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Energy Efficiency Resource Standards in Europe and China

IEA DSM Programme: Workshop on Experiences with Energy Efficiency Resource Standards

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The Regulatory Assistance Project (RAP)

RAP is a global, non-profit team of experts providing technical and policy assistance to government officials on energy and environmental issues. RAP has advised governments in more than 25 nations and 45 states and provinces, and in Europe works closely with the European Climate Foundation.

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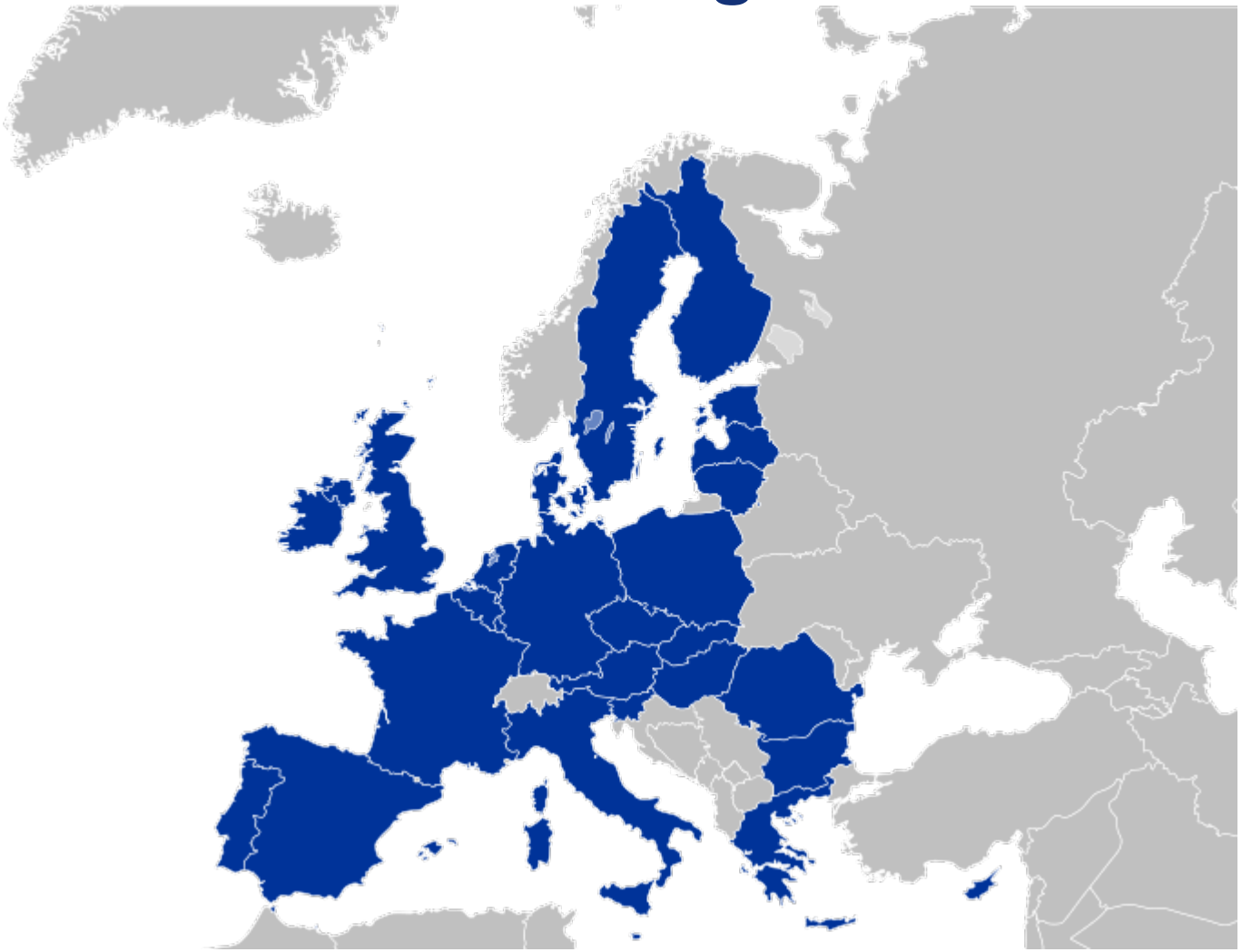
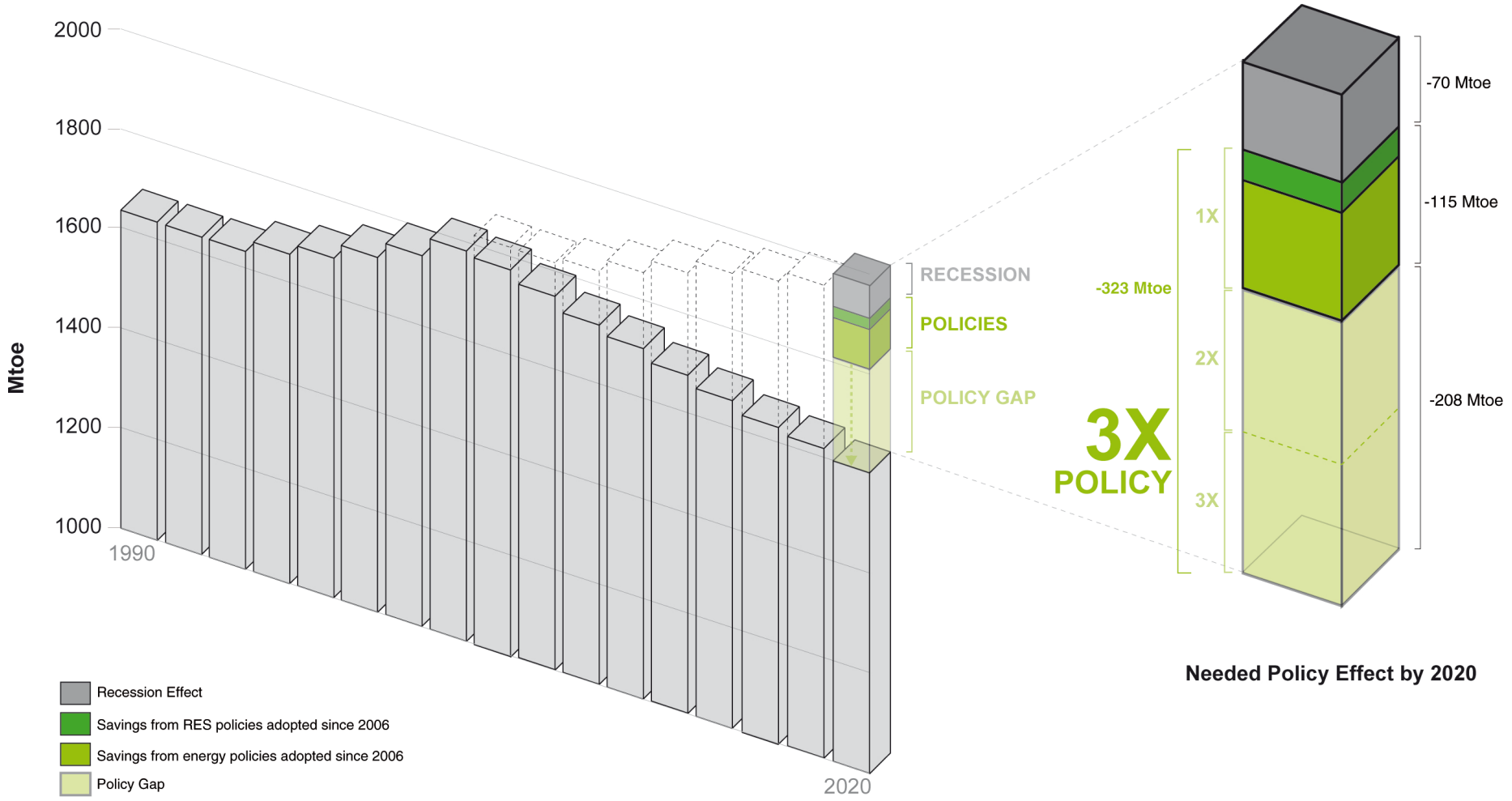
A. Overview of EE Obligations in Europe



