

EU Experience of Energy Company Obligations to Stimulate Energy Efficiency Investments

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Regulatory Assistance Project (RAP)

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- ▶ Non-profit organization providing technical and policy assistance to government officials on energy and environmental issues
- ▶ Principals are all former regulators or energy officials with deep experience in energy efficiency and other clean energy alternatives
- ▶ Funded by several foundations, US DOE & EPA and international agencies.
- ▶ We have advised governments in over 18 nations and 40 US states
- ▶ European office in Brussels. Currently working closely on the proposed EU Energy Efficiency Directive and related energy efficiency policies.

Contents

- ▶ Clarifying terms on Energy Company Obligations (ECOs) (also known as Energy Efficiency Obligations and White Certificates (WCs))
- ▶ Summary of key principles & regulatory involvement
- ▶ Snapshot of 2008 situation in EU with results where available & recent developments with ECOs in 2011
- ▶ Importance of ECOs in Member State (MS) National Energy Efficiency Action Plans (NEEAPs) for those countries with ECOs
- ▶ Superiority of ECOs over increases in energy prices in delivering energy and CO2 reductions
- ▶ Do ECOs work?

Why Do We Need ECOs?

- Energy Efficiency (EE) does not happen to the extent that “the rational economist” would predict due to market barriers
- ECOs only exist because the Government has intervened in the energy market to require the energy company to stimulate energy savings in eligible customers’ premises and/or homes
- In this sense, they are the same as other environmental interventions into energy markets such as EU ETS Certificates or Green Certificates (Renewables)
- All such ECOs in EU operate the same principle – the obligation requires the energy company to prove that their activities have resulted in energy efficiency improvements by eligible end use customers - for this they are awarded a WC accrediting the extent of the energy savings achieved

How Do ECOs work - 1?

- ▶ Energy retailer/distributor has obligation to save energy in customers' premises/homes; target related to “volume” of energy supplied/distributed/residential customer numbers + financial penalties if company fails to meet its target
- ▶ Projects with large energy users can “afford” to have energy saving measures monitored for actual savings achieved
- ▶ For small energy users – need simple approach to keep M&V costs down – use “approved” measures for which there are well established energy saving values (known as deemed or ex ante savings)
- ▶ Monitoring and verification then is a “measure count” + random “dip check” of the submitted claims for energy savings

How Do ECOs Work - 2?

- ▶ To ensure social equity, some European Member States (MSs) (e.g. Flanders, France and UK) define a priority group of customers (low income) who receive priority or even have a fraction of the energy savings target restricted to them

What Costs are Involved & Who Pays?

- ▶ Cost of energy efficiency measures met by energy companies (subsidies), with contributions from customers, landlords (especially social), local authorities, charities, manufacturers etc.
- ▶ Cost of energy company marketing, sales, reporting, planning etc. (in UK estimate cost as ~18% of energy retailer direct costs on EE measures)
- ▶ Reporting & monitoring of energy saving projects and if energy company target met (in UK done by Ofgem (Energy Regulator) and <0.1% of energy supplier costs in 2010)
- ▶ Government resource cost to set target every few years and R&D e.g. reduction of savings due to comfort (UK Government cost < Ofgem cost)

How are these Costs Passed Through?

- ▶ If obligation is on an energy retailer in a liberalised market, then cost of ECOs is “a cost of business” like other environmental requirements and passed onto end customers
- ▶ If obligation is on regulated part of energy company (e.g. distributor or if the retail price is still regulated), then costs are in the regulated tariff charged to end customers
- ▶ In effect, the “polluter pays” principle applies

Potential roles of the regulator

- ▶ Can set the energy saving target – but better if Government does this as there are political balances to be achieved between the economic, environment and social implications of ECOs
- ▶ In Italy and UK, regulator is administrator of the ECO; tasks include apportioning the overall target to individual companies, approving project outlines before start; verifying projects were implemented and done well so as to justify energy saving values, record progress towards company's target (or sub target), setting out the administrative requirements and technical procedures etc. (use experts)
- ▶ Provide periodic reports to Government; fine companies who fail to meet their targets (never happened)

How are they delivered?

