

**White Certificates Conference
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The Italian experience with white certificates

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This is not an official document of the Italian Regulatory Authority for Electricity and Gas

Brief history

- ◆ **Energy efficiency obligation (EEO)** on electricity and gas DSOs: “concept” introduced in 1999 and 2000 (but no targets yet)
- ◆ **Legislative framework** introduced in 2001; two core elements:
EEO + **energy efficiency certificates (TEE) 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** (first regulatory period 2005-2009)
- ◆ Extended to 2012 and revised in **December 2007**
- ◆ Few additional revisions in 2008 (e.g. eligible actors, sectoral and cost recovery coverage)
- ◆ Further revisions foreseen in 2011 but yet to be defined



Governance

- ◆ **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. M&V-measurement and verification of energy savings, qualitative requirements; cost-recovery, sanctions, rules concerning certificates and trading)
 - **day-to-day administration and enforcement** (e.g. project evaluation; energy savings certification; checks and inspections; annual compliance check with the targets)
 - **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** upon AEEG authorisation
 - administration of TEE **Registry** and **trading platform** (spot market)
 - proposals on trading rules to AEEG
- ◆ **Energy Agency (ENEA):** supports AEEG in **projects evaluation**; from mid-2011 also involved in the development of simplified M&V methods, to be approved by Ministry of Economic Development



EEO elements

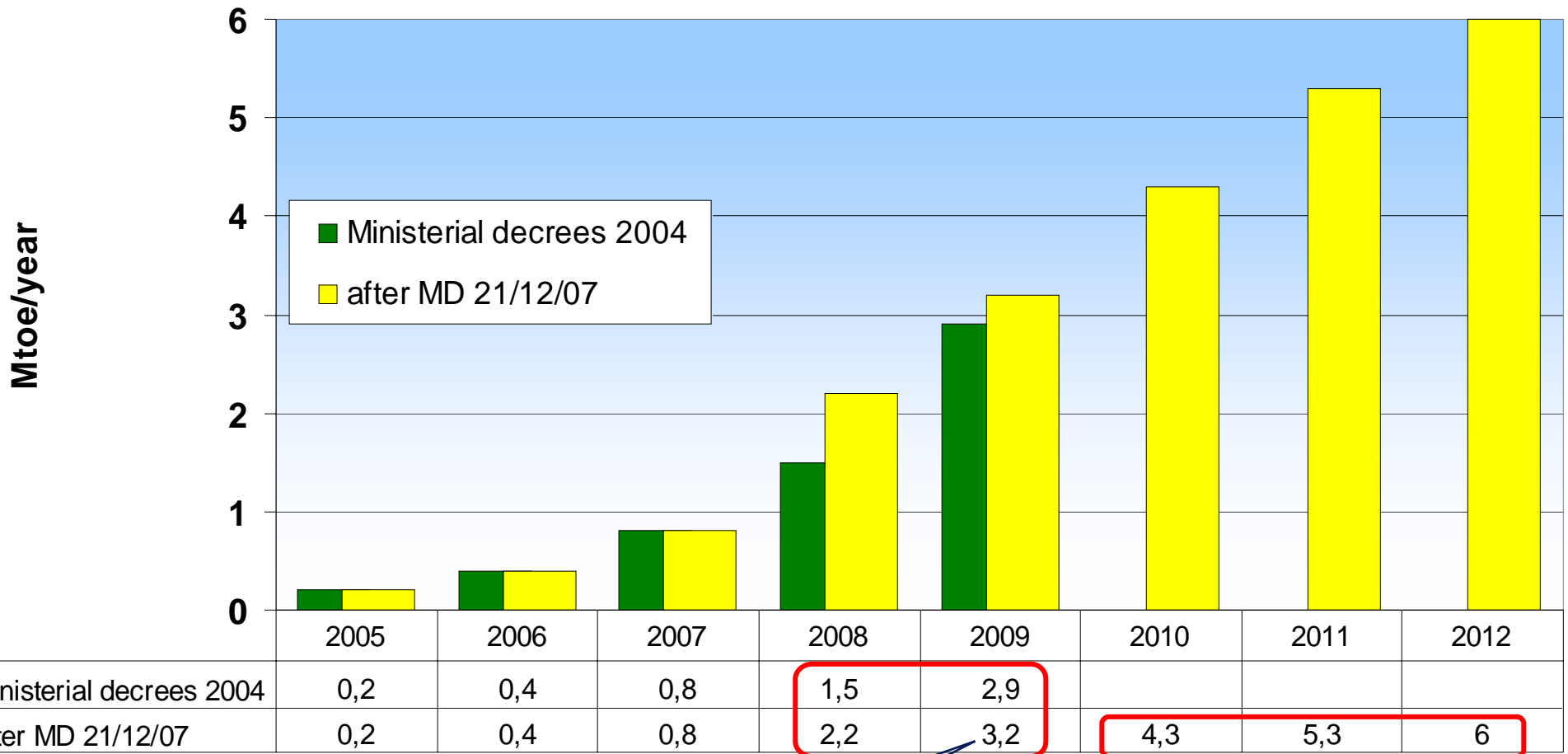
- ◆ **Targets:** primary energy savings (toe); annual and ex-post; first regulatory period 2005-2009, extended till 2012 for the time being; *cf. following slide*
- ◆ **Obligated parties:** electricity and natural gas DSOs > 50.000 customers as of 31 December of year t-2 (previous threshold: 100.000 customers); individual target proportional to own market share (market served by obligated parties)
- ◆ **Scope:** all end-use sectors^(*); only “hard” measures (e.g. 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 (maximum level so far 100 €toe)

(*) 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



Increase in targets

Extension of targets

1,8 Mtoe for electricity DSOs
 (=5,1% of distributed volumes) +
 1,4 Mtoe for natural gas DSOs
 (=3,5% of distributed volumes)



Market component

- ◆ **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
 - from 3 to 5 types of certificates
 - banking
 - electronic **Registry**, directly linked with the AEEG information system for administering projects evaluation
 - electronic **trading platform** (one session per week)
 - **rules and procedures** to access, to guarantee security of market deals, etc.
 - **full transparency** on both volumes and prices (spot market and OTC)



M&V approach – 1

main issues

- ◆ What is “special” about M&V of energy savings?
 - you have to measure the energy savings via a **comparison of the energy consumption before and after the project**
 - **in some cases** the “before the project” scenario is not known (data, new installations) and **you need to make assumptions; or you want to support only technologies more efficient than e.g. mandatory standard or market average (baseline definition)**
 - in other cases the “before the project” scenario is known, but **you need to net out** the impact on consumption trends of variables other than those on which the energy saving project have an influence
 - in other cases **measuring everything is not cost-effective** (e.g. mass-market technologies)



M&V approach – 2

AEEG approach

- ◆ **2005-2011: *ex-post* accreditation of energy savings for 5 years** (8 years for heating and A/C; 10 years for high efficient CHP). => impact on the relative stringency of targets and incentive structure cf. other national schemes.
Reformed in late 2011: lifetime savings accredited over the crediting lifetime (5 years for most measures)
- ◆ **3 types of M&V methods:**
 - 1) **deemed** savings (no on-field measurement; pre-defined annual energy savings/installed unit= toe/year/unit);
 - 2) engineering **estimates** (partial on-field measurement; pre-defined evaluation algorithm, with pre-defined values for some parameters)
 - 3) complete energy **monitoring** plans (subject to pre-approval)
- ◆ **Information campaigns eligible only if associated to specific “hard” measures**
 - **2% “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”)



M&V approach – 3

AEEG approach

- ◆ **To encourage third parties submission: guidelines and minimum requirements** for deemed savings proposals and engineering methods
- ◆ To ease the access to the system of measures for which no deemed savings or engineering method is available: diffusion of best practices and **guidelines to develop energy monitoring plans for specific types of projects**



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**

Further methodologies

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



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.



