

What are EEOs, WCs, ESOs etc? & Recent EU and global experience

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The Confusing Nomenclature

EEOs = Energy Efficiency Obligations

WCs = White Certificates (sometimes tradable)

ESOs = Energy Supplier Obligations

EEPS = Energy Efficiency Performance Standards

And many other names!

Vary dramatically in delivery detail but all underpinned by “ some part of an energy company/provider or legal entity has an obligation to save end use energy through energy efficiency measures; backed by penalties or financial incentives”

IEA estimate Globally over \$13 billion/year on EEOs

Why EEOs on Energy Companies?

- EEOs place responsibility for EE on the actors in the sector directly connected to the provision of energy
- Consumers need help to invest – (audits, advice, financing, incentives, etc.) Energy companies can overcome barriers, work directly with consumers, or support those who do.
- Energy companies can be a stable source of revenues: avoiding ups and downs of annual public funding and providing incentives for efficient delivery.
- Energy companies also have key roles in other parts of an EE policy package – codes and standards, consumer education, smart metering and tariff reform.

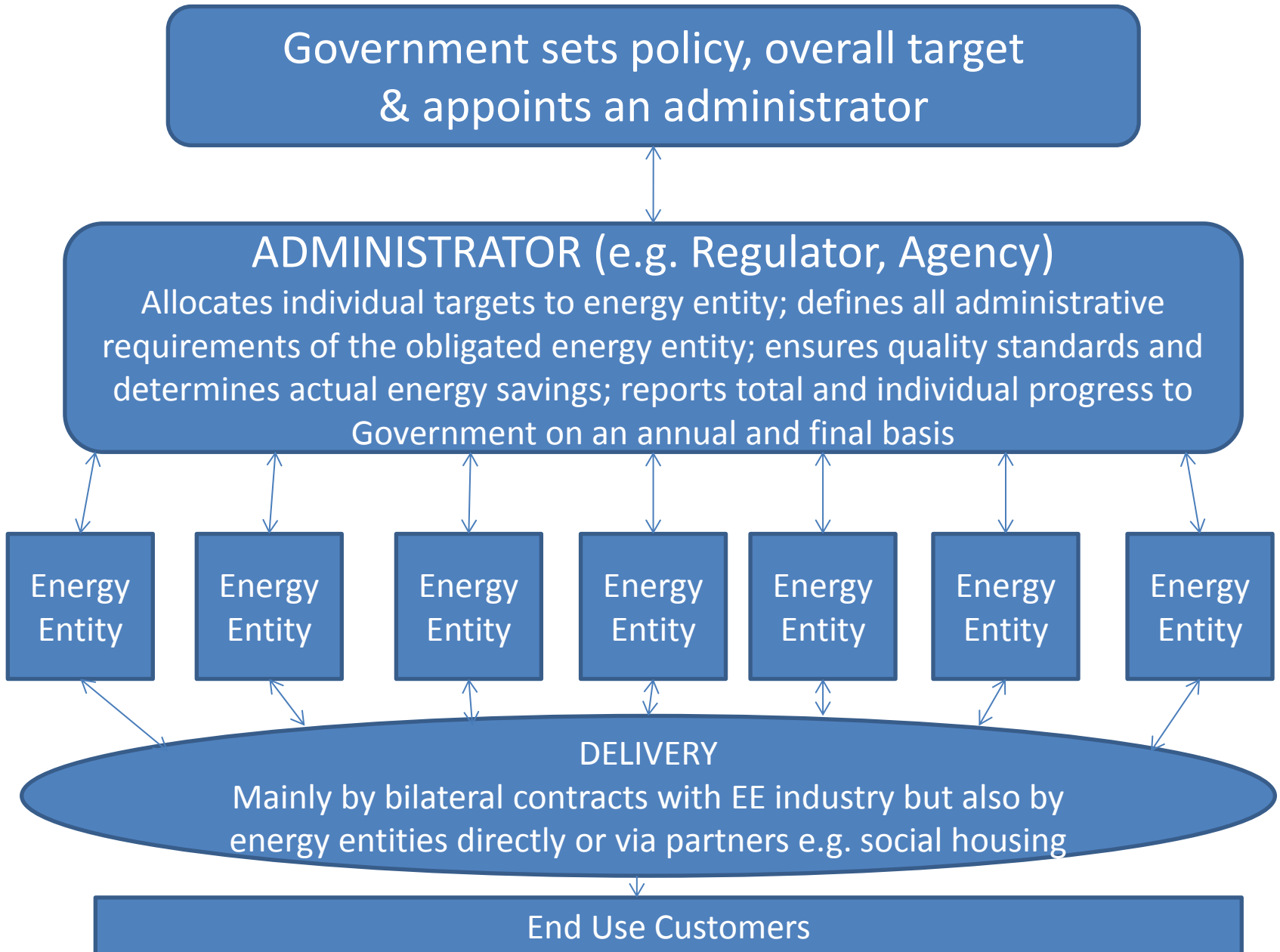
How do EU EE Obligations Work?