- ▶ Mainly done by bilateral contracts between obligated company and an energy efficiency market actor e.g. insulation company, retailer of appliances, manufacturers, heating installers etc
- ▶ In Italian & French WC schemes, accredited parties not just the obliged energy companies can earn WCs in their own right and that these, in principle, can be subsequently traded
- ▶ In Italy, some development of ESCOs but most Italian WCs earned by non obligated parties are by companies involved in the installation of energy efficiency measures
- ▶ Many ECOs require a check on the quality of a sample of energy efficiency installations to ensure “EE is a good experience” and this has improved the installation quality

ECOs in the EU (2008)

Country	Obligated Company	Eligible Customers	Target set by	Administrator
Belgium - Flanders	electricity distributors	residential and non energy intensive industry and service	Flemish Government	Flemish Government
France	retailers of non-transport energy	All (including transport) except EU ETS	Government	Government
Italy	electricity & gas distributors	All including transport	Government	Regulator (AEEG)
GB	electricity & gas retailers	Residential only	Government	Regulator (Ofgem)
Denmark	electricity, gas & heat distributors	All except transport or covered by EU ETS	Government	Danish Energy Authority

ECOs in the EU (2008)

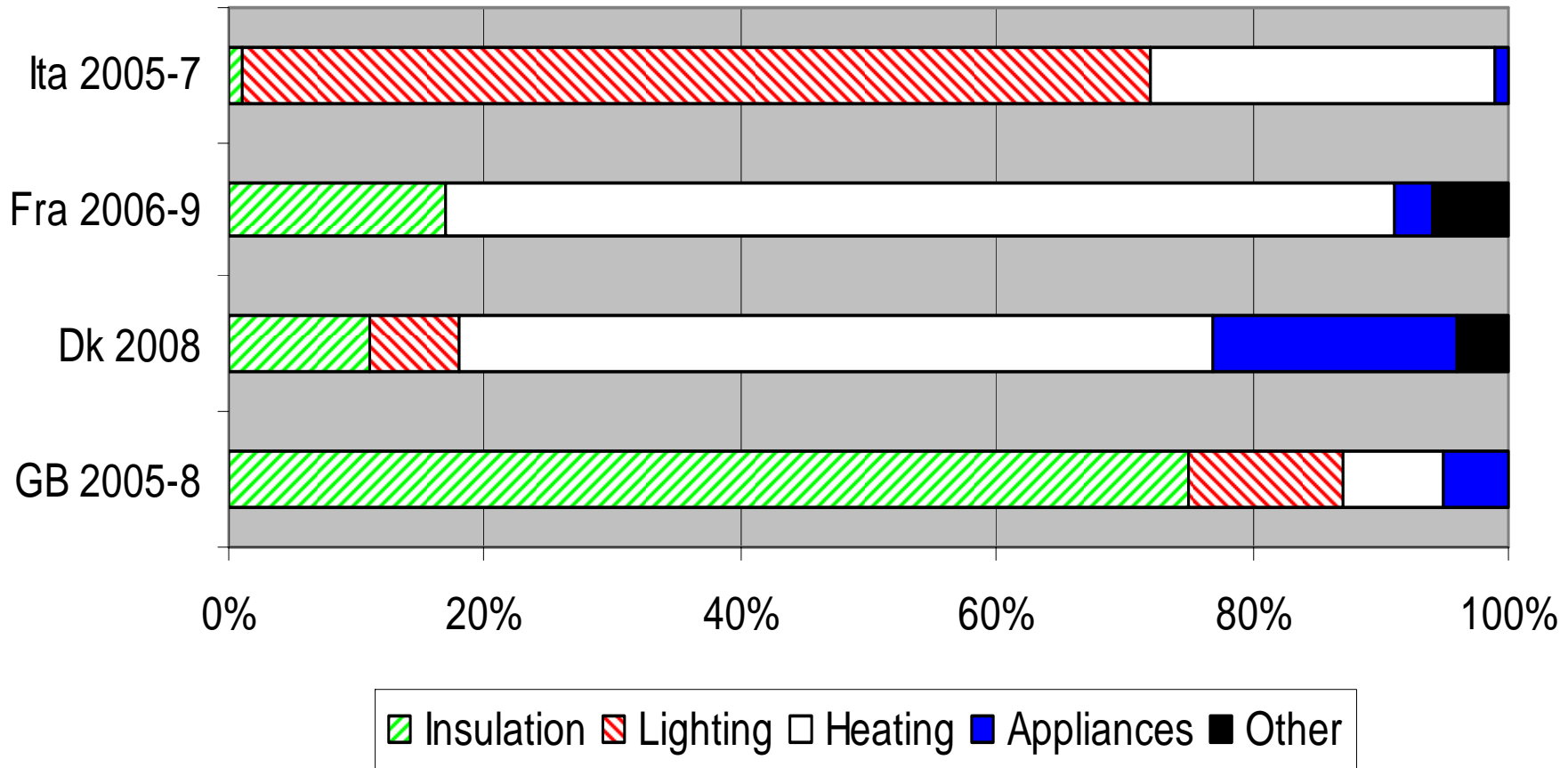
Country	Nature of saving target	Size of target in 2008	Estimated annual spend by companies €M {€/person}
Belgium – Flanders	1 st year primary energy	0.6 TWh annual	26 {4}
France	lifetime delivered energy	54 TWh over 3 years	180 {3}
Italy	cumulative 5 year primary energy	2.2 Mtoe in 2008	190 {3}
GB	lifetime CO2	154 MtCO2 in 3 years to 2011	900 {15}
Denmark	1st year delivered energy	0.82 TWh annual	25 {5}