Cost-recovery

AEEG approach

◆ Cost-recovery mechanism for obliged DSOs:

- **financed via** electricity and natural gas rates
- **2005-2007: only electricity and natural gas savings; since 2008: all fuels except transport; since 2011: all fuels including transport with deemed savings**
- **up to** the occurrence of the target
- **€unit of primary energy saved => flat and technology neutral**
- **adjusted annually** according to a pre-defined formula

$$C_{t+1} = C_t \cdot (1 - e)$$

where:

C_i is the unitary allowance applied to year i [€/toe]

e is the average % increase in the prices of energy for residential customers
(electricity, natural gas and gas oil for heating)



=> increases when energy prices (i.e. the avoided energy cost) fall and viceversa, so as to stabilise the overall incentive to invest in EE



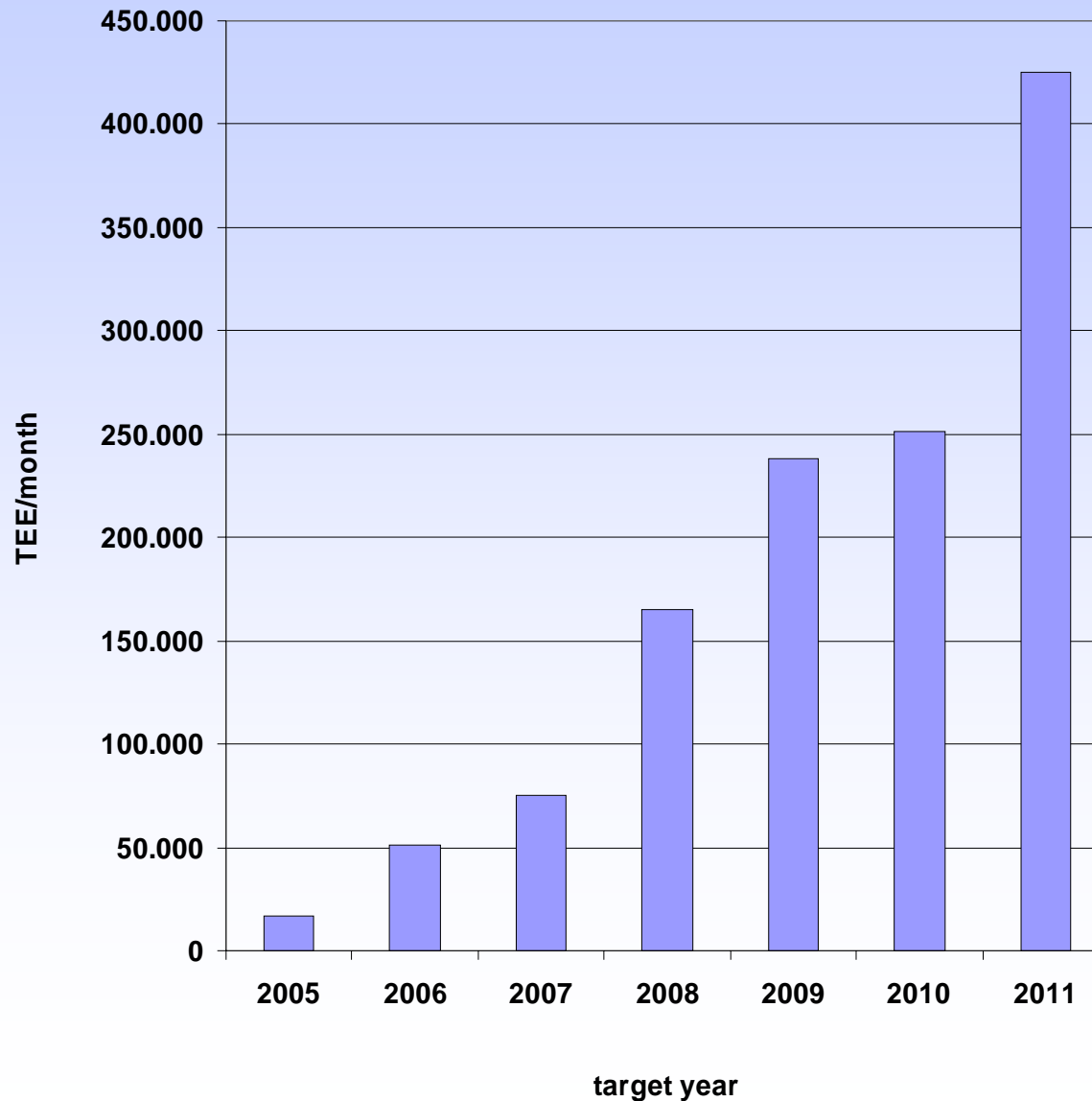
RESULTS 2005-2011^(*)

(*) Source: *Second Statistical Report on the 2011 target year of the TEE mechanism*, forthcoming (www.autorita.energia.it)