- 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

Range of successful approaches globally

1. Obligation on **regulated distribution utility**
Italy; Denmark; Flanders; most USA states; Ontario
2. Obligation on **competitive energy retailers**
Great Britain, France, Ireland; 3 Australian states
3. Obligation funded by levy on distribution companies but a) placed on **government agency** *Oregon*
or b) **tendered for a single** (non-energy provider) **entity** *Vermont* (overseen by energy regulator)
or c) **tender to all market actors** *Portuguese regulator*
4. **Performance Contracting** with 3rd parties (other than the obligated entities) *Texas, New Jersey*

Typical administrative procedure for EU EEOs



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?

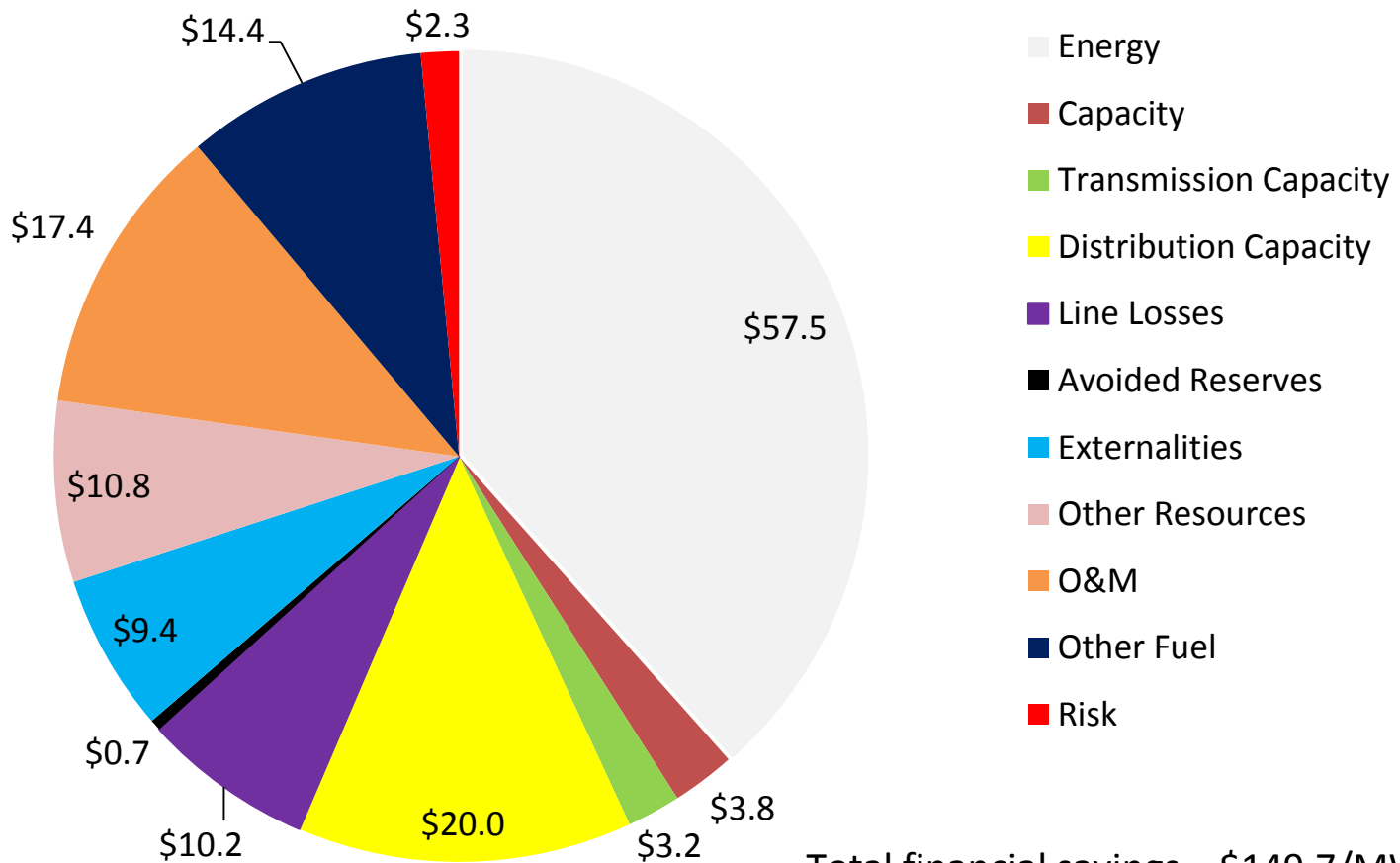
- Mainly by bilateral contracts between obligated energy company and an energy efficiency market actor e.g. insulation company, retailer of appliances, manufacturers, heating installers
- However, in GB energy companies are establishing heating companies, insulation subsidiaries & microgen (RE); similar 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