Europe's ambitious targets: 20/20/20 by 2020
On efficiency, trend is only half of goal



EE Obligations & White Certificates

- Several major EE programmes are based on an obligation on some part of the energy supply chain to save energy in their customers' premises, or to pay a levy for EE.
- Renewable Energy/CO2 Certificates exist mainly because of Government intervention in the market place
- White Certificates are no different – they measure actions to meet an energy efficiency obligation
- ***Trading*** of White Certificates can be a final stage -- any party (not just obligated party) could obtain (verified) certificates of energy saving which could be traded on the open market

How do EE Obligations Work?

- Energy supplier/distributor has obligation to save energy in customers' premises/homes; target related to "volume" supplied/distributed, or residential numbers
- For small energy users – need simple approach to keep M&V costs down – use "approved" measures for which there are well established energy saving values (deemed or ex ante savings);
- For larger energy users – scaled engineering estimates or actual measured savings for the bigger projects
- Monitoring and verification then is a "measure count" + random "dip check" + quality checks

How are savings delivered?

- Mainly through bilateral contracts between obligated company and energy efficiency market actors -- e.g. insulation company, retailers of appliances, manufacturers, heating installers
- However, in UK energy suppliers are establishing affiliates -- heating companies, insulation subsidiaries & renewable microgen
- Only in Italy has there been trading of WCs generated by non obligated parties
- Cost recovery: If EEO is on energy supplier in a liberalised market, no price controls and therefore becomes a “cost of doing business”; if on distribution company, usually allowed for in the distribution price control

EE Obligations in the EU

- 5 major EEO programs in effect today. These 5 vary significantly in detail from country to country
- In addition, Spain & Portugal have EE levy on energy distributors
- Ireland & Netherlands considering obligation on energy suppliers
- Poland starting with levy on energy suppliers – just enacted a small white certificates program
- EU Commission now considering legislation to require a supplier mandate or levy in every Member State

EE Obligations in the EU (2008)

Country	Obligated Company	Eligible Customers	Target set by	Administrator
Belgium - Flanders	electricity distributors	residential and non energy intensive industry and service	Flemish Government	Flemish Government
France	all suppliers of energy	All (including transport) except EU ETS	Government	Government
Italy	electricity & gas distributors	All including transport	Government	Regulator (AEEG)
GB	electricity & gas suppliers	Residential only	Government	Regulator (Ofgem)
Denmark	electricity, gas & heat distributors	All except transport or covered by EU ETS	Government	Danish Energy Authority

Targets, Ambition, Spending – Wide Variation

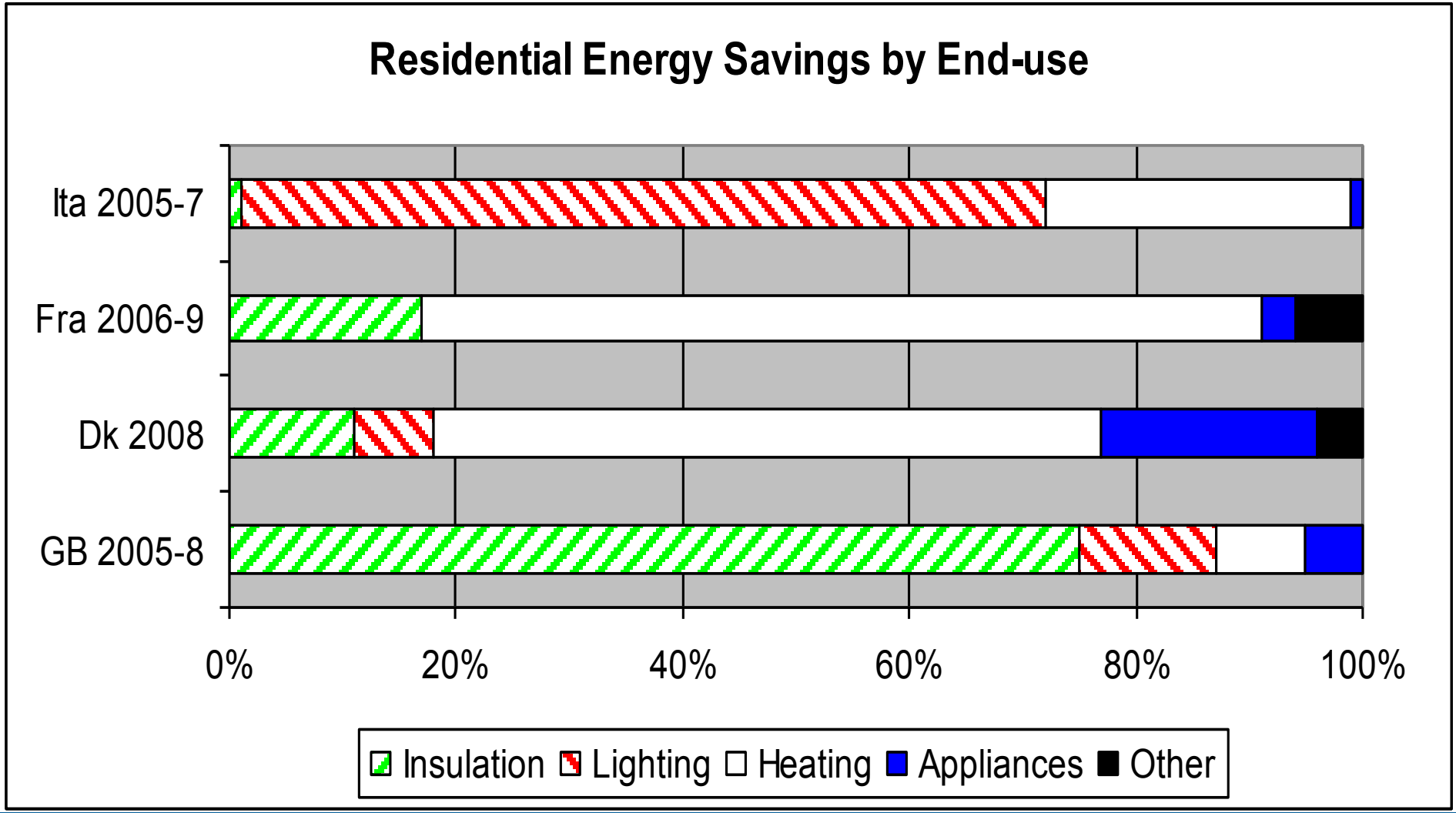
(2008 data)