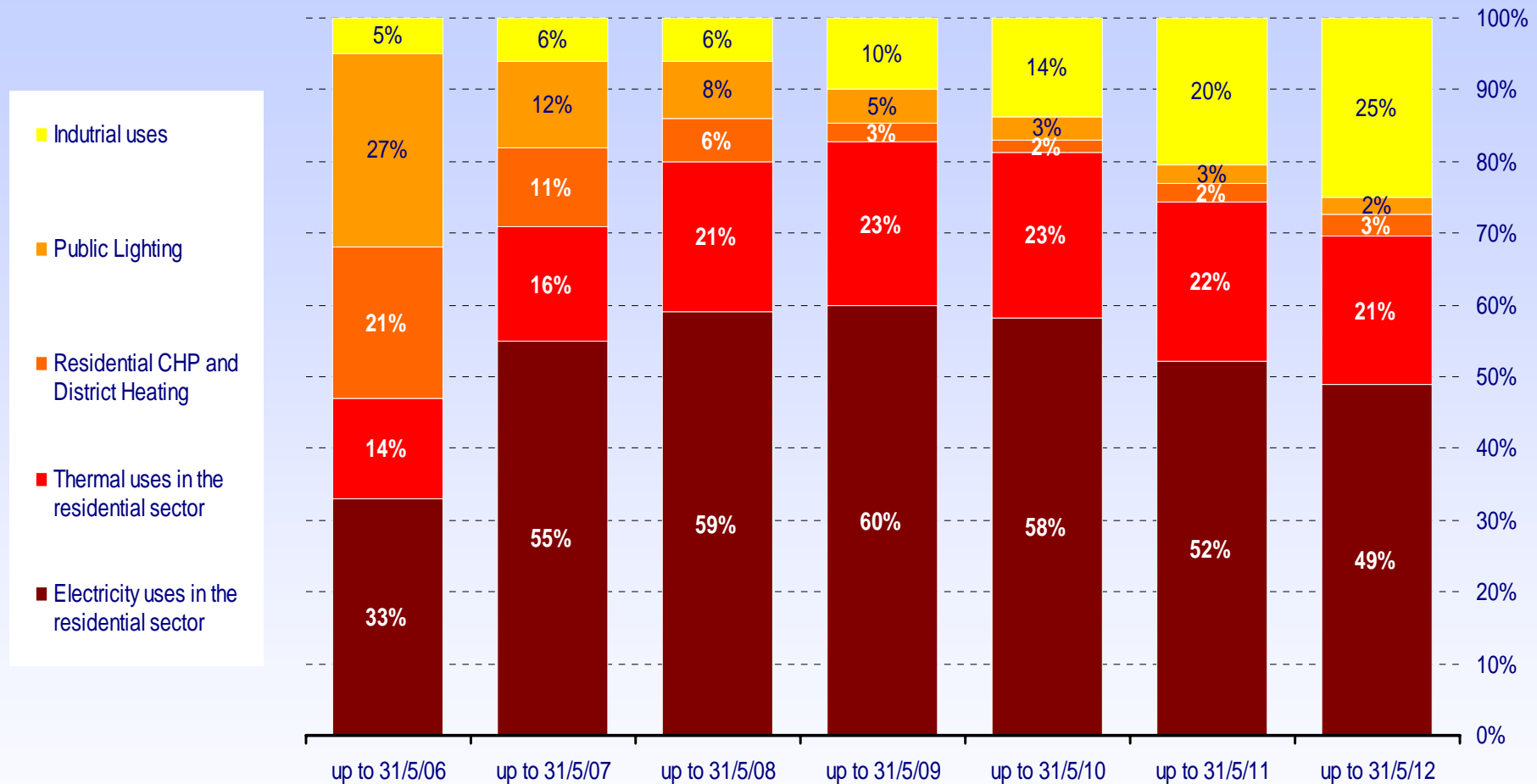


Average energy savings rate

Monthly TEE emissions rate



Sectoral breakdown



➤ **The share of energy savings delivered in the industrial sector is constantly increasing. This means that the mechanism is gradually promoting investments in long(er) lifetime saving measures**



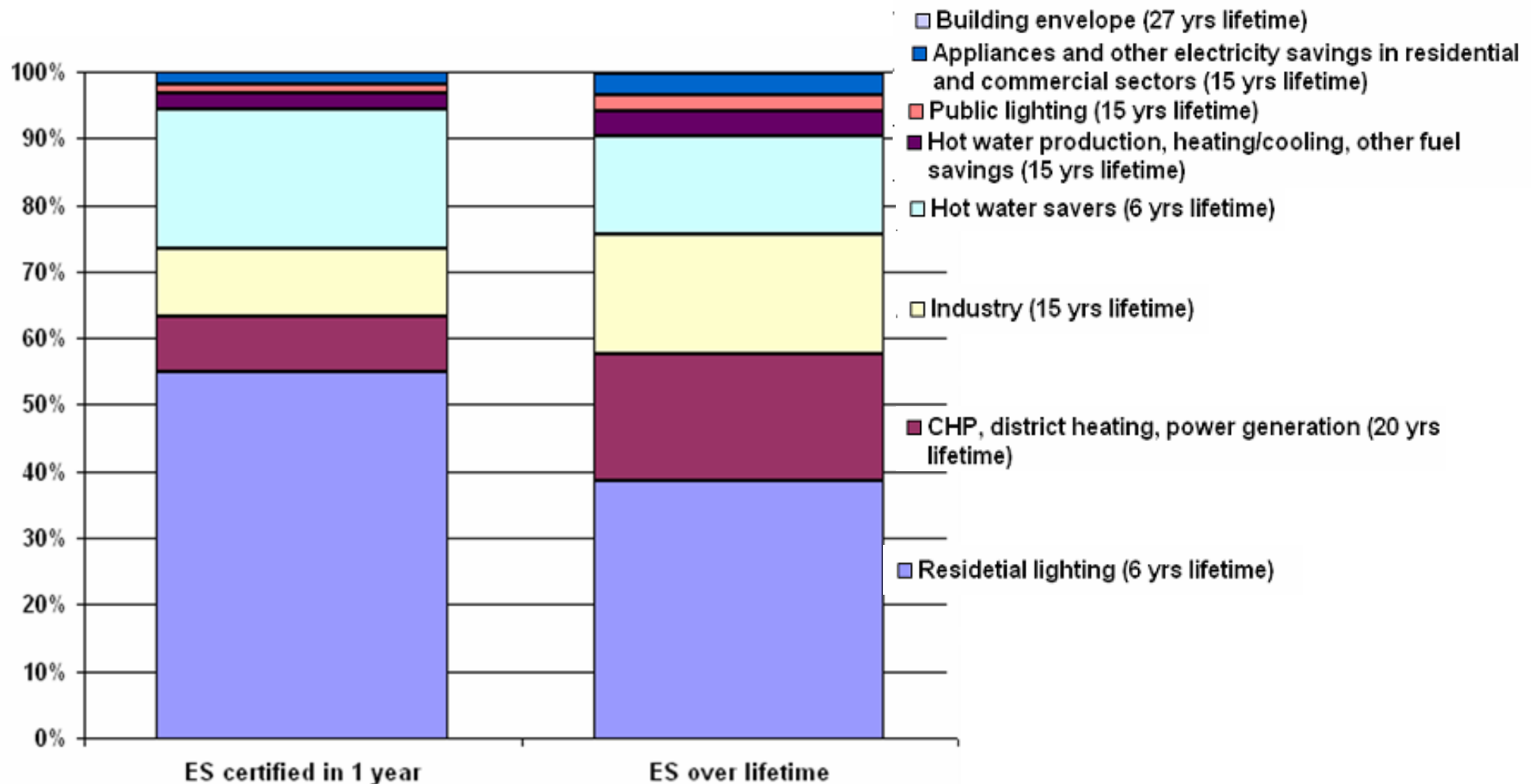
Effects of different accounting rules - 1