Most ECO Activity is in Residential Sector

Country	Period	% energy savings from residential sector
Belgium - Flanders	2008	58% (mandated)
Denmark	2008	42%
France	2006-9	87%
Italy	2005-8	83%
GB	2005-8	100% (mandated)

EU ECOs – Where do the savings come from?

Residential Energy Savings by End-use



Why such big differences?

UK has a relatively old and poorly insulated housing stock whose construction (cavity walls) allows relatively cheap wall insulation

Italian ECO took a long time to complete the legal processes and so by the time it started, the prices of CFLs had fallen dramatically and so Italian companies were able to achieve energy savings from CFLs at ~1/3rd of the original cost estimate

Denmark has extensive district heating schemes in place

France awarded energy saving to boilers enhanced by being based on the housing stock average boiler efficiency rather than the (higher) average efficiency of modern replacement boilers; this coupled with the availability of tax breaks for new boilers from the French Government meant boilers were a relatively “easy and cheap” sale for energy companies

Recent ECO Trends in the EU

- ▶ Growing recognition that only counting first year energy savings towards the target undervalues energy savings from those measures with longer lifetimes; Denmark has introduced weighting factors dependent on the life time of the EE measure; Italy similar options
- ▶ France is pioneering an obligation on companies involved with road transport fuels; this is being placed on the oil importers rather than the retailers of transport fuel
- ▶ Ireland introducing ECO this year on energy suppliers; Polish parliament passed legislation to introduce WC on energy suppliers of electricity, natural gas and heat providers; Polish energy regulator will be the administrator; WCs will be traded at the power exchange; expected 1.5 – 2% impact on energy prices

Evaluations of EU ECOs - 1

- ▶ All countries have undertaken evaluations but comparison between the different MSs is complicated because of the different targets, energy saving values etc.
- ▶ Bertoldi et al (2010) compared France, Italy & UK; in all cases the total cost estimates of saving a unit of electricity or gas are lower than electricity and gas residential prices by between a factor of 2 to 6
- ▶ Denmark has evaluated the cost of energy saved in the phase from 2006-9 to be -0.45 €cents/kWh
- ▶ GB target for 2005-8 met 23% cheaper than Government estimate (cost = 3.6% of annual fuel bills)
- ▶ National cost effectiveness has improved with every phase of the GB obligations since 1994; similarly Italy

