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Critical Synthesis Report 3: Lund Workshop (16/6/05)

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SUMMARY

Preface

An international workshop on Market Mechanisms for White Certificates trading was held on June 16th 2005 at IIIEE Institute of the University of Lund - Sweden. The workshop was organised as the third of five similar events, planned in the frame of the activities of the Task 14 for IEA-DSM Implementing Agreement. The subject of this workshop was: “National or international systems for White Certificates? – What can we learn from Tradable Green Certificates”. The choice of Sweden allowed for wide gathering of Swedish experts coming from STEM (the Swedish contracting Party in the Task), the IIIEE Institute, Elforsk and other Institutes and cultural Organisations and Industries in the sector of the Energy Efficiency.

The workshop gave the participants a chance for updated knowledge of the present state of application of Green Certificates in Sweden and of the prospects for cross-border trading of these Titles between Sweden and Norway, with the ambition to transmit this useful knowledge to the Task XIV activities on White Certificates trading. The presence of the Task 14 non-Swedish experts - coming from France, Italy, Netherlands, Norway and UK - also improved awareness and visibility within Sweden of their national policies on the same subject.

Beyond the issue of cross-border trading, the approaches on some practical issues relevant to the implementation of a White Certificates scheme and its trading (such as criteria for design and development of projects for energy efficient end-uses, valuation issues, monitoring mechanism and non-compliance regime, involved costs) were considered in detail.

This document represents the Critical Synthesis Report of the above Lund workshop, whose presentations are annexed, and of the related comments collected during the side experts’ meeting.. The Report is mainly devoted to:

- comments, remarks and unsolved questions raised during the workshop
- contributions of the Task experts in finding answers and reading-keys.

The experiences and positions exchanged among the participating experts and stakeholders ranged over a very wide variety of items under current discussion and are pointed out in the following remarks.

Pros and cons of cross-border trading of White Certificates

The events of June 15th - 17th held in Lund in the frame of the Task XIV activities gave the chance to focus **pros and cons of** national Energy Efficiency systems where trading of White Certificates - when occurring - is confined at the most at a **national level**, versus a chance of wider **cross-border trading**. Profit was also taken of some learned lesson gained from experiences gained in EU Northern Countries on Tradable Green Certificates. Though all the experiences are still in progress, some definite positions and advice were expressed as warnings for countries who are setting up or are tuning their national schemes on Energy savings with involvement of White Certificates trading. These positions can be summarised as it follows:

1. Advantages are envisaged in cross-border trade from the economic point of view, owing to a larger potential for energy savings projects and greater flexibility in implementing them.

2. However, a critical issue is to find common national objectives, in terms of both nature of savings (primary or final energy, CO_2 related savings, etc) and quantities. Convergence on views on this matter is considered a really complicated process.

3. The types and levels of benefits depend very much on the border of the analysis considered to identify the involved actors in an energy savings project.

4. With reference to costs for the actor who bears the obligation to save energy, it might be cheaper to buy a certificate in another country.

5. The conclusion could be the opposite in case the cost/benefits analysis were considered from a wider societal viewpoint. In particular, international trading would very probably bring about losses of societal benefits at a national level, such as:
   - Local reduction of environmental effects
   - Local grater opportunities of employment
   - Local technological improvement
   - Avoided costs at national level for grid expansion

   (otherwise present without trading), since it would prevent for complete exploitation of the local potentiality of energy savings and the related advantages. In other words, priority should be paid to securing national interests over an international scheme and to guarantee a national exploitation of energy savings benefits earlier than any extra-national operations.

6. Complexity in this matter is particularly challenging when monitoring and verification of energy savings are considered. In fact, unlike REC procedures, the subjective sides underlying the evaluation of the energy savings connected to a project are even amplified by the national specificities. This is particularly critical in the cases when the amount of saved energy (or number of certificates delivered) possibly depends (as in France) on the specific targeted geographical area (e.g. to cope with problems of local grid congestion or new building capacity).

7. However, the idea of common approaches in view of pan-European exchanges of White Certificates may possibly have chances of success for a selected short list of projects for which harmonised *lines of attack* can be identified.

Practical issues in White Certificates trading

A second (but not less important) subject of the workshop and of the side experts meeting focused the different approaches of the participating Countries on **practical issues.** The relevant contributions complemented the contents of the event. The main remarks are below summarised:

1. Quantitative comparisons among information given by the different Countries showed the differences in the approaches adopted to define the energy savings targets and to estimate the savings expected from the relevant EE measures. At present, the main differences refer to:
   - Use of primary or final energy
   - Unit of measure of saved energy: toe, kWh, GJ, PJ
   - Harmonisation factors among different energies
   - Physical reference unit of saved energy:
     - integral data (e.g. per dwelling or per floor surface)
     - Specific data (e.g. per substituted appliance, per surface of insulated wall)
   - Yearly or cumulated savings
   - Discount rate

2. Harmonisation among these criteria is useful for purposes of comparisons, but it becomes dramatically important in view of **international trading of White Certificates**, where a common and agreed value of saved energy must be assigned to a White Certificate regardless of the Country who produced it.

3. **Harmonisation will be a challenge**, since Countries adopt different approaches such as:
   - different energy accounting systems (e.g. for discount rate, lifetime of a measure),
   - different conversion criteria from final to primary energy (that is utterly relevant for electricity), which are very site-specific; that is, they depend on the characteristics of the country electric generation system: in some Country, the amount of White Certificates corresponding to a given amount of saved energy depends also on the geographic site of savings (e.g. PACA districts in France)
   - different baseline criteria: the definition of the terms of reference for the calculation of the energy savings is the keystone which an evaluation procedure is built on; in fact, the perimeter including the eligible measures (and the related evaluations of their technical potential and penetration) is strongly dependent on the criteria adopted to choose this baseline

   For these reasons, not homogeneous comparisons are very likely to be expected and are almost inescapable.

4. Regardless of harmonisation, comparisons are expected to gather deeper insight on aspects, such as:
   - Where the different national procedures relevant to the same energy savings measure match and where they risk to conflict more frequently
   - Which evaluation criteria are assumed in different Countries for the same energy savings measure
   - Which the particular motivations and the national drivers are for such differences (e.g. security of supply, specific urgencies, etc)

5. A continuously growing attention is being paid to ***transaction costs*** as a somehow hidden and less evident component – unlike direct costs - of the total costs of energy savings projects.

Transaction costs are supplementary to those of plain realisation of the project and they make up a sort of significant overheads in undertaking all the phases of White Certificates lifecycle.

6. Transaction costs deserve more attention, even because they can be unexpectedly remarkable, but very often they are not given any specific evidence, being their quota *sunk* in the overall commercial relationship between supplier and end-user, according to competition requirements. Moreover, energy suppliers could be reluctant to transfer part or all of these costs to their clients and then to risk to loose market shares. In fact, a trading scheme on Energy Efficiency Certificates is bound to penalise the supplier who is not capable of meeting a given energy savings target and/or is obliged to transferring his cost inefficiencies to the end-user. For the same above reasons, streamlined procedures need to be explored in order to reduce administrative costs involved in the considered EE schemes.

The issues of additionality and of costs (transaction ones and others) will be matters of a joint presentation of the involved Countries during next workshop to be held in Groningen on October 27th 2005.

It should be remarked that the discussion on these subjects is still in progress. It must be considered that the current report represents a collection of opinions, gathered in the Paris event, only for internal use of the Task: than, this material has not a conclusive character but it rather represents a rational base for a future fully discussed and agreed Final Report.

1 GENERAL INFORMATION

1.1 Forewords

The IEA-DSM Task XIV has been established in June 2004 with the aims of evaluating:

- whether – and how – a scheme involving the issuing and the trading of White Certificates (WhC) provides an effective means of attaining targets of reduction of:
    1. primary energy consumption (main concern)
    2. CO_2 emissions (secondarily)
- what is the most suitable format for such a scheme
- what implementation problems are involved, at national and extra-national levels
- how it can interact with other schemes.

The Task involves at present the participation of the experts appointed by six Countries: France, Italy, Netherlands, Norway, Sweden and UK. These Countries are developing White Certificates schemes or are interested in any case in market-based instruments to implement energy efficiency policies. In the case of Sweden, a national reference group was established and is operating on this subject in order to approach preliminary pros and cons of having White Certificates schemes. Finally, Sweden and Norway also considered the participation to the Task a chance to get answer to the questions 'why' and 'how' a scheme like this was introduced in Italy, France and Great Britain.

More information about task goals and organisation are given in the relevant website:

http://dsm.iea.org/NewDSM/Work/Tasks/14/task14.asp

The Task fundamentally is carried out through five workshops, open to all the interested local and international stakeholders, to be held during the development of the Task and to be hosted by the participating Countries. The outcome of each workshop is to be documented in a Critical Synthesis Report, which makes up an official Task deliverable.

The present Report belongs to this class of documents and is relevant to the third workshop planned for Task XIV. The workshop was held in Lund on June 16^{th} 2005 at IIIEE Institute of the University of Lund. The workshop focused mainly on pros and cons of national Energy Efficiency systems where trading of White Certificates, when occurring, is confined at the most at a national level, versus a chance of wider cross-border trading, also taking profit of some learned lesson from experiences already gained in EU Northern Countries on Tradable Green Certificates. As a second (but not less important) subject, focus was also given to the different approaches of the participating Countries on practical issues (such as criteria for design and development of projects for energy efficient end-uses, valuation issues, monitoring mechanism and non-compliance regime, trading mechanisms). The relevant contributions complemented the contents of the event.

Some information follow about participants and contents.

1.2 Participants

About 30 participants (see the below Tab. 1) attended the workshop, coming mainly from the hosting Country and from the Countries funding the IEA-DSM task XIV.

SURNAME	NAME	ORGANISATION	COUNTRY
Alopaeus	Tea	Naturvardsverket	Sweden
Capozza	Antonio	CESI	Italy
Devine	Martin	DEFRA	UK
Enge	Andreas	Enova	Norway
Forsberg	Anna	STEM	Sweden
Grattieri	Walter	CESI	Italy
Hedenström	Claes	Vattenfall	Sweden
Holmquist	Lars	Goteborgi Energi	Sweden
Johansson	Lars	Umeåenergi	Sweden
Jörgen	Elf	Fortum	Sweden
Kärrmarck	Urban	STEM	Sweden
Lindqvist	Ulf	Jamtkraft	Sweden
Lithell	Christer	Öresundkraff	Sweden
McCormick	Kes	IIIEE	Sweden
Monjon	Stéphanie	ADEME	France
Montin	Stefan	Elforsk	Sweden
Moor	Rene	Ministry of Economics	Netherlands
Mundaca	Luis	IIIEE	Sweden
Neij	Lena	IIIEE	Sweden
Normand	Mathias	STEM	Sweden
Oikonomou	Vlasis	University of Groningen	Netherlands
Overland	Conny	Göteborg University	Sweden
Peterson	Christian	WSP Göteborg	Sweden
Pierre	Inge	Svenskenergi	Sweden
Rabany	Bertand	Ministry of Economy, Finance and Industry	France
Rodriguez	Carmen	Red Eléctrica de España	Spain
Sandqvist	Maria	Teknikforetagen	Sweden
Tarbé	Magali	EdF	France
Valleskog	Martin	Naturgas	Sweden
Kåberger	Tomas	IIIEE	Sweden

Tab. 1 – Participants to the workshop

1.3 Content

The workshop hosted ten presentations plus a Panel Discussion (see the below Tab. 2).

