

EEOs Key Principles & Danish Case Study

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About the Regulatory Assistance Project (RAP)

RAP is a global NGO providing technical and policy assistance to government officials and agency staff on energy and environmental issues. **RAP senior staff are former regulators, government officials or senior energy policy advisors**, and RAP's work is **funded exclusively by foundations and government agencies**.

RAP has worked in more than 20 nations and 50 provinces and states. RAP's European offices are headquartered in Brussels, with a small office in Berlin.

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- 1) What are and how do EEOs work?
- 2) EU experience to date
- 3) Why do Governments like EEOs?
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The Confusing Nomenclature

EEOs = Energy Efficiency Obligations

WCs = White Certificates (sometimes means 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, quality, consumer education, smart metering and tariff reform.

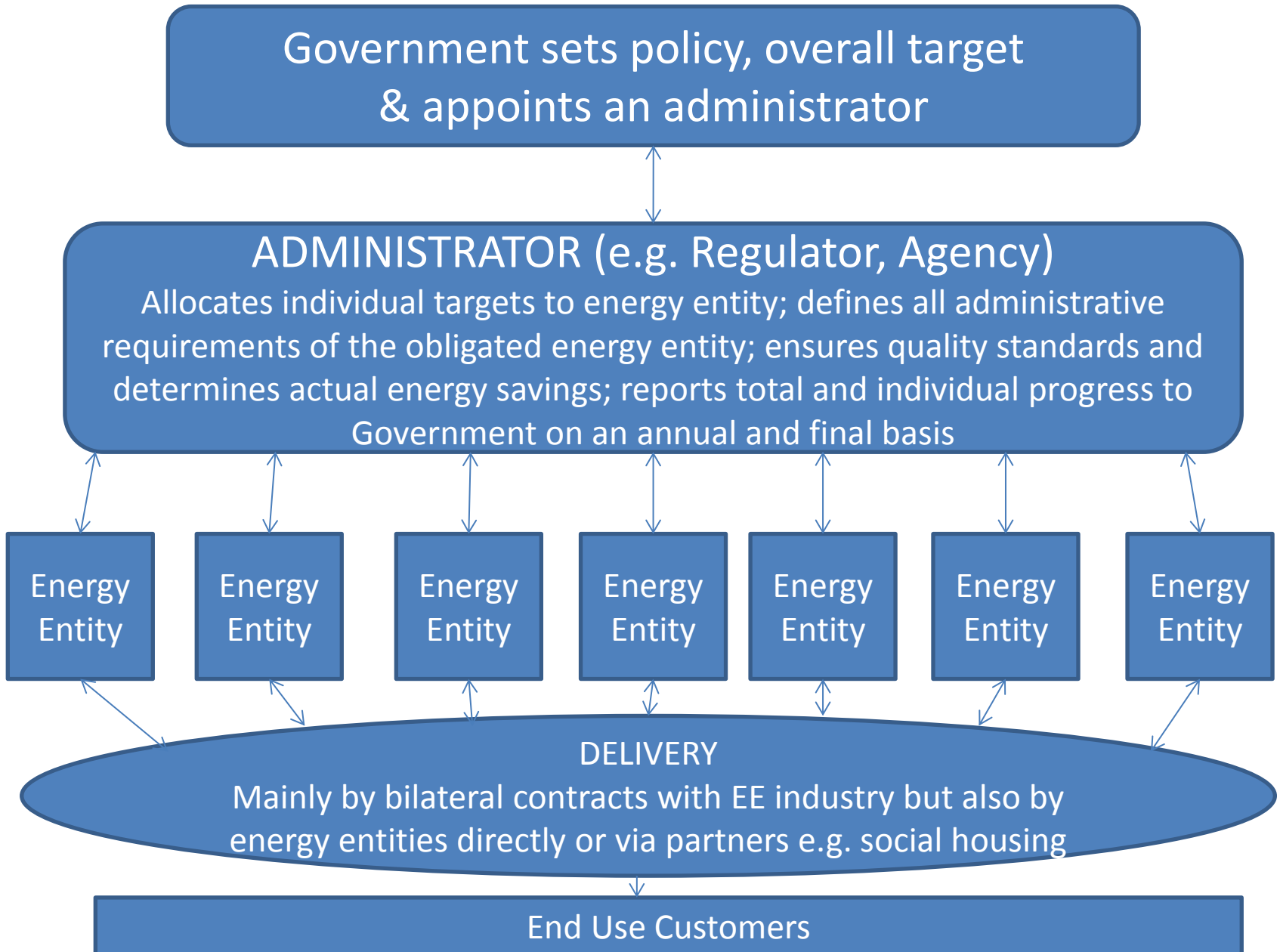
How do EU EE Obligations Work?

