

EEOs, WCs, ESOs etc, Article 7 EED & Recent EU and global experience

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- Article 7 – the “quantitative bit” of EED
- Growing importance of Energy Efficiency Obligations (EEOs) in meeting MSs’ energy saving targets
- The various forms of EEOs
- Recent EU experience of EEOs
- Lessons learned & real impacts
- Where do EEOs fit into a well defined energy efficiency policy (a personal view)?

EED & eligibility of measures

- Article 7 of EED sets MSs cumulative energy saving target for 2014-20; the 1.5% new savings each year likely to reduce to 1.125% (early actions & supply side); if exclude transport sector from target calculation, ~0.75%
- Essential to ensure “real energy savings”
- Defines eligible measures (widely) & how to count savings towards the target
- Only savings beyond “business as usual” eligible – crucial to define baselines
- Measurement & Verification (M&V) process outlined (especially Annex V); important applies to all measures, not just EEOs

Alternatives to EEOs

- EED permits delivery of part or all of the target by alternative measures that reduce end-use consumption (Article 7.9) e.g.
- Energy or carbon taxes;
- Financing instruments or fiscal incentives;
- Regulations or voluntary agreements;
- Standards and norms above EU minimum;
- Labelling schemes, which must be compliant with the EU Labelling Directive 2010/30/EU;
- Training and education;
- Establishment of a national energy efficiency fund.
- **All must meet the eligibility criteria established for EEOs.**

Problem areas in EED – Baselines

- Energy savings only if better than required by EU legislation e.g. Ecodesign, EPBD, minimum EU tax levels
- Ensure double counting of energy savings is eliminated e.g. tax break and a financial subsidy from an EEO
- Savings must be the result of an EEO or other policy measures (Article 7.9), with the explicit aim to improve energy efficiency (especially important for taxation policies e.g. FiT, VAT are not specific EE policies)
- For taxation measures, due to short period 2014-20, real, short-run price elasticities of demand should be used e.g. for residential typically -0.2)
- **Additionality (incl. free riders) –most difficult; only savings beyond “business as usual” should be eligible**

Problem areas in EED - Determining energy savings

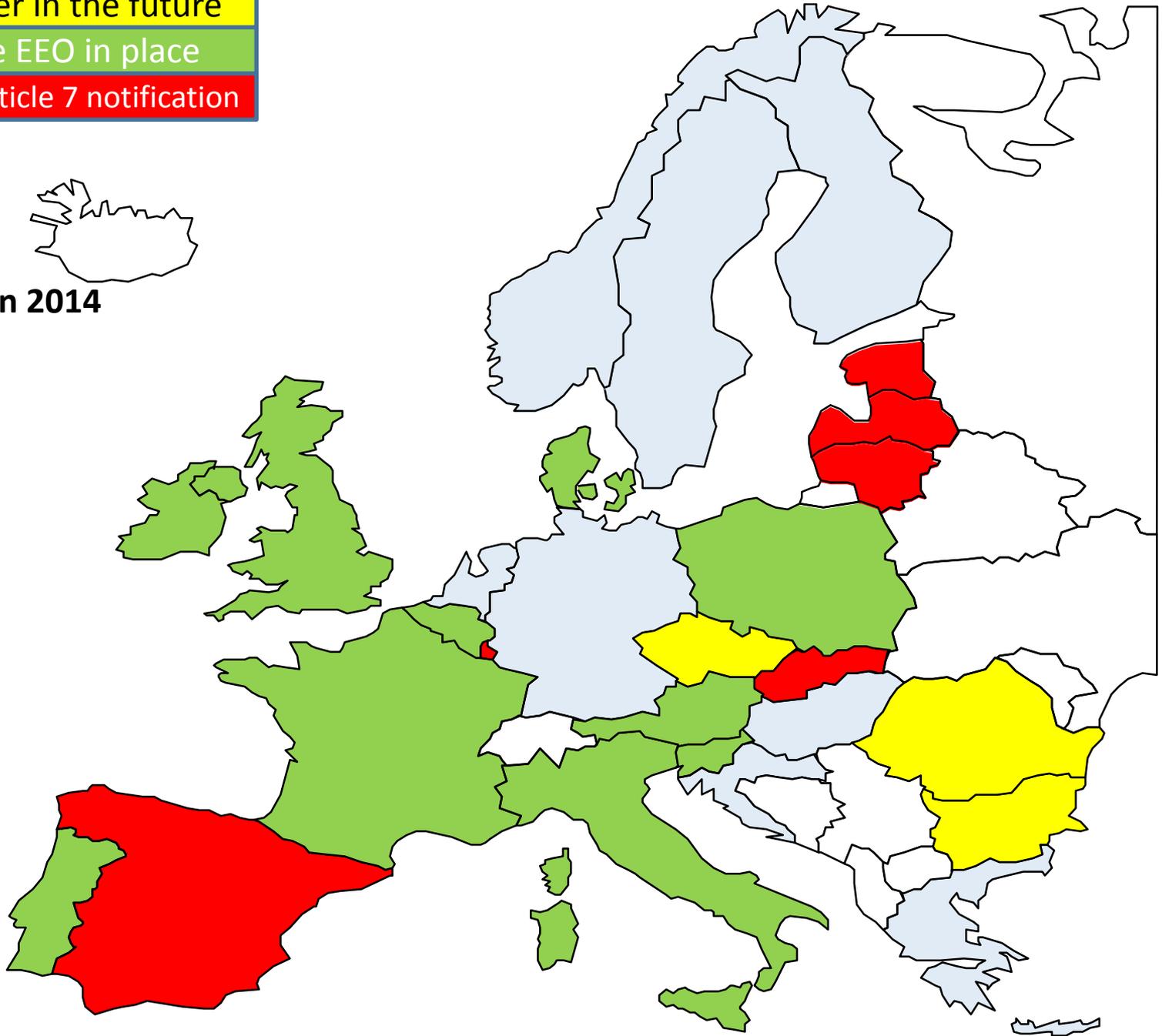
- Rules: e.g. deemed energy savings have independent verification; dealing with the issues of free riders; materiality of obligated party involvement
- Ensure EEOs lead to long-term ambitious savings (avoid a target where only the first year's energy savings are counted and incentivise measures with longer lifetimes).
- To avoid “stop-go” market activity for the energy efficiency industry, permit banking of energy savings from one phase of the EEO to the next
- Best Practice on M&V etc. in: Determining Energy Savings for EEO Schemes, eceee and RAP, April 2012.
URL: <http://www.raponline.org/document/download/id/4898>
- **N.B. All the above applies to all EE policies**