N.	TITLE	AUTHOR	CONTENT
1	Market Mechanisms for White Certificates: a IEA-DSM International Activity	Antonio Capozza (CESI - Italy)	Overview on White Certificates and structure of IEA-DSM task XIV
2	The Energy Efficiency Commitment (EEC) in Great Britain	Martin Devine (DEFRA – UK)	Description of the GREAT BRITAIN scheme in first and second phase of the Energy Efficiency Commitment
3	Energy Efficiency obligations: the Italian scheme	Walter Grattieri (CESI – Italy)	Description of the Italian scheme for White Certificates trading
4	White Certificates: the French System	Bertrand Rabany (Ministry of Economy, Finance and Industry - France	Description of the French scheme for White Certificates trading
5	Introduction to and first experiences of Green Electricity Certificates in Sweden	Mathias Normand (STEM – Sweden)	• Why a green certificates system in Sweden? • Objectives and rules • Market Development and fulfilment of goals
6	Prospects for a common Green Certificate market in Norway and Sweden	Mathias Normand (STEM – Sweden)	• Why international certificate market? • Political challenges • Minimum design criteria • The Swedish-Norwegian case
7	RECS: Renewable Energy Certificates System	Claes Hedenström	• Mission of RECS International and AIB (Association of Issuing Bodies) • Trade possibilities and practices • Cross border trade and legislation

N.	TITLE	AUTHOR	CONTENT
8	Transaction Costs and White Certificates Schemes	Luis Mundaca (IIIEE – Sweden)	• Background about Transaction Costs • The case of White Certificates schemes • Early lesson learnt (Sweden, GREAT BRITAIN, Australia)
9	White Certificates: will local benefits and international trading be coherent?	Lena Neij (IIIEE – Sweden)	Review of possible conflicts between forecast local benefits and economic savings in adopting a White Certificate international trading
10	EuroWhiteCert: stepwise towards effective European Energy Efficiency Policy Portfolios Involving Certificates	Lena Neij (IIIEE – Sweden)	Review on goals and organisation of the EU EIE Project aimed at supporting the conceptual and technical development of tradeable White Certificates schemes
11	Panel discussion: national or international systems of certificates?	Moderator: Urban Kärrmarck (STEM – Sweden) Speakers: Stéphaine Monjon (ADEME – France), Walter Grattieri (CESI – Italy), Mathias Normand (STEM – Sweden), Martin Devine (DEFRA – UK)	• Why energy efficiency and White Certificates • Compliance and transaction costs • A pan-European or a national White Certificates scheme? • Experiences, conclusions and recommendations

Tab. 2 – Summary of the presentations

The complete texts of these presentations are reported as Annexes of the present report; reference is suggested to them for any details. The present report will focus some of the subjects which were deemed to deserve a deeper insight and will give more details on them while using some supplementary material and contributions, obtained during the discussions of the workshop (mainly, the Panel Discussion), in the related experts' meeting[1] and by means of any further exchange on the subject. These comments are also useful for a better understanding of the written contributions already available.

The following chapters document this process of deepening/integration. **A very large amount of these remarks relies on written and recorded contribution of the above mentioned Task experts**. All of them are thanked for their contributions. Specific acknowledgement of that will be done when needed.

[1] Each of the planned workshop is connected to a meeting, restricted to the Task experts designed by the contracting Parties, where some of the most critical subjects are further developed.

2 CURRENT STATUS OF WHITE CERTIFICATES SCHEMES

A key-point of the Task XIV activities is made up of a review of the existing or planned national schemes involving White Certificates. The idea is being carried out to deal with this matter in a comparative way, through a suitable table which allows for synthetical cross-evaluations among the different schemes, while addressing - by means of simple *hypertextual links* - to deeper details contained in further parts of the document.
The following Tab. 3, Tab. 4 and Tab. 5 show an example of this approach, with reference to the GREAT BRITAIN, Italian and French schemes; NSW references will be added later. Detail information are available in the previous Critical Reports (reff. [1] and [2]) for GREAT BRITAIN and France.

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
PRINCIPLE ISSUES					
Scheme basis	Mandatory	Mandatory	Mandatory	Mandatory	
Drivers/Background	Statutory obligation to achieve energy efficiency targets	Statutory obligation to achieve energy efficiency targets	DRIVERS/BACKGROUNDStatutory obligation to achieve energy efficiency targets	Revival of the energy demand-side management policy due to: • National Kyoto targets • Security of supply of Energy sources.	
Global energy savings targets	62 TWh fuel weighted energy benefits	130 fuel-standardised, lifetime-discounted terawatt hours	GLOBAL ENERGY SAVINGS TARGETS Quota system: 2.9 Mtoe/year (regime value in 2009)	54 TWh lifetime-discounted (4% discount rate)	
Reference term of savings	Final energy	Final energy	Primary energy	Final energy	
	Absolute savings	Absolute savings	Absolute savings	Absolute savings	
Compliance period	2002-2005	April 2005 to March 2008	COMPLIANCE PERIOD Annual (2006-2010)	First three years: 2006-2008	
Type of obligation	50% from "priority group"	Obligation to be achieved in relation to domestic consumers in Great Britain. 50% of energy savings to be achieved from a "priority group" of low-income consumers	TYPE OF OBLIGATION 50% from electricity/gas consumption reduction	No particular obligation	
Obligation bound entities	Electricity suppliers and gas suppliers	Electricity and gas suppliers	OBLIGATION BOUND ENTITIES Electricity and gas distributors	Energy suppliers of: • electricity, • natural gas, GPL • cooling and heating and domestic fuel (not for transports), Possibility to form consortia of fuel suppliers	

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
Apportionment criteria					
Threshold	≥15 000 domestic customers served	≥15, 000 domestic customers supplied	Threshold ≥100 000 customers served	• ≥ 0.4 TWh in annual sales (juridical persons) • none for domestic fuel suppliers	
Reference parameter used for apportionment	Number of domestic customers served	Number of domestic customers supplied	Reference parameter Electricity/Gas distributed (market share)	Volume of global annual sales in residential and tertiary sectors	
Criteria	Progressively tighter for companies of increasing capacity	Linear	Criteria Linear	Linear with annual adjustment.	

Tab. 3 – Comparison among schemes for White Certificates trading – Principle issues

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
PRACTICAL ISSUES					
Eligible technologies	• Domestic uses • Open-ended • Pre-approval	• Domestic uses • Open-ended • Pre-approval (action to be notified to Ofgem within one month of commencement)	ELIGIBLE TECHNOLOGIES • All end-use sectors • Open-ended (from the start)	• All end-use sectors (transports included) • All energies • Substitution fossil with renewable (in some cases) Exclusion: - measures on sites covered by ETS - if savings due only to substitution between fossil fuels	
Eligible implementers					
Categories	• electricity and gas suppliers responsible, but flexible to work with social housing providers, retail businesses, consumers and other partners • ESCO schemes encouraged	obligation is on electricity and gas suppliers , but flexible to work with social housing providers, retail businesses, consumers, ESCOs and other partners	Categories • all electricity and gas distributors and ESCOs • companies controlled by the distributors	• All obliged agents • All economic actors but threshold of 3 GWh (a trustee asks and gets the certificates in this last case)	
Accreditation of the implementers			Accreditation of the implementers ESCO accredited through a suitable self-declaration	No	

ATTRIBUTE	**GB EEC 2002-2005**	**GB EEC 2005-2008**	**ITALY WhC**	**FRANCE**	**New South Wales**
Eligible projects					
Categories	• open (pre-approval of schemes) –	• actions approved by the Regulator, Ofgem, as promoting an improvement in energy efficiency • incentive for energy service action • incentive for innovative action	Categories • based on technology requirements	• Focus on standard measures (more then one hundred planed) but … • other measures can be proposed	
Accreditation before/after the realisation of energy savings?			Accreditation before/after the realisation of energy savings No pre-approval for typologies covered by procedures - but possible for other typologies	• possible pre-approval for measures • but *de facto* ex-ante eligibility granted for standard measures	

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
Impact evaluation					
Approach	Annual reports by Ofgem to Government. Following Ofgem's final report on EEC 2002-05, Government will consider its impact, including carbon abatement.	Annual reports by Ofgem to Government. Following Ofgem's final report on EEC 2002-05, Government will consider its impact, including carbon abatement.	Approach a) Deemed-savings approach b) Engineering savings approach c) Direct measurement approach	For standard measures *ex ante* evaluation based on data on technologies, sales of equipment, houses stocks, …. • At present, 45 savings actions being considered	
Additionality	• to be demonstrated by suppliers (deadweight removed from targets)	• to be demonstrated by suppliers (deadweight removed from targets)	Additionality • Dealt with baseline definition and technology requirements • Other adjustments foreseen but not implemented yet	• obliged: any eligible action is additional • Non-obliged: turnover must not be increased or very innovative products	
Time persistence of savings	• Account of this is taken when the levels of savings are attributed to a type of measure.	• Account of this is taken when the levels of savings are attributed to a type of measure.	Time persistence of savings • 5 years in most cases • 8 years for a restricted set of measures on building	Savings cumulated over the time life of the equipment : differs according to the measure	

Tab. 4 - Comparison among schemes for White Certificates trading – Practical issues