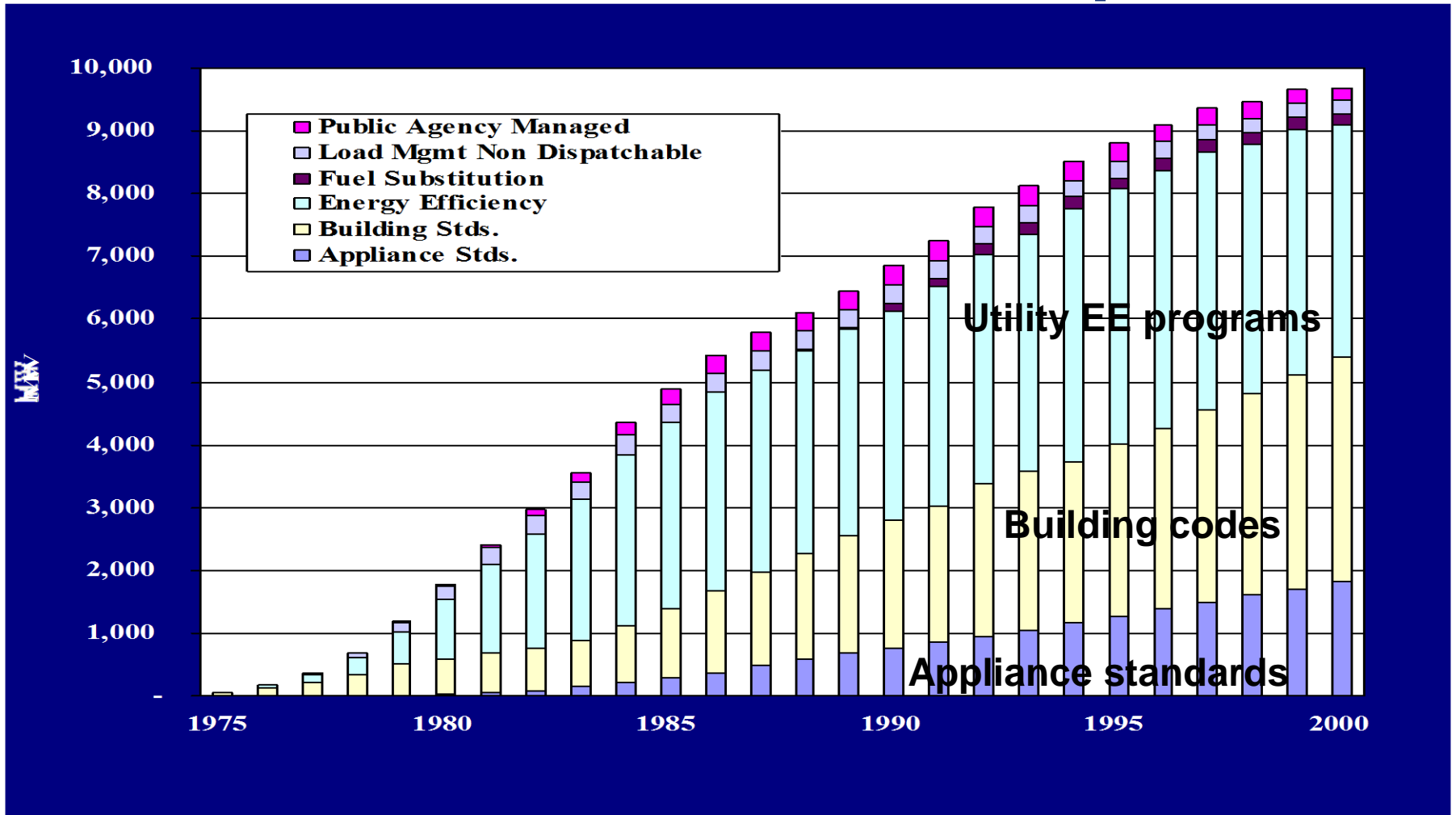
All Energy Saving Benefits from Vermont EEO