Consider in the future

Active EEO in place

EEO in Article 7 notification

As of Jan 2014



Article 7 MS analysis – work in progress

- Nearly half of the energy savings in the 27 EU MSs analysed to date will come from EEOs
- Fiscal incentives account for nearly 20%
- Energy or CO2 taxes ~10%
- More work needed to verify Buildings Regulation figure – looks small to me but maybe wrongly classified
- Not all obeying the first rule of EEOs – Keep It Simple; if not simple in principle, the necessary details make them quickly difficult to manage simply

EEOs - Background

- Started by requiring regulated vertical utilities to save energy in their customers' homes or premises
- Flexible and growing in scope e.g. obligation on retailer /distributor & increasingly on non-regulated energy cos
- EEOs in all end use sectors; most activity in residential & tertiary sectors as can tackle many of the “barriers” to EE e.g. personalised advice, imperfect knowledge, hassle, finance etc. + deemed energy savings
- As EEOs not funded by Government - avoid stop/start of public financing
- Not a “silver bullet” need other EE policies e.g. Building Codes, appliance standards & labeling, low interest finance, tax breaks and the synergies between these

EEOs in Europe

- Cost is between 0.5% and 4% of customer bills (ex VAT)
- Detailed operations of EEOs reflect the local status of the energy market (liberalised or otherwise), the energy efficiency history of the energy companies/ESCOs, climate, energy saving opportunities and culture etc.
- Usually save any end use fuel; some EEOs give priority to low income households
- Only Italy has experience of tradable White Certificates; UK trying a brokerage system to reduce the market power of the energy retailers in energy efficiency
- The legal (or “voluntary”) obligation to deliver energy savings (with penalties for failure) appears to “focus the mind” – important to transfer this aspect to any alternatives

How do EU EE Obligations Work?

- Energy retailer/distributor has obligation to save energy in customers' premises/homes; target related to “volume” of energy supplied/distributed + financial penalties if fail to meet savings 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 with well established energy saving values (known as deemed or ex ante savings)
- Monitoring and verification is a “measure count” + random audit of submitted claims for energy savings

What Costs are Involved?

- Cost of energy efficiency measures (energy company subsidies, end customers, landlords, charities, manufacturers etc.)
- Cost of energy company marketing, sales, reporting, planning etc. (in GB estimate ~18% of their direct costs)
- Auditing & verifying of energy saving projects and if target met (in GB carried out by Ofgem (energy regulator) and <1% of energy supplier costs)
- Government sets target every 3 years + research into energy savings (in GB <<Ofgem costs)

How are these Costs Passed Through?

- If obligation on energy retailer in liberalised market, then EEOs are “a cost of business” like other environmental requirements and passed onto end customers; competitive incentive for low delivery costs
- If obligation on regulated part of energy company (e.g. distributor or if retail price is still regulated), then costs are in regulated tariff charged to end customers
- In effect, the “polluter pays” principle applies
- However, energy saving benefits alone far exceed the costs to consumers (typically 1 to 5% of energy bills)

How are the EEOs delivered?

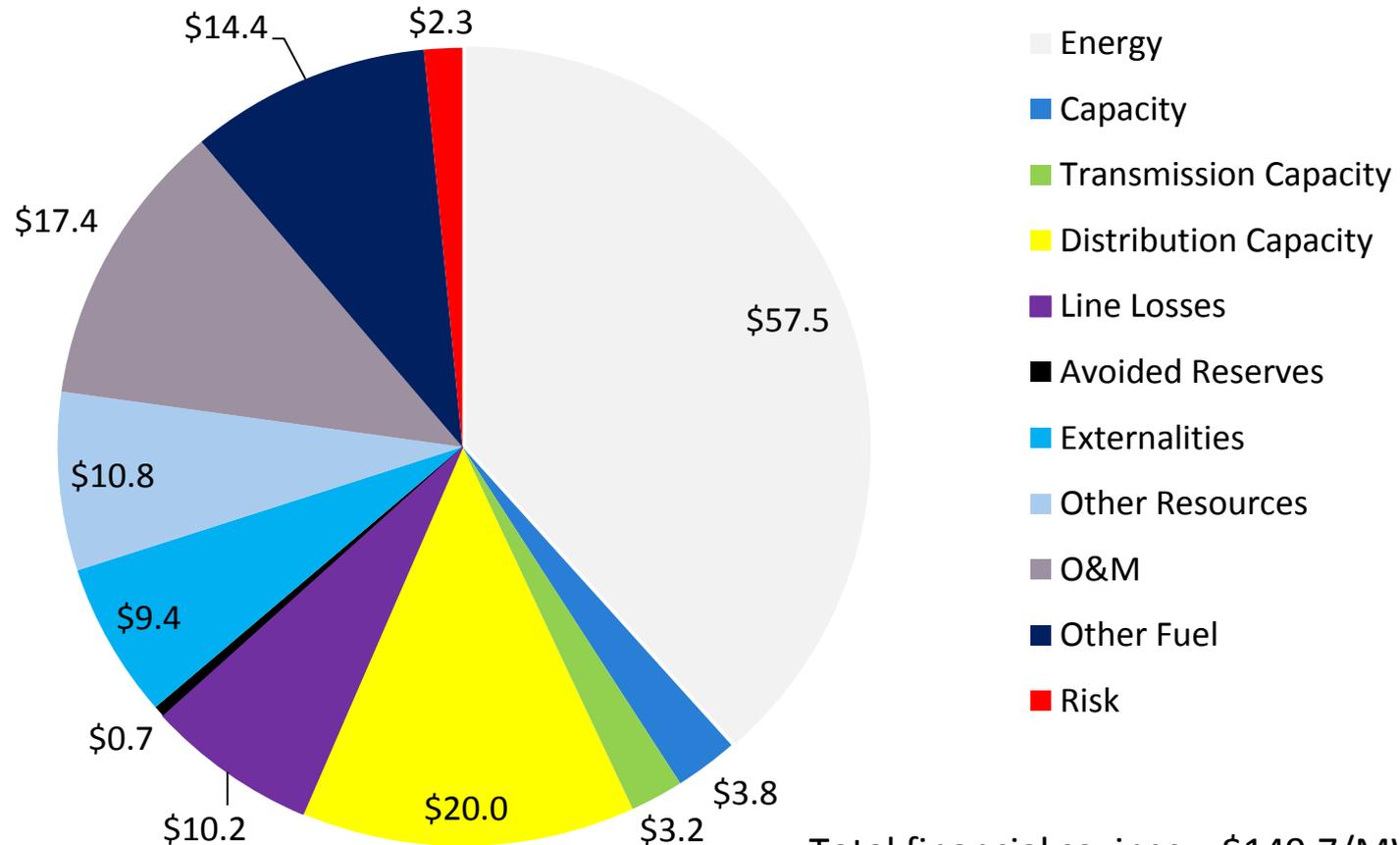
- Mainly by bilateral contracts between obligated energy company and an energy efficiency market actor e.g. insulation company, retailer of appliances, manufacturers, heating installers
- However, in GB energy companies are establishing heating companies, insulation subsidiaries & microgen (RE); similar developments in Italy
- In Italian & French White Certificate schemes, accredited parties (not just the obliged energy companies) can earn WCs and these can be subsequently traded
- Only in Italy has there been significant generation & trading of WCs generated by non obligated parties