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
OTHER ISSUES					
Market design					
Certificates features	• Transfer of Savings • Transfer of all or part of Obligation	• Transfer of Savings • Transfer of all or part of Obligation	Certificates features • 3 types • 5 years lifetime (8 years in some cases) • Metrics: 1 Certificate = 1 toe	• 1 Certificate = n kWh saved • life-time: at least 10 years	
Borrowing/grandfathering	allowed	allowed	Not allowed	No	
Banking			Banking Allowed	Yes	
Trading parties	• Obligated electricity and gas suppliers	• Obligated electricity and gas suppliers	Trading parties • Entities to whom the certificates will be awarded: all electricity and gas distributors, companies controlled by distributors and ESCO's • Others: financial intermediates, voluntary buyers	• Obliged energy suppliers • Eligible parties who can make saving actions and gain WhC	
Trading rules	All trades will have to be approved by Ofgem	All trades will have to be approved by Ofgem	Trading rules • Under discussion: - Frequency of trade - Safety deposit - others	• Official marketplace not planned • Only bilateral exchanges	
Penalty for non-compliance	• Penalty for not complying with its energy efficiency target may be up to 10% of the supplier's turnover.	• Penalty for not complying with its energy efficiency target may be up to 10% of the supplier's turnover.	PENALTY FOR NON-COMPLIANCE "Missing" energy savings to be recovered in the following two years. In addition, heaviest non-compliances will involve penalties proportional and greater than the investment required to compensate the non-compliance.	• 2c€/kWh • Doubled if the obliged voluntarily does not buy certificates available at a price equal or under 2c€/kWh	

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
Body Responsible for establishing the Scheme	Government	Government	BODY RESPONSIBLE FOR ESTABLISHING THE SCHEME Ministries of Productive Activities and of Environment	Ministry of Industry	
Body Responsible for administrating the Scheme	Gas and Electricity Markets Authority (Ofgem)	Gas and Electricity Markets Authority (Ofgem)	BODY RESPONSIBLE FOR ADMINISTRATING THE SCHEME Regulatory Authority for electricity and gas	Ministry of Industry ADEME helps the Ministry to define and evaluate the standard actions	
Body Responsible for Verification of the projects	Gas and Electricity Markets Authority (Ofgem)	Gas and Electricity Markets Authority (Ofgem)	BODY RESPONSIBLE FOR VERIFICATION OF THE PROJECTS To be appointed by Regulatory Authority for electricity and gas	DRIRE delivers WhC:	
Body Responsible for Registering the transactions	Gas and Electricity Markets Authority (Ofgem)	Gas and Electricity Markets Authority (Ofgem)	BODY RESPONSIBLE FOR REGISTERING THE TRANSACTIONS GME - National Electricity Market Operator (Non electric Markets area)	Not specified for the moment	

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
Scheme financing	• Costs fall on energy suppliers, who may pass them on to their consumers through domestic electricity and gas tariffs	• Costs fall on energy suppliers, who may pass them on to their consumers through domestic electricity and gas tariffs	SCHEME FINANCING • Cost-recovery via electricity and gas tariffs (customer differentiated, updatable) • Acknowledged costs to obliged parties: 100 Euro/ certificate redeemed (Type I and Type II certificates only)	• Cost-recovery via tariffs of the supplied energy vector • negotiated increase of tariff for the part of market not yet liberalised	
Interaction with other policy tools					
Fiscal and other incentives		Incentive for energy service action Incentive for innovative products	Fiscal and other incentives Allowed additionality of incentives (from central and regional governments)	No involvement of subsidies planned	
Link with other schemes	• ETS: only surplus	• Suppliers may undertake action with Government programmes, as long as there is an additional improvement in energy efficiency. Suppliers may undertake action which is not in conjunction with a Government programme, but uses contractors who are also managing agents for a Government programme.	Link with other schemes • Not decided yet	• Not decided yet	

ATTRIBUTE	GB EEC 2002-2005	GB EEC 2005-2008	ITALY WhC	FRANCE	New South Wales
Attained outcomes		Ofgem reports formally in July 2005 on EEC 2002-05. April 2005 informal update indicates that suppliers have exceeded the overall target			
Present scenario/state-of-the-art		EEC 2005-08 commenced on 1 April 2005.	PRESENT SCENARIO/STATE-OF-THE-ART Project performed in 2001-2004 submitted for assessment of ex-post evaluated energy savings.	• Law adopted soon • Decrees under negotiation • Implementation of programme planned for 2006	

Tab. 5 - Comparison among schemes for White Certificates trading – Other issues

3 DETAILS ON THE ITALIAN SCHEME

The following considerations are mainly based on ref. [3] with up-to-date information obtained from presentations N. 3. This section addresses issues not covered in the previous Critical Synthesis Reports.

3.1 Principle issues

DRIVERS/BACKGROUND

- **FOREWORD**

The choice of a White Certificates systems in Italy (see ref. [3]) is based substantially on political drivers:

- The need to implement Kyoto protocol: Italy has committed to reducing its emissions by 6.5% between 1990 and 2008-2012. About 26% of the whole emission reduction goal (24-29 MtCO2) will have to be achieved through energy efficiency improvements on the demand side of the energy market
- The need to implement two European Directives (96/92/CE and 98/30/CE) on the liberalisation of the electricity and gas market. These two EU Directives were implemented into the Italian electricity and gas market by two Italian legislative acts: Legislative Decree no. 79 of 16 March 1999 (Decreto Bersani) and Legislative Decree no. 164 of 23 May 2000 (Decreto Letta) respectively. Both acts determine that concessions for the Distributors' operation shall contain provisions to increase energy efficiency of end uses, according to quantitative targets to be set by Decree of the Minister of Industry jointly with the Minister of the Environment
- The need to fix these targets in energy efficiency in end uses. Two Legislative Decrees, the so called Twin Decrees 24 April 2001, finally updated on 20 July 2004, definitely established the quantitative targets in terms of primary energy, the suitable actions to fulfil them and the mechanism of White Certificates trading
- The affinity with the Proposal for a Directive on energy end-use efficiency and energy services COM (2003) 739

- **BACKGROUND**

Until recently the promotion of energy efficiency in end-use sectors has not been at the top of the Italian energy and environmental policy agenda. Policy efforts have mainly focused on the supply side of the market, aiming at enhancing the conversion efficiency of the existing capital stock, promoting a shift away from carbon intensive fuels to lower or zero emissions fuels (i.e. renewable sources) and, although to a lesser extent, promoting investments in new capacity and infrastructure.

One reason for this policy choice is possibly linked to the fact that Italy has been traditionally characterised by a relatively low per-capita energy consumption compared to other industrialised countries and this has long (and incorrectly) been interpreted as an indicator of high efficiency in energy use. On the contrary, it is primarily the result of an economic structure characterised by a relatively low share of high energy intensive industries and a significant share of the agriculture and tertiary sector, favourable climatic conditions and a relatively high fiscal pressure on energy-related activities.

In the last few years, driven by the rising environmental concern and the increasing attention being paid to issues related to security of energy supply, a number of studies have explored the technical and economic energy savings potential in the country.

These analyses pointed out that a significant potential existed, although at different levels, in every sector of the economy. These results have fuelled the debate over appropriate ways to promote improvements in the efficiency of energy use.

- **KYOTO REQUIREMENTS**

Under the Kyoto Protocol and the subsequent burden sharing agreement among European Union member states, Italy has committed to reducing its GHG emissions by 6.5% between 1990 and 2008-2012. According to 1997 official national estimates this commitment drives Italy to curb national GHG emissions from a forecasted value of about 622 $MtCO_2e$ in 2012, to 555 $MtCO_2e$ by the first commitment period, resulting in a total reduction of 102 $MtCO_2e$, corresponding to an actual reduction target of –18.5% with respect to 1990's emissions level[2].

In November 1998 the Government adopted the second *National Programme to reduce GHG emissions* (NCP hereafter) which singles out six 'key actions' that will deliver this emissions reduction target (cfr Tab. 6). The overall reduction target, the sectored targets and the general policy framework set out in the NCP have been put at the heart of the national energy policy independently from the Kyoto commitment.

According to the NCP, policies and measures to promote energy savings in end-use sectors will play a key role in the reduction of GHG emissions nation-wide: about 26% of the whole emissions reduction goal, corresponding to a cut of 24 to 29 $MtCO_2$, will have to be achieved through energy efficiency improvements on the demand side of the energy market. On the supply side, over 20% of the total long term reduction target will have to be achieved through efficiency improvements of power plants; a further 18% will have to be delivered via an increase of energy generation from renewable sources.

Key action	2002	2006	2008–2012
1 Efficiency improvements in power generation	–4 to –5	–10 to –12	–20 to –23
2 Energy saving in transport	–4 to –6	–9 to –11	–18 to –21
3 Promotion of renewables	–4 to –5	–7 to –9	–18 to –20
4 Energy savings in end-use sectors	–6 to –7	–12 to –14	–24 to –29
5 Emission reductions in non-energy sectors	–2	–7 to –9	–15 to –19
6 Sinks	–	–	–0.7
Total	–20 to –25	–45 to –55	–95 to –112

Source: CIPE's Deliberation 19 November 1998, N. 137/98.

Tab. 6 - **Key actions in the NCP and emissions impact ($MtCO_2e$)**

The NCP does not lay down specific policy tools to be used in order to pursue the above mentioned emissions reduction goals; however it does specify that these emissions cuts will have to be achieved via policies and measures that:

[2] As a consequence of the increasing trend of GHG emissions in the period 1997 -1999 these numbers are now being revised.

- enhance the emission reduction potential of policy measures that have to be introduced in order to comply with EU directives and regulations;
- pursue the modernisation of the industrial and energy system and infrastructure and the improvement of energy efficiency in a cost-effective way;
- promote the development of innovative low-emission technologies.

In other words, the great part of the package of measures implemented within the NCP will have to be of a "non-regret" type: together with emissions cuts, they will deliver a number of secondary benefits in terms of efficiency improvements, enhancement of the competitiveness of the national electricity supply industry, air quality improvements in towns and cities.

- **ENERGY EFFICIENCY AND THE OPENING-UP OF ENERGY MARKETS TO COMPETITION**

A further important criterion for the definition of the policy tool-kit to promote the reduction of GHG emissions nation-wide has emerged simultaneously to the need to implement the two European Directives on the liberalisation of the electricity and gas market (96/92/CE and 98/30/CE): the search for policy tools consistent with the new emerging market framework. The common understanding is that, in order to avoid undue subsidisation, market opacity and discrimination, 'traditional' policy instruments such as standards and fiscal incentives have to be gradually substituted by incentives based upon market mechanisms.

The process of implementation of the two European liberalisation Directives has also given rise to a growing concern over the possible negative environmental impacts of the liberalisation process. Many are concerned that as markets become more competitive and prices gradually decline, consumption (and related emissions) increases while utilities adopt myopic behaviours and seek to shed costs, starting from activities which are characterised by high initial investment costs and long pay-back periods, such as renewable sources, R&D initiatives and DSM programs.

With regard to the latter, these concerns have been integrated into the legislative acts which implement the EU Directives in the national electricity and gas market (the above mentioned *Decreto Bersani* e *Decreto Letta*): both acts determine that concessions for distributors shall contain provisions to increase the energy efficiency of end uses, according to quantitative targets to be set by Decree of the Minister of Industry jointly with the Minister of the Environment.