GB ECOs – national levelised cost of energy saved in period 1994 to 2008

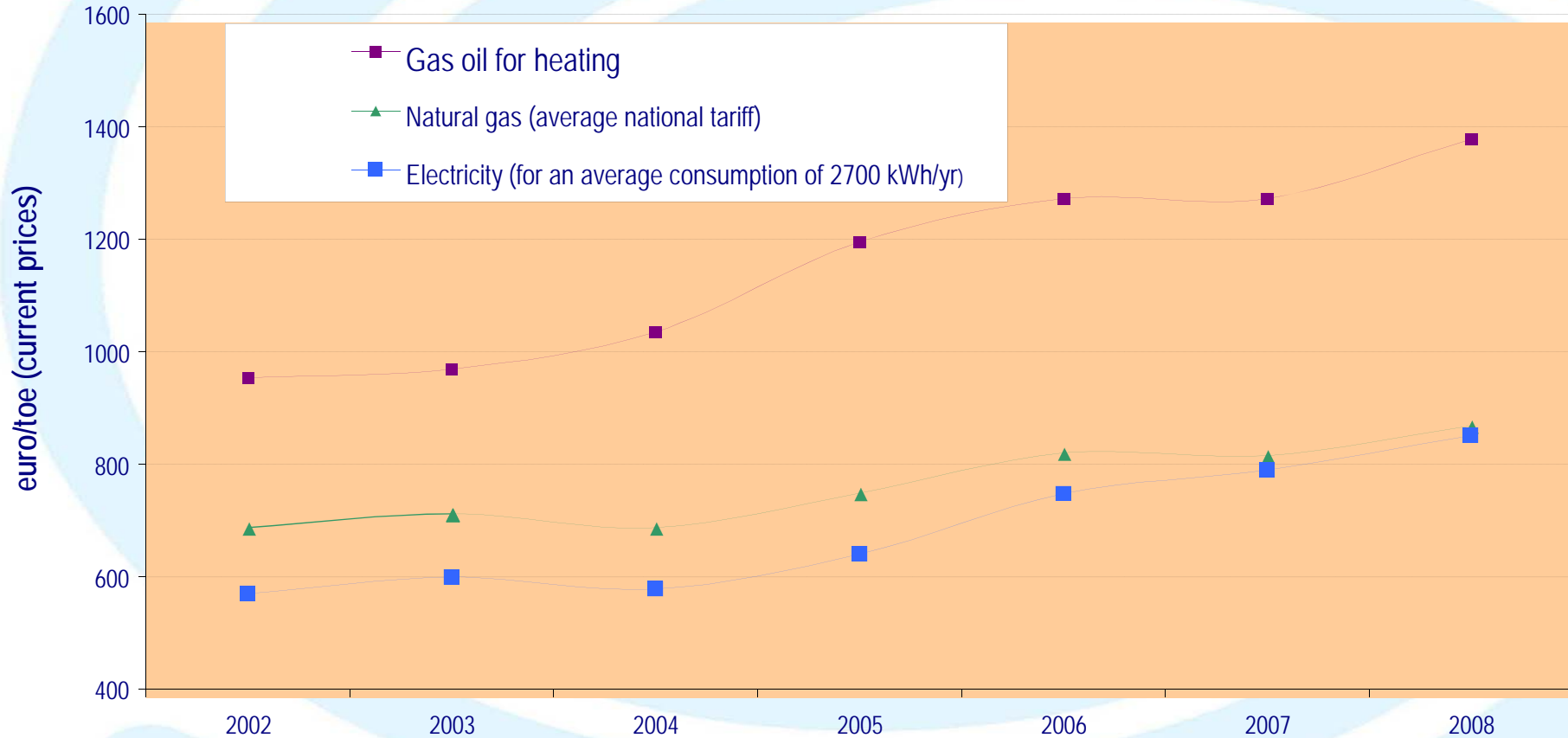
Fuel	1994-8	1998-00	2000-2	2002-5	2005-8
Electricity	1.8	1.4	1.3	1.0	0.9
Gas			1.0	0.6	0.5

Notes

Approximate cost to all parties (i.e. energy companies, customers and third parties) of GB ECOs over the various phases from 1994 to 2008. All costs are expressed in p/kWh in 2001 prices & methodology.

