Joint European Commission and eceee seminar on Energy Efficiency Obligations

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Designing and effective EEO: lessons learned from the Italian experience

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Outline

1. (Brief history)
2. Governance
3. Key design features
4. Main results
5. Lessons learned



Brief "hystory"

- **Energy efficiency obligation** on electricity and gas DSOs: "concept" introduced in 1999 and 2000 (but no targets yet)
- **Legislative framework** introduced in **2001;** two core elements:

EEO + certificates trading

- **Regulatory framework** developed throughout **2002-2004** via consultation of all interested parties
- Limited revision of the legislative framework in 2004
- **Fully operational** since **January 2005**
- **Extended and revised** in **December 2007**
- **Additional revisions foreseen** in 2008 (implementation of Directive 2006/32/CE) and 2011 (implementation of RES Directive): e.g. longer time horizon, additional/different obligated parties, different sectoral coverage, governance; yet to be defined

Governance/1
core elements to be defined

EEO	Trading
▪ targets ▪ obliged actors ▪ eligible sectors and measures ▪ measurement and verification rules and procedures ▪ enforcement rules ▪ (cost recovery mechanism, if any)	▪ elible actors ▪ trading options ▪ trading rules and procedures
Governance (parties involved in the regulation and administration of the scheme)	

Governance/2
key actor involved

- **Government: core elements** (e.g. targets, obligated and eligible parties, apportionment criteria, eligible measures, trading options, general enforcement and cost-recovery criteria; crediting lifetime)
- **Regulator (AEEG):**
  - **technical and economic regulation** (e.g. measurement and verification of energy savings, qualitative requirements; cost-recovery, sanctions, approval of trading rules)
  - **day-to-day administration and enforcement** (e.g. project evaluation, with technical support of ENEA; energy savings certification; checks and inspections; annual compliance check with the targets; legal cases); in the future GSE
  - **monitoring of results and proposals to the Government** in order to enhance its effectiveness via legislative actions (Annual Report; Interim Statistical Reports)
- **Electricity Market Operator (GME S.p.a.):**
  - **Certificates (TEE) issuing**
  - administration of the **TEE Registry** and of the **trading platform** (spot market)
  - proposals on **trading rules** to AEEG
- **Energy Agency (ENEA): from mid 2011 also involved in the development of deemed savings, to be approved by Government (MSE and MATT)**