Globally, EEOs are highly cost effective

- **USA state EEOs** save electricity for 3-4 US cents/kWh compared to 6-9 cents per kWh for generation cost alone
- **EU experience:** saving residential electricity or gas, costs less than 25% of the cost of that fuel to the consumer; costs of EE measures falls with economies of scale
- **PLUS: EE can save** on transmission and distribution upgrades, lower reserve margins and line losses, has no emissions, improves reliability, lowers peak loads
- **“Merit Order Effect”:** In competitive power markets, lower demand also **lowers clearing prices for all consumers** – not just consumers who save energy
- In some USA cases, these non end-use benefits can justify the entire cost of the EE program

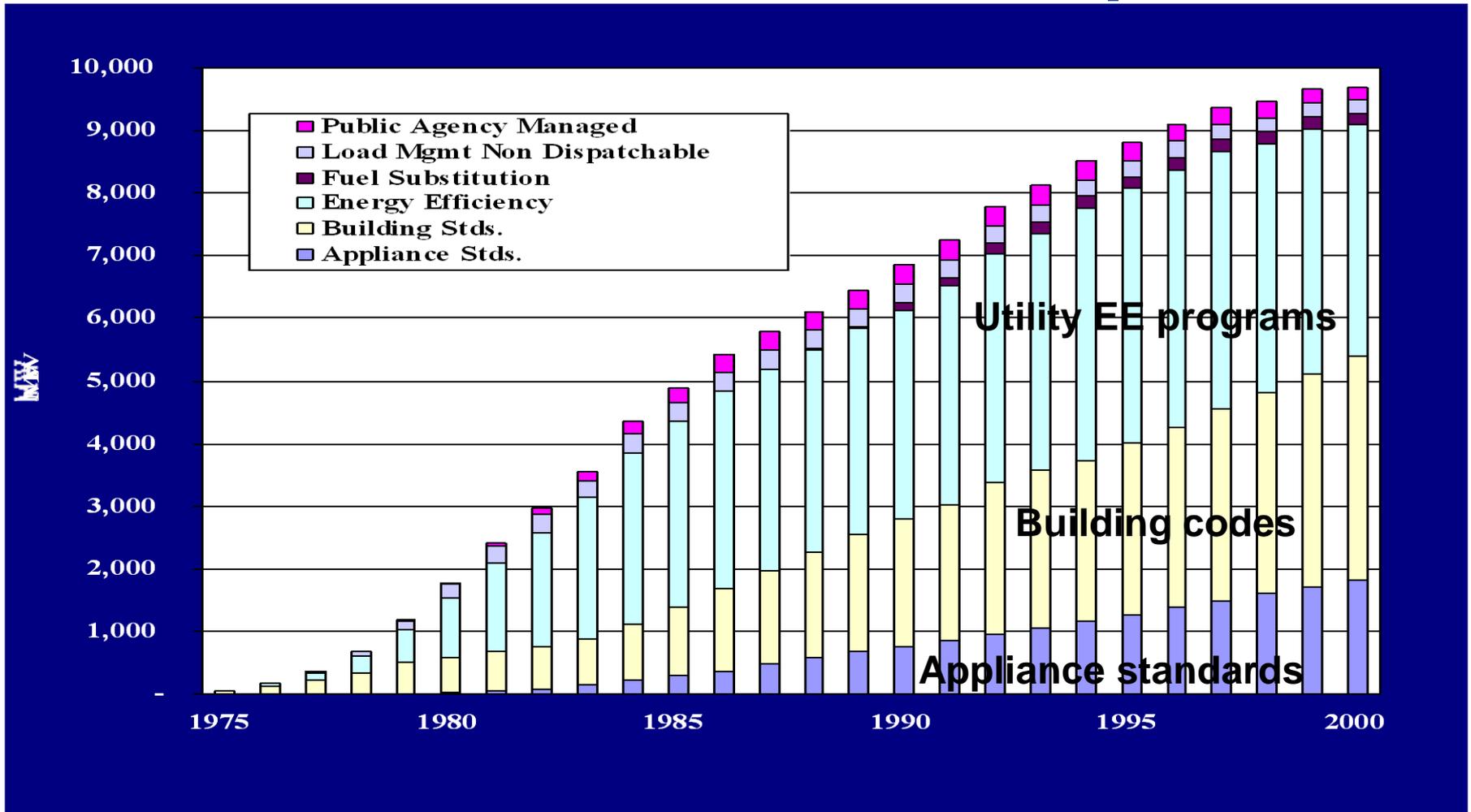
Energy Saving Benefits - Vermont EEO

Vermont saving values from 2010 EEO Activity



Total financial savings = \$149.7/MWh
CO2 price ~ 14.5 €/ton

EEOs are in addition to other policies



California energy efficiency investments lowered demand by 25% over 25 years

Experience of EEOs in Europe

Contents

- For 5 longest running EU EEOs show the variety of approaches
- Newest EEOs
- Why EEOs are 9 times better than an energy or carbon tax

