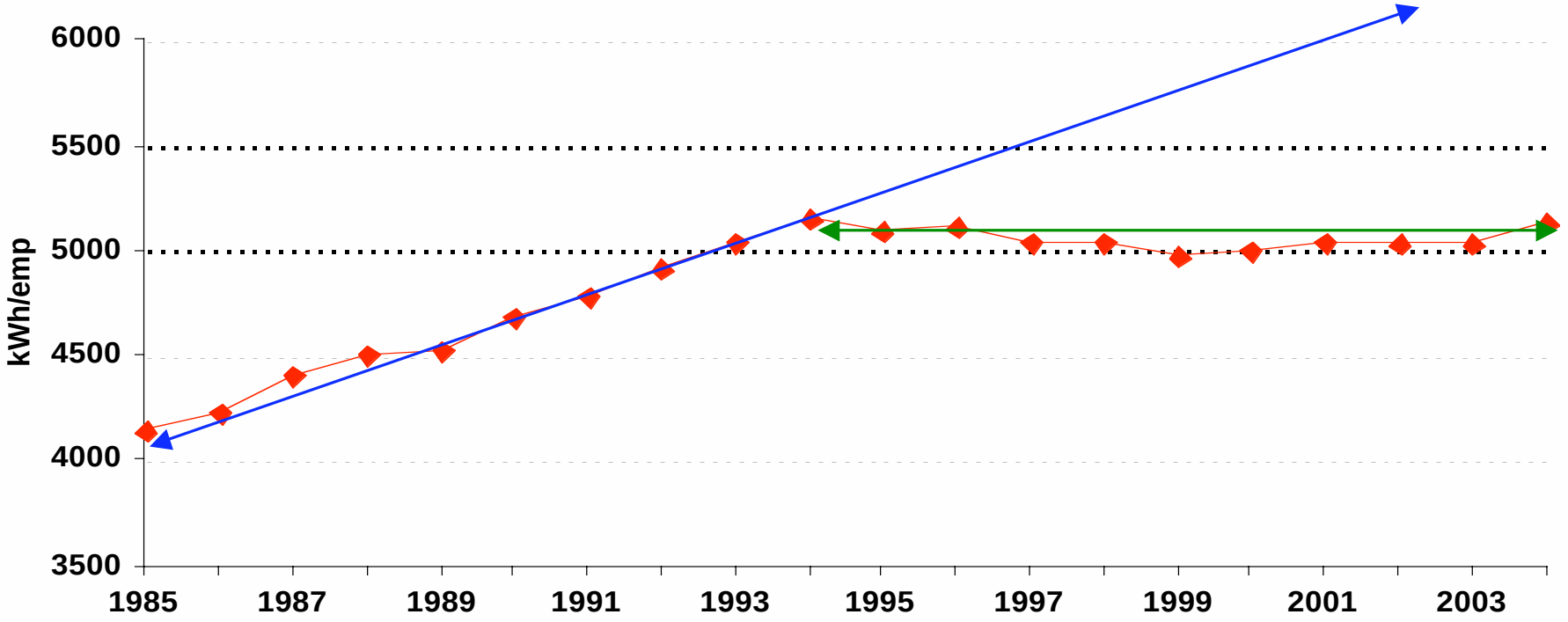
➢Trend easy to measure➔ any deviation compared to the trend in the future can be linked to measure



Countries with national measures and rupture in the trend of the unit consumption : case of Denmark