The need to set these targets gave the Government a great opportunity to rethink the structure of the policy instruments used until that date to promote energy efficiency in end-use sectors. In July 2004 two Legislative Decrees were issued[3] (the Twin Decrees 20 July 2004, one for the electricity distribution sector and one for the natural gas distribution sector) which set these quantitative targets together with a new and quite innovative policy tool-kit to promote their achievement. The policy package combines command and control type of measures (mandatory quantitative targets) with market based instruments (certificate trading) and elements of tariff regulation (cost recovery mechanisms via electricity and gas rates).

[3] These Decree, among the other things, update annual energy savings targets, of two similar previous Decrees issued on April 2001which are cancelled and substituted by these more recent ones.

The introduction of tradable White Certificates is the transposition to end-uses energy efficiency of a principle that has been applied so far to a number of other topics in a number of countries (e.g. emissions reductions, development of renewable energy sources, water rights). Its major aim is to combine the 'guaranteed results' of regulation (i.e. mandatory energy savings targets) with the economic efficiency of market-based trading mechanisms. At least in theory and under strict assumptions, it is expected to achieve the predefined and compulsory targets at the minimum total cost.

GLOBAL ENERGY SAVINGS TARGETS

The mandatory targets of the herein considered Italian scheme involve a gradually growing annual value expressed in Mtoe/year of absolute saving of primary energy, according to the below Tab. 7.

Year	Annual Energy Savings (Mtoe/year)
2005	0,2
2006	0,4
2007	0,8
2008	1,5
2009	2,9

Tab. 7 – Italian Energy saving targets

The following conversion factors hold, according to the considered energy carrier:

- The fuel savings are accounted on the base of their lower calorific power expressed in GJ, considering that 1 toe=41.860 GJ
- The electricity savings are accounted through the conversion factor 1 kWh=$0.22 \cdot 10^{-3}$ toe.

COMPLIANCE PERIOD

The saving actions must be performed in the period 2005-2009. Within this period, there are five annual deadlines to be respected, and the targets will be verified (through the surrender of White Certificates) for each year by May 31st of next year, starting from 2006.

TYPE OF OBLIGATION

The overall target can be attained by:

- Electricity savings
- Gas savings
- Other fuels savings

The target is shared over the **two targeted sectors, the electricity Distributors and the gas Distributors**, according to the following Tab. 8:

Year	Annual Energy Savings (Mtoe/year)	
	Electricity Distributors	Gas Distributors
2005	0.1	0.1
2006	0.2	0.2
2007	0.4	0.4
2008	0.8	0.7
2009	1.6	1.3

Tab. 8 – Italian Energy saving targets sharing

Each targeted sector must comply with **at least 50% of his goal** (the so called *50% constraint*) by means of savings obtained on end-uses relevant to his proper energy vector. In other terms, the electricity Distributors must reach at least the half of their goals with savings on electrical end-uses; the residual part may be fulfilled with savings on gas or other fuels end-uses (i.e. fuel switching) . Accordingly, the gas Distributors must reach at least the half of their goals with savings on gas end-uses; the residual part may be fulfilled with savings on electricity or other fuels end-uses. The *50% constraint* translate in an electricity consumption target equal at least at 1.5% of the total electricity distributed to final consumer in 1999 (net of auto-consumption). In the case of natural gas, it translate in a reduction of at least 3% of the total natural gas distributed in the same year.

OBLIGATION BOUND ENTITIES

Obligation concerns a very restricted collection of subjects: **the electricity and gas Distributors** with more than 100,000 customers as of Dec 31st 2001. They are the owners of the distribution networks. In some cases these operators also act as suppliers towards the end-users (at present –date of report - this is the case of the electricity end-users not eligible for an open market yet - practically, all the household users).

APPORTIONMENT CRITERIA

- **THRESHOLD**

The total energy savings targets are shared among Distributors exceeding the **lower threshold of 100,000 customers** served as of Dec 31st 2001. At the moment, the resulting pool of obliged agents is made up as it follows:

- electricity: 10 Distributors, serving about 98% of total customers
- natural gas: 24 Distributors, serving 9.630.000 customers (over a total of about 16 millions)

- **REFERENCE PARAMETER**

Reference parameter for apportionment is the **ratio of own electricity/gas distributed to the total** in the previous year.

- **CRITERIA**

The amount of the apportioned targets over an obliged entity is **proportional to his assessed sales volume** (see above).

3.2 Practical issues

ELIGIBLE TECHNOLOGIES

All end-use sectors are eligible. An open list of eligible technologies was set up by the Regulatory Authority (see"ELIGIBLE PROJECTS"). Supply-side projects are considered not to be eligible to meet the obligation[4].

ELIGIBLE IMPLEMENTERS

- **CATEGORIES**

All electricity and gas Distributors are eligible implementers of Energy Savings projects, regardless of their market share.
Companies controlled by the above Distributors, are eligible as well.
Finally, **Companies finalised at supplying energy services** (ESCO's) are eligible implementers.

- **ACCREDITATION OF THE IMPLEMENTERS**

Accreditation is required for ESCO's to become eligible agents within the Italian scheme. The formal acknowledgement is given by the Authority for Electricity and Gas upon delivery of documents which evidence the Company statute. ESCO's are accredited through a suitable self-declaration, which assesses that the supply of integrated services aimed at realising and possibly managing energy efficiency measures is included among their commercial scopes At present, a list of about 200 accredited ESCO's is available.

ELIGIBLE PROJECTS

- **CATEGORIES**

The targets do not refer to specific end-use sectors and/or type of projects. Consequently, the kind of the eligible projects is open to allow for compliance with target in the widest way. The rules to design, implement and quantify (in term of savings) these projects are issued by the Authority for Electricity and Gas (AEEG). An **illustrative** (then 'open') **list of projects** was set up by law; it includes:

1 End-Use Power Factor compensation
2 Electric motors and their applications
3 Lighting Systems
4 Electricity leaking (stand-by losses reduction)
5 Substitution of electricity with other more efficient energy sources
6 Reduction of electricity consumption in thermal uses
7 Reduction of electricity consumption for air conditioning
8 Promotion of high efficiency electric appliances in offices and homes
9 Devices for combustion of non renewable fuels

[4] This exclusion is specifically mentioned in the decrees. However, a bit contradictorily, eligible projects attached to the two decrees include small photovoltaic plants (< 20 kW).

10 Substitution of electricity to other energy sources with reduction of primary energy consumption
11 Heating/cooling and heat recovery in buildings supplied with non renewable fuels
12 Development of renewable energy sources at users' premises
13 Promotion of electric and natural gas vehicles
14 Campaigns for education, information and promotion of energy efficiency

- **ACCREDITATION BEFORE/AFTER THE REALISATION OF ENERGY SAVINGS**

Standard procedures for savings evaluation exist. No pre-approval is requested for projects covered by these procedures.
Pre-approval is possible to assess eligibility of the other typologies (see "metered baseline methods" in Approach" below).

IMPACT EVALUATION

- **APPROACH**

Three types of methods are available for the evaluation of the energy savings connected to a project:

- **<u>Default method</u> (no on-field measurement):**
  It is based on standard evaluation procedures with no on field measurements and it gives "ex-ante" the energy savings per physical unit (e.g. per substituted lamp, per kW of installed motor power, etc) of equipment. This approach will be used for projects for which expected savings are reasonably well understood and direct measurement would therefore be not cost effective. The approach is typical for "mass" projects where reliable averages can be determined. For every type of project, a simple equation is provided together with standard values for each of the parameters included in the equation itself. In this default method, gross savings were to be converted into net savings through simple multiplication by a default factor which takes into account for free-riding effects and, depending on the type of project been considered, by a second default factor which takes into account the impacts of different delivery mechanisms (e.g. direct installation, sale without installation, discount bonus, etc.). Subsequent year savings will have to be estimated using a default persistence factor specified by AEEG (see also "Time persistence of savings").
  At present (June 2005) 20 procedures are officially available:

  1. Substitution of incandescent lamps with CFLs
  2. Substitution of electric water heaters with electronic ignition gas heaters
  3. Installation of gas fired boilers rated "4 star efficiency"
  4. Substitution of pilot-flame gas water heaters with electronic ignition gas heaters
  5. Substitution of single-pane with dual-pane windows
  6. Wall and roofing insulation (heating savings)
  7. Use of photovoltaic generators below 20 kW
  8. Use of solar water heaters
  9. Installation of variable speed drives for pumping systems below 22 kW

10. Energy recovery from natural gas decompression
11. Installation of high efficiency electric motors
12. Installation of high efficiency refrigerators, freezers, washing machines, dish washers facilities
13. Installation of low flow showerheads in homes, hotels and recreational
14. Installation of faucet aerators in homes
15. Installation of air source heat pumps in new or renovated residential buildings
16. Installation of power regulators in public lighting systems
17. Replacement of mercury vapor lamps with high pressure sodium lamps
18. Installation of air conditioners with cooling capacity below 12 kW
19. Wall and roofing insulation (cooling savings)

Each procedure was submitted to the interested parties for remarks prior to the official issue through a consultation phase.
An on-line system was set up on the Authority website, which allows the eligible operator to submit in an direct way their requests of verification and certification of attained savings and the relevant accounting records. The following Fig. 1 shows an example of this application for energy savings accounting with reference to a project of substitution of incandescent lamps with CFLs.

