

Policies, Energy efficiency, Lighting

The Italy 'case study'



Energy efficiency needs support policies.

This is true for energy efficiency with lighting systems.



Main policies related to energy efficiency in Italy:

- ❖ Finance Law for 2007 ("Finanziaria")
(Approved by Italian Parliament on Dec 17, 2006)
- ❖ Law-Decree of President of Republic, to comply the EU Directive 2002/91/CE related to the energy performance of buildings
(Dated october 6, 2006, which integrates and corrects the previous Decree of aug 19, 2005, n.192)
- ❖ White Certificates

Finance Law for 2007 ("Finanziaria")

Tax deduction for the expenses sustained to achieve energy savings, increase energy efficiency or install alternative energy sources facilities (ENEA is involved)

- ❖ Energy saving with lighting system is explicitly included, but it is not fully implemented till now

Law-Decree related to EU Directive 2002/91/CE (energy performance of buildings)

Many measures, e.g. New and old buildings to be sold shall have the energy certification, More thermal insulation needed, Mandatory for the new buildings: solar water heating and photovoltaic installation

- ❖ Lighting is included but not implemented till now
 - ❖ The European standard EN15193 "Energy performance of buildings - Energy requirements for lighting" has been voted and will be published soon
 - ❖ Special national measures have to be defined and published (ENEA is involved)

White Certificates

- ★ Twins Ministerial Decrees of 20 July 2004 (electricity and gas) establish mandatory quantitative energy efficiency targets (primary energy savings) at national level, on annual basis (first commitment period: 2005-2009)
- ★ First operational tradable white certificates scheme introduced world-wide
- ★ Obligated actors: electricity and gas distributors, and target sectors: all energy end-use sectors
- ★ Entered into force in January 2005
- ★ Definition of the technical rules, administration, monitoring and enforcement of the whole mechanism under the Italian Regulatory Authority for Electricity and Gas (AEEG) responsibility
- ★ Compliance with targets via the implementation of energy saving projects, by distributors (directly or via controlled companies) and ESCOs

White Certificates: General criteria

- ★ Simple and transparent rules and procedures
- ★ Certain and reliable reference framework for operators
- ★ Promotion of economic efficiency and technological innovation
- ★ Consumers protection and promotion of competition
- ★ Search for a balance between robustness and reliability of savings versus simplicity and cost-effectiveness



- ★ 3 methods:
 - ❖ deemed savings
 - ❖ engineering estimates projects
 - ❖ energy monitoring plans
- ★ Associated information campaigns and training programs entitle the hard measure to a 5% “premium” on the amount of energy savings. The campaigns themselves must comply specific requirements
- ★ Only additional savings are considered, i.e. over and above spontaneous market trends and/or legislative requirements

White certificates: The 3 Methods

Deemed savings

- For project typologies with "known" expected savings
- Specific amounts of saved energy are defined for each installed unit (toe/unit/year), with assumptions on a number of variables (baseline, working conditions, working hours...)
- No on-field measurement (no cost-effective)

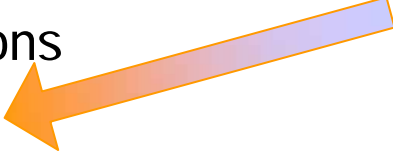
Engineering estimates

- For projects whose saving impact is quite well understood but varies depending on a limited number of identifiable parameters (e.g. number of working hours)
- Specific evaluation algorithms are defined, with preset values for some parameters while other parameters have to be measured case by case

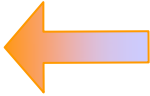
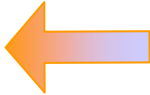
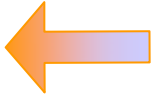
Energy monitoring plans

- For projects whose energy performance crucially depends on variables and parameters that change from case to case and is therefore less predictable
- Monitoring plan is subject to pre-approval