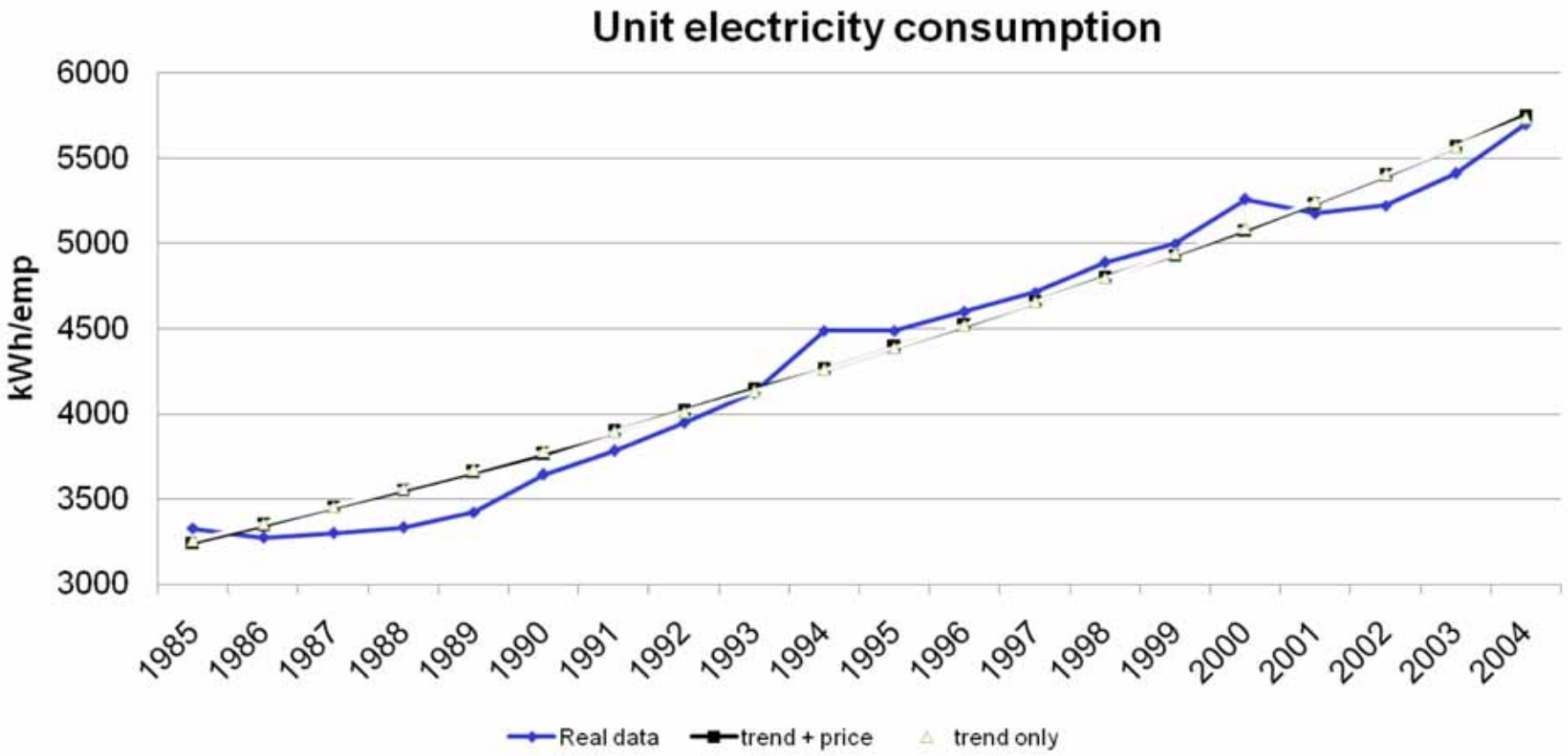
(DSM since 1995 and Elec. Saving Trust since 1996)

- Which trend considered to calculate energy savings? :
  - ✓ 1985-1994
  - ✓ Or 1994-2004?
  - ✓ Or somewhere in between? (saturation of autonomous change?)