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
- Do EEOs really deliver energy savings?

EEOs in the EU (2011)

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	Regulator (AEEG)
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)

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	2008	58% (mandated)
Denmark	2008	42%
France	2006-9	87%
Italy	2005-8	83%
UK	2005-8	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
- Austria has had voluntary EEOs on electricity, gas and oil retailers and district heating since ~2010; law obligating EEOs expected to be passed in 2013; 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; 2 of 6 GB energy retailers missed 2012 target by 1.1% and 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 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
- Some examples

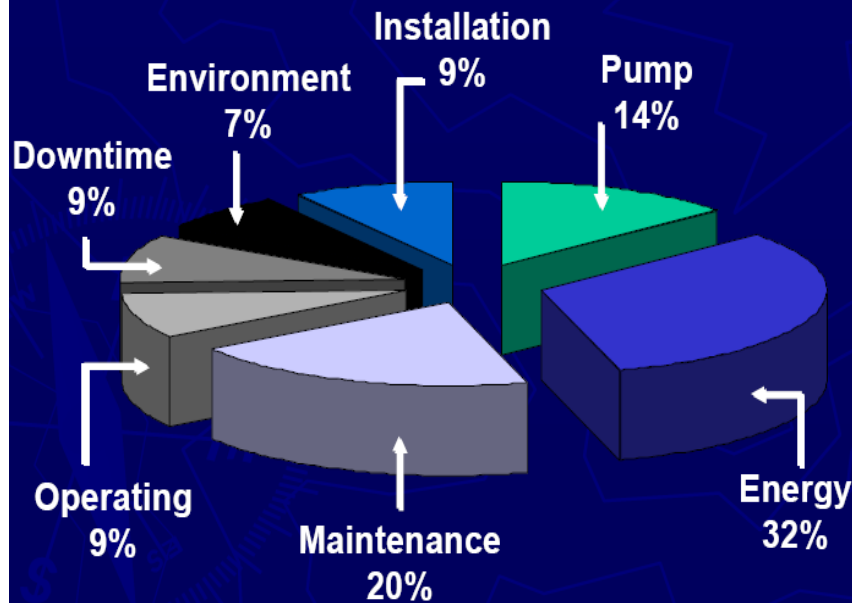
“EEOs have kick started market for energy services”

- We see an increasing bundling of selling energy and delivering energy efficiency services in partnership with installers and others
- 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; 27% households)

Case story – coating & refurbishing pumps

Example of Life Cycle Costs for an Industrial Pump.



- Research from Danish project concludes that coating can:
- Protect a new pump from corrosion and erosion and improve energy efficiency
 - Renovate and protect existing pumps and improve its energy efficiency compared to when it was new
 - Improved energy efficiency 3-29%
 - Extended lifetime 2-3 times

10% of industrial DK electricity is used for pumps

Case productivity – feedstuff company - 1

Production of cattle food

Soy meal, grain products, and other products are mixed

Grinded

Steam and other fluids are added

Passes an expander

The mix passes through a pellet plant

Energy consumption 5.9 GWh

Traditional energy efficiency proposals

Motors drive systems etc

Saving potential: 300-450 MWh

Case productivity – feedstuff company - 2

- However, **focus on the production process**
- Production 12 t/hour, designed for 20 t/hour
- By increased steam production, production could be increased to 15 t/hour
- By increasing the size of the motor of the pelleting mill from 50 kW to 250 kW the production was increased to 17 t/h
- Energy saving 795 MWh (i.e. ~twice the traditional approach)
- Payback, only focus on energy, 4.2 year, with production improvement - less than 1 year