- 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 independently established energy saving values (known as deemed or ex ante savings)
- Monitoring and verification becomes 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** *Portugal*
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 provides subsidies, end customers, landlords, charities, manufacturers etc.)
- Cost of energy company marketing, sales, reporting, planning etc. (in GB estimate ~18% of their direct subsidy 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 saving values (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, consumer energy saving benefits alone far exceed their costs (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

WCs – who can earn & trading

- In all EEO schemes, a WC for energy savings validated by the EEO administrator is awarded
- Design of EEO determines who generates WCs i.e. can non-obligated parties earn WCs in their own right (only in Italy and very limited in France)
- Trading of WCs varies greatly by country
- Common for WCs to be traded between obligated parties
- In Italy, 2/3rd of WCs are still initially contracted bilaterally; in France <4% from non-obligated parties

2) Experience of EEOs in Europe

Contents

- For 5 longest running EU EEOs show the variety of approaches
- Newest EEOs
- Why EEOs aimed at households/small organisations are better than an energy or carbon tax for saving energy

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	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 since 2011 voluntary EEOs on all major energy retailers and importers of road transport fuels; all end use sectors eligible; Irish Energy Agency oversees;
- Poland WCs 2013-16 on electricity, natural gas and heat retailers; open tender for WCs which can be traded in market; 80% WCs from end use sectors (all eligible); Energy Regulator oversees; too complicated - less than 4% expected energy savings in 1st tender
- Austria since 2010 voluntary EEOs on electricity, gas and oil retailers and district heating; law obligating EEOs expected; residential & public end use sectors eligible; Austrian Energy Agency oversees;
- Slovenia 2011 EEOs on electricity, gas, oil retailers & district heating; either contribution to Ecofund or direct action (size)

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 target by 1.1%
- Function in both liberalised energy markets and also where they target monopolistic segments; all EEOs need continuous updating & effective quality standards