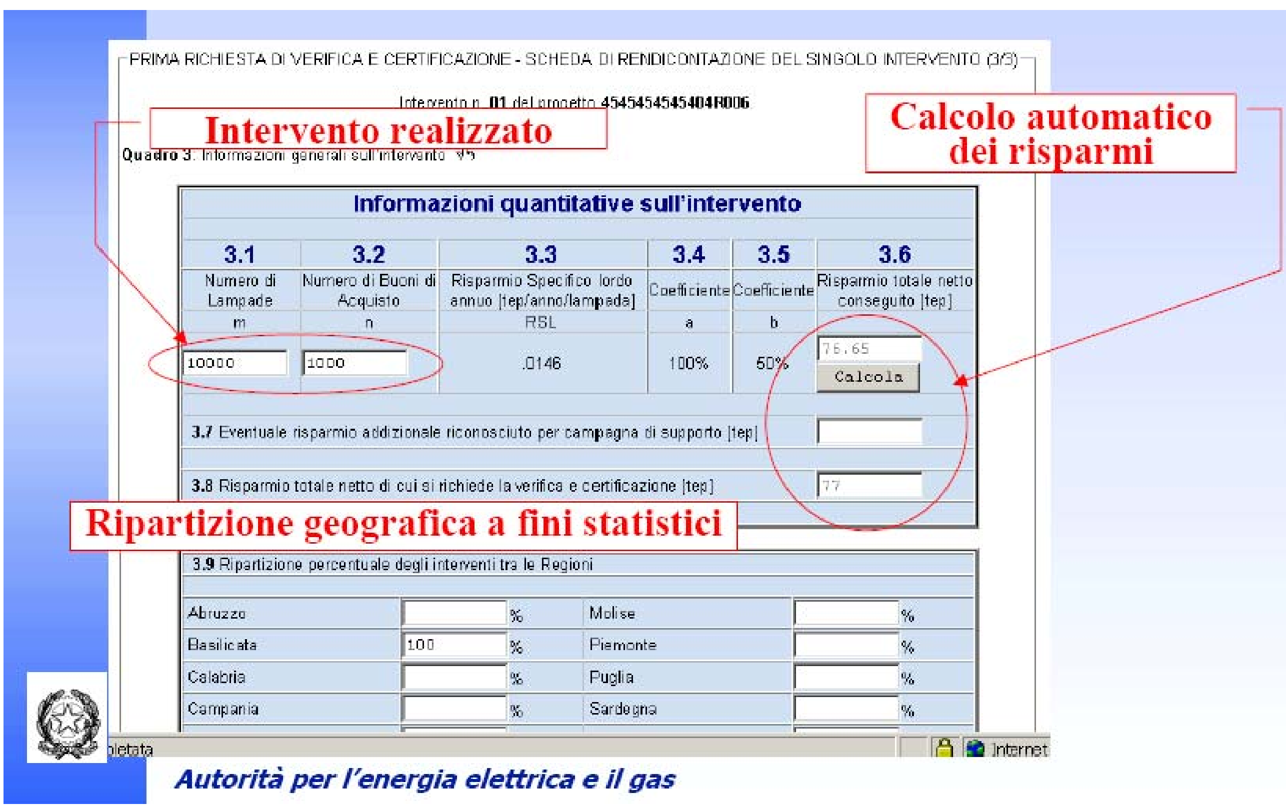

Fig. 1 – Example of on-line system to energy savings accounting of an eligible project

- **<u>Analytic method (some on-field measurement)</u>**
  This method can be considered as an "open" default method, where savings are assessed after on-site metering of few relevant parameters. This method is justified for peculiar projects having relatively large unit size (cogeneration, VSD pumping systems, etc.), that is those projects whose energy saving impact is quite well understood but varies depending on a limited number of identifiable parameters of usage (e.g. number of hours of usage). Also in this case, standard evaluation procedures are going to be established, based on an algorithm where the value of some parameters is fixer whereas direct measurement is required of the parameters of usage which are likely to vary significantly case by case.

  At present, only example of procedures of this kind is available:
  1. Installation of variable speed drives for pumping systems over 22 kW

- **<u>Metered baseline method</u>**
  According to this method, savings are based on the difference between the measured energy consumption 'before' and 'after' the implementation. Baselines may be normalised and adjusted to other process variable (actual versus reference exploitation of equipment, thermal load of buildings, climatic conditions, etc). This approach will be open only for projects whose performance crucially depend on variables and parameters that change from case to case and is therefore less predictable. The approach is based on monitoring plans which must be submitted for pre-approval to the Authority for Electricity and Gas and must conform with pre-determined criteria (e.g. sample size, criteria to choose the measurement technology, etc.). Energy savings are inferred through the measurement of energy use.

- **ADDITIONALITY**

Additionality evaluations are founded on the base-line concept. The base-line represents what the user would do if he had notbeen encouraged to choose the most efficient appliances on the market.
Baselines adopted in the evaluations procedures in default and analytic methods are built on:

- average consumption of installed stocks according to existing mandatory standards (e.g. see ref. [4]); this criterion holds for <u>energy savings projects in buildings</u> (heating, insulation, etc); for example, the baseline for the insulation to an old building is estimated as the average of the insulation effects, according to the age of the building; the measure will tend to rise the performance of this building to the performance required by the present regulation.

- average of sales (updated at 2002), which allows for evaluation of "average" consumes of the "average" equipment existing on the market; this criterion holds for <u>energy savings projects based on substitution with high efficiency boilers or high efficiency electric appliances</u>;
  this criterion is dependent on the market share and on the present technological development[5] and need of periodic updating of baseline is then required to keep significance to the whole evaluation process.

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[5] To this purpose, a continuous and remarkable drift of the market towards *class A* efficiency is under way in Italy, owing mainly to the a definite position of the equipment sellers in this sense.

As for the latter above point, some more details should be considered. In fact, the matter of baseline when a substitution occurs deserved particular attention when the procedures were set up in Italy. As a result of wide debates, a base principle was assumed that the driver for a substitution of an equipment is obsolescence rather than its possible low efficiency; in other words, the end-user carries on a substitution of an equipment since it is old and not in view of higher efficiency. These reasons motivated the above choice of the baseline for the energy savings, which was assumed as the "average" equipment[6] existing on the market and evidenced by recent sales data.

For procedures relying on the default and analytical methods, additionality is included in models which underlay the procedures themselves. For metered baseline methods, the proposed savings programme shall also point out the criteria used to keep additionality into account.

- **TIME PERSISTENCE OF SAVINGS**

A default factor may be used in the standard procedures to keep into account the actual savings persistence of the measures. The persistence of savings must be measured directly when analytical and metered baseline methods are used.

Apart from that, the maximum lifetime of most eligible projects is conventionally set at 5 years as far as its contribution to the fulfilment of the mandatory targets is concerned.

This conventional lifetime is extended to 8 years for a restricted set of measures on buildings:
- Thermal insulation of buildings
- Control of radiation entering through glass surfaces during summer season
- Techniques of bio-climatic architecture
- Techniques based on passive cooling
- Techniques based on solar water heaters

3.3 Other issues

MARKET DESIGN

- **CERTIFICATES FEATURES**

The purpose of White Certificates is twofold:
1. they serve as an accounting tool to prove that the corresponding amount of primary energy as been saved; to this aim, at the end of each compliance period, distributors will have to surrender to the Authority for Electricity and Gas a number of White Certificates corresponding, in energy value (ton of oil equivalent), to the obligation they were asked to meet in that period;
2. they are allowed to be traded either bilaterally or in a White Certificates market specifically set up to that purpose by the Electricity Market Operator.

Coherently with the framework designed by the Twin Decrees, three types of certificates are forecast, characterised by different degrees of fungibility between each other (see Tab. 9):

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[6] Which represents the equipment that the end-user would buy anyway in substitution of his obsolete one.

a) type 1 certificate: they attest the achievement of primary energy savings through reductions of electricity consumption;
b) type 2 certificates: they attest the achievement of primary energy savings through reductions of natural gas consumption;
c) type 3 certificates: they attest the achievement of primary energy savings through reductions in the consumption of other fossil fuels (fuel switching).

Certificate type	**Usability/Tradability/Fungibility**			
	Electricity Decree		***Natural gas Decree***	
	Achievement of the target related to the reduction of electricity consumption	*Achievement of the target related to the reduction of primary energy consumption*	*Achievement of the target related to the reduction of gas consumption*	*Achievement of the target related to the reduction of primary energy consumption*
Type 1 certificate	YES	YES	NO	YES
Type 2 certificate	NO	YES	YES	YES
Type 3 certificate	NO	YES	NO	YES

Tab. 9 - Types of energy efficiency certificates issued by AEEG and degree of fungibility among each others

Lifetime of these certificates is strictly dependent on time persistence of the related energy savings Measure (5 or 8 years, see “Time persistence of savings”). Lifetime will turn out to spread out beyond the period 2005-2009 of application of the Twin Decrees (see **Errore. L'origine riferimento non è stata trovata.** and **Errore. L'origine riferimento non è stata trovata.**). This circumstance was forecast in view of a likely reiteration of these Decrees over 2009.

As for the Certificates metrics, the equivalence:

1 Certificate = 1 toe

is assumed.

- **BANKING**

Being lifetime of each certificate set at 5/8 years, banking of certificates is allowed whereas borrowing[7] is not. Banking will allow distributors some additional flexibility in meeting the obligation. No limits were planned for the bankable amounts of White Certificates.

- **TRADING PARTIES**

The parties involved in White Certificates Trading are essentially the operators to whom the certificates will be awarded: all electricity and gas Distributors, companies controlled by Distributors and ESCOs. Besides these institutional parties, participation of financial intermediates, and voluntary buyers is expected as well.

[7] That is, issuing of an amount of White Certificates prior to the implementation of the project they refer to.

Joint operation of the Authority for Electricity and Gas and of the Electricity Market Operator (GME) will occur in the trading frame according to the scheme of Fig. 2 , with roles and duties specified in following sections.

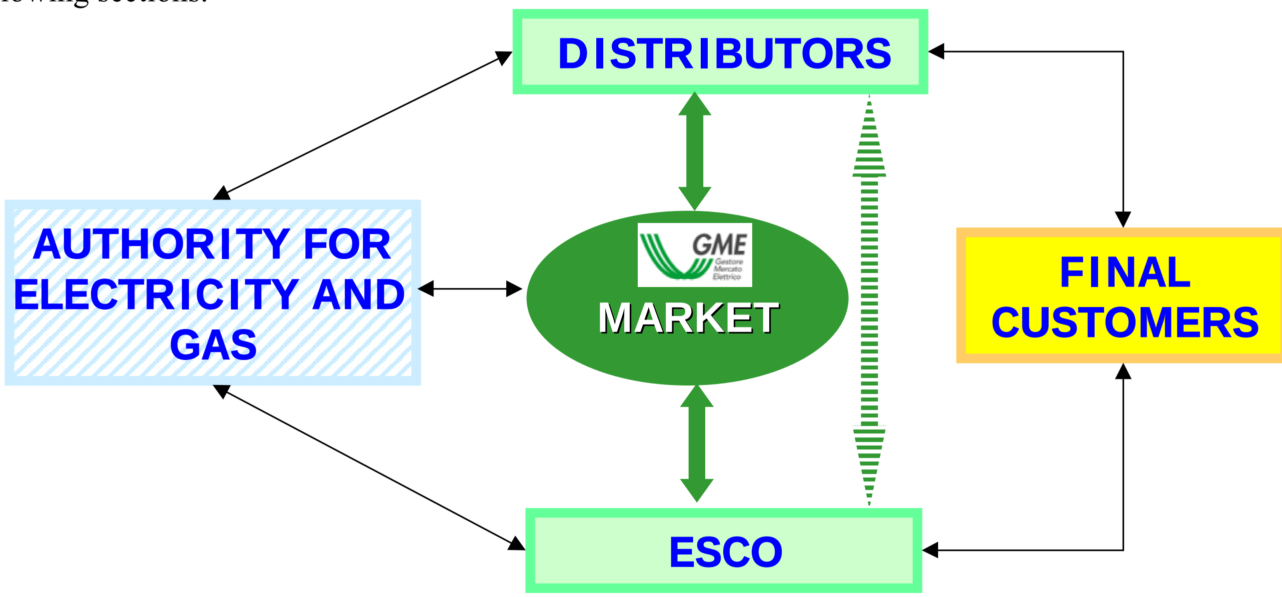


Fig. 2 – Parties involved in White Certificates trading

- **TRADING RULES**

White Certificates are issued once the related energy savings projects are approved by the Authority. The issued number reflects the acknowledged energy savings according to the rule:

1 Certificate = 1 toe

The White Certificates are to be assumed as the only valid document which entitles the obliged operators to assess compliance with their energy savings targets.

