European evaluation experience

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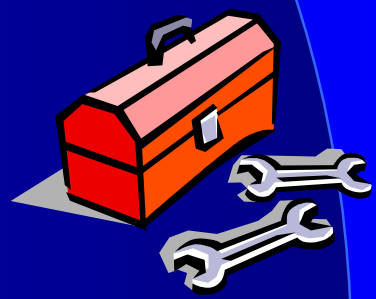
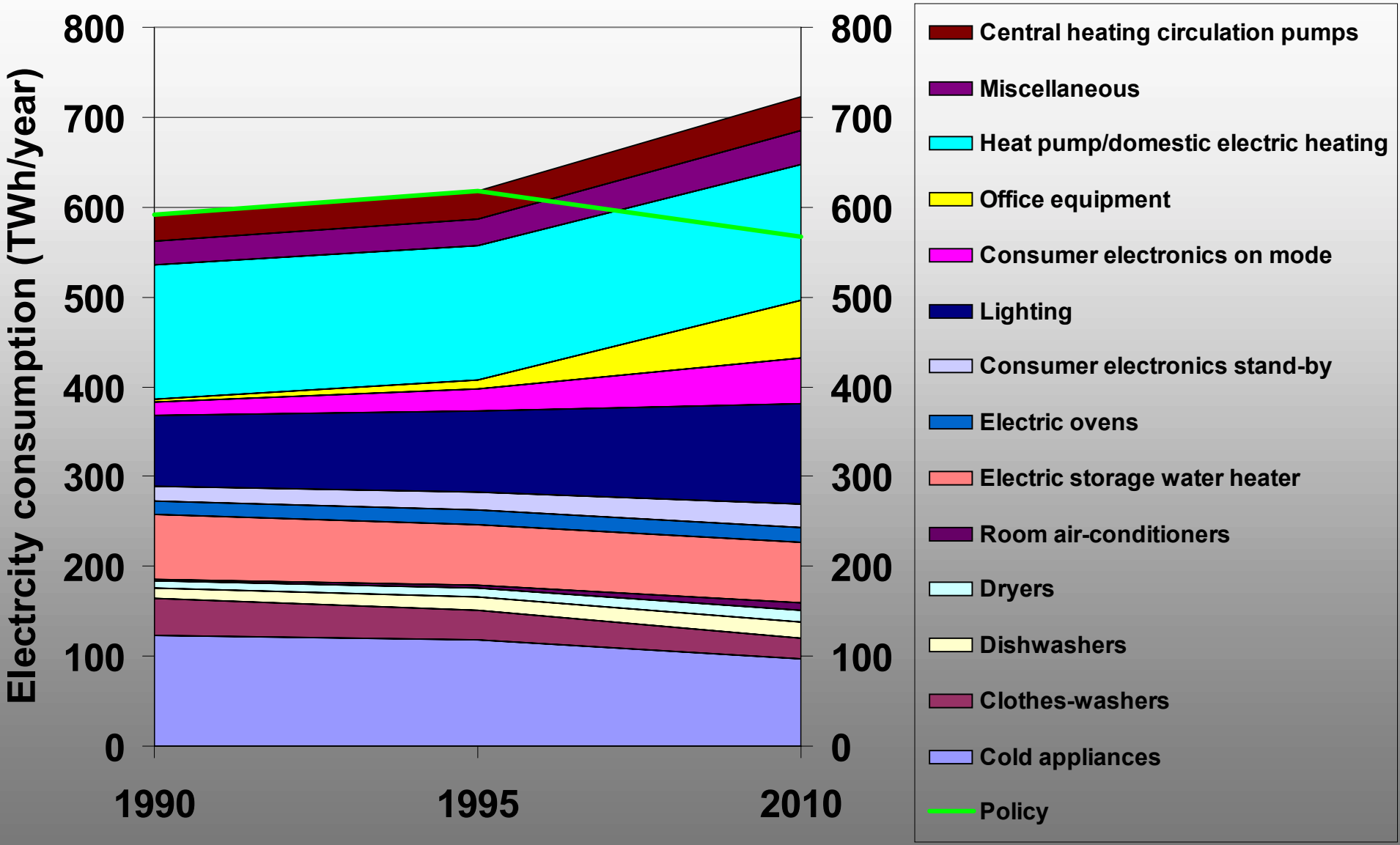
Standards and labels in the EU

Since the launch of the PACE (1989) and SAVE (1992) programmes the EU has introduced a variety of policy measures to accelerate appliance energy efficiency:

- mandatory comparative energy labelling
- mandatory minimum energy performance standards
- voluntary negotiated agreements
- co-operative technology procurement programmes
- endorsement energy labelling



EU demand forecasts & policy goals



Why evaluate?

- To provide firm evidence of programme scales, impacts and future potential - essential to unlock and maintain programme resources
- To establish what has been done and what further could be done
- To optimise programme design and implementation

EU programme evaluation activites

Programme evaluation has focused on the following:

- monitoring the market by gathering and analysing model sales, energy, efficiency, features and price data (leading indicators)
- conducting end-use metering and other actions to determine stock energy trends (lagging indicators) and to establish behavioural and environmental influences
- evaluating programme implementation (at the government, manufacturer, retailer and consumer level)
- verifying claimed performance

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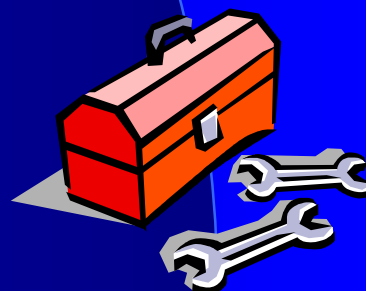