Country	Nature of saving target	Current size of target	Estimated annual spend by companies (€M)
Belgium – Flanders	1st year primary energy	0.6 TWh annual	26
France	lifetime delivered energy	54 TWh over 3 years (raised to 100 TWh/year)	180
Italy	cumulative 5 year primary energy	23 TWh in 2009	196
UK	lifetime delivered CO2	185 MtCO2 in 3 years to 2011	900
Denmark	1st year delivered energy	0.82 TWh annual	25

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)

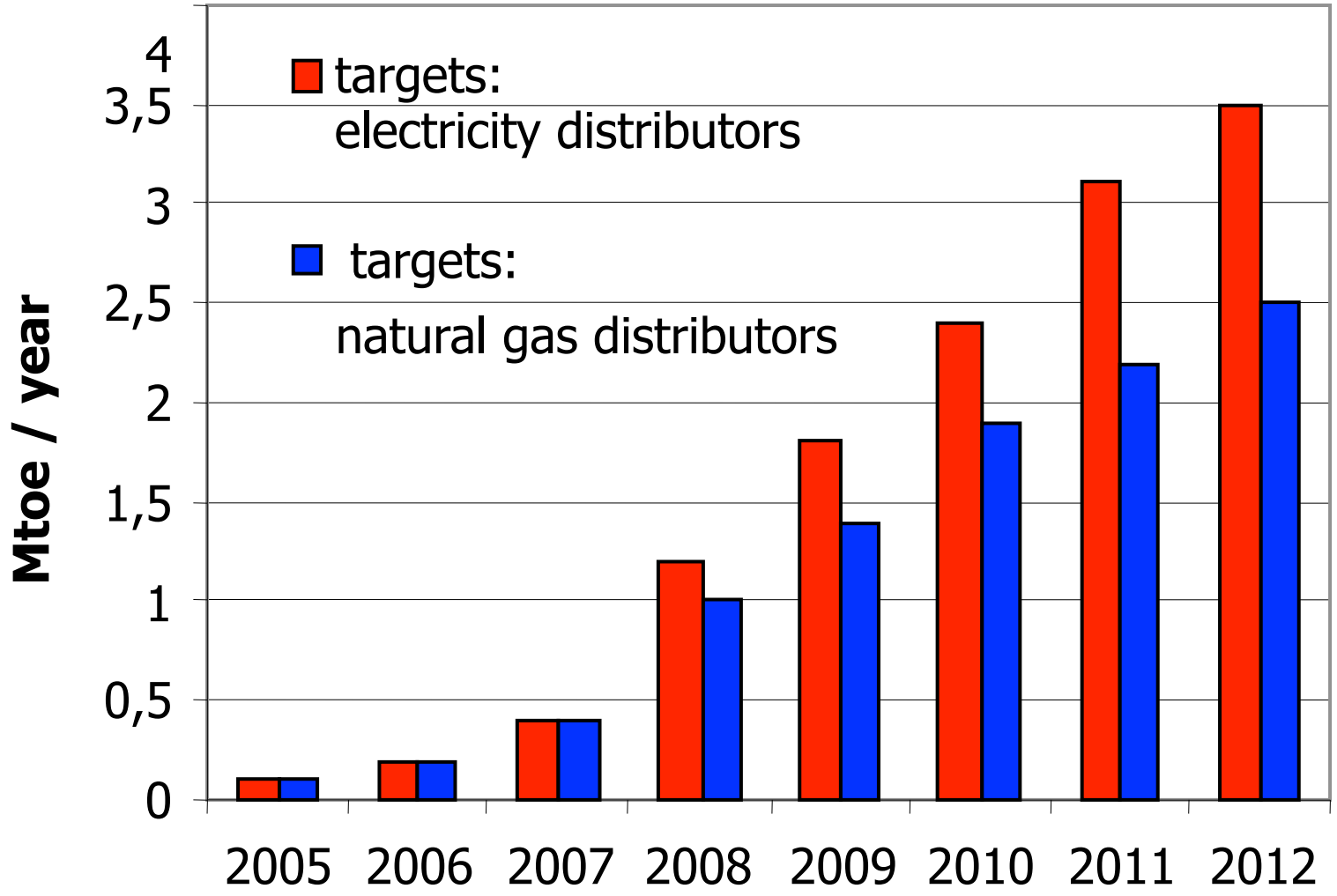
Which End-Uses? National Schemes Vary