History of EEOs in the EU

Country	Year	Obligated fuels
UK	1994	electricity only; expanded to gas in 2000
Denmark	1995	electricity only; expanded to gas, heating oil & district heating in 2000
Flanders	2002	electricity only
Italy	2005	electricity and gas
France	2006	electricity, gas & heating oil/LPG; importers of road transport fuel 2010
Portugal	2007	electricity only
Austria	2009	electricity, gas, district heating and heating oil
Slovenia	2011	electricity, gas and heat providers
Poland	2012	electricity, natural gas and heat providers
Ireland	2012	all fuels including road transport

EEOs in the EU (2013)

Country	Obligated Company	Eligible Customers	Administrator
Belgium - Flanders	electricity distributors	Residential & non energy intensive industry and service	Flemish Government
France	Energy retailers + importers of road transport fuels	All (including transport) except EU ETS	Government
Italy	electricity & gas distributors	All including transport	Government Agency
GB	electricity & gas retailers	Residential only	Regulator (Ofgem)
Denmark	electricity, gas, oil & heat distributors	All except transport	Danish Energy Authority

EEOs in the EU (2011 or 2012)

Country	Nature of saving target	Current size of target	Estimated annual spend by companies €M {€/person}
Belgium – Flanders	1 st year primary energy	0.6 TWh annual	60 {14}
France	lifetime delivered energy	345 TWh over 3 years to end 2013	340 {5}
Italy	cumulative 5 year primary energy*	5.3 Mtoe in 2011	530 {9}
GB	lifetime CO2	293 MtCO2 in 4.75 years to end 2012	1400 {24}
Denmark	1 st year delivered energy*	6.1 PJ annual	100 {18}

* With weighting factors for longer lived measures

Most Activity is in Residential Sector

Country	Period	% energy savings from residential sector
Belgium - Flanders	2010	58% (mandated)
Denmark	2010	39% (biggest is industry)
France	2011-13	80%
Italy	2009-11	81%
UK	2008-12	100% (mandated)

Latest EEOs in the EU

- Ireland introduced voluntary EEOs in 2011 on all major energy retailers and importers of road transport fuels; all end use sectors eligible & overseen by Irish Energy Agency; target is first year energy savings
- Poland introducing WCs in 2013-16 on electricity, natural gas and heat retailers with open tender for WCs which can be traded in market; 80% of WCs from end use sectors (all eligible) & overseen by Energy Regulator; targets set annually in primary energy savings – too complicated + value of WC?
- Austria has had voluntary EEOs on electricity, gas and oil retailers and district heating since ~2010; residential & public end use sectors eligible & overseen by Austrian Energy Agency; target of 0.6% each year (c.f. EED)

Observations on EEOs in the EU - 1

- Different targets, different end use sectors covered, different obliged actors - reflect local status of energy market, EE history of the energy providers, climate, energy saving opportunities, culture etc.
- Goals set fairly low, and been achieved at costs below policy makers' expectations; energy companies now spending >€2.5 billion/year; by end 2011 over 55 operational years experience of EU EEOs, no energy company failed to meet it's overall energy saving target; 1 of 6 GB energy retailers missed 2012 total target by 1.4%
- Function in both liberalised energy markets and also where they target monopolistic segments; all EEOs need continuous updating & quality standards

Observations on EEOs in the EU - 2

- Started in regulated electricity companies; expanded to include natural gas; but now on **non-regulated energy companies** in AT, DK, FR & IE without problems
- France is pioneering (Ireland followed in 2012) an EEO on oil importers of road transport fuels; to date most oil importers meeting target through residential end use energy savings (both countries)
- 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 of the EE measure; Italy has similar options to value longer lived measures such as insulation & industrial projects

Danish EEOs and Electricity Distributors

- As there are 77 electricity distribution companies, the trade body DanskEnergi plays an important co-ordinating and facilitation role for the electricity distributors
- Electricity distributors deliver half of the total EEO savings
- Full cost recovery scheme from tariffs with benchmark of economic performance undertaken by the regulator
- Danish target to reduce primary energy consumption:
 - 2%/year in 2011
 - 4%/year in 2020
- Translated to final energy consumption:
 - 10.3 PJ/year (Approx 1.5% of final energy consumption)
 - 6.1 PJ/year to come from energy companies

Special regulation on DSO as monopolies

- The distribution companies not allowed to do much by themselves as they are regulated monopoly companies
- Have to involve another EE market actor
 - Often another company in the same group e.g. electricity retailer or energy service provider
 - Otherwise a private engineering company or craftsmen, installers etc.
- Energy Retailers are developing niche markets focusing on partnership through an ESCO approach

“EEOs have kick started market for energy services”

- We see an increasing bundling of selling energy and delivering energy efficiency services in partnership with installers and others
- Energy retailers are developing niche markets focusing on:
 - Climate Partnership with a strong CSR element,
 - ESCO projects and energy performance contracting etc. (main EE measures are process energy & HVAC)
 - Energy savings in public buildings
- Energy efficiency is more about innovation in business models and approaching the customer than new technologies.

(Source DanskEnergi; 56% of their savings comes from industry)

Importance of EEOs to Energy Affordability

As we decarbonise energy supply costs will rise – energy affordability in a low carbon world is a concern

Already an issue & will grow politically e.g. the French EEO from January 2011 has ring fenced savings for low income households

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%; a one off electricity price rise of 3% will therefore reduce electricity demand by 0.6%

But what if that one-off 3% price rise was to be reinvested each year in energy efficiency measures in households?