Observations on EEOs in the EU - 2

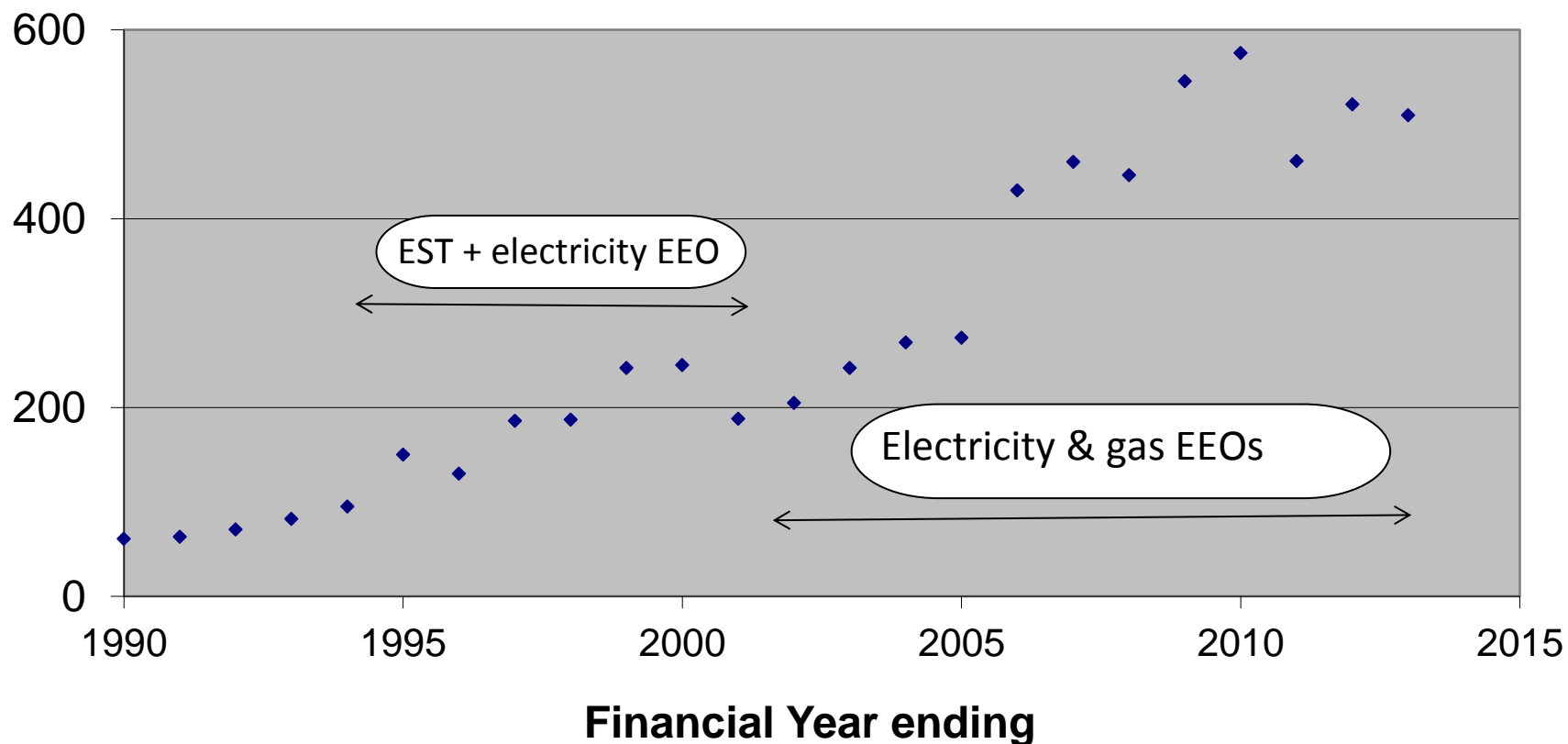
- Started in regulated electricity companies; expanded to include natural gas; but now on **non-regulated energy companies** in DK, FR, AT & IE without problems
- France is pioneering (Ireland followed in 2012) an EEO on oil importers of road transport fuels; to date oil importers meeting target through residential end use energy savings (both countries); <1% of savings in France from transport
- 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

3) Why do Governments like EEOs?

- Clearly they do as all the major countries with EEOs have expanded them in recent years (Dk, It, Fr, UK)
- Can utilise technical expertise of energy companies
- Proven deliverer of energy savings & NOT part of public expenditure
- Can dramatically increase EE activity
- Many other non-end use benefits
- Among the most cost-effective policy options for sustainable energy deployment