Monitoring market trends

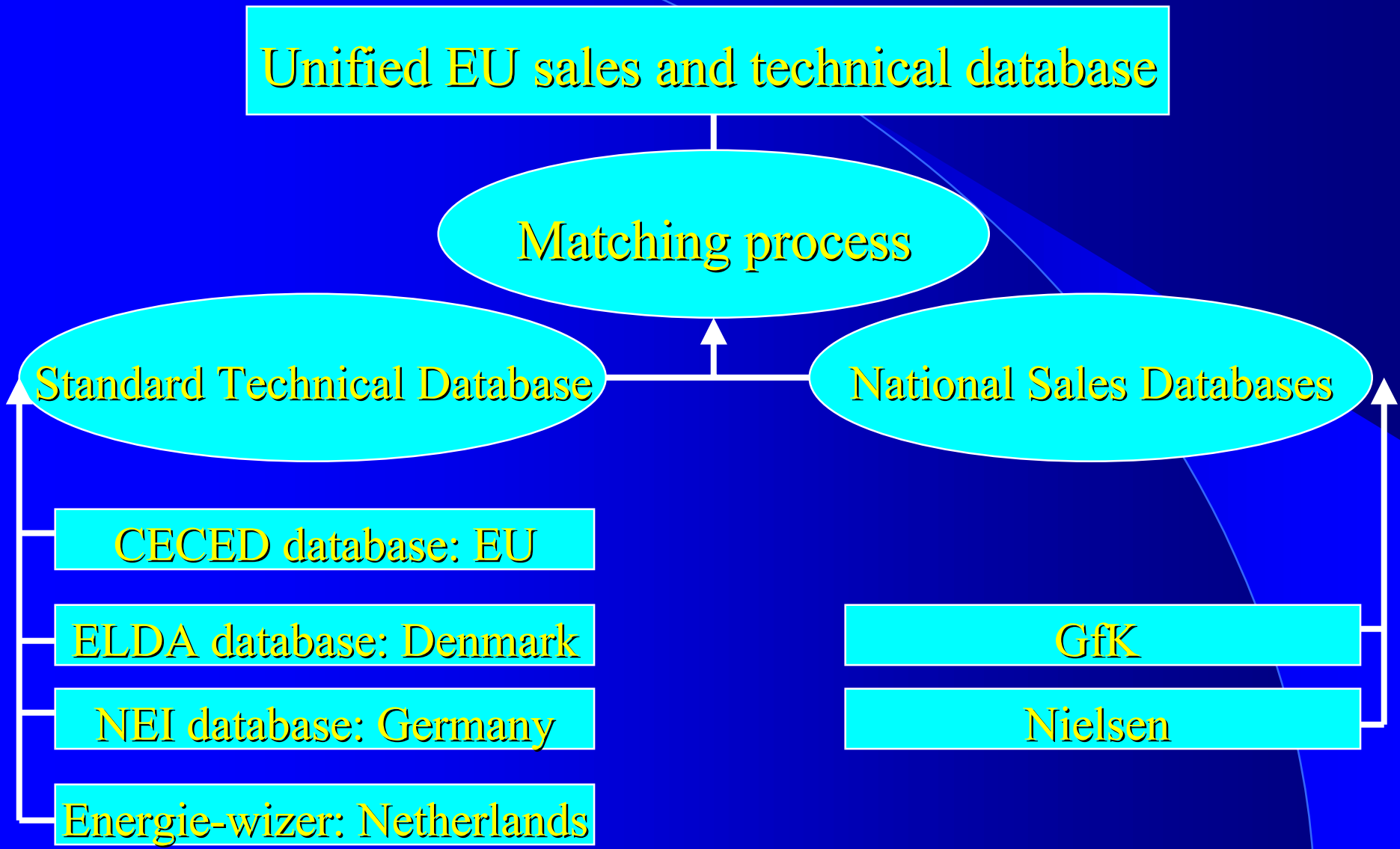
Market monitoring provides a quantitative assessment of energy efficiency and consumption trends for major household appliances. Thus far:

- sales-weighted appliance energy efficiency trends have been analysed through a series of studies
- detailed sales-weighted efficiency trends have been analysed for 1994 to 1998 at the EU level - data from 1999 to 2001 should be analysed presently
- data on the models available on the market has been gathered from manufacturers and provides a useful proxy for the sales-weighted trends before they have been determined

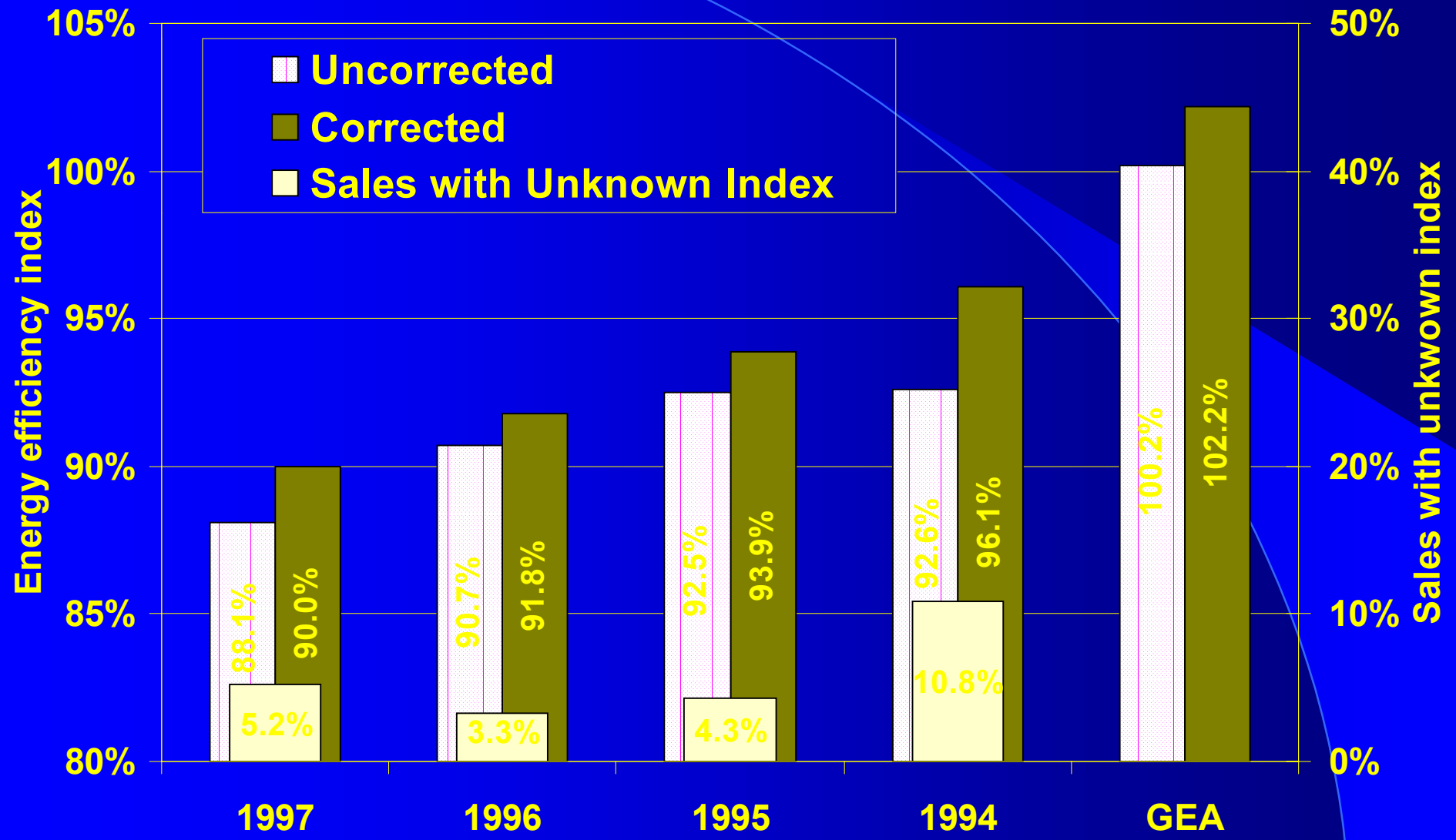
Product data accumulated

- Detailed sales-weighted data has been gathered for: refrigerators & freezers, clothes-washers, washer-dryers and household lamps
- Data for dishwashers and clothes-dryers may be added shortlty
- Non sales-weighted data has been gathered for: water heaters, room air conditioners, dishwashers, clothes-dryers, ovens, TVs, VCRs, audio equipment, office equipment and circulation pumps - full time series data is not always available for these