White Certificates Example: Snapshot of Italian WC Scheme

- WC in place since January 2005
- Original goal: meet Kyoto commitments
- Obligation covers 14 electricity and 61 gas grid distributors
- Enel = 87% of electricity obligation
- 3 gas distributors = ~45% of gas obligation
- 83% of savings are residential

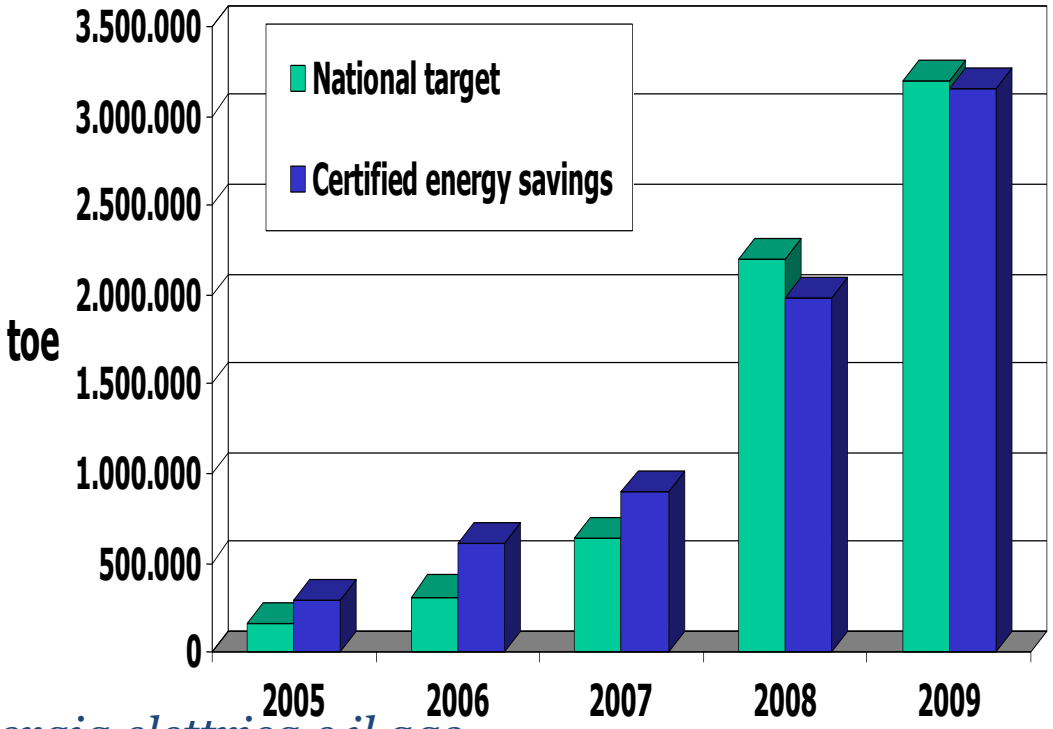
Primary Energy Savings Targets in Italy -- Total of 22.4 Mtoe by 2012



Autorità per l'energia elettrica e il gas

Most years, savings exceed set targets

6.7 million toe saved against a target of 6.5 million toe (2005-2009)