Avoided energy costs for participating customers in Italian WCs (Source AEEG)

Value of saved energy for domestic users (taxes included)



cf. tariff contribution = 100 euro/toe



Capacity Building → Sustainable Energy Regulation in Eastern Europe and Central Asia

large "private" economic gains

Evaluations of EU ECOs - 2

- ▶ The GB phase from 2005-8 resulted in a benefit to the nation (not a cost) to save a tonne of CO₂ of €60 after correcting for some savings being taken in the form of increased comfort (higher indoor temperatures) and deadweight (i.e. those that would have done it anyway)
- ▶ In the first phase of the French WCs, the cost to energy suppliers was 0.4 €cents/kWh cumac i.e. 40% of the value of the fine set per kWh cumac by the French Government for any energy company missing its target
- ▶ Result of the MS evaluations has been that activity has expanded in recent years in nearly all countries with existing ECOs

Increases in EU ECOs in 2011

Country	Activity for latest data (year) or new target	Increase over 2008 activity
Belgium - Flanders	2.6 TWh/y (2009)	>30%
Denmark	1.7 TWh/y	>100%
France	345 TWh cumac in 3 years by end 2013 including road transport	Approx. 300%
Italy	5.3 Mtoe cumulative	No change in “new savings” but CFL & shower deemed savings reduced
GB	185 MtCO ₂ in 3 years by 2011	20% increase + extension to end 2012

Observations on ECOs in the EU -1

- ▶ Core element in all: the energy saving obligation (backed by penalties if target missed); Voluntary markets not expected to emerge
- ▶ Relatively few schemes in place (6 + 2 imminent) – they vary quite a lot but all judged to deliver successfully
- ▶ Different targets, different end use sectors covered, different obliged actors - reflect local status of energy market, the EE history of the utilities, climate, energy saving opportunities, culture etc.;

Observations on ECOs in the EU - 2

- ▶ Goals were set fairly low, and have been achieved and at costs below policy makers' expectations; expanded to energy companies now spending ~€2 billion/year; in ~50 operational years experience of EU ECOs, no energy company failed to meet it's overall energy saving target
- ▶ Empirical evidence shows they are best suited to deliver low-cost and standard energy efficiency measures, often targeting small energy users where traditional barriers to EE are greatest
- ▶ Function in both liberalised energy markets and also where they target monopolistic segments

The importance of ECOs to NEEAPs

- ▶ ECF (2009) study looked at National EE Action Plans submitted to EU as part of ESD requirements to identify those policies expected to make the greatest contribution to energy and CO2 savings in 2016
- ▶ Only residential and tertiary sectors examined but as seen earlier, these are the sectors of most relevance to ECOs
- ▶ For the 3 MSs with quantified NEEAP and with ECOs in place, the ECF study deduced the contribution to the expected savings in 2016 for Belgium - Flanders, Italy & UK
- ▶ Some policy measures were treated as packages – not separated into their individual components as the policy measures were designed as a package

Indicative savings from ECOs by 2016

Country	Residential Sector Policy mix	% of energy savings for residential sector by 2016	Tertiary Sector Policy mix	% of energy savings for tertiary sector by 2016
Belgium - Flanders	ECO	>50%	ECO + Bdg Regulations + Government subsidies	>80%
Italy	ECO + tax incentives + Government subsidies *	>70%	ECO + incentives	>70%
UK	ECO	41%	No ECO	n/a

* Italian NEEAP says “the most significant instrumentWhite Certificates” p20

Importance of ECOs to Energy Affordability

- ▶ As we decarbonise energy supply, expectation is that energy supply costs will rise – energy affordability in a low carbon world is a concern
- ▶ EU ETS increases cost of energy and sends strong price signals to the supply side but the signals to the demand side are much weaker
- ▶ For example in UK for a 10% increase in electricity prices, demand reduction is -2.3%; however for a 10% increase in income, electricity demand increases by +3.4% and this has helped drive electricity growth in the last 2 decades in the residential sector
- ▶ A one off electricity price rise of 3% will therefore reduce electricity demand by 0.69%