They may be negotiated both via bilateral contracts and in the marketplace organised by the Electricity Market Operator, with trading rules (concerning the periodicity/frequency of trading, safety rules for buyers and sellers, etc.) jointly defined with the Authority

The main features forecast for the marketplace are the following:

- Continuous trading
- One trading book for each type of Energy Efficiency Certificate (electricity, gas, primary energy – see Certificates features)
- Guaranteed deposit requested to buyers
- Real-time link with Register

An example of how the bid will work is shown in the following Fig. 3 and Fig. 4, which differ on the assumptions made on whether a price limit occurs.

Trading Book			
BID		OFFER	
QUANTITY	PRICE	PRICE	QUANTITY
50	**180**	**185**	40
30	**175**	**189**	60
70	**172**	**194**	20

Bid with **price limit**: **Buy 50 @ 190**

Trading Book			
BID		OFFER	
QUANTITY	PRICE	PRICE	QUANTITY
50	**180**	**189**	50
30	**175**	**194**	20
70	**172**		

Fig. 3 – Example of bid with price limit

Trading Book			
BID		OFFER	
QUANTITY	PRICE	PRICE	QUANTITY
50	**180**	**185**	40
30	**175**	**189**	60
70	**172**	**194**	20

Bid **without price limit**: **Buy 50 @ market**

Trading Book			
BID		OFFER	
QUANTITY	PRICE	PRICE	QUANTITY
10	**185**	**189**	60
50	**180**	**194**	20
30	**172**		

Fig. 4 – Example of bid without price limit

PENALTY FOR NON-COMPLIANCE

At present, rules are defined on “Missing” energy savings, which must to be recovered within the following two years. In addition, heaviest non-compliances will involve penalties. The exact amount of the penalties is still under definition. The following criteria will drive the future choices:

- The penalty must be proportional and greater than the investment required to compensate the non-compliance.
- The penalty will be related to the number of not saved toe’s with respect to the specific assigned target
- The characteristics and the economic conditions of the non-compliant operator must be taken into account: to this purpose, the value of the penalty per not-saved toe will be also based on market data, i.e.:
  - on incremental costs of products and services for energy efficiency,
  - on the price signals given by the White Certificates market

The unit value of this penalty is also linked with the allowable cost recovery mechanisms, which acknowledges costs to obliged parties as 100 Euro per redeemed White Certificate (Type I and Type II certificates only - see “SCHEME FINANCING”).

Sanction proceedings will be put in a specific government-administered Fund to be used to back information and training programs on energy efficiency in end-use sectors.

BODY RESPONSIBLE FOR ESTABLISHING THE SCHEME

The Ministry of Productive Activities and the Ministry of Environment defined the general rules of the scheme with the already mentioned Twins Decrees 20 July 2004 (see above “Energy efficiency and the opening-up of energy markets to competition”).

BODY RESPONSIBLE FOR ADMINISTRATING THE SCHEME

The implementation of the policy framework designed by the Government poses a number of technical questions and challenges, including the choice of the more appropriate impact valuation approaches for energy savings projects, the setting up of the trading mechanism itself, the design of effective monitoring and non-compliance schemes, and the sharing of benefits and costs among the different players (users, energy retailers and suppliers, component and services providers, etc).

The implementation of the whole mechanism is under the responsibility of the Regulatory Authority for Electricity and Gas (AEEG), including the definition of a number of elements which are essential to kick-start its operation (definition and approval of standard and analytical procedures, evaluating the projects when pre-approval is requested, etc). The Electricity Market Operator and the Authority for Energy and Gas jointly decide the Market Rules.

BODY RESPONSIBLE FOR VERIFICATION OF THE PROJECTS

The Authority is in charge of:

- verifying the performed projects,
- assessing the related energy savings for each eligible operator,
- giving the Electricity Market operator a "green light" signal for issuing a corresponding amount of White Certificates
- verifying annually the obliged operators obligations and issuing penalties for non-compliance

Projects are not subject to approval *before* their implementation, although proponents may ask for an ex-ante eligibility check. Each year will have to make an *ex-post* verification and certification of actual savings achieved by each project presented by qualified actors and will issue an amount of White Certificates corresponding to the (certified) volume of primary energy saved.

In order to certify savings and to issue energy efficiency certificates, the Authority will have to verify that projects have been designed and developed according to the criteria set in the Twin Decrees and in the AEEG's *Guidelines on the preparation, implementation and valuation of energy efficiency projects*.

BODY RESPONSIBLE FOR REGISTERING THE TRANSACTIONS

The Electricity Market Operator (GME) is in charge of organising and managing a marketplace for Energy Efficiency Certificates.
The above responsibilities are summarised in the below Fig. 5.

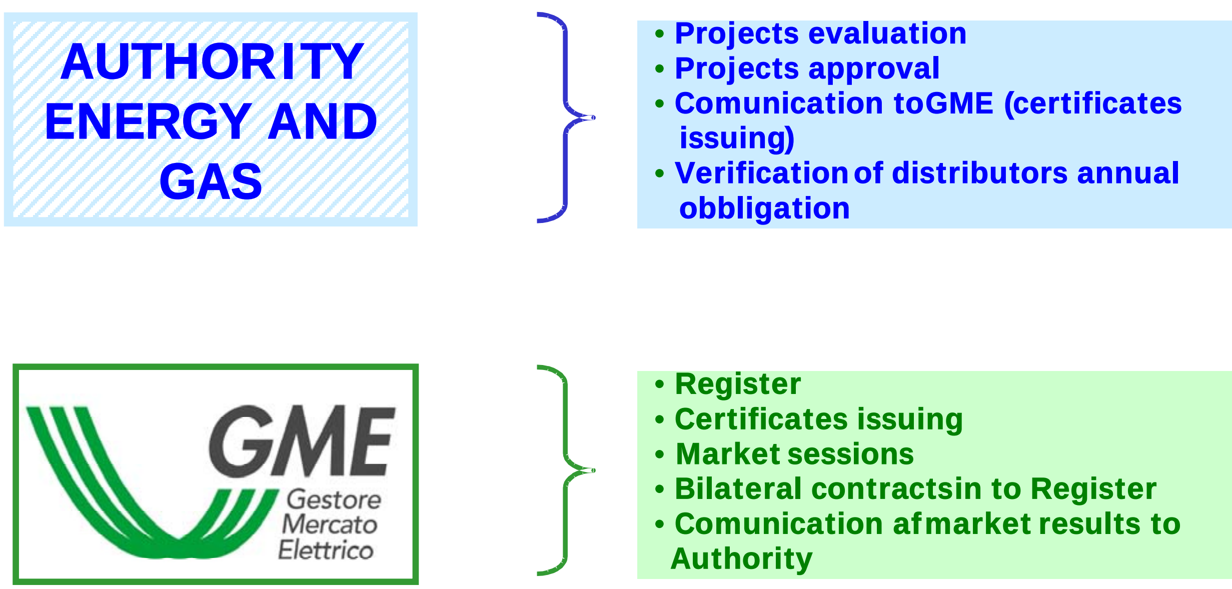


Fig. 5 – Responsibilities under the Italian scheme

The chronological flow of duties is outlined in Fig. 6.

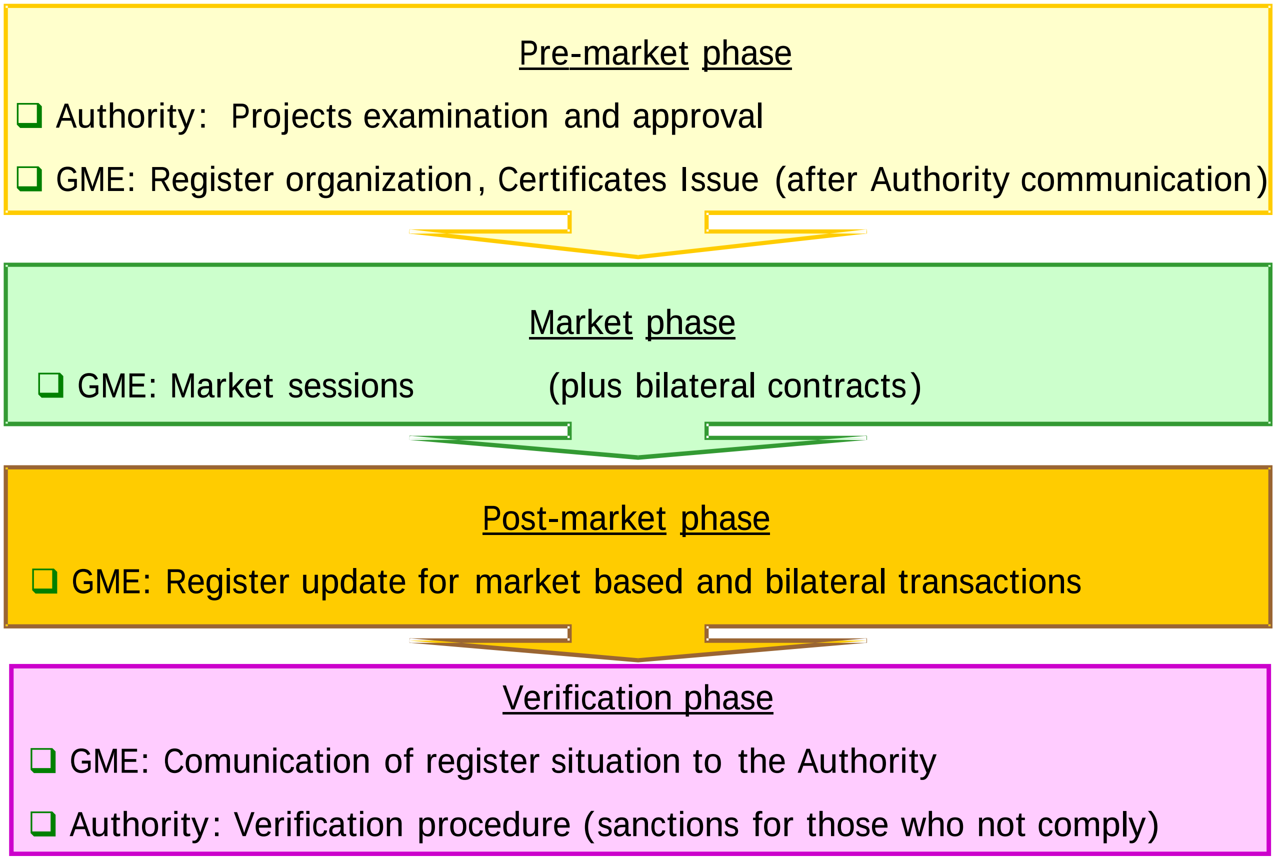


Fig. 6 – Flow-chart of duties involved in the Italian scheme

SCHEME FINANCING

Obliged entities cannot recover costs of energy saving projects via tariffs of the energy vector they distribute, since this part of the market is regulated through a price cap fixed by the Authority against a licence (up to 30 year) granted to the Distributors to operate within their territory in monopoly, not competitive conditions. For this reason, the Twin Decrees allow for the possibility to recover part of the costs borne by Distributors for the development of projects which has not been financed via other sources. The way of recovering these costs is still being defined.