- ◆ **Had Italy measured energy savings with a lifetime approach** (cf. UK and France schemes) the breakdown of delivered energy savings would have been very different:
 - ✓ **in a static picture**: the share of short-term saving measures (e.g. residential lighting) would have been much lower while **the share of long(er) lifetime measures (e.g. building envelope, industrial measures), would have been much larger**, since all their lifetime savings would have been accounted for in the first accounting year (as opposed to be accounted only for 5 years and ex-post)
 - ✓ **in a dynamic picture** (i.e. taking into account the impact of such a different accounting method on investors' incentives and choices): **the share of long(er) lifetime measures would have been even larger** also as a result of a greater number/size of those measures been implemented



Effects of different accounting rules -2

→ merely comparing the energy savings achieved in the Italian system with those achieved by other systems with different measurement and verification rules is not correct and is strongly misleading



Recent regulatory measures

- ◆ From *ex-post* accreditation of energy savings for the crediting lifetime (5 years for most measures) to accreditation of (discounted) lifetime savings over the crediting lifetime, so as to **increase incentives for long-lifetime measures (without increasing the overall tariff burden)**

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

Diagram illustrating the components of the accreditation formula:

- Measure lifetime (points to $T-1$)
- Discount factor (points to $(1 - \delta)^i$)
- Crediting lifetime (points to U)

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

Diagram illustrating the accreditation formula using energy savings:

- Lifetime energy savings (numerator)
- Currently accredited energy savings (denominator)

- ◆ **Reduction of minimum project size**
- ◆ **Simplification of other rules and procedures**



Who is delivering?

	TEE (% share over total)					
	up to 31/5/06	up to 31/5/07	up to 31/5/08	up to 31/5/09	up to 31/5/10	up to 31/5/11
Obligated electricity DSOs	9,1%	6,1%	11,4%	9,8%	7,8%	7,0%
Obligated natural gas DSOs	23,8%	9,4%	10,1%	8,4%	7,7%	6,7%
Non obligated DSOs	2,5%	12,2%	1,9%	1,0%	0,4%	0,5%
Energy service providers (SSE)	64,6%	72,3%	76,6%	80,8%	83,5%	81,3%
Final consumers with an energy manager (SEM)	-	-	-	0,1%	0,6%	4,5%
Total	100%	100%	100%	100%	100%	100%

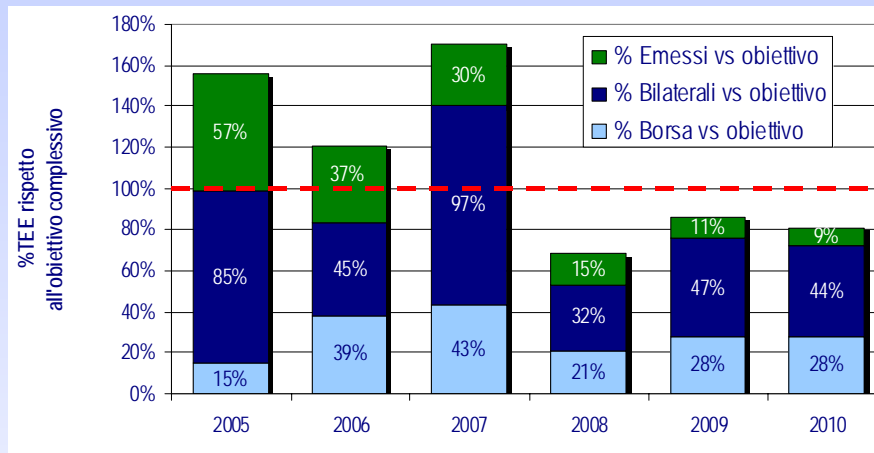
	31 dic 2008	31 dic 2009	31 dic 2010	31 dic 2011
SSE	165	196	270	297
SEM	0	2	9	12



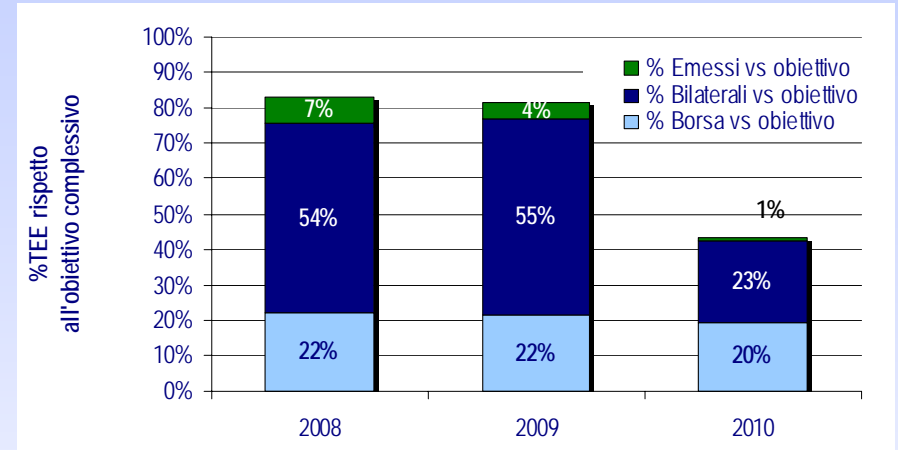
The key role of trading

Compliance strategies of obligated DSOs

DSOs with at least 100.000 final customers



DSOs with at least 50.000 final customers



Compliance strategies of obligated DSOs

Percentage of TEE gained each target year via:

- own projects (“% emessi vs obiettivo”)
- spot market purchases (“borsa”)
- OTC purchases (“bilaterali”)