Autorità per l'energia elettrica e il gas

White Certificates - Italy

- 1 White Certificate = 1 toe saving (~ 11,000 kwh)
- Equivalent to average annual electricity consumption of between 1-2 Italian households
- May be generated by: ESCOs, energy efficiency installers, private and public enterprises with an energy manager, non-obliged gas and electric distributors
- To May 2009, 81% of energy savings attained by registered ESCOs (broadly defined)

- Projects can deliver qualified savings for 5 years (and 8 years for building envelope measures)

Italian WC Program Results

- **Who delivers:** 80% of savings delivered by ESCOs
- **Which energy types**: 75% electricity savings; 20% natural gas savings; 5% other fuels savings
- **How measured:** 85% of savings delivered via projects for which simplified M&V methodologies exist (mostly deemed savings)
- **Which end-uses** :
  - 59% from residential electricity end-uses; 21% residential thermal end-uses ; 11% industrial end-uses (increasing); 6% public lighting, 3% non-industrial CHP and district heating (likely to increase)
- **Cost of conserved energy** to distributors is low :

  Market price of WCs = ~ 2.6 Eurocent/kwh

Top 10 savings measures
2005 - 2007

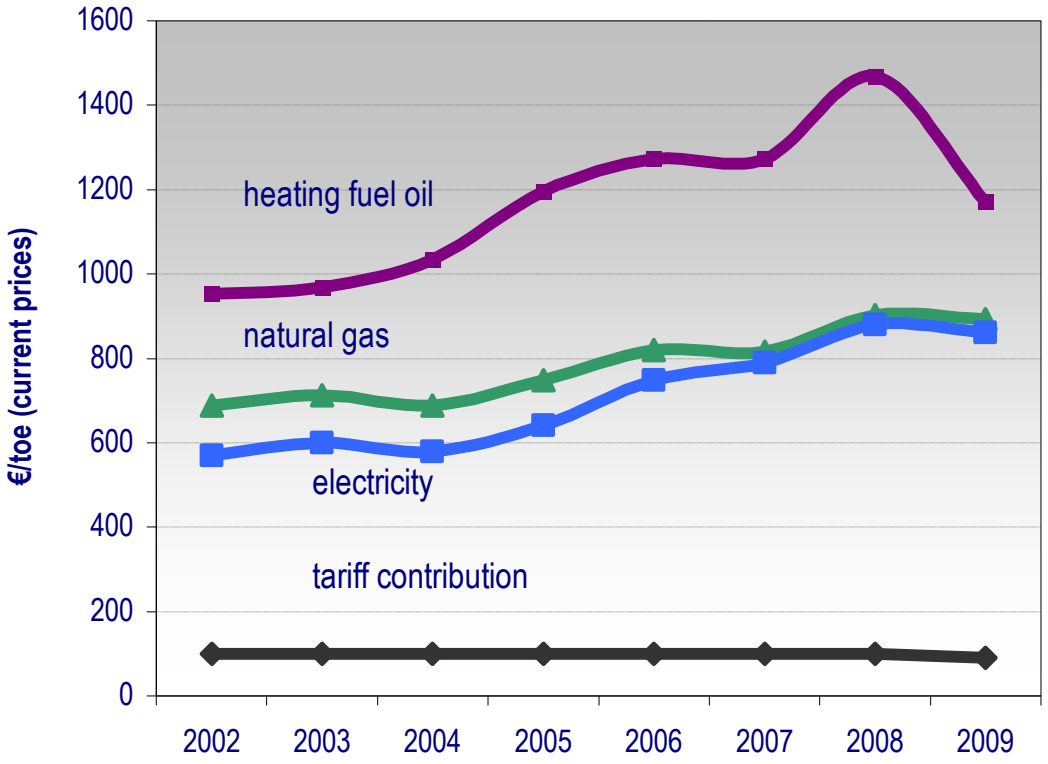
Italy 2005-2007			
		Savings (toe)[b]	*Nr of installations*[c]
1	CFL[a]	1,036,360	20,761,940
2	Low-flow showerheads (residential)	195,404	9,474,586
3	Substitution of mercury vapour lamps with high-pressure sodium lamps in public lighting	116,412	422,621 lamps
4	DH systems[d]	73,767	
5	Low-flow faucets in residential	66,303	16,215,760
6	Solar collectors	54,855	229,419 m2
7	Domestic appliances class A[e]	21,190	839,169
8	Double glazing	12,272	221,441 m2
9	Luminosity regulators in public lighting	11,140	22,888,678 W of lamps regulated
10	Small-scale cogeneration	8,150	