White Certificates: Eligible project classes

- ★ Rephasing of electric systems
 - ★ Electric motors and their applications
 - ★ Lighting systems
 - ★ Reduction of electricity leaking
 - ★ Switching from electricity to other fuels when this produces primary energy savings
 - ★ Reduction of electricity consumption for heating purposes
 - ★ Reduction of electricity consumption for air conditioning
 - ★ High efficient electric appliances
 - ★ High efficient office equipment
 - ★ Switching from other fuels to electricity when this produces primary energy savings
 - ★ Reduction of primary energy consumption for domestic heating, ventilation and air conditioning system
 - ★ Promotion of end-use technologies fuelled by renewable sources
 - ★ Electric and gas-fuelled vehicles
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White Certificates. Deemed savings already published

- ★ Integrated CFLs (Residential, to replace incandescent) 
- ★ Replacement of electric water heaters with gas water heaters (residential)
- ★ Replacement of gas water heaters with more efficient gas water heaters (residential)
- ★ Efficient (i.e. 4 stars) gas water heater (residential)
- ★ Double glazing (residential, offices, commercial, hospitals, schools)
- ★ Wall insulation (residential, offices, commercial, hospitals, schools)
- ★ Small PV plants (residential, offices, commercial, hospitals, schools)
- ★ Thermal solar for water heating
- ★ Efficient appliances: fridges, freezers, dishwashers, washing machines
- ★ Low-flow showers' water taps
- ★ Low-flow water taps
- ★ High efficiency electric motors (industrial uses)
- ★ Heat pumps
- ★ Luminous flux dimmers (public lighting) 
- ★ Na-HP lamps (public lighting, to replace HG lamps) 
- ★ Inverter application on hydraulic systems (small)
- ★ Air conditioning (residential sector)
- ★ High efficient (4 stars) boilers for condominium

How to define deemed savings. Example: CFLs

- ✧ Baseline technology: incandescent lamps
- ✧ Efficient technology: Class A Integrated Compact Fluorescent Lamp
- ✧ Residential installations



Energy Saving Calculation

$$\text{Energy}_{\text{saving}} = (\text{Power}_{\text{inc}} - \text{Power}_{\text{cfl}}) \times \text{hours}_{\text{use}}/\text{y}$$



- ✧ Difficult to apply and not effective
- ✧ Better an average calculation



Assumptions:

- ✧ Probability of installation in each room
- ✧ Number of working hours per year per room
- ✧ Power needed in each room
- ✧ Power difference between incandescent and CFL

How to define deemed savings. Example: CFLs

Room	Power _{inc}	Power _{CFL}	Δ_p	Working time	Savings	Probability	Savings _{prob}
	[W]	[W]	[W]	[h/y]	[kWh/y]		Toe/year
Kitchen	100	20	80	1200	96	30	6.34
"	75	15	60	1200	72	10	1.58
"	60	11	49	1200	58.8	5	0.65
Living room	100	20	80	800	64	20	2.82
"	75	15	60	800	48	5	0.53
"	60	11	49	800	39.2	5	0.43
Bathroom	60	11	49	300	14.7	10	0.32
Bedroom	40	9	31	300	9.3	10	0.2