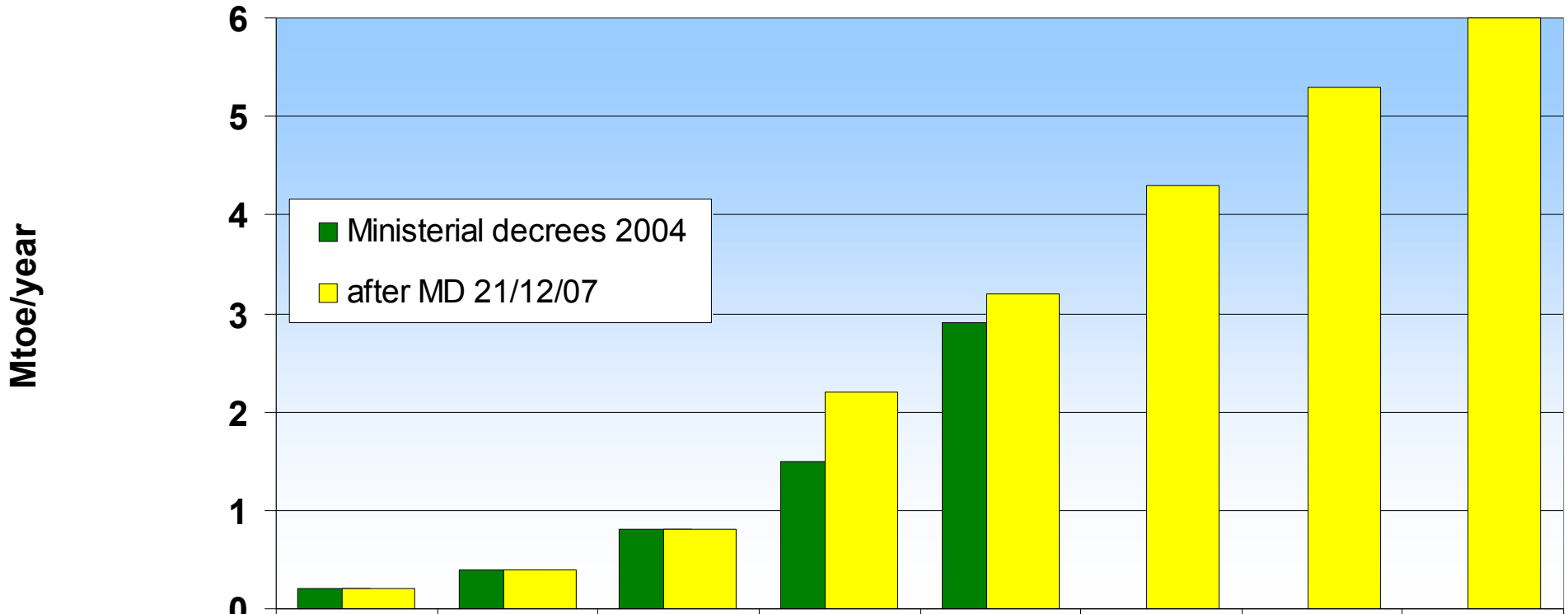
EEO elements

- **Targets:** primary energy savings (toe); annual and *ex-post*; first regulatory period 2005-2009, extended till 2012 for the time being; cf. following slide
- **Obliged parties:** electricity and natural gas DSOs > 50.000 customers as of 31 December of year t-2 (previous threshold: 100.000 customers); individual target proportional to their market share (market served by obliged parties)
- **Scope:** all end-use sectors(*); only "hard" measures (e.e. technology changes (**)); banded obligation in the initial phase (50% of target from electricity and natural gas savings)
- **Enforcement:** financial penalties for non compliance with the target; no unitary penalty defined ex-ante; grace period of one year if compliance at least 60%; otherwise the penalty does not cancel the obligation;
- **Funding:** cost-recovery mechanism for obligated parties financed via electricity and natural gas tariffs (€/toe saved, updated annually) → afternoon session

(*) **Except: PV< 20KW; from mid-2011 reduction in network losses may count towards the target, but no tariff contribution**

(**) **Only exception: information campaigns coupled with "hard" measures; cf following slides**

National targets



	2005	2006	2007	2008	2009	2010	2011	2012
Ministerial decrees 2004	0,2	0,4	0,8	1,5	2,9			
after MD 21/12/07	0,2	0,4	0,8	2,2	3,2	4,3	5,3	6

Increase in targets **Extension of targets**

Trading elements

- **Eligible parties (other than obliged DSOs):** DSOs < threshold, companies controlled by DSOs, energy service providers, big energy users + market intermediaries

- **Certificates trading:**
  - central element
  - no authorisation needed
  - spot market + OTC;
  - 4 types of certificates; banking
  - electronic Registry, directly linked with the AEEG information system for administering projects evaluation
  - electronic trading platform (one session per week; real time data)
  - rules and procedures to access, to guarantee security of market deals, etc.
  - full trasparency on volumes and prices (spot market and OTC)

Summary: options to comply with the EEO

- **Obliged DSOs have three main options**

1. **Carry out energy savings measures on own customers, other DSOs' customers, in other end-use sectors (also working with third parties)**

2. **Purchase white certificates by third parties**

3. **Do nothing and pay the sanction**

M&V approach

- **Ex-post accreditation of annual savings for 5 years (8 years for heating and A/C; 10 years for high efficient CHP)**

- **3 types of M&V methods:**
  1) **deemed** savings (no on-field measurement; pre-defined annual energy savings/installed unit= toe/year/unit); include qualitative requirements
  2) engineering **estimates** (partial on-field measurement; pre-defined evaluation algorithm, with pre-defined values for some parameters while others have to be measured case by case)
  3) complete energy **monitoring** plans (subject to pre-approval)

- **Information campaigns eligible only if associated to "hard" measures**
  - **so far: 5% "premium" on the amount of certified energy savings;**