Avoided energy costs for participating customers

FIGURE 3.3

Direct benefit from energy saved by a domestic user (including taxes)
(Source: calculation on the Authority data and data supplied from the Ministry for Economic Development)

Note:
For “natural gas”, reference is made to the national average gross tariff.
For “electricity”, reference is made to the gross tariff D2 applied to an average consumer (2700 kWh/year and 3 kW)



cf. average tariff contribution < 100 euro/toe and market prices always below this value ➔ large “private” economic gains

Autorità per l'energia elettrica e il gas

Italy is the only country in EU with active White Certificates trading

- Initially only 20% of White Certificates were traded on the market, most as bilateral or subcontract arrangements between the energy distributors and EE installers.
- Energy regulator added reforms at the end of 2007, and the market for White Certificates has operated more actively
- ~80% of WCs are now traded
  - (e.g.,in 2007, 304,932 certificates were traded on the spot market and 556,742 certificates were traded bilaterally against an actual saving target of 633,382 certificates)
- An increasing share traded on the spot market (> 60%), not bilaterally
- From mid-2008 both quantities and prices of bilateral deals (i.e. over the counter trades) must be registered – this is to increase the transparency of trading, to the advantage both of market operators and of the Regulator
- (France permits trades but only ~4% have been traded)

Perceived advantages of EE Obligations

- Key -- A large potential source of non-Treasury funding and non-governmental implementation for a vital public purpose
- Compatible with Europe's market liberalisation goals
- They have worked. In all the EU programs, only 1 small Flemish energy distributor missed its target
- Concern that EE funds are less stable and may not perform as well (EE levy in Spain did not meet spending targets)
- Flexibility: Member States can take different approaches (as in the US)

EU Supplier Obligations: General Observations

- Only a few schemes in place – they vary quite a lot
- Goals were set low, and have been achieved;
- Core element: the **energy saving obligation** (absolute or proportional to sales)
  - Voluntary EE markets not succeeding, even in competitive energy sectors;
- Focus on **end-use sectors**, coverage of electricity and natural gas, at minimum; **Transport sector** hard to cover
- Can work in liberalised energy markets (e,g.,UK) and where they target monopolistic segments (e.g., Italy)
- Existing programs are best suited to deliver **low-cost** and **standard** energy efficiency measures, often targeting **small energy users**;
- Cream-skimming is a real problem; (CFLs in the closet)
- EU will not meet its 20% savings target with current programs

B. New EE Obligations in China

China's New DSM Rule

- Issued by National Development and Reform Commission (NDRC) in November 2010
- Took effect January 1, 2011
- Requires grid (distribution) companies to meet
  - 0.3% of annual energy and 0.3% of annual peak demand -- **with EE**
- Mandated 0.3% based on previous year's sales and demand figures
- NB: Chinese power companies have had very robust load management programs for many years

Broader context

- China's 12th Five Year Plan (2011 – 2015) calls for
  - **16% reduction in energy intensity over five years**
  - Expansion of "Top 1000" program to "Top 10,000" energy consuming enterprises
  - **17% reduction in carbon intensity**
  - Major pollutants emission reduction of 8-10%
- Energy intensity, carbon, and pollutant reductions are *mandatory*
- "DSM is an important measure to meet the energy conservation and emissions reduction target." (Art. 6)
- China spending on EE: between 3% and 4% of total system revenues (about 1.2% is through utilities, rest is direct government spending)

First Priority for Energy Savings

"In order to meet electric power demand, both conservation and development should be taken into consideration, ***but conservation should come first***. While increasing power supply, DSM measures should be considered and given priority."

(Emphasis added)

DSM Rule, Article 4

Details Needing Clarification

- The DSM Rule is very new (Jan 1, 2011)
- 0.3% “power saving” goals
  - No definition of “power saving”
  - Seems to indicate end-use savings, but…
  - Supply-side measures (line-loss reductions and other supply-side efficiency measures) are mentioned in Article 14, and
  - It is unclear whether these measures would qualify towards the 0.3% savings goals or not

Allocation of 3% target

- How should it be allocated among grid companies?
  - Two regional grid companies: State Grid & China Southern Grid; or
  - Provincial distribution companies
- How should it be allocated among customer classes (residential, commercial, industrial)?
  - Modest initial obligation – 0.3%
  - New role for grid companies – may need time to develop competence

Questions?