Why EEOs are more effective than a price rise

Used data on the levelised cost to electricity suppliers in the GB EEO for the period 2005-8 (€2 cents/kWh); Used the actual electricity savings obtained by energy suppliers in the period 2005-8; savings are primarily insulation (36%), lighting (34%) and appliances & ITC (29%)

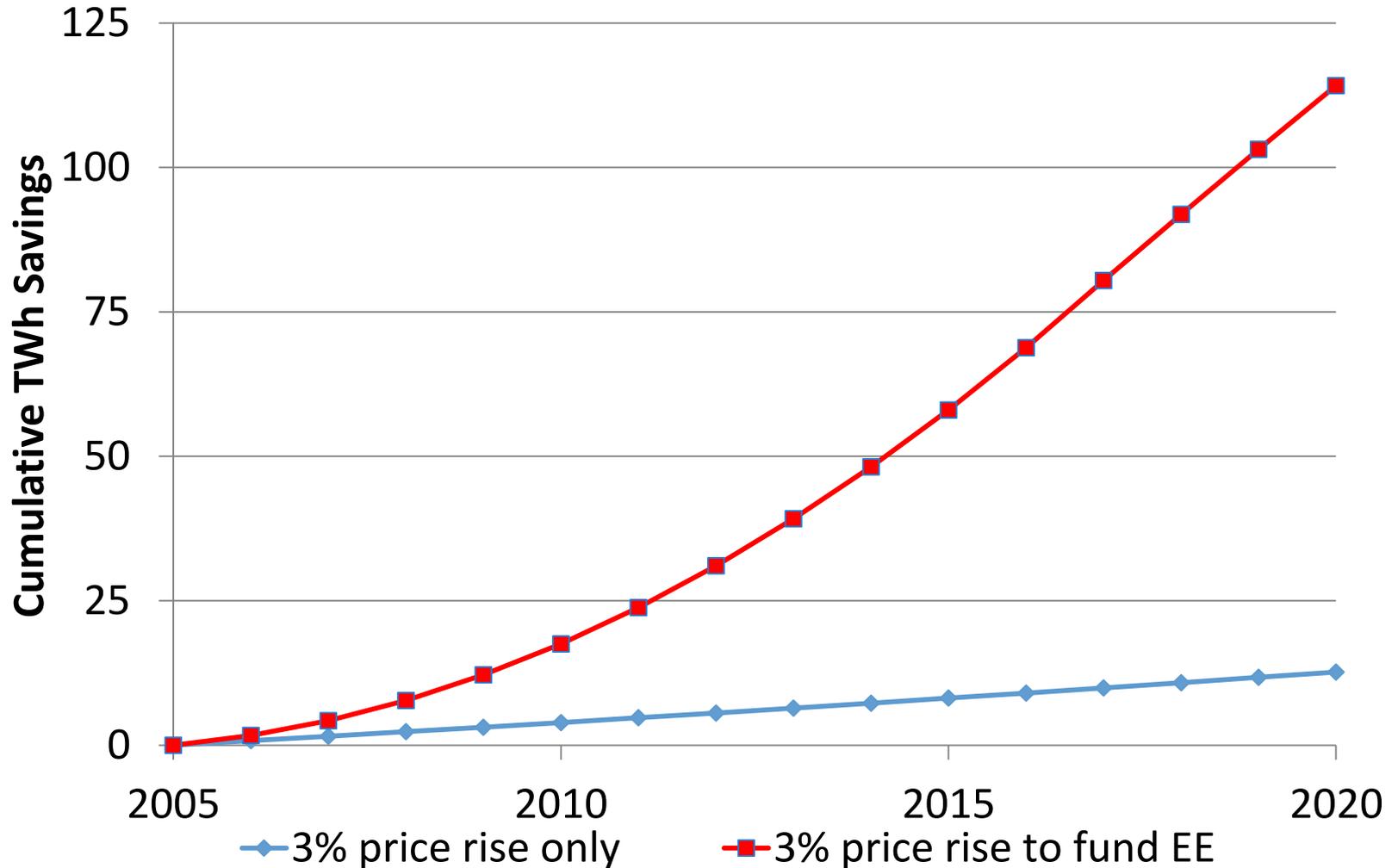
The calculation allows for the fall off over time of electricity savings from the shorter lived measures; it also corrects for comfort (increased amenity) – important for insulation measures

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)

Using data derived from the GB EEO for the period 2005-8 illustrates this more clearly – 9 times more effective in saving energy than a one off price rise by 2020