Importance of GB EEOs for Insulation

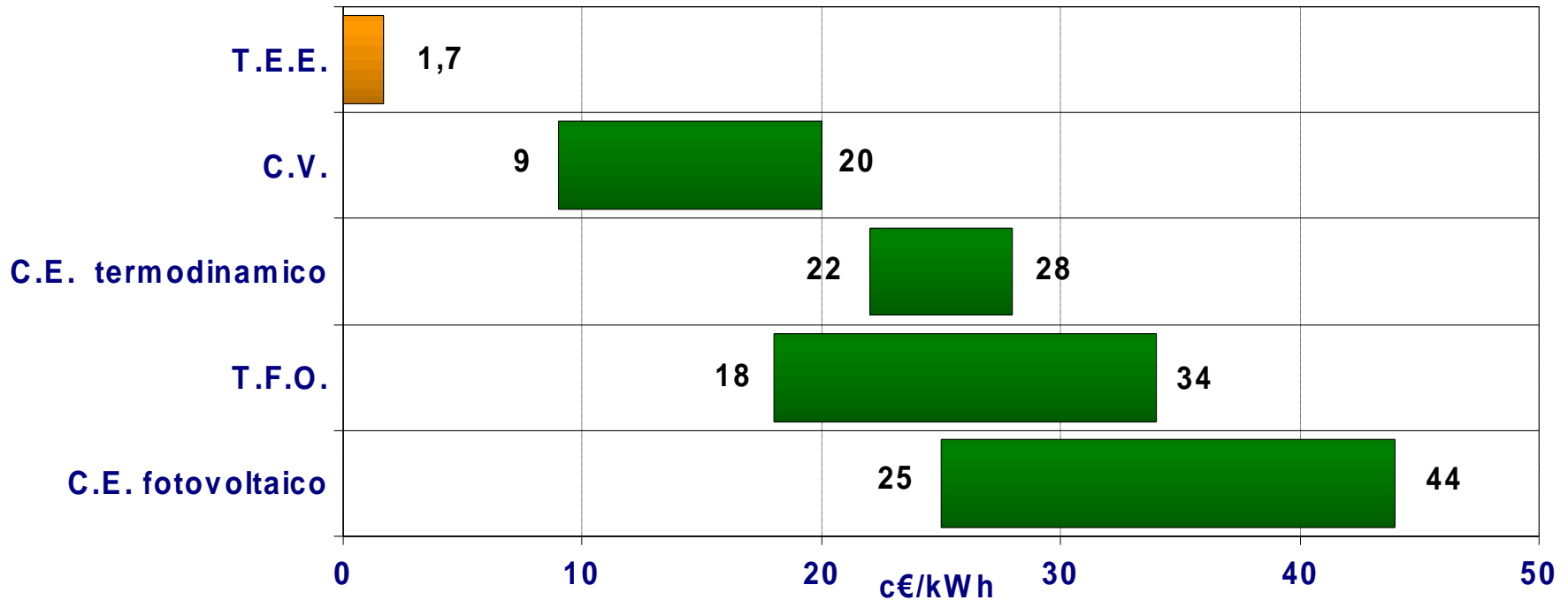
Thousands of CWI per year



GB EEO top 10 measures in 4.75 years (CERT) (source Ofgem = 95.8% of all savings)

Energy Efficiency Measure	Total number of measures installed	% of total CO2
Cavity wall insulation	2,568,870	27.7%
Professional Loft Insulation	3,897,324	25.8%
CFLs	303,952,610	18.4%
DIY Loft Insulation	2,821,275	11.0%
Shower regulators	9,653,441	4.2%
Fuel switching	108,516	2.6%
Window glazing over Building Regulations	34,590,263	1.9%
TVs	30,482,662	1.6%
Standby savers	4,926,715	1.4%
Real time displays	2,999,981	1.2%

Italian comparison with other sustainable options (source AEEG)