- **No use of uplifts (except for the above premium)**

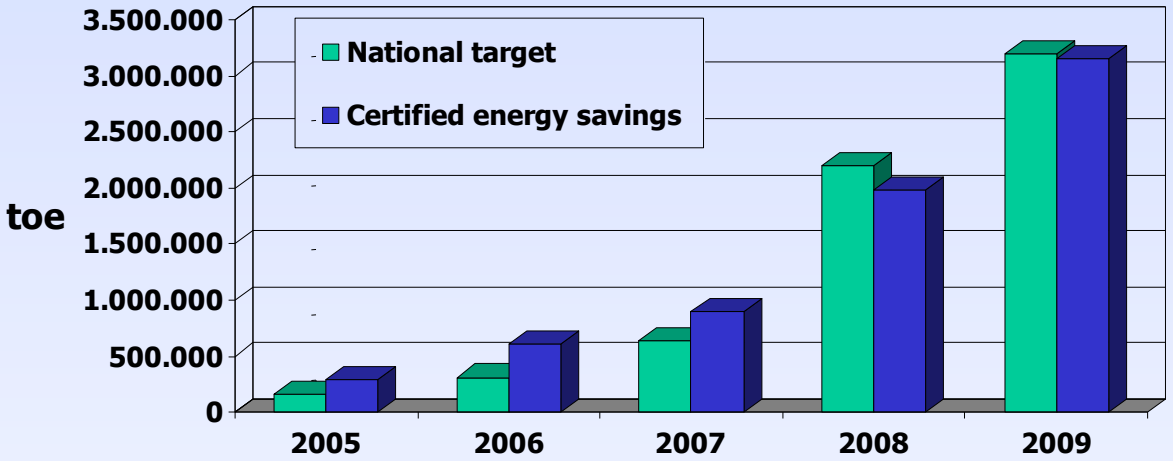
- **Only "additional" savings are considered,** i.e. **over and above spontaneous market trends and/or legislative requirements**
  - periodic updating of deemed saving and engineering formula, to be applied according to a pre-defined schedule ("time-windows")

Main results and lessons learned

Results - 1

(completed five years)

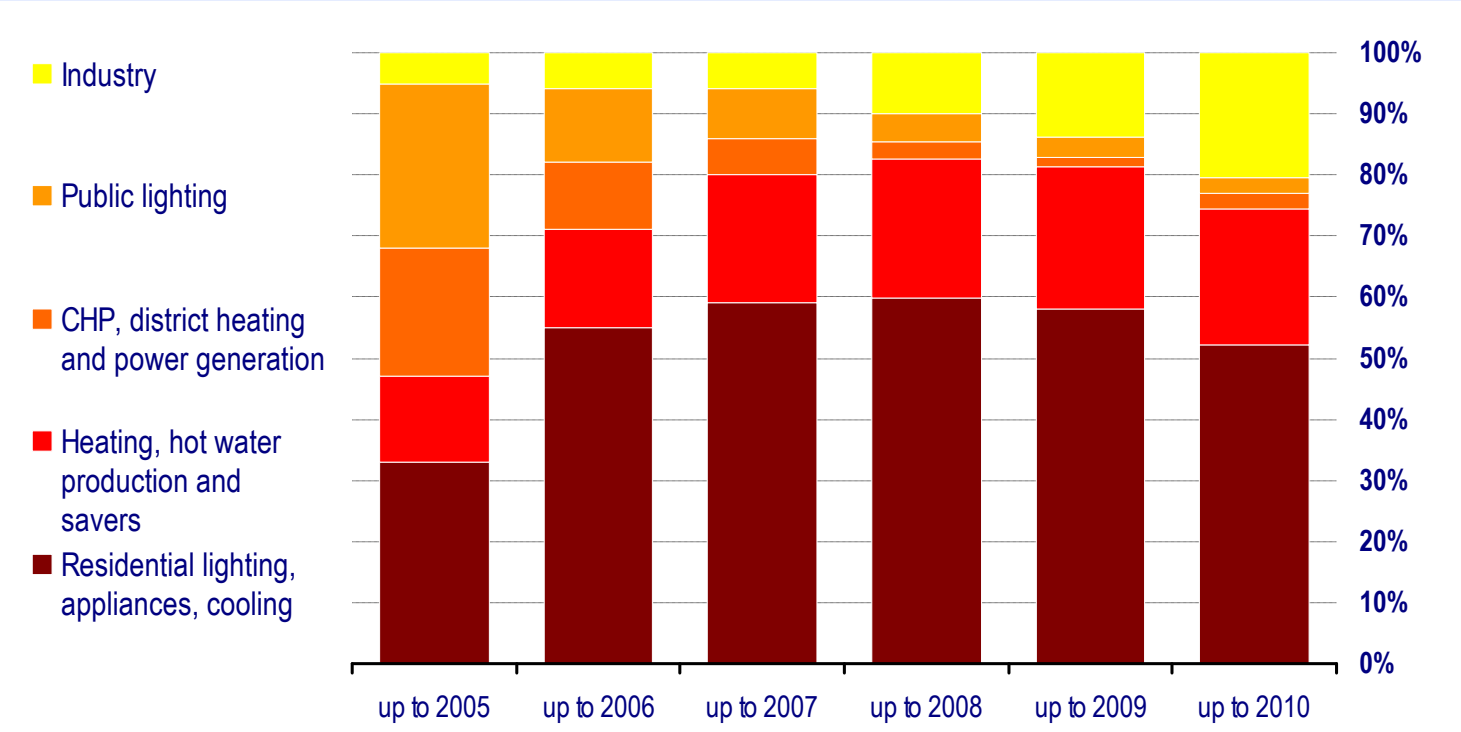
- **6,6 million toe saved against a target of 6,5 million (2005-2009):**