Why ECOs are more effective than a price rise - 1

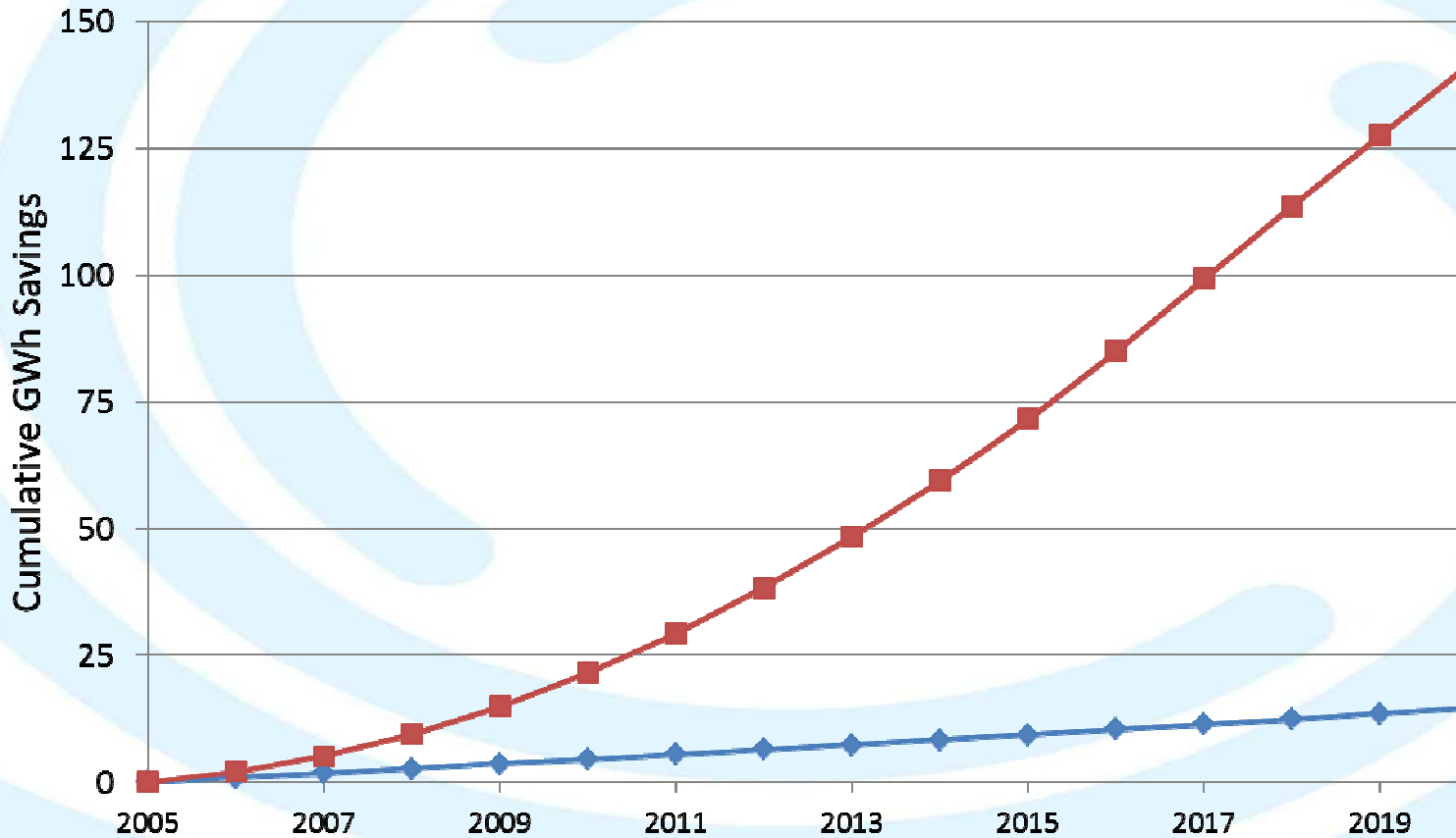
- ▶ But what if that 3% price rise was to be reinvested each year in energy efficiency measures in households?
- ▶ Used the levelised cost to electricity retailers to save a kWh in the GB ECO for the period 2005-8 (€2 cents/kWh); Used the actual energy savings obtained by energy suppliers in the period 2005-8; savings are primarily insulation (36%), lighting (34%) and appliances & ITC (29%)
- ▶ The calculation allows for the fall off over time of electricity savings from the shorter lived measures; it also corrects for comfort (increased amenity) – important for insulation measures