Modelling of the baseline unit electricity consumption of services : case of Spain

- ln (UC) = 0.03 X t + 8.06 (regression over the 1995-2004 period)
- Prices not validated by econometric tests



Calculation of ESD savings

- **Aggregative approach**

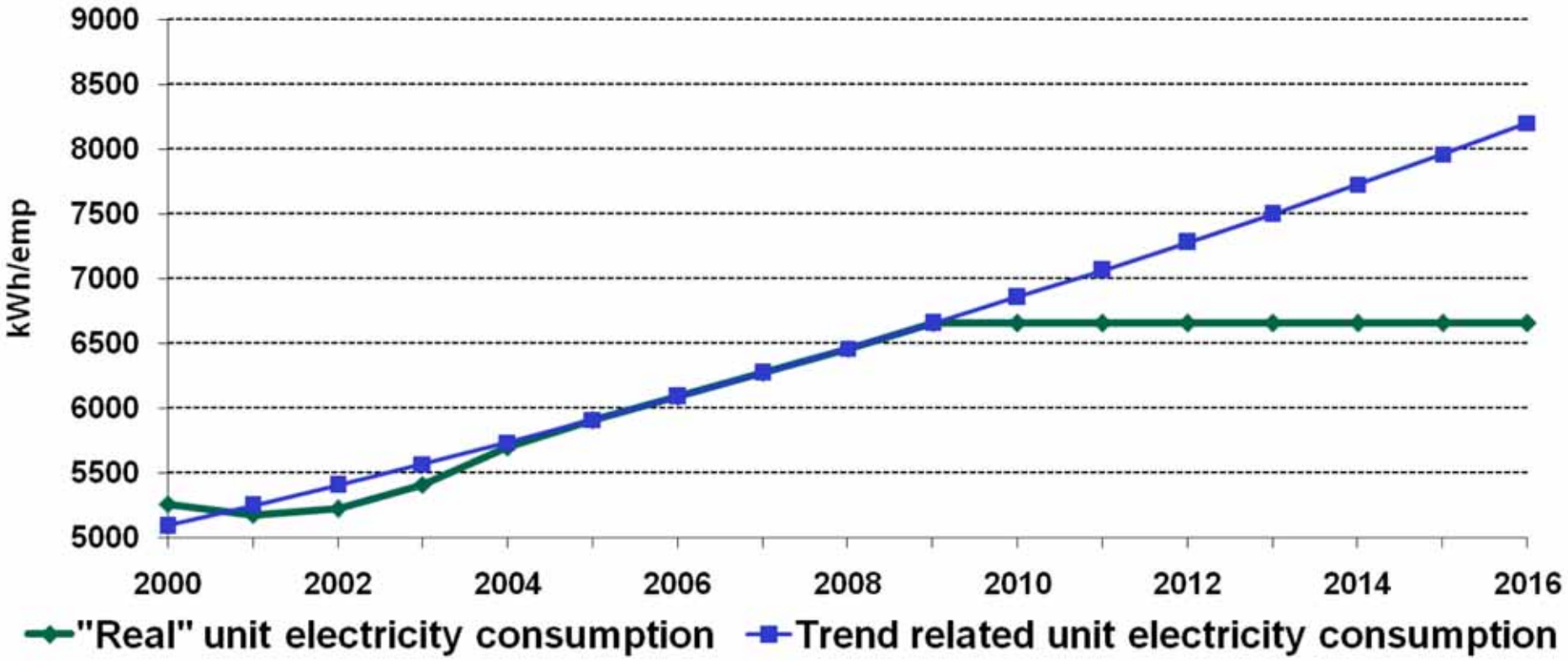
  - **Stage 1 :** Calculation of the trend-related electricity consumption per employee
  - **Stage 2** : Calculation of the trend-related total electricity consumption
  - **Stage 3 :** ESD energy savings calculated by difference between the actual total electricity consumption and the trend-related total electricity consumption

- **Detailed approach**

  - **Stage 1 :** Calculation of the trend-related electricity consumption per employee for each activity subsector
  - **Stage 2** : Calculation of the trend-related electricity consumption of each subsector
  - **Stage 3** : Calculation of the trend-related total electricity consumption by summing the subsectors
  - **Stage 4 :** ESD energy savings calculated by difference between the actual total electricity consumption and the trend-related total electricity consumption

Calculation of ESD savings
Aggregative approach (example)