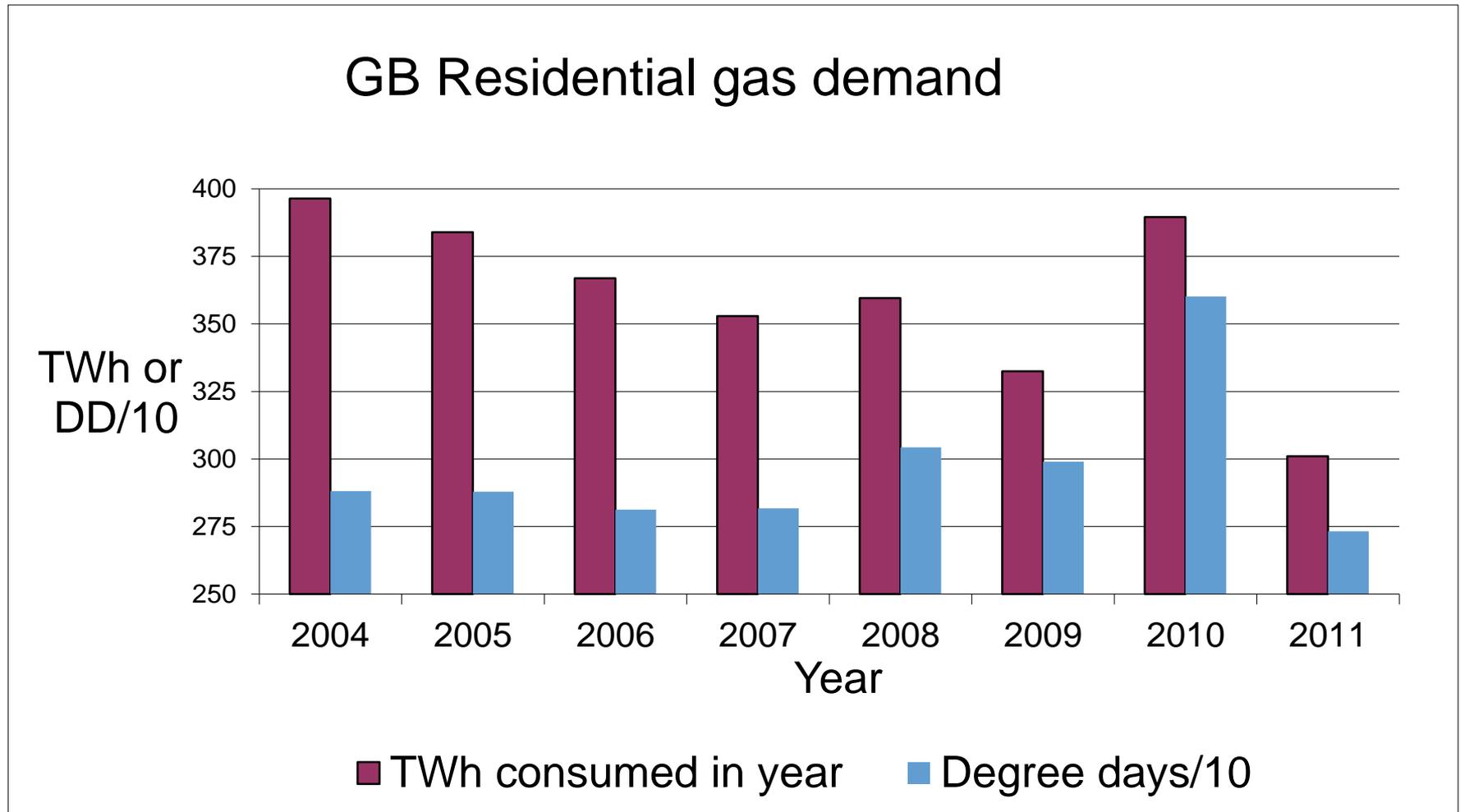
Investing a price rise in EE saves 9 times more electricity than that from a price rise



Is there any evidence that EEOs work? - 1

- 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: EEO obligation doubled (72% delivered energy savings in EEO 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

Annual residential gas demand (7% more customers between 2004-11)



Is there any evidence that EEOs work? - 2

British Gas individual annual gas consumption data for 4 million customers for the period 2006-10

Looked at factors affecting demand:

- > Households, income & tenure of property
- > External and internal temperatures
- > Energy efficiency measures installed
- > Changes in behaviour, lifestyles, increased climate change awareness, energy efficiency advice etc.

Is there any evidence that EEOs work? - 3

For this 4 year period, conclusions were:

Average household consumption fell by 22% over the period!!

Annual fall was 4.9%/year compound

Behaviour & 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 EEOs

- Despite wide variation in implementation of EEOs & energy market liberalisation status, they have been successful policy tools – deliver energy savings cost effectively
- MSs with EEOs have evaluated their programmes and expanded them in recent times; EU EED encourages EEOs and more are planned in Europe
- In largest EEO, over 5 years since 2005, contributing to a significant reduction in residential gas demand (22%)
- EEOs avoid MS Government having to use public expenditure to stimulate EE – relevant to the current financial problems facing MSs

EEOs as part of a package of EE policies

- No silver bullet for EE
- BUT often too many disparate EE policies operating in a MS
- Used 2007 NEEAP submissions from EU-15 under old Energy Services Directive (where quantified!)
- Looked for policies which MSs expected to deliver >10% of ESD target (9% annual saving by 2016)
- Classified as a significant policy if more than 1 MS expected it to save >10% of ESD target
- Only examined residential and tertiary sector

Key Policies in Residential and Tertiary -1

- **Building Regulations** – main policy; key to success is better compliance + extend to existing buildings e.g.
 - UK retrofit boilers in 2005 mandated to be condensing – market share gone from ~30% to 97% (c.f. 1992 EU Directive on boilers)
 - UK government threat to introduce minimum EPCs for rented accommodation if no significant improvement by 2014 – carried out
 - In the future - minimum EPCs at time of sale or rent?
- **Appliance Minimum Performance Standards & Labelling** – primarily driven at EU level but many examples of national schemes in advance of EU legislation (boiler labels, endorsement labels)

Key Policies in Residential and Tertiary -2

➤ Obligations on energy utilities

- Without long term commitment, energy companies will not change their strategy and EE manufacturers will not undertake the required investment
- UK scheme ends 2015 but energy suppliers been told there will be a successor at similar levels till 2020

➤ Low Interest Loans

- From an EE Investment Bank especially if linked with tailored advice e.g. KfW in Germany

➤ Government grants and subsidies

- Now difficult times!

Key Policies only in Residential Sector

- **Income Tax breaks** e.g. Finland, France, Greece, Italy & Portugal
 - Questions about deadweight – those that would have done it anyway

Key Policies only in Tertiary Sector

- **Tailored advice** e.g. Germany & UK
 - Often in conjunction with other policy measures such as subsidised energy audits and low interest loans

Policies that were not judged significant

- Reduced VAT for EE products (R & T sectors)
- Environmental taxation (R & T sectors)
- Subsidies for going beyond existing building regulations for new build (R only)
- Behavioural measures – problem of quantification rather than acceptance that it is important (R only)
- Setting energy savings or carbon dioxide targets for the public sector (T only)
- accelerated depreciation for energy efficiency equipment (T only)