Other Details

- Trading - Not envisaged to be part of the Rule right now
- ESCOs – three main options
  - Grid companies build in-house capability to deliver DSM services
  - Grid companies create and contract with their own ESCOs
  - Grid companies contract with 3rd party ESCOs to deliver services
  - EM&V –
    - “Verification of energy savings through independent third parties is encouraged.” (Article 17)
    - Key elements have yet to be delineated

What Costs are Involved & Who Pays?

- Cost of energy efficiency measures (energy companies, 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 to set target every few years + research into energy savings (in GB <<Ofgem costs)
- N.B. All transaction costs other than auditing, verifying and authentication are included in most evaluations

Legislative Process

- Definition of the obligation and introduction of the energy efficiency certificates market: Ministerial Decrees April 2001
- Technical revision + definition of implementing regulation: 2002 and 2003
- New legislative provisions in July 2004
- Entered into force in January 2005
- Extended and revised in December 2007
- Definition of technical rules, administration, monitoring and enforcement of the whole mechanism under the Regulator's (AEEG) responsibility

Eligible Measures

- All end-use measures, including transport
- No behavioral measures
- 4 types of certificates:
  - Type 1: electricity savings
  - Type 2: natural gas savings
  - Type 3: fuel savings other than type 1, 2, 4
  - Type 4: transport

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Discussion

1. What is the **real goal** of targets?

- Reduction in energy consumption, however accomplished? <**environmental** and security goals>
- Increased economic efficiency (energy intensity of EU economies)? <**economic** and security goals>

2. With or without an EU-wide binding target, are **national binding targets** needed to provide the necessary level of EE ambition?

3. Can **Supplier Obligations** be a substitute for national binding targets?

- Can the obligation cover all the important areas?
- Can we rely on **energy suppliers** to deliver **energy savings** or just to provide the **funding**?
- Is this approach more politically feasible?

Discussion -- Continued

6. If we have Supplier Obligations, do we need codes, standards, labels, taxes, etc.?

- Experience from existing schemes -- e.g., UK , France
- Supplier-only schemes: what incentives does this create for (1) codes and standards, (2) public subsidies for efficiency?

FINALLY --

Absent binding targets, what **"concrete steps"** are most likely to yield real savings?

- Supplier Obligations – mandatory? National choice only?
- EEAP requirements with Commission reviews
- "Cap and invest" strategy for use of ETS auction revenues
- Prohibit fossil subsidies; add Nuclear windfall recovery
- What else?

Some major lessons from White Certificate Schemes

Schemes in Italy and France are dominated by **subsidy measures** in the **residential sector (in France provided by tax incentives):**

- Financial incentives for end-users are important in the residential sector, especially for measures with long pay-back periods.

The two schemes are dominated by measures with **standardized saving factors (deemed saving values)**, esp. in the residential sector;

Supplier obligations are well-suited to deliver low-cost and standard measures (mass markets):

- Measure lifetimes are critical in encouraging more expensive measures

Some supply options (micro cogen, SWH, PV), and district heating;

Supplier obligations: Major design issues

- Size of the obligation – and what sectors?
- Choice of primary or final energy,
- Who is obliged ? Who may deliver savings?
- Eligible measures and lifetimes of measures,
- Measurement &Verification of savings (M&V) –
- Cost-recovery,
- Interactions with other policy tools.

Targets

- 23 TWh in 2009
- Set as cumulative 5 year primary energy (8 years' credit for building envelope EE)
- In 2009, savings were from:
  - 77% electricity
  - 19% natural gas
  - 4% other fuels

Definition of “ESCO”

- In Italy, a wide definition of ESCOs has been used, which includes basic energy efficiency providers. Only a few are traditional ESCOs as defined by the EU Energy Services Directive.
- By 2006, 577 “ESCOs” were accredited with the Italian regulator – this allows them to use the on-line system to submit projects.

B. Italy

Measurement & Verification

- AEEG has developed three approaches for the M&V of the primary energy savings achieved by each project:
  - a default (deemed savings) approach: totally ex-ante (toe saved/year/unit installed); no on-field measurement;
  - an engineering approach: pre-defined measurement formula; partial on-field measurement;
  - energy monitoring plan: complete on-field measurement

Can we envisage a EU wide WC scheme?

- Not in the short term!
- Different targets of primary/delivered energy or CO2, different end use sectors covered - reflect local status of energy market/history/culture etc.
- Perhaps more importantly, different rules for measuring “savings” and for dealing with deadweight
- But for EU Energy Services Directive we need to harmonise how we measure energy efficiency savings
- So conceivably in the medium term?