Only Distributors that are subject to the energy efficiency obligation will be able to recover part of the costs borne for the development of energy saving projects via these tariff components. The rationale for this choice being that non-obliged actors who decide to develop energy savings projects, will do so because they see in this a business opportunity linked, *inter alia* , to the tradability of the energy efficiency certificates. The same is true for ESCOs (whose costs could not be recovered via rates).

The level of the tariff components that will be used to cover these costs will be set so as to reflect standard “allowed costs” related to these activities as opposed to a passthrough mechanism of actual costs borne by distributors. Such a system, based on standard rather than actual costs, is intended to introduce incentives for distributors to reduce the costs incurred to meet the obligation via energy saving projects, since not all the costs they incur will be passed on to final consumers via electricity and gas tariffs.

An average standard cost per unit of primary energy saved was determined by the Authority. At present, costs recovery is acknowledged to obliged parties as 100 Euro per redeemed White Certificate (Type I and Type II certificates only[8]), that is 100 Euro per certified saved toe.

INTERACTION WITH OTHER POLICY TOOLS

• FISCAL AND OTHER INCENTIVES

Additionality of incentives coming from other mechanisms (e.g. from central and regional Governments) is allowed. Example can be given in the case of installation of low power photovoltaic plants, which is an eligible measure: in this case, the owner of the plant can sell the produced power to the grid system taking advantage of a profitable price fixed by law; simultaneously, he can sell the gained White Certificates to an obliged Operator finding a supplementary source of gain.

• LINK WITH OTHER SCHEMES

Links with other market schemes are expected, but they have not been decided yet. At present, the different certificates schemes (White, Green, ET) are not interchangeable in Italy.

ATTAINED OUTCOMES

The scheme is in its early stage of implementation and significant statistics have not been performed yet. Some expected outcome on the CO_2 emission due to the implementation of the measures relevant to a reduction in electricity consumptions were evaluated as in Tab. 10

[8] Based on equity considerations, it was assumed that electricity and gas consumers contribute to finance the diffusion of energy efficient technologies only in their respective sectors. Therefore, only savings achieved via cuts of electricity and gas consumption (evidenced by *type I* and *type II* certificates, will be ‘eligible’ for cost recovery via electricity and gas rates respectively

Year	National specific target (Mtoe) (+)	Reduced consumption in MWh (*) (1 kWh=0.22*10^{-3} toe)	$MtCO_2e$ avoided (1 kWh=0.5 kg CO_2 e)
2005	0.1	454,545	0.23
2006	0..2	909,100	0.45
2007	0. 4	1,818,182	0.91
2008	0.8	3,636,364	1.82
2009	1.6	7,272,727	3.64

(*) specific non-cumulated savings; the whole target is assumed to be fulfilled by reducing electricity consumptions
(+) primary energy

Tab. 10 – Forecast impact of the electricity measures on CO_2 emissions

PRESENT SCENARIO/STATE-OF-THE-ART

A set of tool for a start-up of the scheme in 2005 was set up by both the Authority (in terms of rules and standard/analytic procedures) and the Electricity Market operator (in terms transaction mechanisms). The market sessions on the marketplace will start at the end of 2005 and bilateral transaction are underway. Feeling is for this first year of scarce ability of obliged operators to perform directly energy savings projects; a massive demand of White Certificates traded with ESCOs is then very likely to occur.

4 TRANSACTION COSTS AND WHITE CERTIFICATES SCHEMES

4.1 Background about Transaction Costs

4.1.1 Forewords

The issue of transaction costs has been gathering attention of people involved in the all the fields of certification trading for some years. In fact, when DSM programmes are undertaken, fruitful and effective participation and involvement of all the actors is strongly subordinated to profitability of these programmes for all these parties. In these conditions, keeping into account this kind of cost items, sometimes not so patent in the first instance, could even shift the benefit/cost ratio towards unexpectedly low values which can allow policy makers and operators, involved in the implementation of these energy politics, for more cost-effective choices.

The subject was explicitly considered in the frame of this Task in last workshop held in Paris (see: J. P. Tabet: "A succinct synthesis of the French Academic Workshop on White Certificates held on March 9th, 2005, at Ecole des Mines, Paris" in ref. [2]) and it was more extensively outlined in presentation n. 8 of the present workshop, on which the following remarks are based. The results of these approach depicted herein are substantially based on the current research work done by L. Mundaca (IIIEE-University of Lund), synthesised in presentation n. 8 of the present workshop and widely described in ref. [10].

4.1.2 Transaction costs: reasons to focus attention

In general terms, a transaction occurs when a good or service is transferred across a technologically separable interface (see ref. [7]). A transaction cost is any cost that is not directly involved in the production of goods or services but that it is essential for realising the trade as such (see ref.[8]); these cost are then characterised by:

- an ancillary feature with respect to the main costs specifically involved in the "construction" of goods or services
- occurrence connected to transferring these goods or services across an identifiable border.

Typical transaction costs are those connected to search of information, assessment of partners, costs of negotiation, legal advice, etc.

These costs sometimes are not correctly accounted for, owing to their additional character; this circumstance often misleads the analyses on economic effectiveness of projects and it is bound to lead to not exhaustive or deceptive profit evaluations. In fact, over- or under-evaluation of these costs involve a number of negative upshots:

- Lowering the expected profits and benefits
- Raising total costs of investments and policy programmes
- Discouraging participation of the possibly involved Parties
- Depicting profitable small-scale projects as unfeasible

Under these circumstances, studies to determine systematically these costs and aimed at identifying ways to cut them down are envisaged in the future Task activities.

4.2 Transaction costs in the case of White Certificates schemes

4.2.1 Life cycle of White Certificates

A first approach to transaction costs related to White Certificates was carried out with reference to the single phases of development involved in the life-cycle of the White Certificates themselves within a scheme of energy savings policies. These phase are synthetically recalled below, with reference to Fig. 7:

- planning: the features of a White Certificates scheme (e.g. targets, addressees, M&V, trading issues) are identified and established
- implementation: the planned scheme is accomplished operatively
- M&V: operations of measurement and/or evaluation are performed of the energy savings produced by the projects performed within the scheme
- Issuance: energy savings are acknowledged to the implementers of the projects and they are certified by issuing a corresponding amount of White Certificates
- Trading: a market occurs among obliged and eligible parties on excess or lacking quotas of White Certificates
- Redemption: the obliged Parties show to comply with their target delivering a corresponding amount of White Certificates to the Administrator of the scheme. Clearance of these certificates occurs after compliance verification

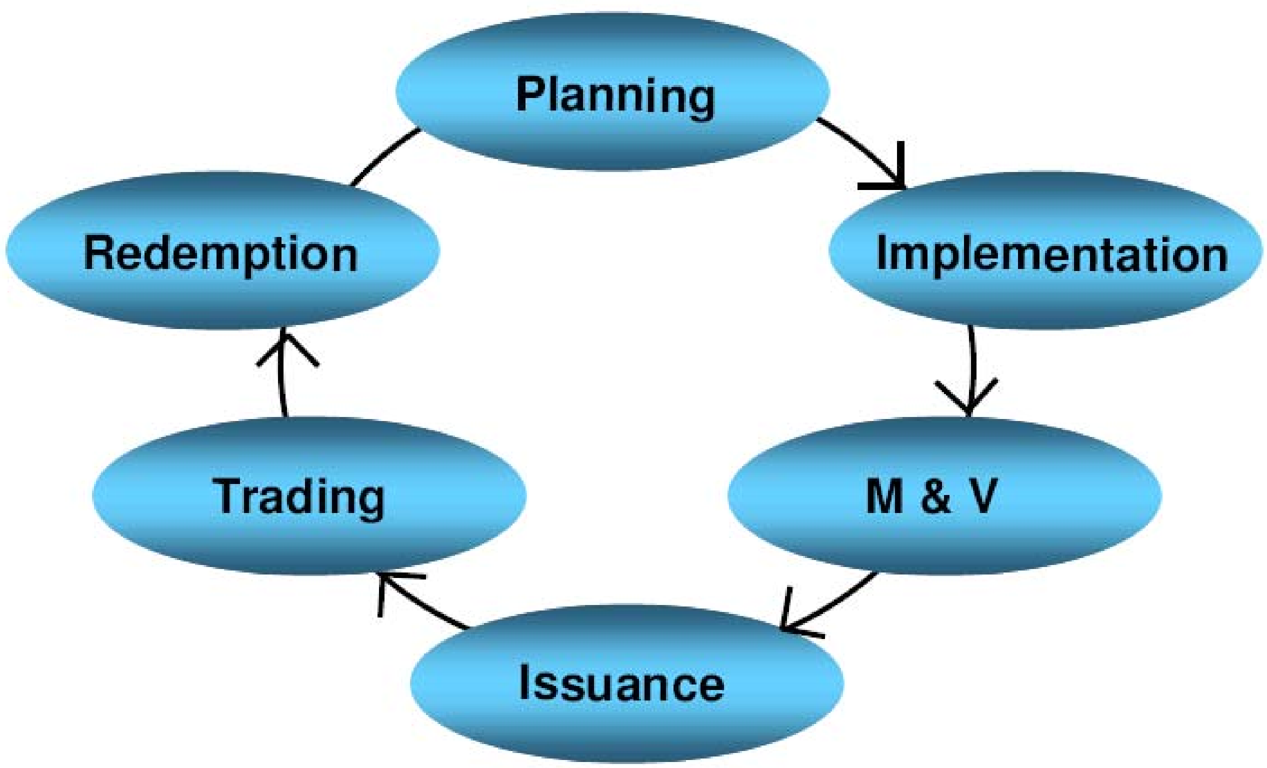


Fig. 7 – Phases of lifecycle of White Certificates

A non exhaustive and preliminary list of transaction cost voices, which will have to be further investigated and analysed in depth in next events of the Task, is outlined in the following sections.