- Decreasing supply surplus
  - ✓ annual targets increased from year to year, particularly in the last two years
  - ✓ the increased volume of accredited TEE has not been sufficient
- **2010 data confirm difficulties to meet future targets (cf. following slides for a discussion)**
- **81,4% delivered by energy service providers,** 4,9% by large consumers (2010 data)
  - ➢ heterogeneous ESPs sector
  - ➢ strong concentration (70% owned by 15 ESPs; 231 registered and "active")

Results - 2

- **68% electricity savings**
- **77% of savings delivered via projects for which simplified M&V methodologies exists (mostly deemed savings)**
  - share of savings delivered via industrial projects, for which complete monitoring plans have to be implemented, is constantly increasing (from 4% to 23%)



Results - 3

- Costs and benefits ➔ AFTERNOON SESSION
- So far it has worked in delivering energy savings, in a cost effective way, mainly via "mass market" measures and technologies that are already cost-effective, and via energy service providers
- The market has been important to highlight market disequilibria and the need for corrective actions as well as a source of information on costs and market strategies
- We have learned how to measure energy savings (development of M&V tools and technical competences)
- It has given visibility and concreteness to energy savings making them measurable and eligible for support

Main lessons learned/1

1. Careful target definition is crucial

M&V rules as well as additional projects and products requirements also influence the stringency of the target

- ✓ e.g. additional savings versus full savings; *ex-post* versus *ex-ante*; crediting lifetime versus technical lifetime (cf. following slides)
- ✓ e.g. in 2008 AEEG has revised the conversion factor toe/KWh: the new factor is 15% lower than the old one ($0,187*10^{-3}$ vs $0,22*10^{-3}$ toe/kWh)
- ✓ AEEG regularly updates deemed savings and engineering algorithms to guarantee additionality and take into account market and legislative developments; projects and products requirements are also updated

  ➔ *e.g following 2 slides*

- **1st release (2003):**
  - unique value adopted = 14.6 10^{-3} toe/CFL/year
  - CFLs could be granted for free
- **2nd release (2008):**
  - saturation degree considered (estimated at 78% for E27 lamps and 58% for smaller E14 lamps),
  - specific savings defined for different types of CFLs,
  - minimum product requirements introduced (technical life >10,000 hrs, minimum lumen/W ratio, etc.)
  - project requirements introduced to avoid fraudes and abuses

RSN [10^{-3} tep/anno/UFR]	Attacco	Potenza nominale (P) e flusso luminoso (ϕ) della lampada fluorescente
0,730	E14	$P \leq 9W$, $\phi \geq 386 \pm 3\%$ lumen
3,079	E14	$P \leq 11W$, $\phi \geq 660 \pm 3\%$ lumen
1,613	E27	$P \leq 11W$, $\phi \geq 660 \pm 3\%$ lumen
4,712	E14	$P \leq 15W$, $\phi \geq 874 \pm 3\%$ lumen
2,468	E27	$P \leq 15W$, $\phi \geq 874 \pm 3\%$ lumen
3,949	E27	$P \leq 20W$, $\phi \geq 1246 \pm 3\%$ lumen
3,801	E27	$21W \leq P \leq 23W$, $\phi \geq 1246$ lumen

- **3rd release (2009, following European Regulation no. 244/09/CE):**
  - CFLs >15 W are no more eligible for TEE due to the phase-out of incandescent lamps >75 W
  - CFLs classification is made more detailed
  - product requirements are updated according to those indicated in the European Regulation
- **No more eligible from end of January 2011**