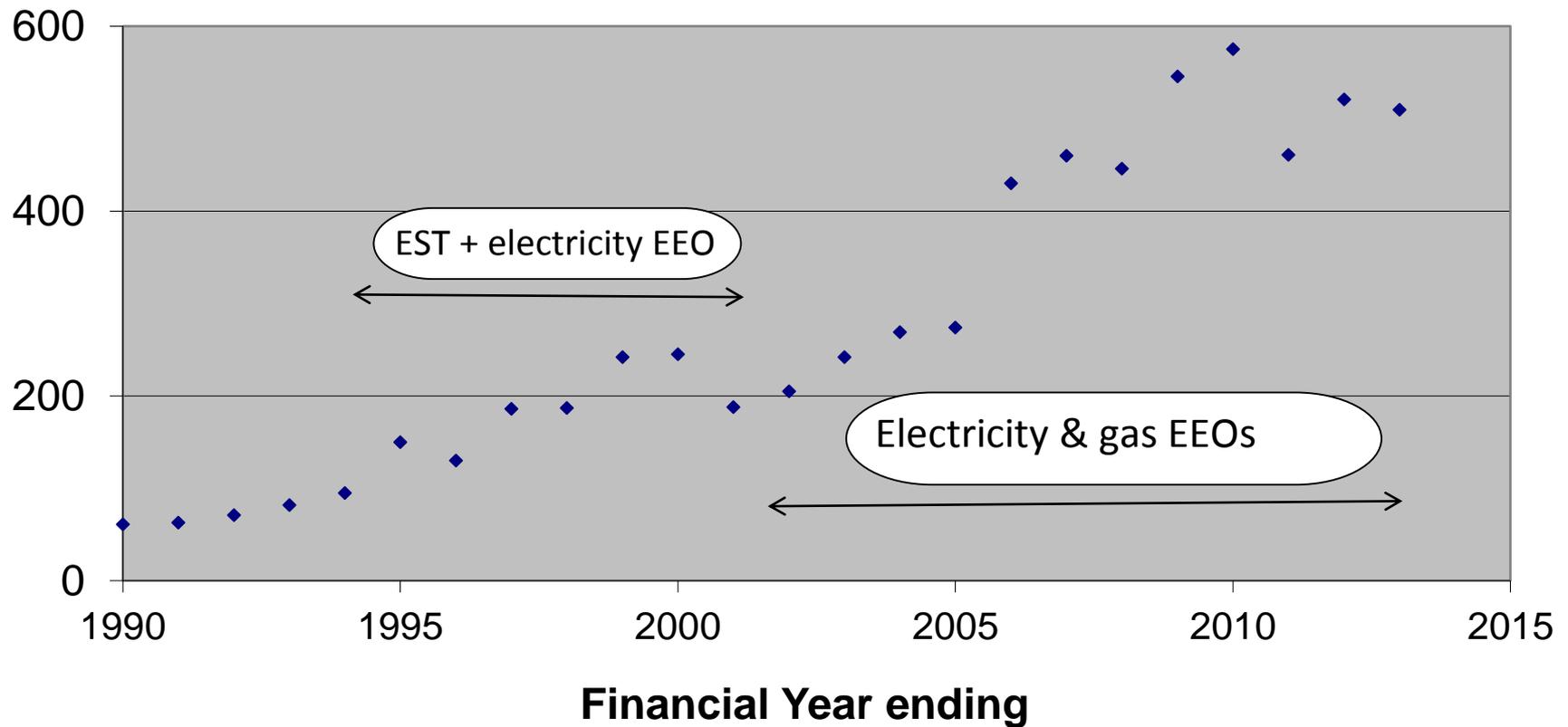
Highly personal view of key EE policies

- Large energy users have EU ETS – MSs need to recycle some of revenue income for EE in other end use sectors to achieve the CO2 reduction in an affordable fashion for all consumers
- Small energy users in non-process industrial sectors would benefit from EEOs due to widespread applicability of measures, ability of EEOs to overcome many of the barriers to EE and deemed energy savings approach
- ESCOs appear globally to work best in medium to large commercial and public sector buildings (standard and replicable measures avoid process energy complications)
- Process energy – voluntary agreements?