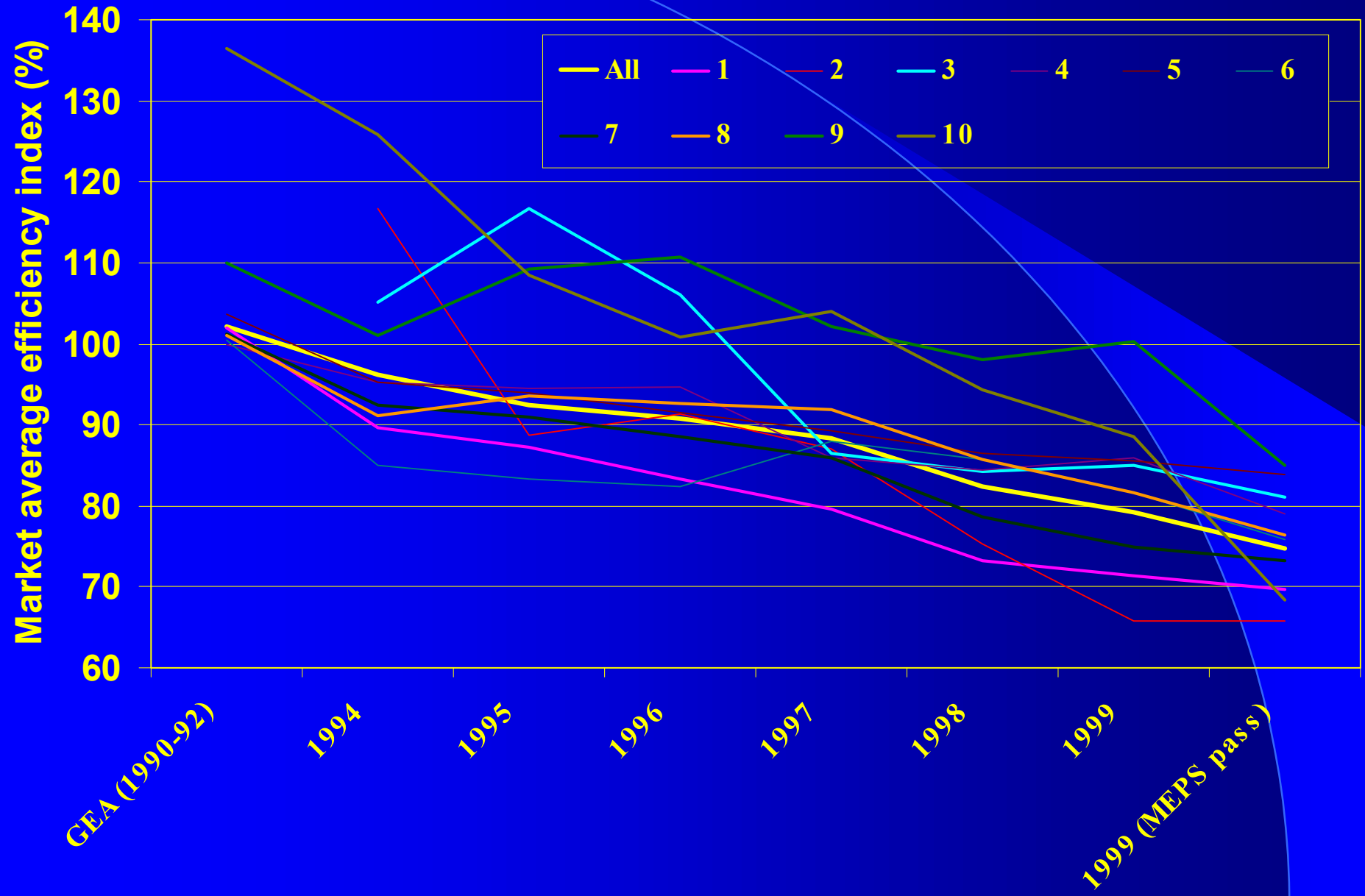
Data sources and compilation



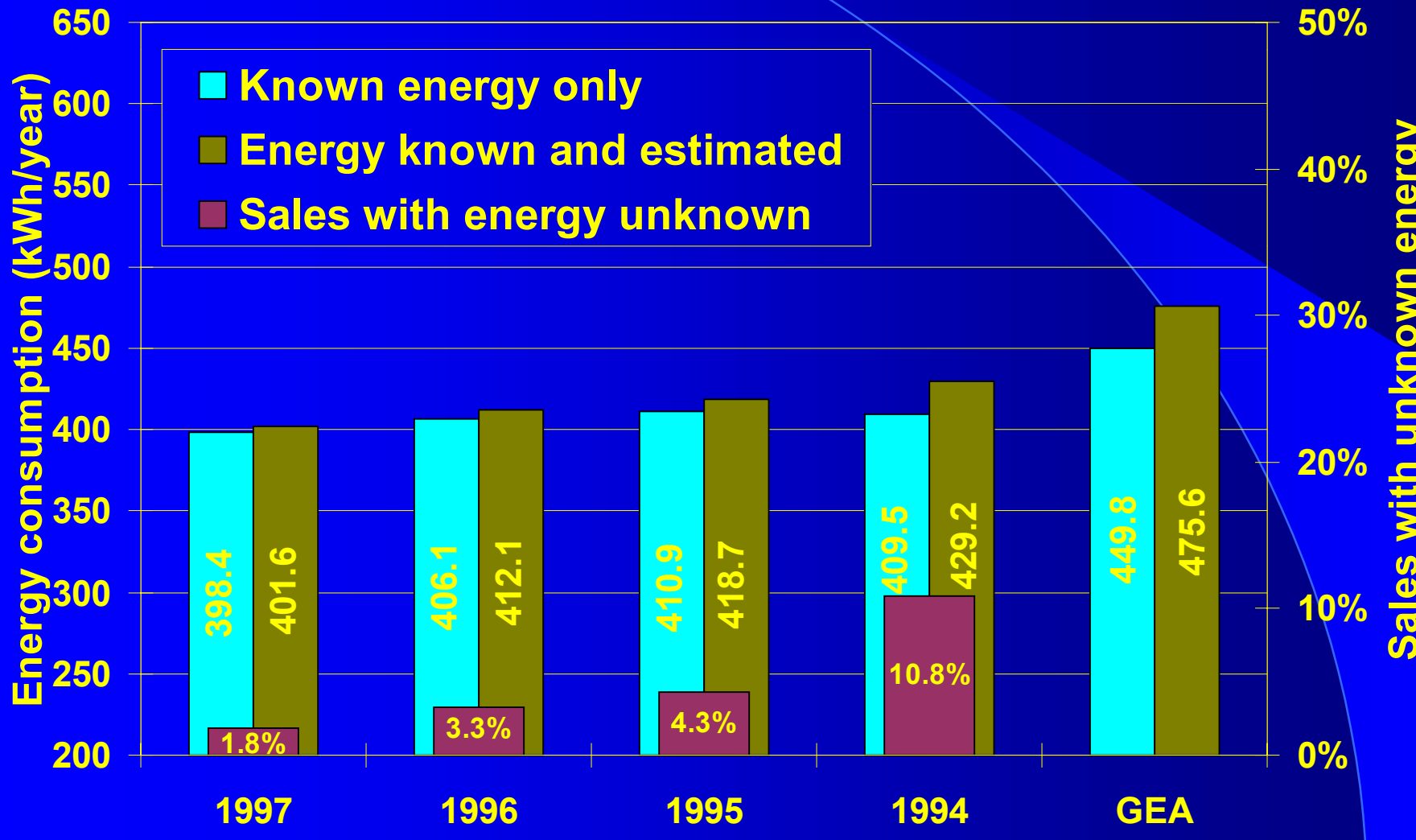
Cold appliance energy efficiency trends



Cold appliance energy efficiency trends



Cold appliance energy consumption trends



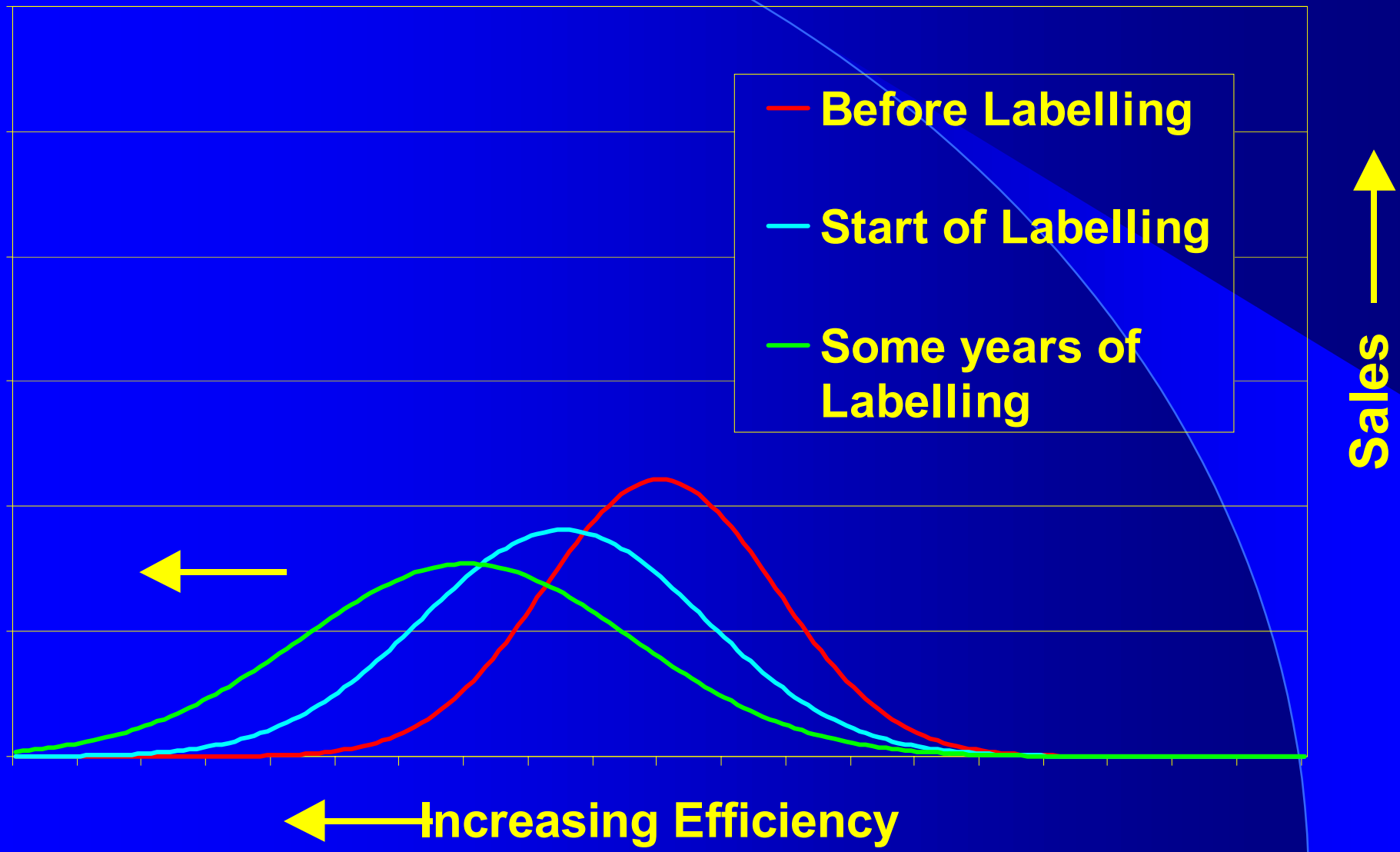