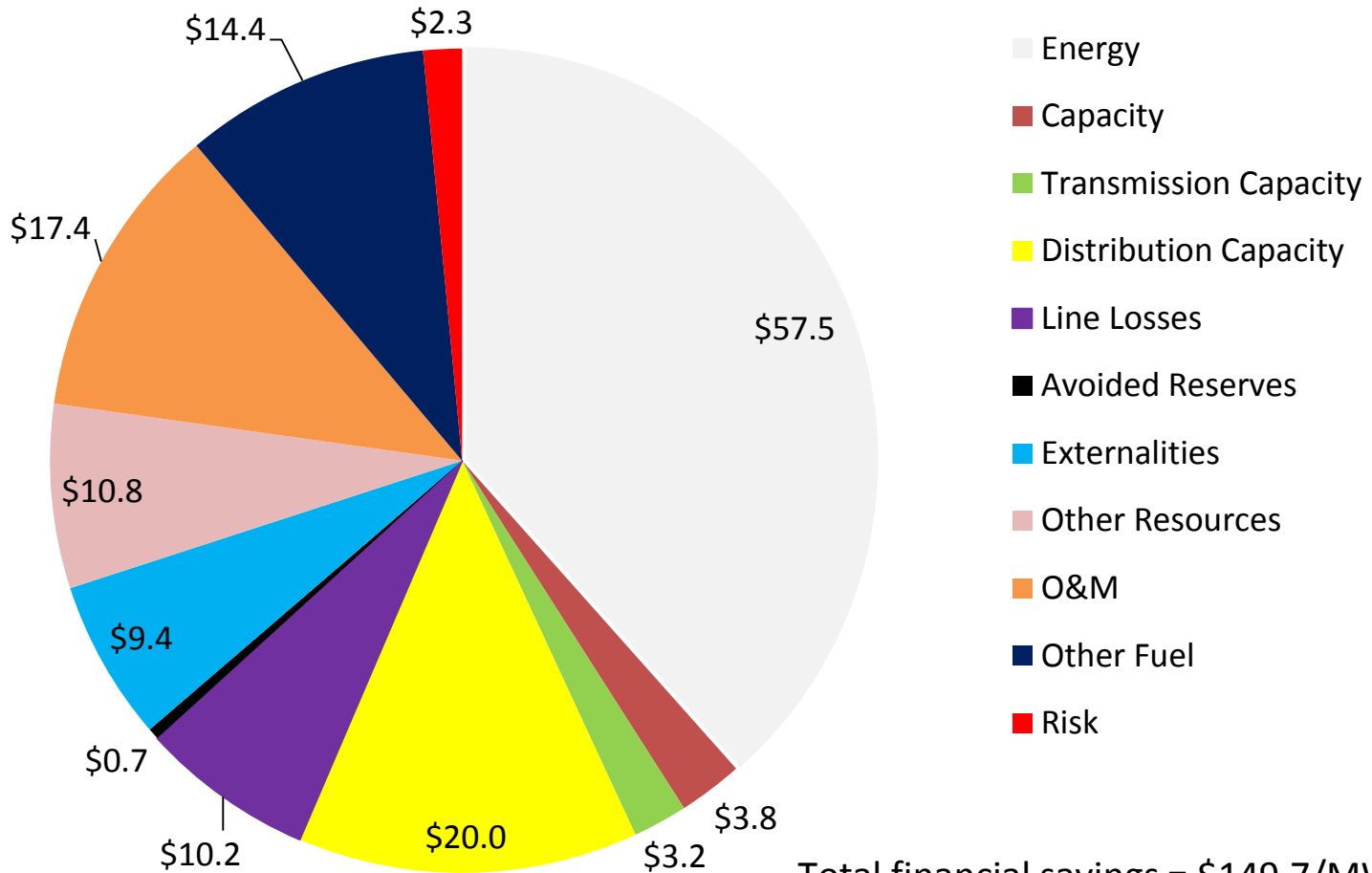
The average cost of the Italian WCs in the period 2005-2009 is equal to 1,7 c€/KWh to be compared with the above incentive mechanisms delivering similar environmental benefits (e.g. green certificates and other types of feed-in tariffs for renewable electricity generation)