RSN [10^{-3} tep/anno/UFR]		Potenza nominale (P) e flusso luminoso (Φ) della lampada
Attacco E14	Attacco E27	
0,471	0,247	P = 5W , $\Phi \geq$ 214 lumen
0,536	0,281	P = 6W , $\Phi \geq$ 262 lumen
0,601	0,315	P = 7W , $\Phi \geq$ 310 lumen
0,666	0,349	P = 8W , $\Phi \geq$ 357 lumen
0,730	0,383	P = 9W , $\Phi \geq$ 357 lumen
1,728	0,905	P = 10W , $\Phi \geq$ 533 lumen
3,079	1,613	P = 11W , $\Phi \geq$ 660 lumen
3,455	1,810	P = 12W , $\Phi \geq$ 714 lumen
3,852	2,018	P = 13W , $\Phi \geq$ 767 lumen
4,272	2,238	P = 14W , $\Phi \geq$ 821 lumen
4,712	2,468	P = 15W , $\Phi \geq$ 874 lumen

Main lessons learned/2

2. If the EEO is raised on (unbundled) DSOs:

- ✓ coupling the obligation with a **trading** mechanism and the consequent choice of eligible (non obligated) parties are key
- ✓ the **structure of the distribution market** (and the choice of the EEO's threshold) impact on the scheme's outcomes
- ✓ the design of the **cost-recovery mechanism** is crucial since DSOs operate in a regulated market, and asks for additional regulatory choices ➔ AFTERNOON SESSION

Main lessons learned/3

3. **Sectoral scope: a wide scope contributes to the cost-effectiveness of the scheme, particularly when the EEO is coupled with a certificates trading; but trade offs may exist (e.g. higher complexity and administration costs) ➔ AFTERNOON SESSION**

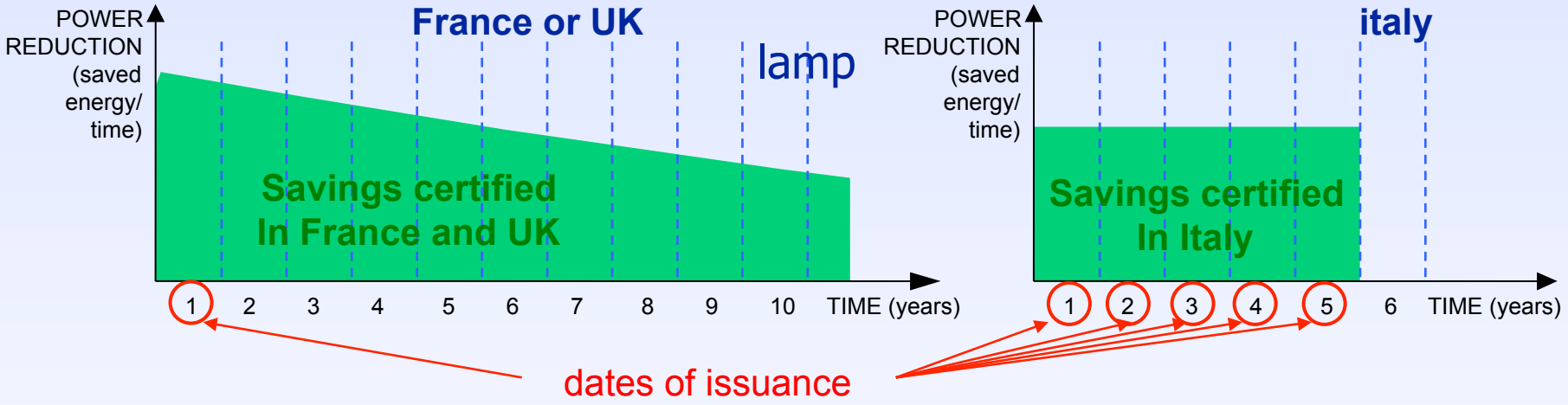
4. **The choice to allow for some form of trading drives the design of the EEO component (e.g. scope in terms of eligible sector, measures and third parties). In turn, there are core elements of the EEO that may impact on trading and its outcomes: e.g. the cost-recovery mechanism inevitably affect market prices and dynamics; a pre-defined penalty may act as a price cap ➔ AFTERNOON SESSION**

Main lessons learned/4

4. **M&V is key to the feasibility, robustness and cost-effectiveness of the EEO, and it is a key driver of the projects breakdown ➔ following 2 slides**
   - M&V relies on e.g. availability of independent data, labelling schemes or other efficiency indexes to held identifying the baseline
5. **But M&V is not sufficient: qualitative project requirements and careful validation are also key to ensure real energy savings and customer protection**
6. **Interactions with other policy tools are crucial**