Signature analysis: evaluation of market transformation theory

The market data evaluations have not only enabled energy consumption and efficiency trends to be determined but have also helped market transformation theory to be refined.

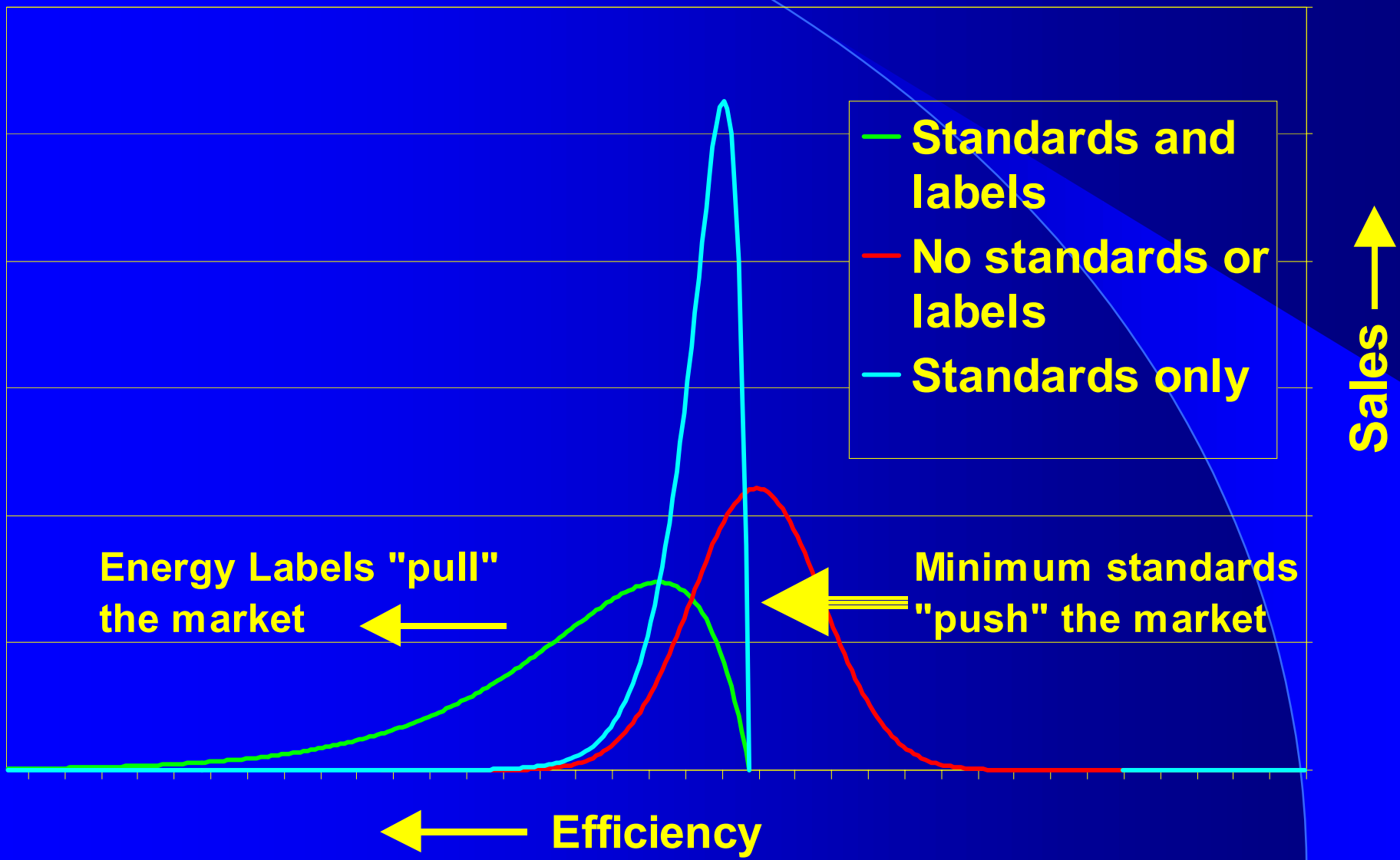
In particular:

- clear proof of the impact of categorical mandatory energy labels has been demonstrated
- the impact of minimum energy efficiency thresholds has been shown

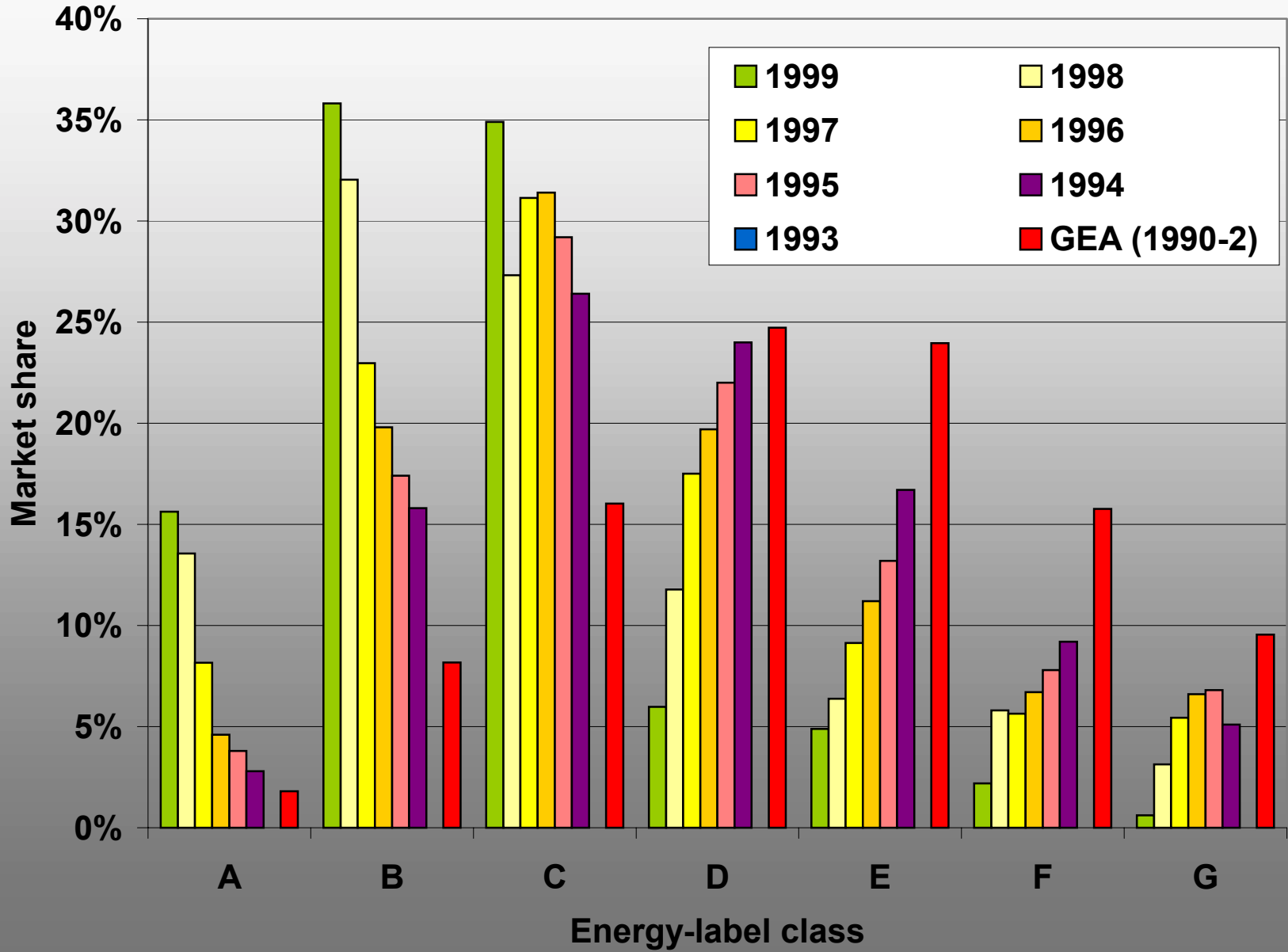
Energy labelling: in theory encourages higher appliance efficiency