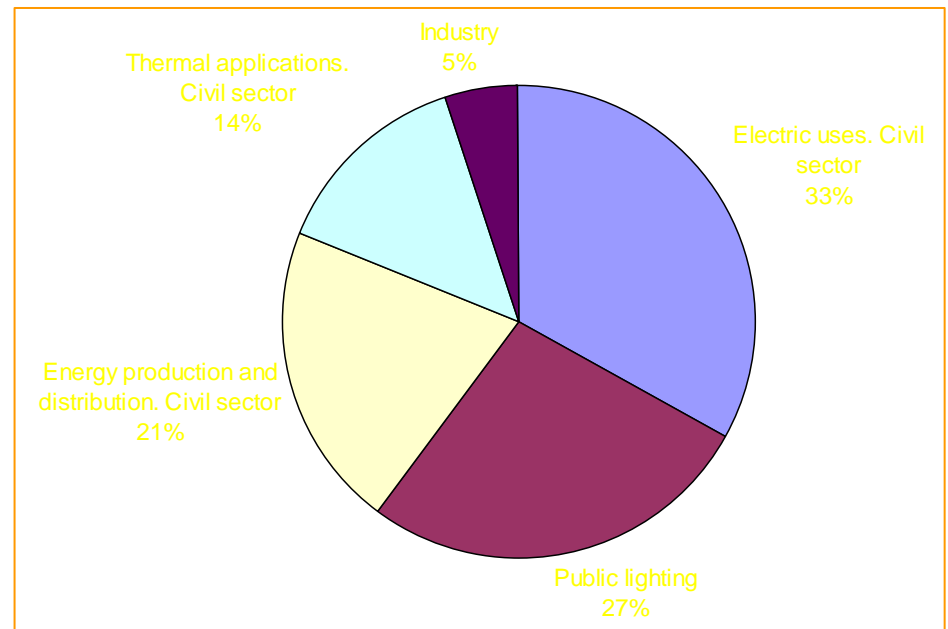
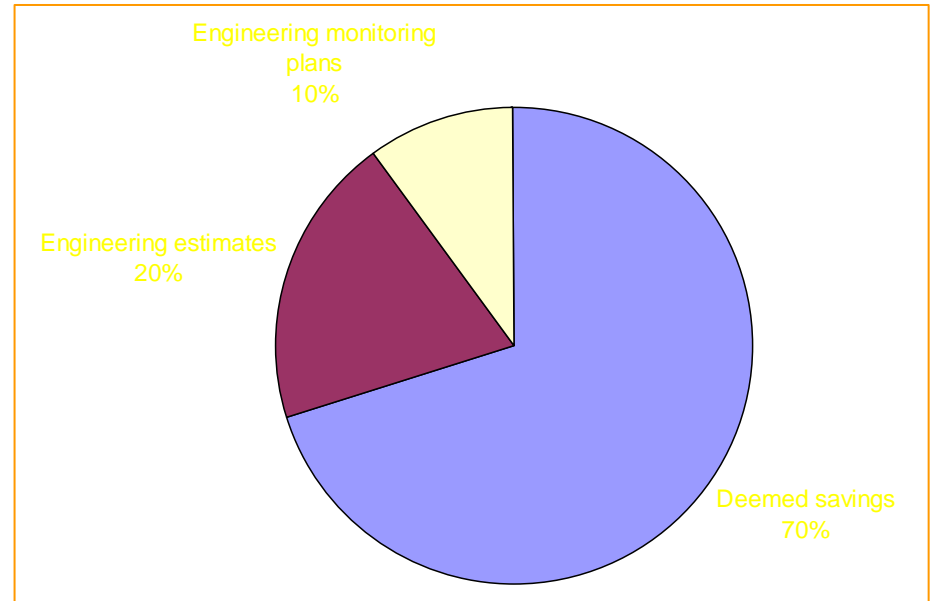


Weighted average of achievable primary energy savings per lamp:
 14.6×10^{-3} toe/year

1 TOE = 0.22 x 10⁻³ kWh

After one year of white certificates

- ❖ Savings values have been reached (2005 values: 152 000 toe for large distributors, 63% in electricity sector, and the rest in gas)
- ❖ ESCOs have been the most "active" subjects (> 2/3 of WhC), much more than obliged actors (< 1/3)
- ❖ Lighting plays a major role (27% only for public lighting, + CFL... domestic)
- ❖ Deemed savings have been the preferred method (70% WhC)



White certificates and lighting application.

The point of view of an evaluator

ENEA has active part to evaluate applications for White Certificates.

Is it easy to 'play' with white certificates scheme?



Deemed savings:

- Easy to misunderstand the available deemed schemes
- Project must 'produce' savings. Some claimed savings are not acceptable
- Dissemination campaigns: have to fulfill certain (right) requirements
- The special case of CFLs: What happens afterwards?

e.g. street lighting measures are not suitable for 'analogous' industrial applications

e.g. collecting data of lamps sales, because the project had not modified the market

not only 'entertainments' on energy savings

In most cases CFLs are distributed (often for free) to people, with a supporting dissemination campaign. We never know whether or not people really use the lamps in their own houses. But this is not related to WhC.

Energy monitoring plans:

- Difficult to have the pre-installation measures
- Difficult to define the 'average market situation'
- Very good jobs, poor documentation (no standard forms to fill for calculations)



The system works and many very good projects have been proposed and, most important, approved

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Contacts:

- Autorità per l'energia elettrica e il gas (<http://www.autorita.energia.it/>)
- ENEA. ACS-Protris (<http://efficienzaenergetica.acs.enea.it/>)
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