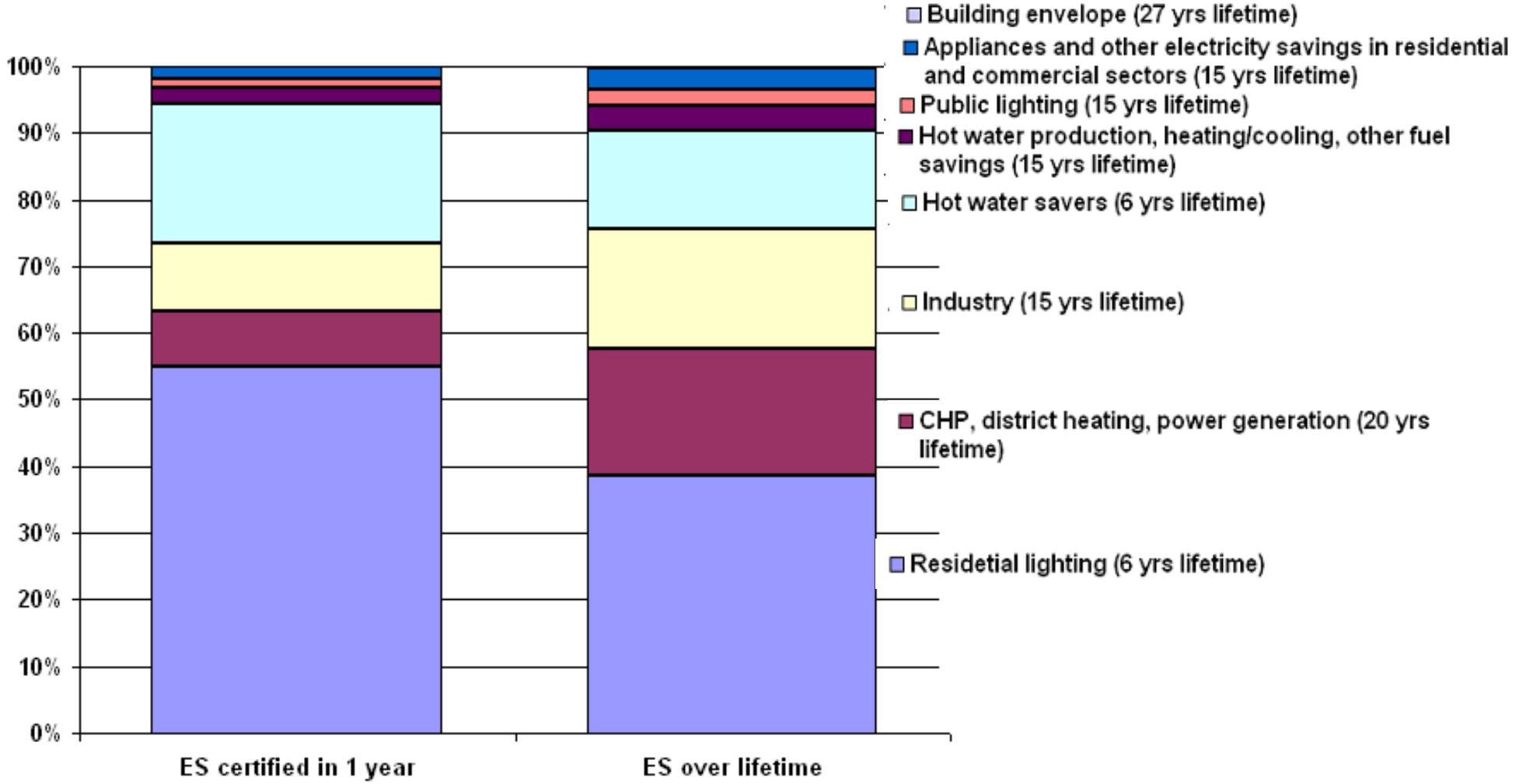
Effects of different accounting rules

Current M&V rules imply that two measures with the same amount of yearly certified savings are granted the same amount of incentives, regardless the difference in their technical lifes; for example a CFL and a “class A+” refrigerator could get the same amount of TEEs over 5 years even though the technical life of a refrigerator can be at least 2 times that of a CFL.