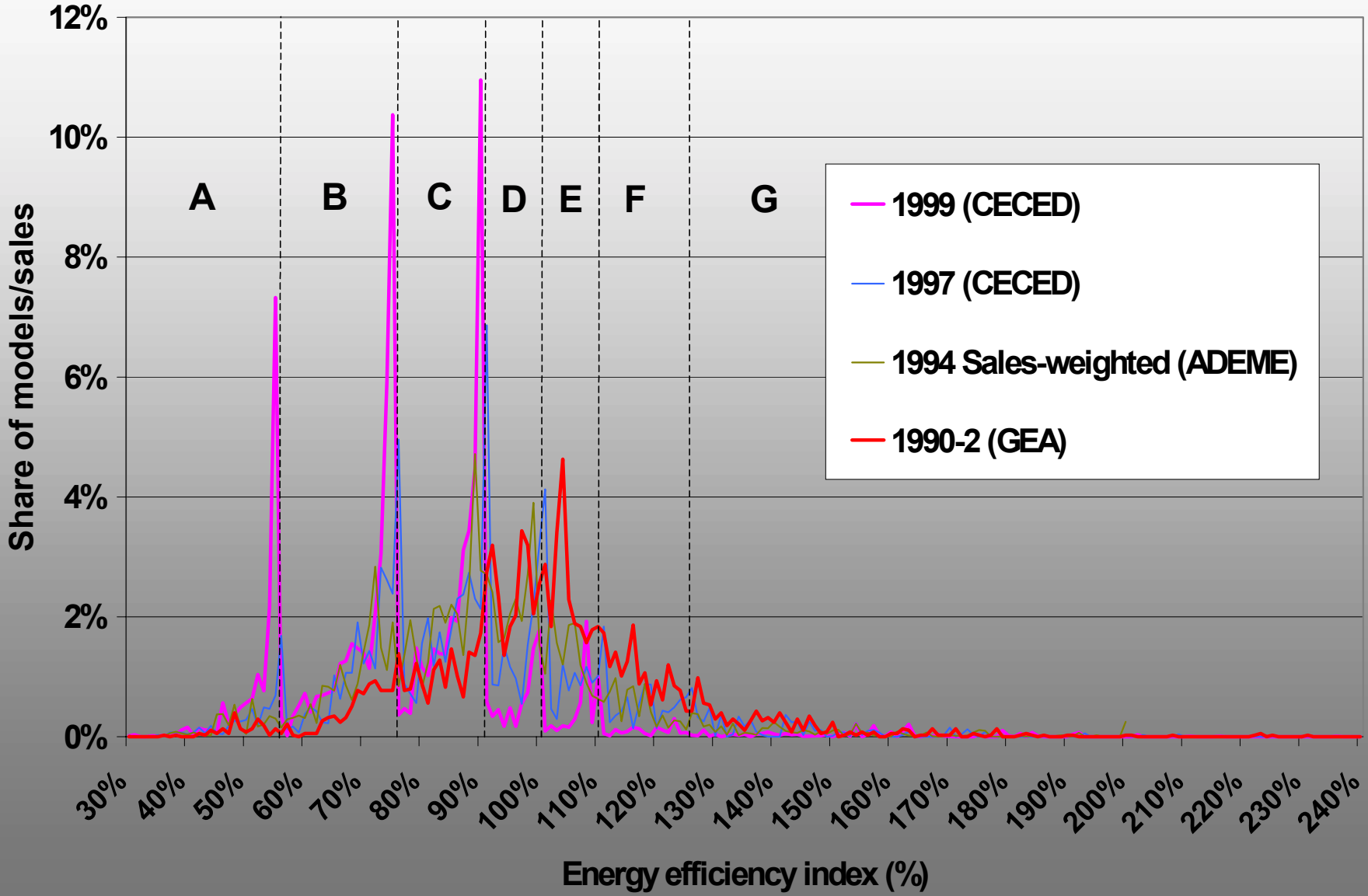
Market transformation theory: a mix of policies to raise appliance efficiency