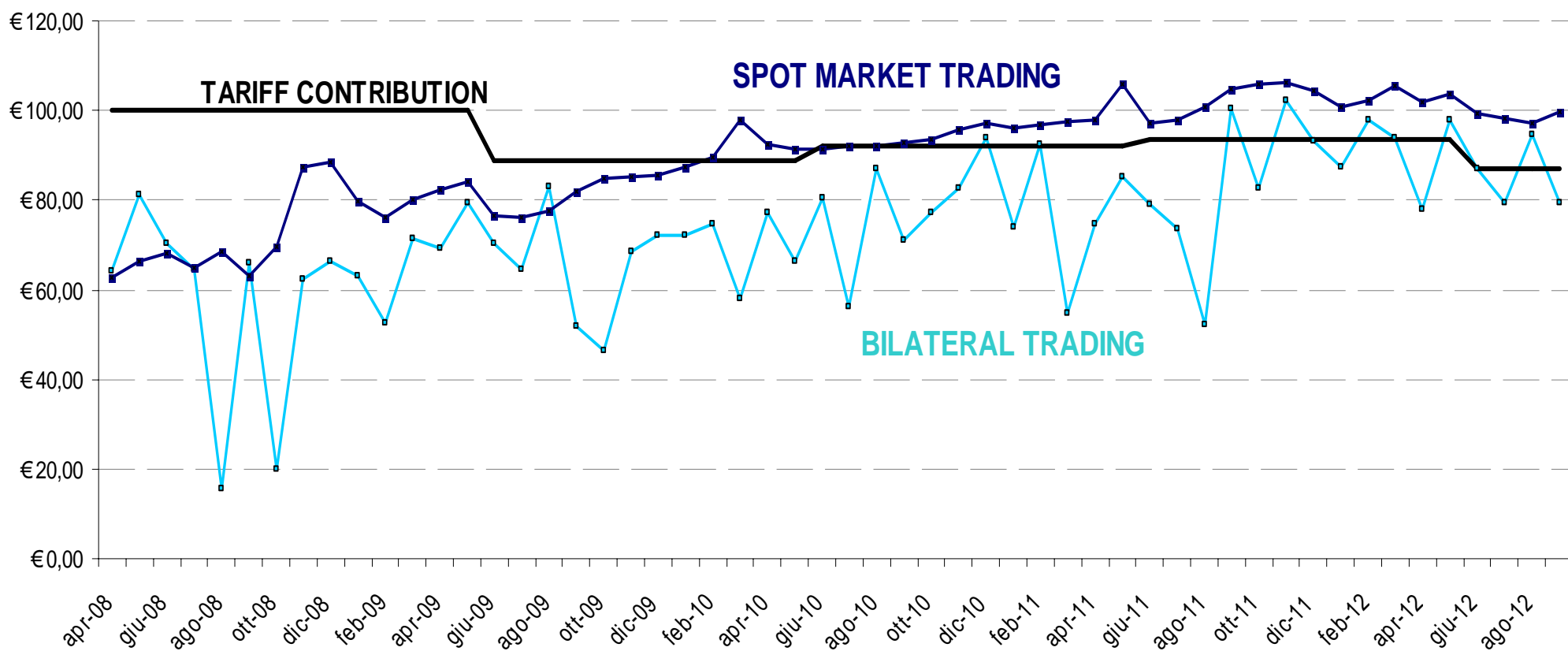
Market liquidity

	per il 2005	per il 2006	per il 2007	per il 2008	per il 2009	per il 2010
Obiettivi assegnati	155.911	311.758	633.382	2.200.003	3.200.000	4.300.000
% incremento obiettivi	-	100%	103%	247%	45%	34%
TEE scambiati	145.567	472.637	861.674	2.099.842	2.913.390	3.952.973
% incremento volume	-	225%	82%	144%	39%	36%
% scambi/obiettivo	93%	152%	136%	95%	91%	92%

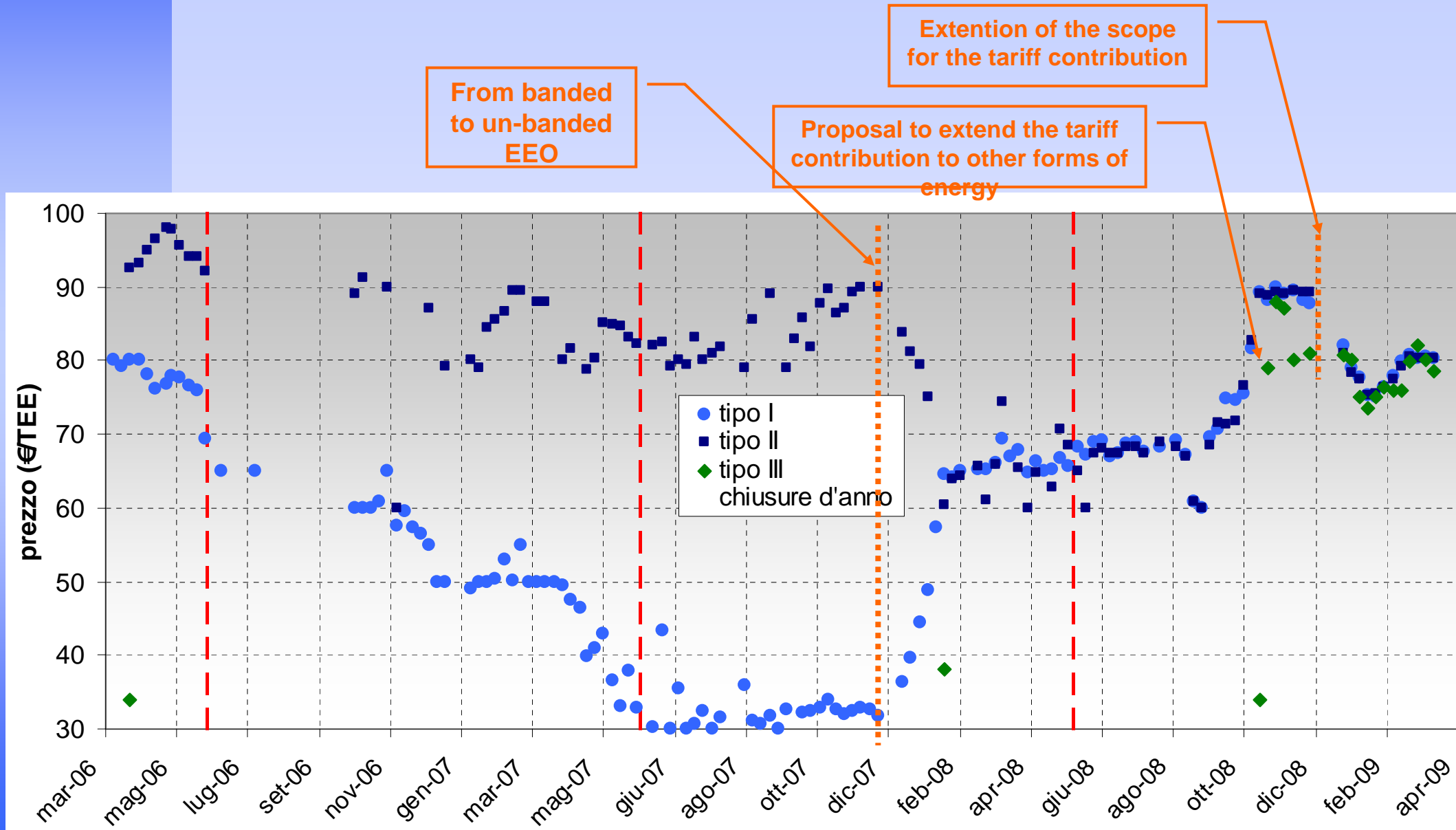


Market Prices

Market prices are very **important signals for decision-makers** on the **effectiveness and efficiency of the system** as well as important reference indexes **to set e.g. the tariff contribution, the sanctions of non compliances**