Why ECOs are more effective than a price rise - 2

- ▶ The calculation assumes that the levelised cost of saving a unit of electricity remains the same in real terms after the end of 2008 till 2020; that the real price of electricity remains constant in the same period;
- ▶ Assumes an underlying growth in electricity demand for households of 1.4% (this was the historic average over the 20 years prior to 2005)
- ▶ Evaluate the cumulative energy savings to 2020 from the one off price rise alone and from investing that 3% each year in energy efficiency measures through ECO activities
- ▶ ECO is more than 9 times more effective in saving energy than a one off price rise itself by 2020

Investing a price rise in EE saves more than that from a price rise

Cumulative Energy Saving from a one off 3% rate rise compared to investing that on-going rise in EEOs



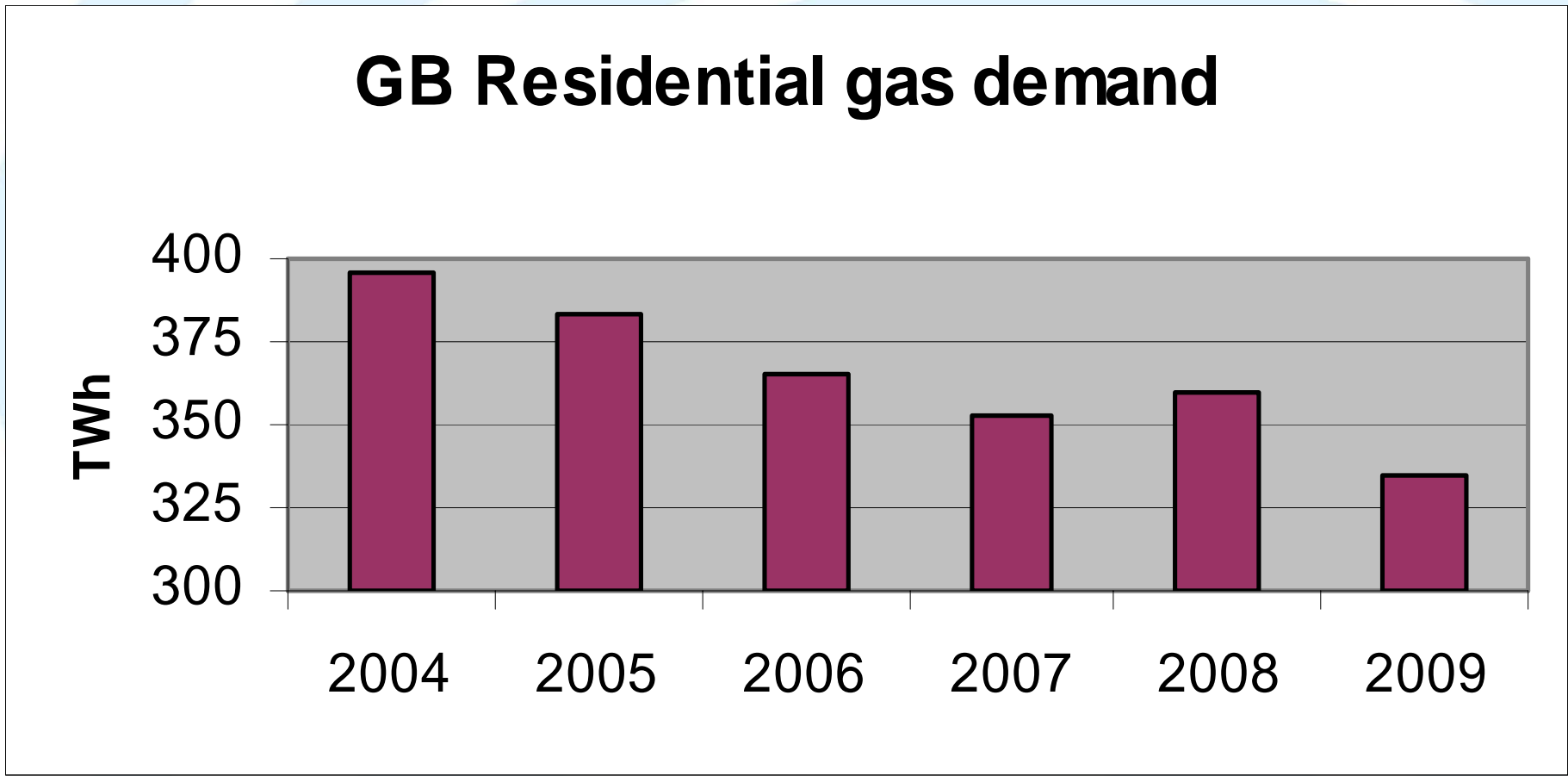
Is there any evidence that ECOs work – top down analysis? - 1