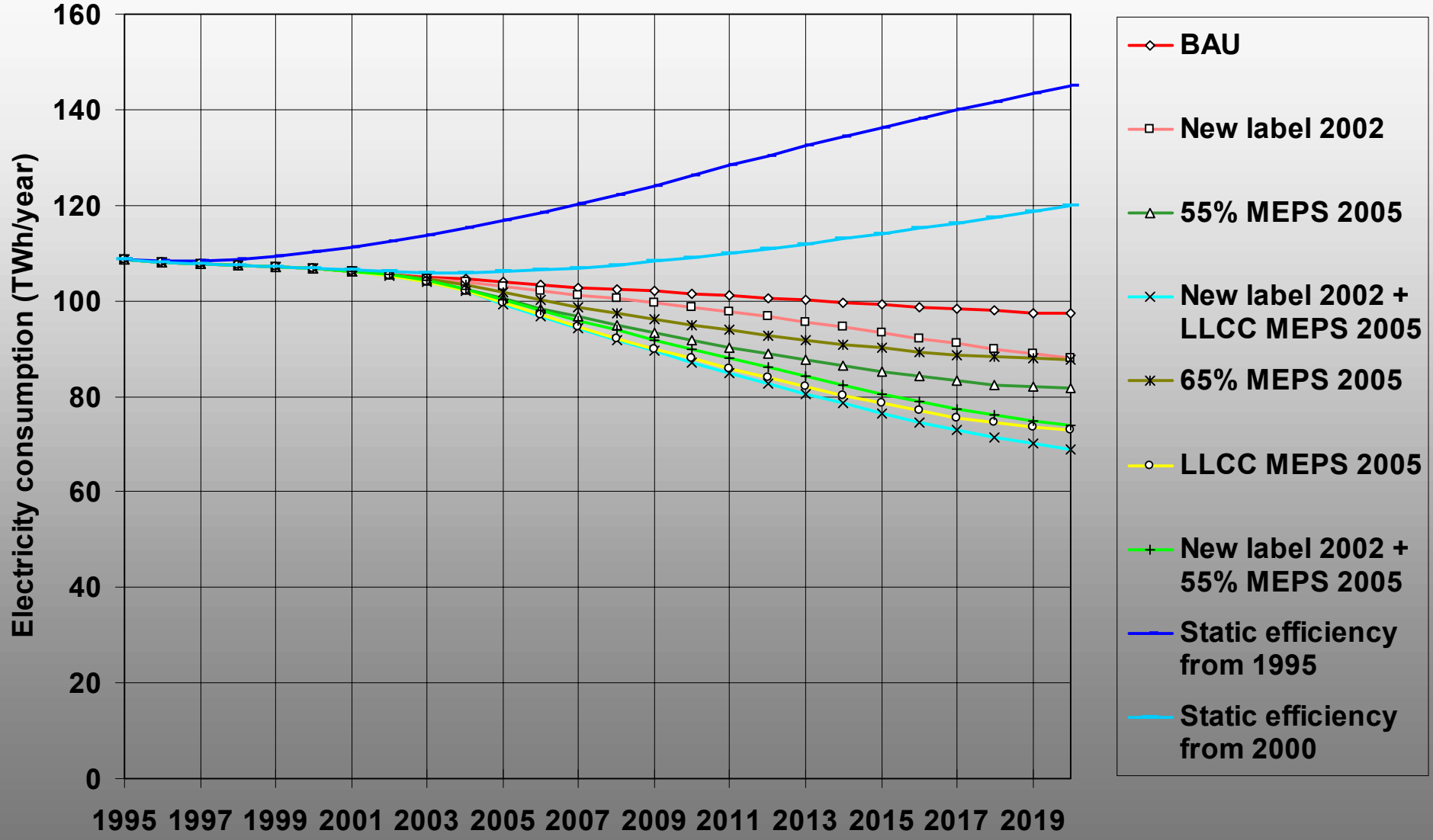
Principal findings: refrigerators



Principal findings: Impacts of EU policies

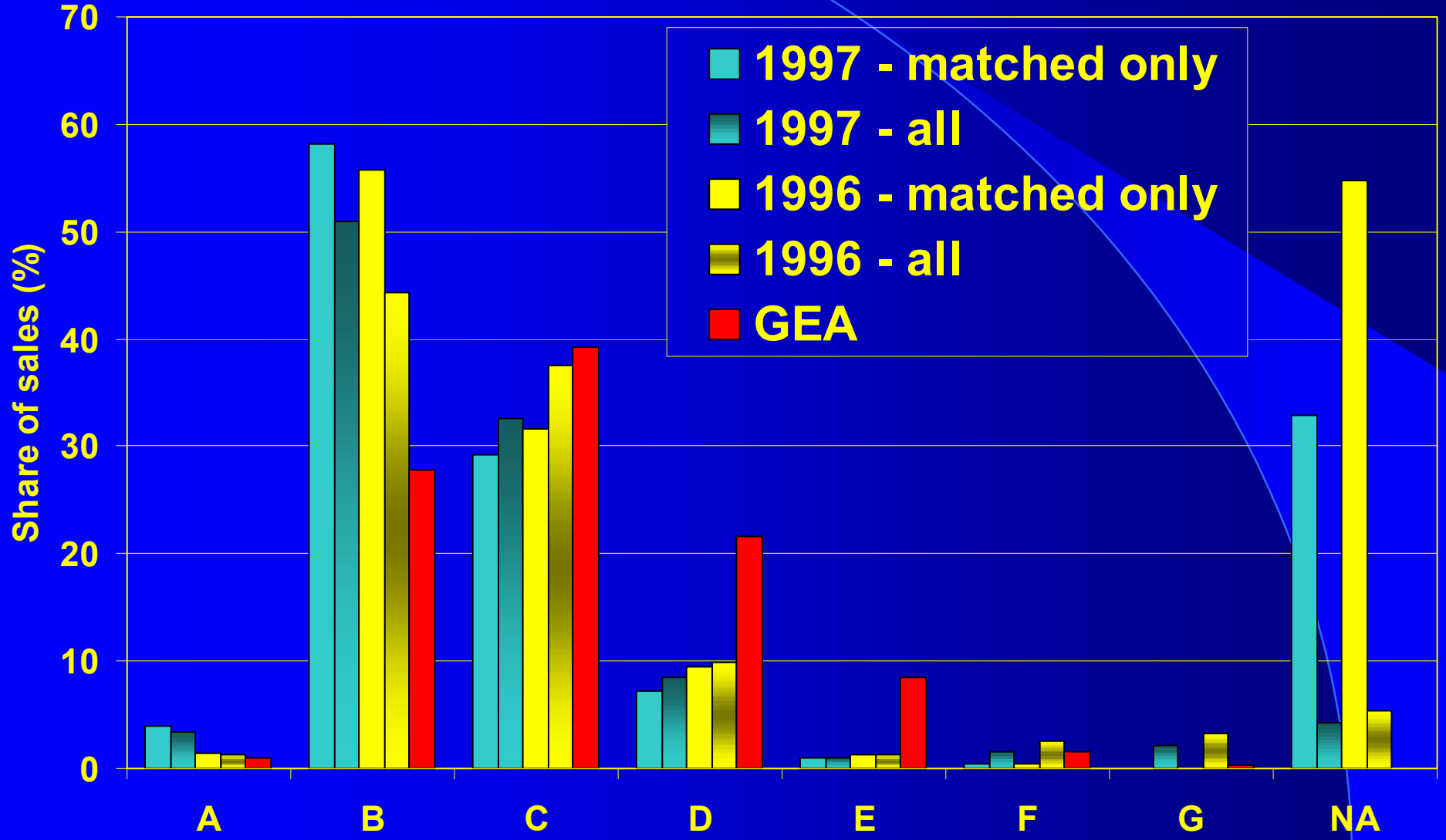


Projected policy impacts: refrigerators



Projected policy impacts (55% MEPS +new label)

Clothes-washer energy efficiency trends: policy compliance monitoring



Evaluations using end-use metering

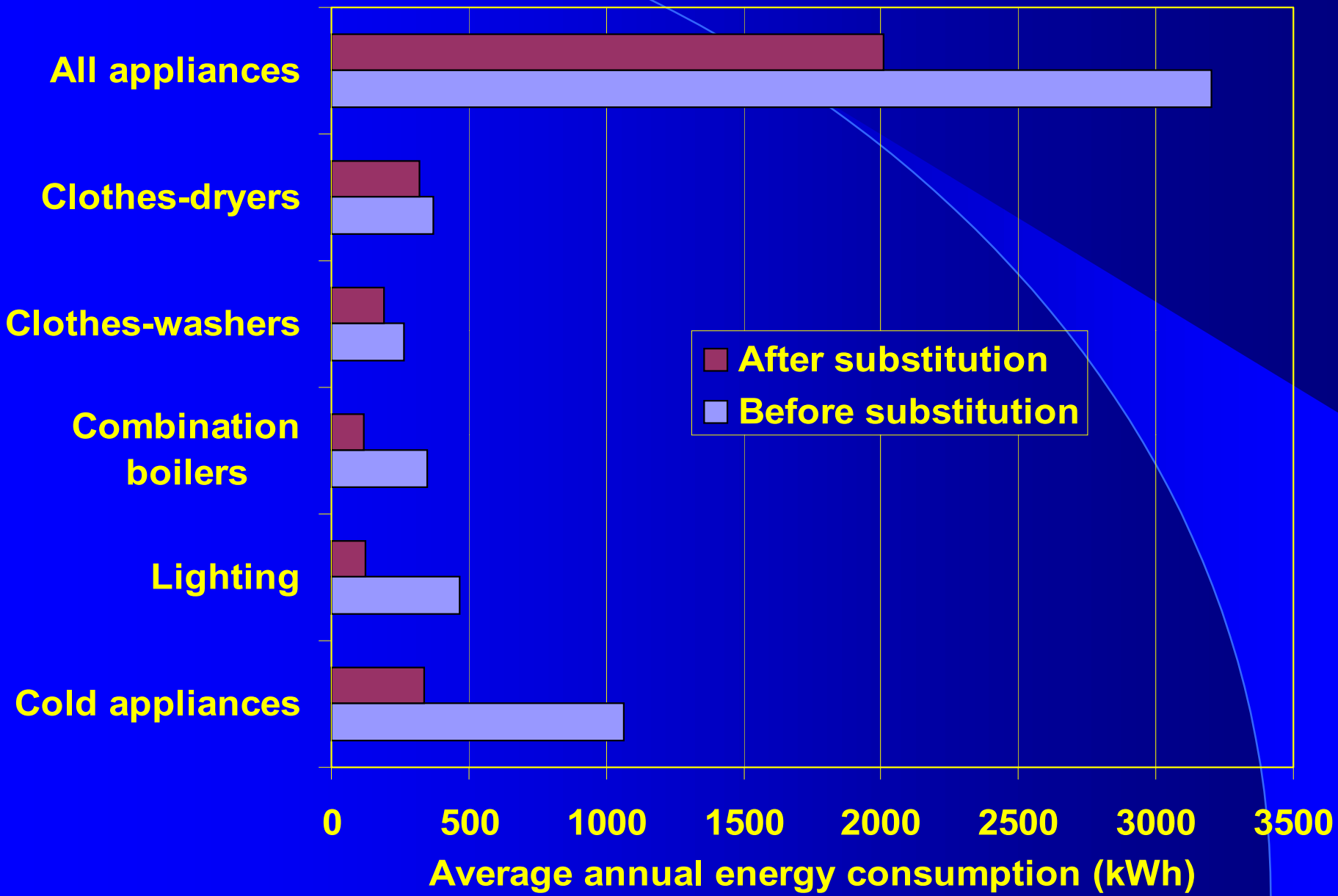
End-use metering complements the market data evaluations