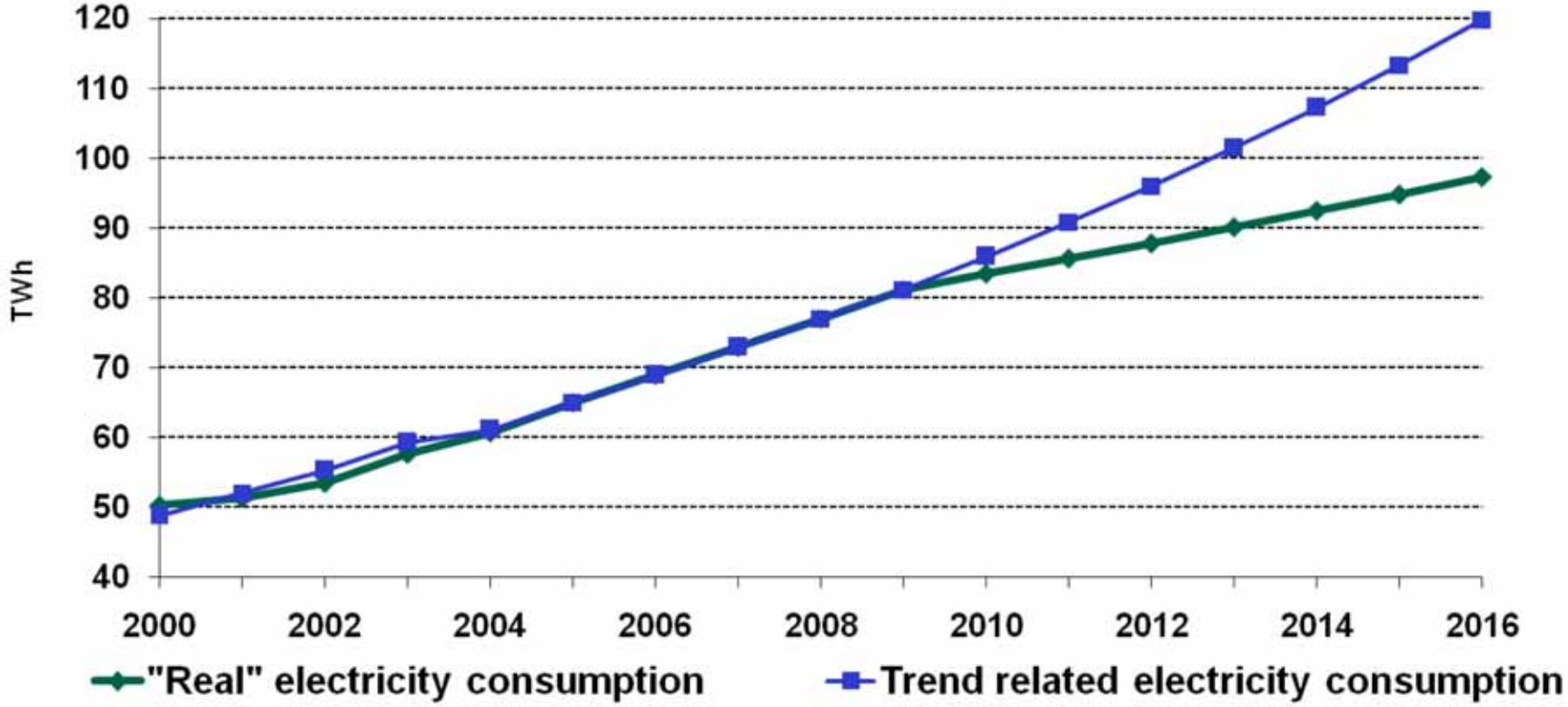
➢ **Stage 1 :** Calculation of the trend-related electricity consumption per employee



"Real" unit electricity consumption are obtained by assuming the implementation of a first policy in 2008 with first impact in 2010 (stabilisation of the unit consumption)