- ▶ Use GB Government data on residential energy consumption as GB has the longest running and largest ECO
- ▶ In GB natural gas provides 80% of all heating & hot water
- ▶ Prior to 2005 residential gas demand increasing in range 1 to 2% per year
- ▶ But in 2005, 3 important developments which would reduce demand: ECO obligation doubled (72% delivered energy savings in ECO come from insulation measures in gas households); new regulations on boiler replacement meant condensing boilers quickly moved from 36% of the replacement market to >97%; gas price rises for residential customers reduced demand

Is there any evidence that ECOs work – top down analysis? - 2

- ▶ Also greater awareness of climate change, behavioural change campaigns etc help reduce gas demand
- ▶ Factors increasing demand were between 2004 to 2009, gas customers increased by ~1.6 million (7%); more Degree Days in 2008 & 2009 than in earlier period, so “warmer winters” not an issue
- ▶ Complicated analysis by GB Government underway

Reduction in GB Residential Gas Demand in Period 2004 to 2009



Is there any evidence that ECOs work – bottom up analysis? - 1

- ▶ British Gas individual annual gas consumption data for 4 million customers (~40% of their customer base) have been analysed for the period 2006-10
- ▶ Looked at factors affecting demand:
 - > Households, population, income and tenure of property
 - > External and internal temperatures
 - > Energy efficiency measures
 - > Changes in behaviour, lifestyles, increased climate change awareness etc.

Is there any evidence that ECOs work – bottom up analysis? - 2

For this 5 year period, conclusions were:

- > British Gas' residential natural gas consumption fell annually by 4.9% compound
- > retail gas prices changes are not significantly correlated with household natural gas consumption changes (due to retailer switching/lower tariffs?)
- > the economic factors did decrease annual consumption in some years but over period slightly increased consumption
- > Behaviour and lifestyle changes etc. reduced by ~ 2.7%/year
- > Reduction in gas customer demand was 3.3%/year as a direct result of energy efficiency measures (mainly insulation and heating)

Conclusions on EU ECOs

- ▶ Despite wide variation in implementation of ECOs & market liberalisation status, they have been successful policy tools
- ▶ MSs with them see them as a major policy initiative to meet their NEEAPs and are continuing to expand their scope; growing interest from other MSs
- ▶ They result in more energy savings than would be obtained from an equivalent rise in the price of energy alone
- ▶ By reducing the number of units required for household energy services, ECOs help energy affordability for low income households in the transition to a low carbon world
- In the longest running and largest ECO, over the last 5 years they are contributing to a significant reduction in gas demand

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