Effects of different accounting rules

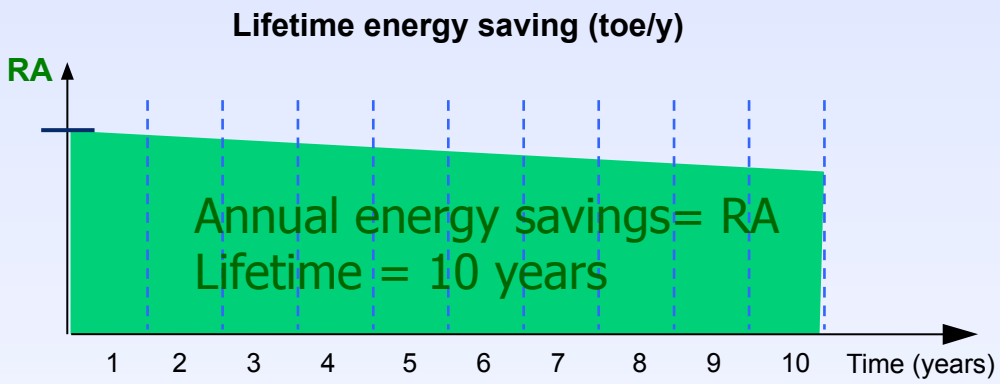
Project breakdown would change considerably with a lifetime approach; the graph shows the (static) result over one year (e.g. 2009)
It would change even more with a dynamic vision



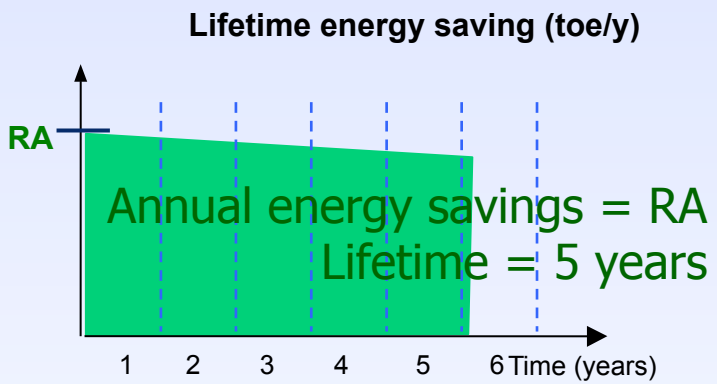
Promoting long(er) lifetime measures

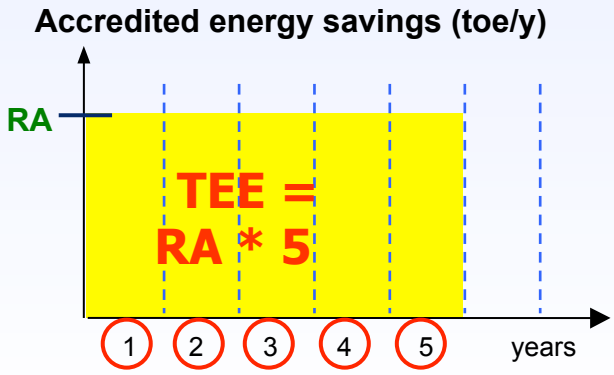
With current accounting rules:

Measure 1 (water-heater replacement)



Measure 2 (standy-by stop)





Proposed uplift factor τ for accredited annual energy savings that takes into account the lifetime of different energy saving measures

Measure lifetime

Discount factor

$$\tau = \frac{\sum_{i=0}^{T-1} (1-\delta)^i}{U}$$

Crediting lifetime

$$\tau = \frac{\text{Lifetime energy savings}}{\text{Currently accredited energy savings}}$$

N.	Categoria	U [anni]	T [anni]	δ [%]	τ [-]
A	Generazione o recupero di calore per usi di processo industriale + cogenerazione per usi di processo	5 10	**20**	3%	**3,0** **1,5**
B	Sistemi di azionamento o generazione di energia elettrica da recuperi in ambito industriale	5	**15**	3%	**2,4**
C	Generazione di calore/freddo per climatizzazione e produzione acqua calda nel settore civile + cogenerazione nel settore civile	5 10	**15**	3%	**2,4** **1,2**
D	Illuminazione pubblica e privata	5	**10**	3%	**1,8**
E	interventi sull'involucro edilizio finalizzati alla riduzione dei fabbisogni di illuminazione artificiale	5	**30**	3%	**4,0**
F	Elettronica di consumo	5	**5**	3%	**0,9**
G	Elettrodomestici per il lavaggio e per la conservazione dei cibi	5	**15**	3%	**2,4**
H	Edilizia passiva e interventi sull'involucro edilizio finalizzati alla riduzione dei fabbisogni di climatizzazione	8	**30**	3%	**2,5**
J	Riduzione dei fabbisogni di acqua calda	5	**5**	3%	**0,9**