Danish EE Scheme

- Business case for energy retail companies
 - Gross margins on electricity sale (spot): 0.5 EUR cent/kWh
 - Gross margins on energy saving activities: 3-7 EUR cent/kWh

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%)

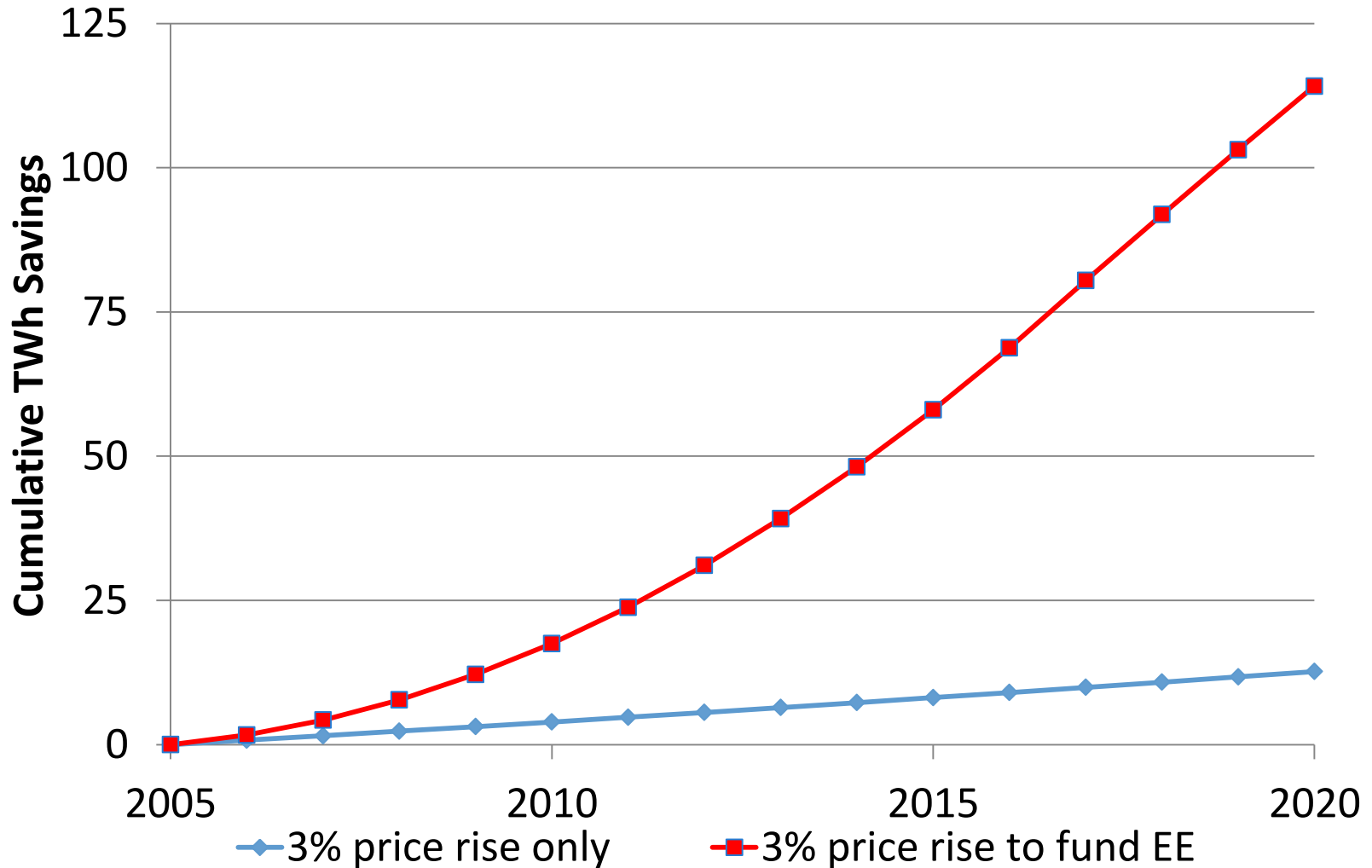
The calculation allows for the fall off over time of electricity savings from the shorter lived measures; it also corrects for comfort (increased amenity) – important for insulation measures