Extra slides

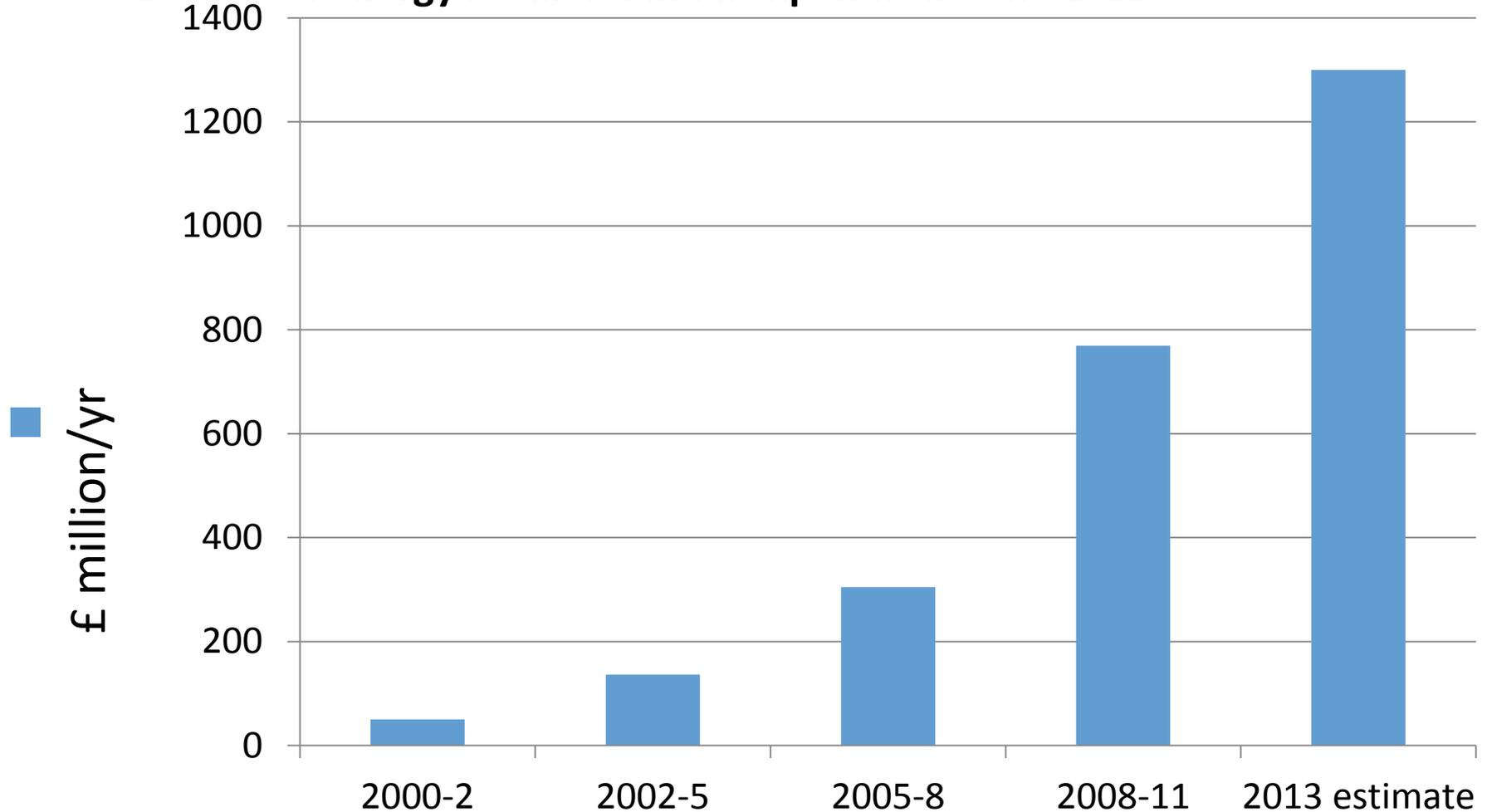
Importance of GB EEOs for Insulation

Thousands of CWI per year



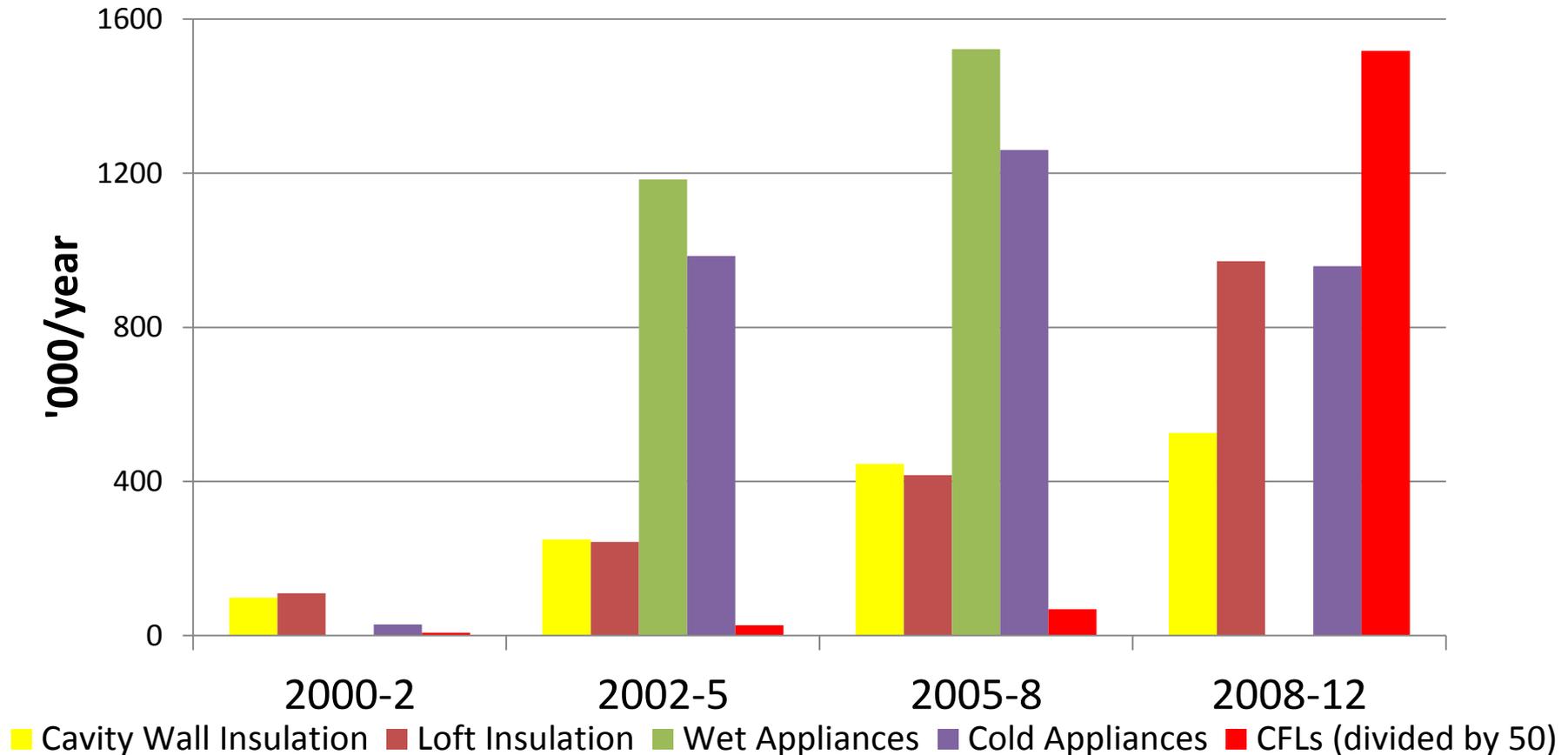
GB EE Obligations - History

Estimated energy retailer annual expenditure on GB EEOs



GB EE Obligations - History

Number of measures installed thousands/year



CERT installations –the top 10 in 4 years

Energy Efficiency Measure	Total number of measures installed	% of total CO2
Cavity wall insulation	2,103,150	26.4%
Professional Loft Insulation	2,915,389	22.4%
CFLs	303,555,479	21.4%
DIY Loft Insulation	524,651	10.3%
Shower regulators	5,171,654	4.3%
Communal heating - number of heating systems	397	2.7%
Fuel switching	90,476	2.5%
Window glazing over Building Regulations	1,506,930	1.9%
TVs	30,324,293	1.9%
Standby savers	5,442,049	1.8%