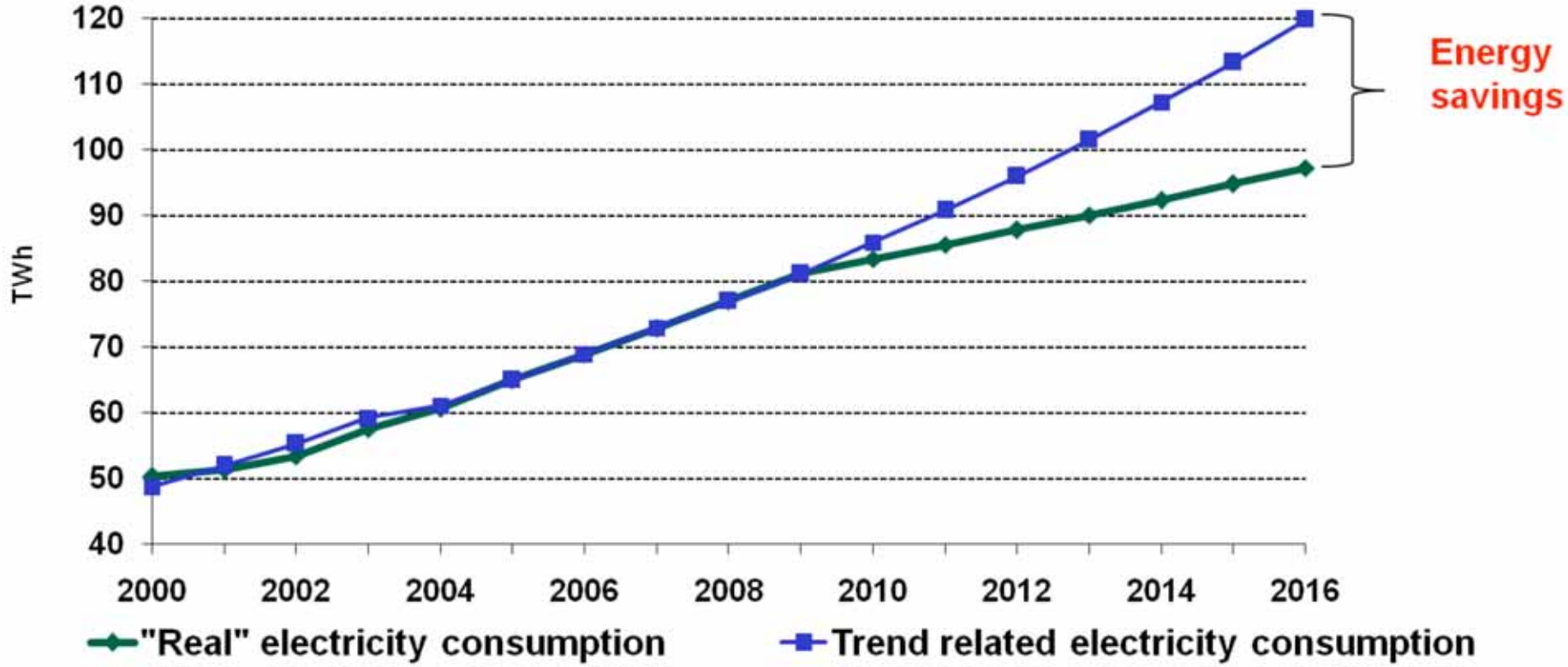
Calculation of ESD savings
Aggregative approach (example)

➢**Stage 2 :** Calculation of the trend-related total electricity consumption



Calculation of ESD savings
Aggregative approach (example)

➢**Stage 3 :** ESD energy savings calculated by difference between the actual (“real”) total electricity consumption and the trend-related total electricity consumption



Step 9 : Conclusions and issues for replication on electricity end uses in services

- The detailed approach is the best one, but can be implemented only for few countries

- Price effect generally difficult to measure, as electricity prices did not change enough in the past

- Selection of baseline trend to assess energy savings:
  - ✓Most recent trend?