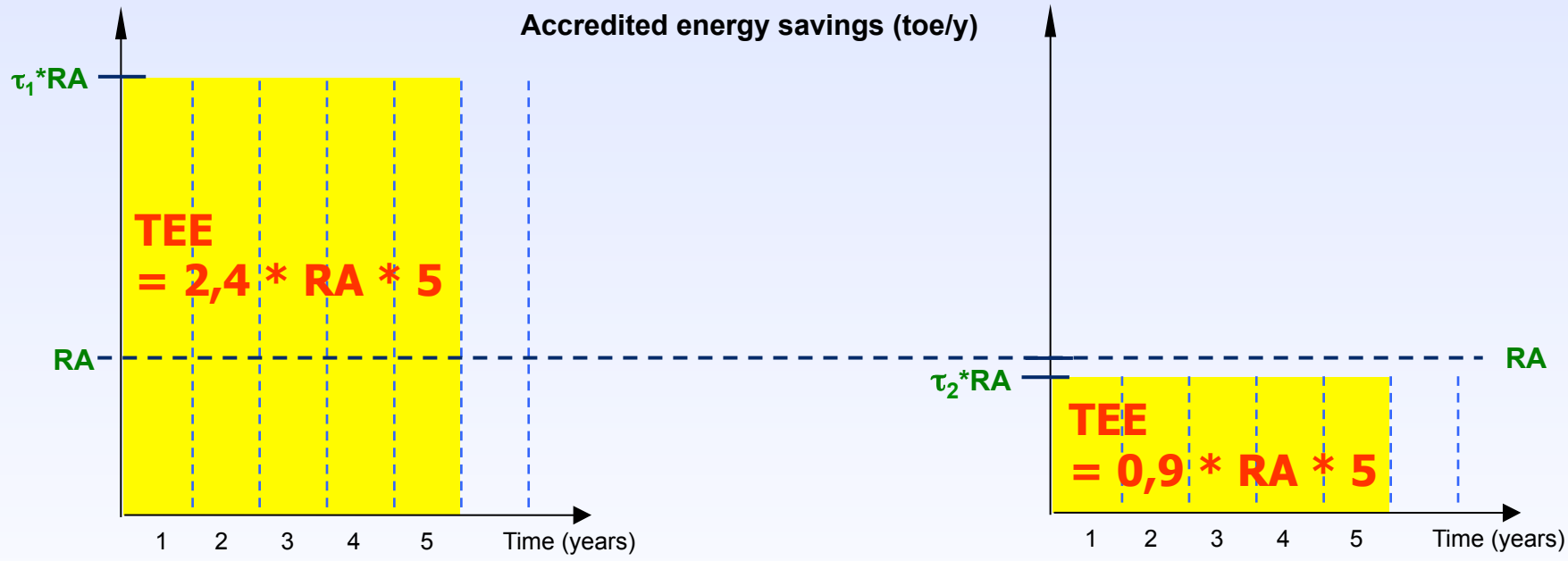
With the proposed accounting rules:

Measure 1 (water-heater replacement)

$\tau = 2,4$

Measure 2 (standy-by stop)

$\tau = 0,9$



Appendix

M&V methodologies

examples of measures evaluated via monitoring plans

- Restructuring of the process lay-out in order to reduce the final energy need
- Replacement of combustion devices for heat production
- Replacement of big electric drives
- Application of variable speed drives to pumps, compressor, etc.
- Application of renewable energy sources for heat production (mainly biomass and vegetal oils)
- Retrofit of cooling systems
- Waste heat recovery and free cooling systems
- Application of CHP to industrial processes.

M&V methodologies

coverage of approved deemed savings and engineering algorithms

- **Buildings** (wall insulation, double glazing, solar power, central heating and cooling)
- **Domestic equipment** (white appliances, air conditioners, boilers, heat-pumps, efficient shower-heads, aerated flow breakers, stand-by stop)
- **Industrial equipment** (motor drives, variable speed drives, natural gas decompression)
- **Private and public lighting** (retrofit or new street luminaries, light flow regulators, LEDs for cemeteries and traffic lights)
- **CHP plants and district heating systems**

Under study after first round of consultation

- energy efficient laser printers
- home broadband access gateways
- energy efficient UPS (Uninterruptible Power Supply) systems