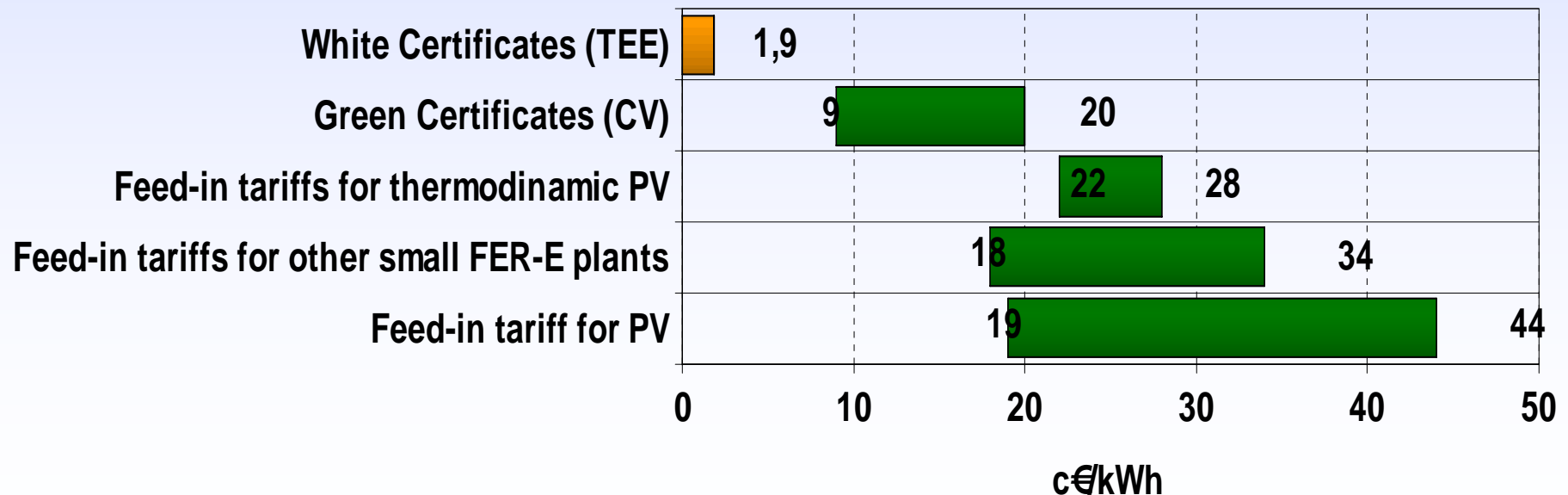


Market Prices and Legislative changes



Cost-effectiveness of TEE versus other FER-E supporting tools

With reference to the year 2011 white certificates (**TEE**) **have been from 5 to 23 times more cost-effective than other incentive tools designed to achieve similar sustainable development objectives** (in previous years the comparison has been even more favourable to TEE).



Cost-effectiveness of TEE versus other EE supporting tools

The cost-effectiveness of TEE has been confirmed by the 2010 Energy Efficiency Report by ENEA (National Energy Agency) where it compares the **costs or the State of the various policy tools introduced to promote end-use energy efficiency**

misura	costo-efficacia investimento totale (euro/kWh)	costo-efficacia per lo Stato (euro/kWh)
D.lgs.192/05	0,13	non applicabile
55%	0,10	0,05
20%	0,013	0,002
TEE	non disponibile	0,0012
Trasporti	0,82	0,10

Tabella 3: Efficienza economica strumenti di incentivazione



TEE cost for an average-household

Impact of TEE on electricity and natural gas tariffs:
maximum impact 6,5 €/anno in 2012

year	c€/kWh	€/household/year *	c€/mc	€/household/year **
2005	0,00	0,1	0,01	0,2
2006	0,01	0,2	0,02	0,3
2007	0,01	0,3	0,05	0,7
2008	0,04	1,0	0,12	1,6
2009	0,05	1,4	0,16	2,2
2010	0,07	1,9	0,21	3,0
2011	0,09	2,5	0,26	3,7
2012	<i>0,10</i>	<i>2,6</i>	<i>0,28</i>	<i>3,9</i>