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

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

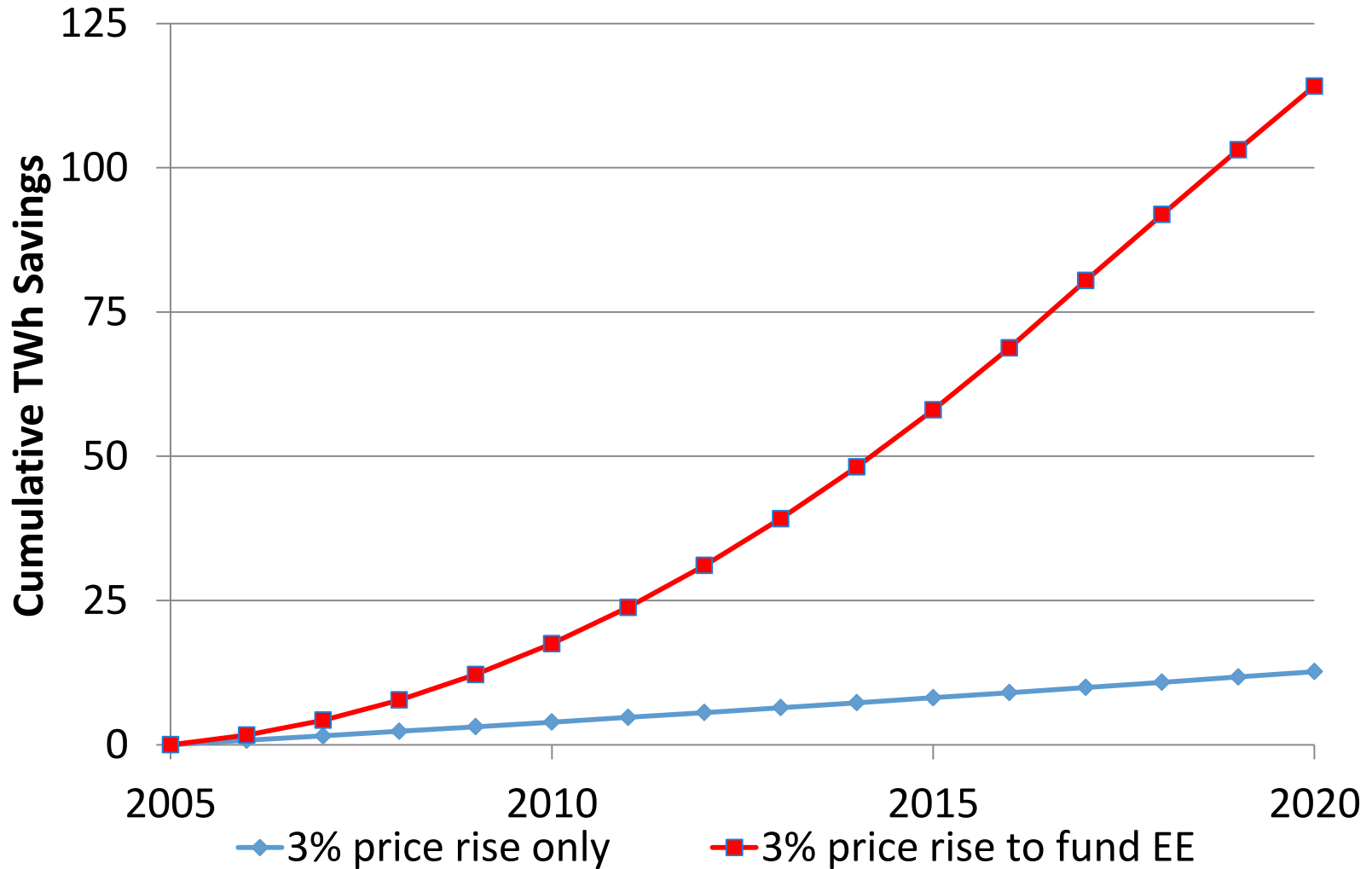
Calculation allows for the fall off over time of electricity savings from the shorter lived measures; it also corrects for comfort (increased amenity) – important for insulation measures

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) (not sensitive parameter)

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 the price rise



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

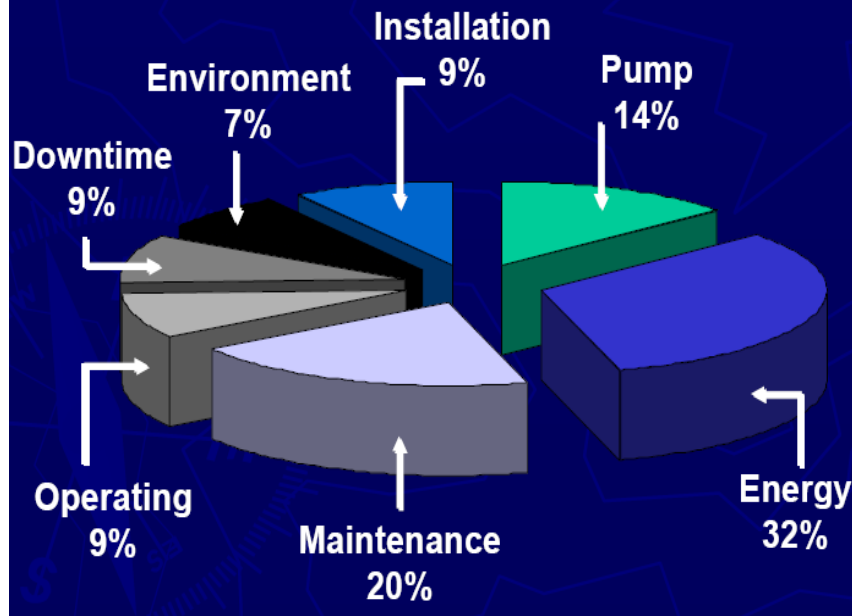
“EEOs have kick started market for energy services”

- 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