- It helps to establish behavioural and environmental characteristics that are needed to derive estimates of *in situ* end-use energy consumption from consumption measured under standard test conditions
- It enables estimates of the importance of each end-use to be derived
- It can verify whether efficiency gains under standard test conditions translate into gains *in situ*

End-use metering in the EU

- Extensive end-use metering studies have been conducted in the majority of EU countries
- Non-instrusive metering equipment has been used to minimise self-concious behavioural changes
- The results have highlighted some significant behavioural and cultural differences between European regions that have a strong influence on the use and energy consumption of appliances such as: ovens, clothes-washers, clothes-dryers and boilers
- Environmental factors have a significant impact on regional average energy use for some appliances such as: air conditioners, refrigerators and lighting

What savings have been measured?



Implications of measured savings for France

Recorded savings by end-use in 20 French households

Appliances	Average savings per household (kWh/year)	Implied national savings for France (TWh/year)
Cold appliances	725	12.00
Lighting	340	7.72
Boilers (standby savings)	215	1.15
VCRs (standby)	118	1.75
Satelite TV decoders	96	0.48
Satelite dish controllers	95	0.95
Clothes-washers	70	1.42
Clothes-dryers	56	0.22
TV (standby)	0-145 (average 21)	0.67
Total	1715-1860	26.36

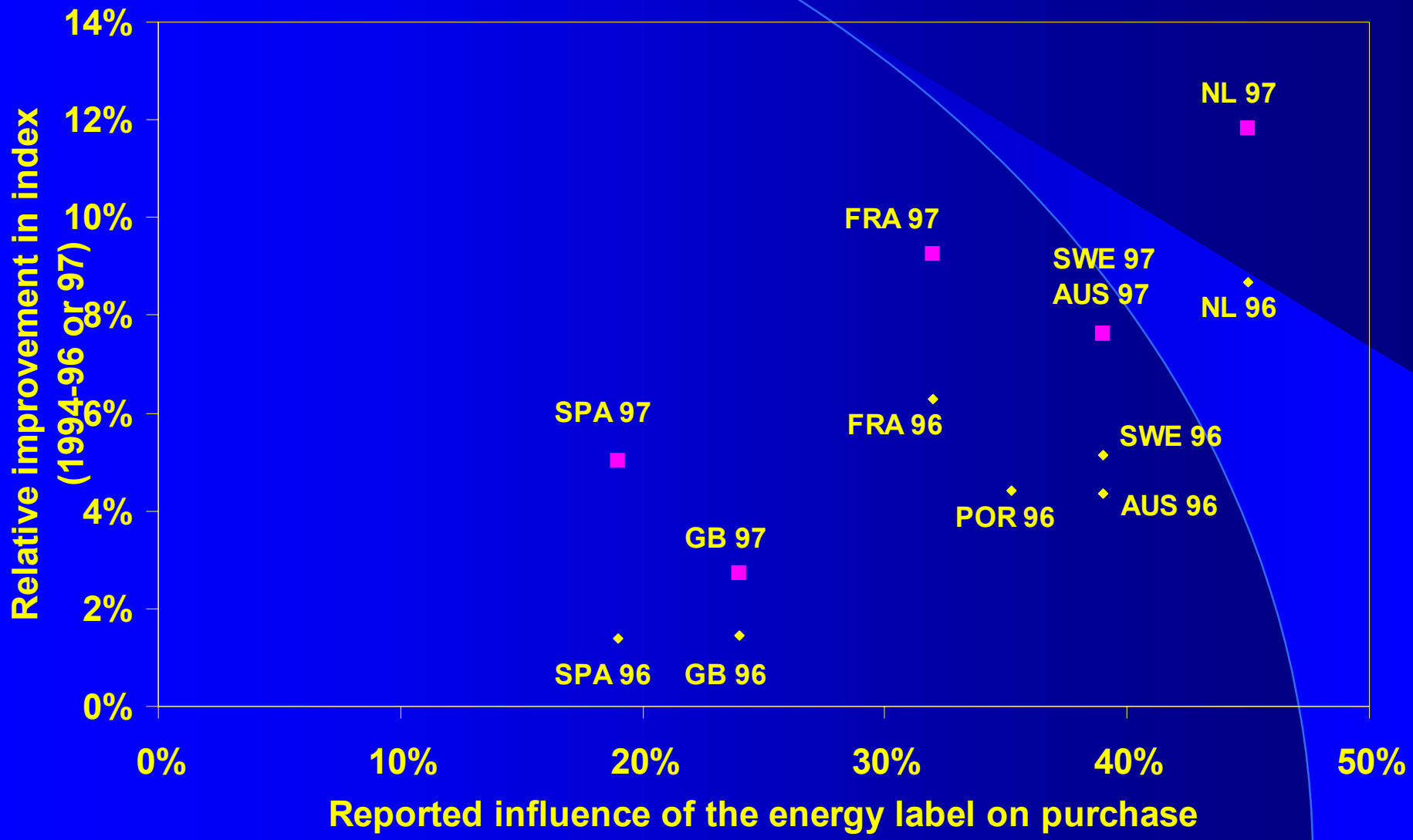
Conclusion: 50% reduction in electricty-specific residential electricity consumption have been measured from the use of more efficient appliances

Process evaluations

In 1997 an EU-wide evaluation was conducted of the implementation of the refrigerator energy label which found:

- *Significant delays in some Member States implementing the EU regulations into national law*
- *Only 56% of refrigerators were properly labelled*
- *Manufacturers were universally supplying energy label fiches with their products*
- *Some serious concerns over the accuracy of declared performance but no worse than previously*
- *A strong link between the level of correctly labelled products and the reported influence of the label on consumer purchases*

Efficiency improvement is linked to labelling compliance and attitudes



Energy labelling and standards are moving the market in the EU

- EU consumers spend ~14.5 billion Euro on electricity for cold appliances each year and 7.8 billion Euro to purchase new ones
- The average efficiency of the cold-appliance market had improved by ~27% since the introduction of labels and MEPS (from 1990-92 to September 1999)
- Once this efficiency gain has fully worked into the stock it will reduce electricity bills by ~4 billion Euro and avoid ~15.5 Megatons of CO_2 emissions each year
- The clothes-washer market in 1997 was on course to satisfy the voluntary agreement targets for 1998