* annual consumption: 2700 kWh

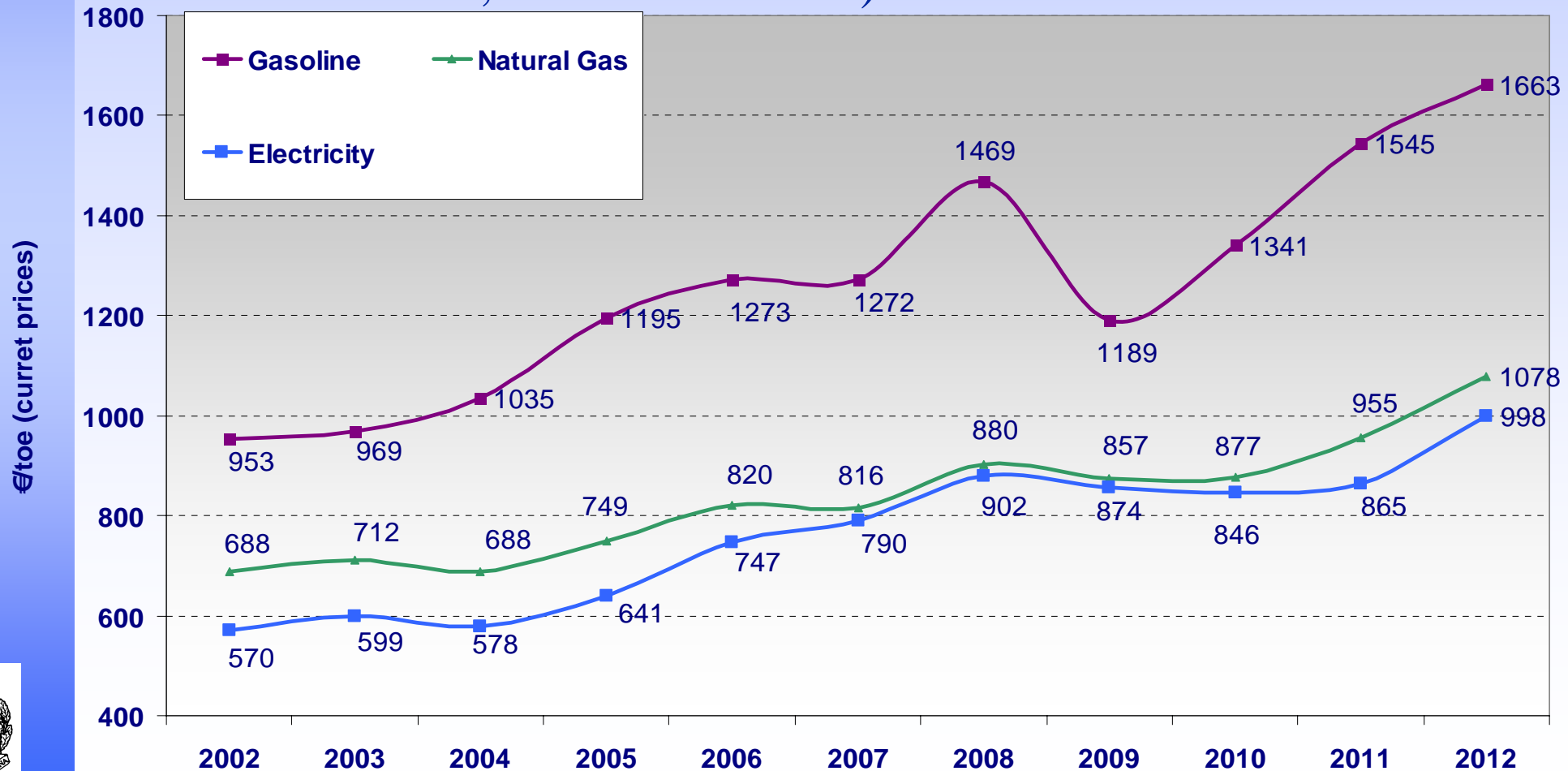
** annual consumption: 1400 mc

NOTE: data in *dark blu* are estimates



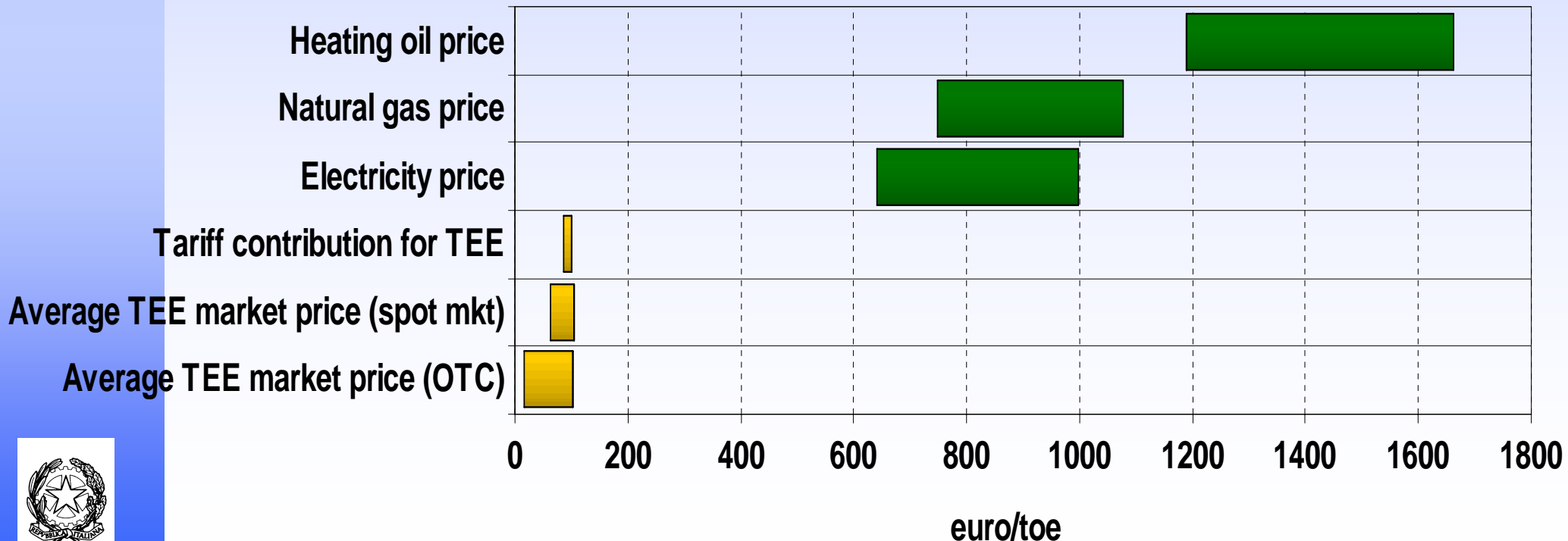
Direct private benefits

The **avoided energy cost has been from 11 e 19 times greater than the tariff contribution** (that varied from 100 €/toe in 2005-2008 to 86,98 €/toe in 2012).