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;

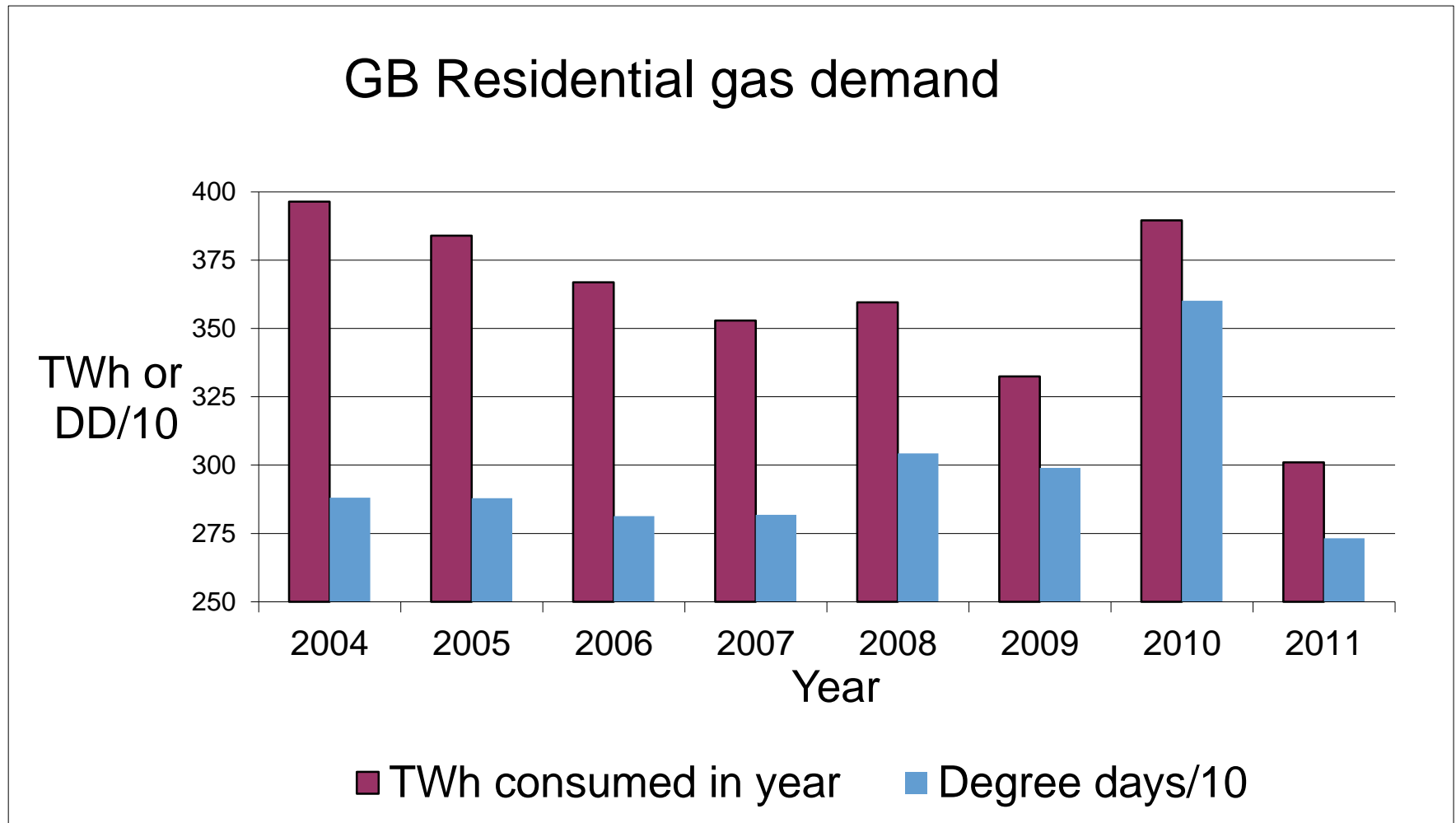
Assumes an underlying growth in electricity demand for households of 1.4% (this was the historic average over the 20 years prior to 2005)

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



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



Is there any evidence that EEOs work? - 1

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? - 2

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