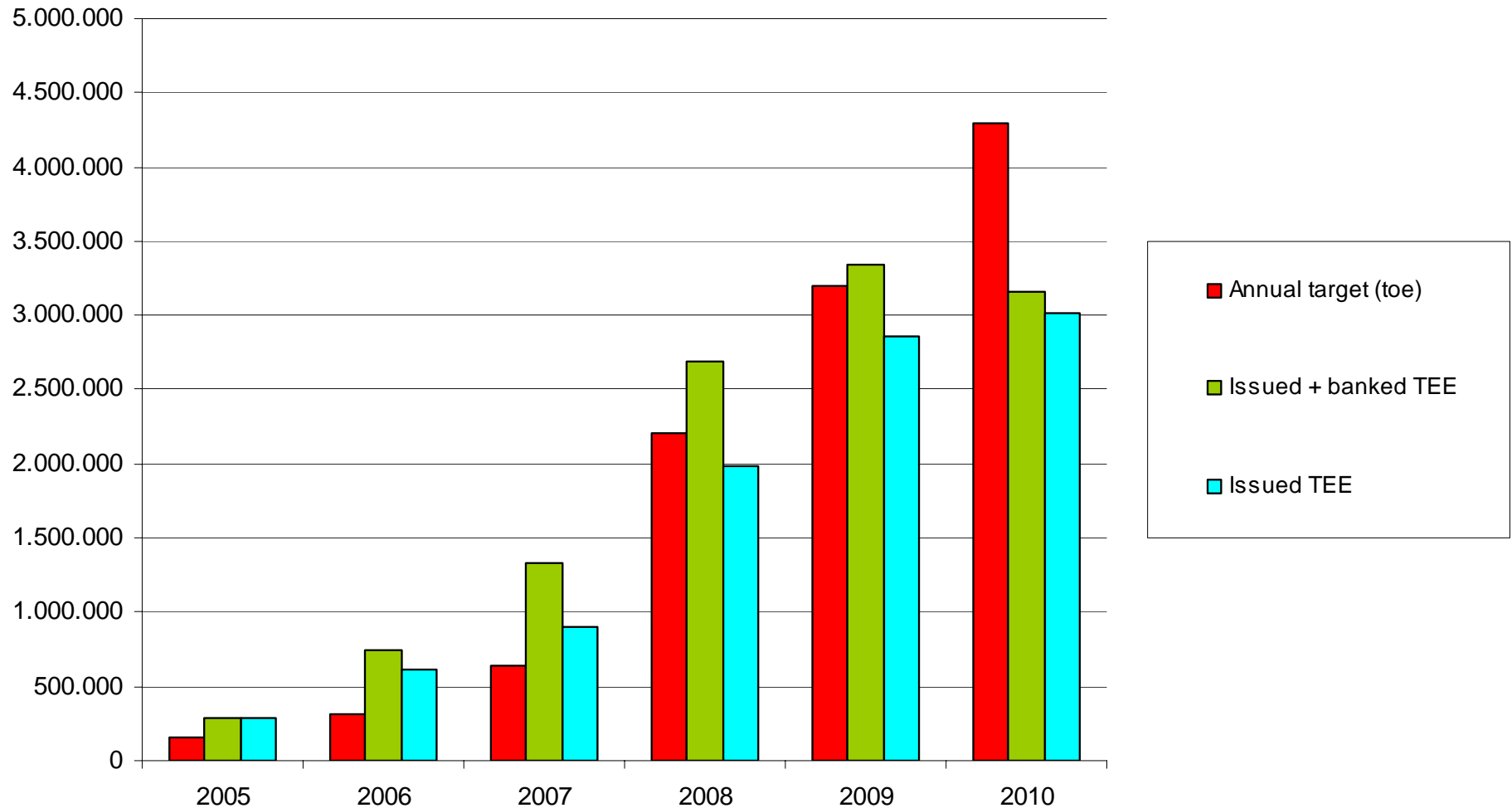


Costs/Benefits Ratio

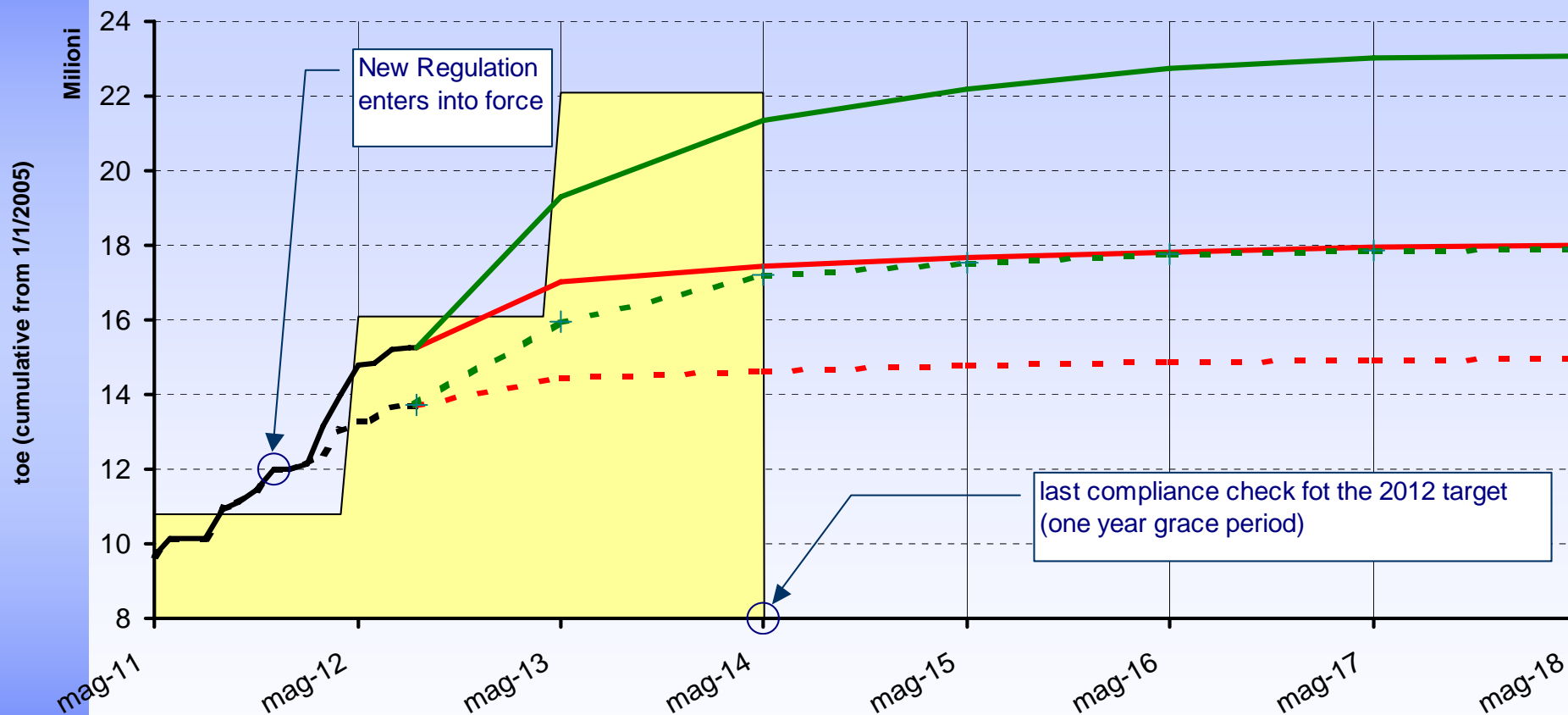
In the overall 2005-2012 period the costs/benefits ratio may be graphically shown by **comparing the range of variation of energy prices (the benefits) with the range of variation of costs for different market actors** (tariff contribution or average market prices for TEE)



TEE supply versus targets



Effects of the Regulatory changes introduced in November 2011 (lifetimesavings)



- Fabbisogno di TEE per raggiungere gli obiettivi nazionali ad oggi fissati dalla normativa
- + Scenario 2 (vecchie LG): TEE che si sarebbero emessi in futuro con le vecchie LG (senza effetto tau)
- Scenario 1 (vecchie LG): TEE che si sarebbero emessi in futuro con le vecchie LG (senza effetto tau)
- Scenario 2 (nuove LG): TEE emessi in futuro con nuove LG (con effetto tau)
- Scenario 1 (nuove LG): TEE emessi in futuro con nuove LG (con effetto tau)
- TEE effettivamente emessi
- TEE che sarebbero stati emessi con le vecchie LG



The way forward

◆ **AEEG has urged the Government to:**

- **fix future targets**, at least up to 2020
- **clarify TEE boundaries relative to other incentive mechanisms** recently introduced (e.g. new support mechanism for high efficient CHP; feed-in tariff for renewable heat and small energy efficiency measures)
- clarify and rationalise the **governance** of the mechanism
- promote **development of technical norms market studies, independent data and statistics** to support M&V of energy savings

◆ **Meanwhile we are studying:**

- approaches to **promote the development of ESCOs, EPC, new business models**
- ways to **prevent opportunistic behaviour** (e.g. hoarding) without interfering with the market
- possible **alternative approaches to fix and update the cost recovery rate**



A few references

http://www.autorita.energia.it/it/pubblicazioni_ee.htm

◆ *Annual Reports on the White Certificates Mechanism (Sixth Annual Report plus a Summary of the first five years of implementation to be published also in English)*

◆ *Interim Statistical Reports on the White Certificates Mechanism (two every year)*

Papers on the Italian White certificates scheme:

◆ *Tradable White Certificates: experiences and perspectives, in Energy Efficiency, 5 (2012)*

◆ *Tradable Energy Efficiency Certificates: the Italian experience, in Energy Efficiency, Vol. 1, Number 4, November 2008, p. 257-266, Springer Netherlands*

◆ *Not Just Energy Savings: Emerging Regulatory Challenges from the Implementation of Tradable White Certificates, Proceedings of the 2008 ACEEE Summer Study on Energy Efficiency in Buildings. American Council for an Energy Efficiency Economy, Washington D.C. (August, 2008)*

◆ *Assessment of White Certificate Schemes and their Integration into the Carbon Markets, with Paolo Bertoldi and Silvia Redessy, in Proceedings of the 2006 ACEEE Summer Study on Energy Efficiency in Buildings. American Council for an Energy Efficiency Economy, Washington D.C. (August, 2006)*



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