4.2.2 Related transaction costs for the single phases of White Certificates lifecycle

4.2.2.1 Planning

Some of the transaction costs involved in the Planning phase are the following:

- Search of information/opportunity
- Feasibility studies
- Search of partners / contractors
- Negotiation / Agreement
- Administrative procedures
- Time[9] spent to perform the above process

4.2.2.2 Implementation

Some of the transaction costs involved in the Implementation phase are the following:

- Procedure for approving the scheme and its administration
- Commissioning time (e.g. times related to orders, contracts, etc)
- Baseline setting (e.g. all the activities for inquiries, database etc)
- Opportunity costs

4.2.2.3 Monitoring and verification

Some of the transaction costs involved in the Monitoring and verification phase are the following:

- Search of information
- Energy efficiency audit
- Procedures for approval of projects and administration
- Time spent to perform he above process

4.2.2.4 Issuance

Some of the transaction costs involved in the Issuance phase are the following:

- Procedure for approving White Certificates issuing and it administration
- Time spent in performing the above process

4.2.2.5 Trading

Some of the transaction costs involved in the Trading phase are the following:

- Search of information
- Market analysis
- Search of partners
- Negotiation and contracting
- Legal services
- Procedures for approval of the above process and its administration
- cost related to political delays in decisions

[9] In this phase and in the following, “time” costs are substantially the cost connected to all possible deferments along the time extension of the considered lifecycle phase.

4.2.2.6 Redemption

Some of the transaction costs involved in the Redemption phase are the following:

- Procedures for performing the above process and its administrations
- Putting into service the procedure
- Legal services

4.3 Early lesson learnt (Sweden, GREAT BRITAIN, Australia)

Some results obtained from recent experiences are presented below. In these examples, a trial was done to get quantitative evaluations on transaction costs, from the viewpoint of either their share with respect to the total investment (see sect. 4.3.1) or the punctual values related to some specific phase of the White Certificates lifecycle (see sect. 4.3.2 and 4.3.3).

4.3.1 Transaction costs in a project

Some experience was gained in Sweden while dealing with the Green Certificates scheme still under way (see also next sect. 5.2), which showed interesting parallelisms with the White Certificates scheme herein considered.

Looking at EU level, the ADMIRE REBUS project attempted to estimate transaction costs related to RES-e. By surveying RES-e developers, the related transaction costs were evaluated in terms percent with respect to the total investments required by an economically remarkable project within that scheme (see ref. [9]). These results are synthesised in **Fig. 8**, with evidence of maximum, minimum and average values for each cost component.

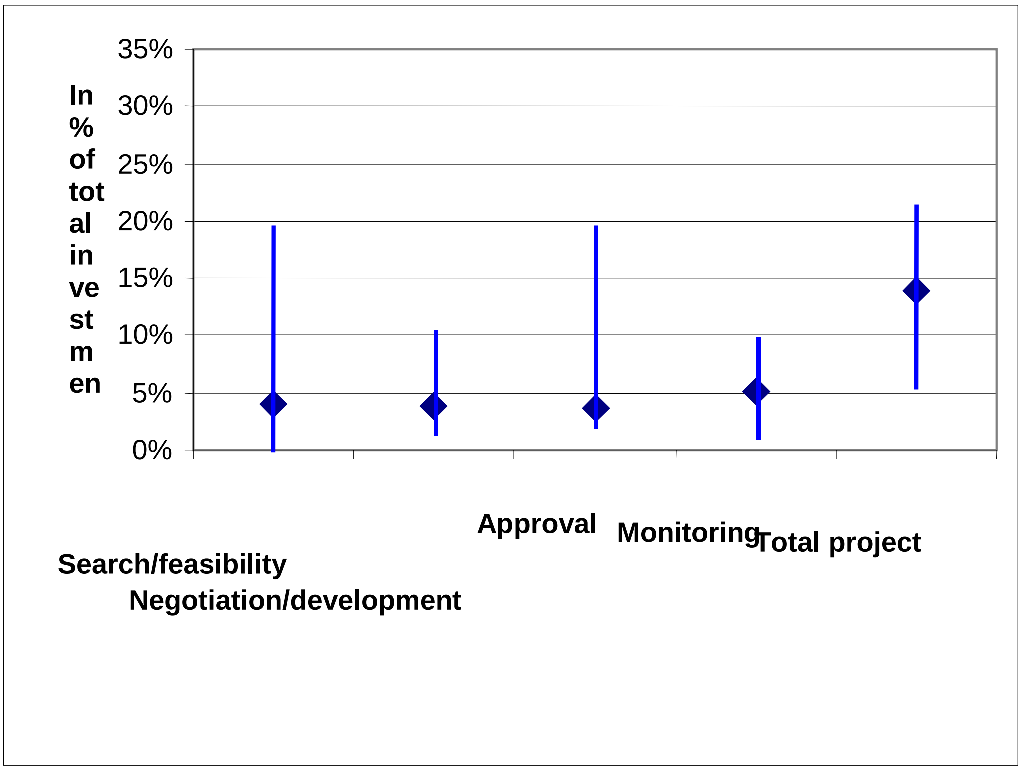


Fig. 8 - Transaction costs in RES-E

4.3.2 Related transaction costs for Monitoring & Verification phase

Some data on transaction costs related to Monitoring & Verification phase were made available during the past workshops of the Task held in Paris. They are below considered:

- Energy Efficiency Commitment (EEC) in Great Britain:
  According to Ofgem (see sect. 2.1.2 of ref. [1]), a rough breakdown of the costs of operating EEC in GREAT BRITAIN for the first period of application 2002-2005 gives a total ~£ 300,000 per year. The biggest costs were connected to the external auditor and to management of the database. The cost of operating the EEC anyway represented less than 0.5% of the total Regulatory Agency's budget, i.e. it was a very small portion of Ofgem's total budget of £ 400 million.

- Energy efficiency certificates trading scheme in New South Wales, Australia:
  Knowledge gained on the Energy efficiency certificates trading scheme being applied in New South Wales (see chpt. 3 of ref. [2] and relevant annex) showed that a major issue has been the relatively large transaction costs (and the consequent negative impact) for small energy efficiency projects. In fact, applicants have to pay for audits and the average cost of an audit is about AUD 10,500 (EUR 6,250)
  The Scheme Administrator took the decision to minimise the transaction costs and the administrative burden

The Administrator has been working on this subject for some time with interested parties to sensibly structure energy efficiency projects Chance are emerging to reduce transaction costs per project by combining small projects with different geographic locations, installation types, calculation methods, etc.

4.3.3 Transaction costs for Trading phase:

Much more essential and qualitative information were made available, after the first period of EEC operation in GREAT BRITAIN, on transaction costs involved in the Trading phase (see again chpt. 2 of ref. [1]). Strong feeling occurred of high costs related to search for information. Lack of formal platform for obligation/savings trading was a very likely reason of these unexpectedly high costs. Although much more difficult to identify, interviewees perceive damages at corporate/business level.

4.3.4 Final preliminary remarks

Some studies are being performed on the issue of transaction costs. No definite results are expected yet in this preliminary phase, though precise and shared opinions are emerging on the matter:

1. Nature and scale of transaction costs can be roughly ascribed at first instance to two categories:
   - Market-related costs
   - Institutional-related costs

2. Administrative burden seems to play a critical role on increasing the related transaction costs

3. In theory, transaction costs might be expected to be higher for Monitoring and Verification and lower for Approval. The case of GB proves that the transaction costs related to the former can be very low: the ex-ante approach is the reason.

4. Ways are to be pursued to reduce transaction costs; doubts are on the sector (public or private actors) to be firstly involved. Presence of brokers may facilitate aggregation processes and perform cumulated economies on small size projects.

5. A deeper insight of transaction costs is bound to maximise theoretical benefits of implementing White Certificates schemes involving trading.

5 WHITE CERTIFICATES: NATIONAL OR INTERNATIONAL TRADING

5.1 Forewords

A trading of White Certificates is primarily intended to be developed within a national perimeter. A wider extension of it, which ranges over extra-national contexts, is an alternative feature of the scheme which is focusing the attention of policy makers entrusted of the matter.

Pros and cons of these options are particularly interesting in a EU framework where, as a line of principle, their operations can be agreed more easily, over particularly wide international perimeters and with grater chances of flexibility in a market spread out over the national borders.

The need of harmonisation among national energy savings targets and among the procedures for their evaluation is one of the most critical and cumbersome tasks to be undertaken. In lack of significant experiences already gained, studies are in progress on this subject. Some contributions to approach the matter were given in the frame of Task XIV during the Lund workshop considered in this document:

- The former contribution (see sect. 5.2) outlines the studies performed in Sweden by the Swedish Energy Agency (STEM) in view of an international trading of Green Certificates (REC) with Norway, aimed at regulating and compensating short- and medium-term shortage of REC of a Country with the excess of REC of the other. These experiences are expected to bring about useful suggestions in handling the matter of international exchange to be extrapolated to White Certificates issue.
- The latter contribution (see sect. 5.3) describes some preliminary studies undertaken in the frame of EU EIE EuroWhiteCert project, which considered principle benefits and disadvantages of trading-based schemes with respect to out-of-trade ones and highlighted some subjective sides of the benefit/disadvantage evaluations, which are not so evident in a first approach and need to be carefully considered.

5.2 The example of Green certificates

5.2.1 Forewords

The Swedish Government has instructed the Swedish Energy Agency (STEM) to investigate the expected consequences of an expanded electricity[10] certificate trading market. The work was performed and a synthesis of the results is presented below. The main purpose of the work was to identify and assess the consequences of short-term and long-term effects, to identify and analyse the basic criteria that will need to be fulfilled by the countries, and to present and evaluate possible models for assigning quotas to the countries. The work also included consideration of the implications of EU legislation on an expanded market, together with a presentation of any necessary legal changes that will be required. The present synthesis is based on the workshop presentations n. 5 and 6 and on the detailed document issued by STEM (see ref. [11]).

[10] “Electricity certificate” is handled as synonym of “Renewable Electricity Certificate” or “green certificate”

5.2.2 The Swedish Energy Agency's overall conclusions

1. Objectives and purposes of cross-border electricity certificates trading

The main goal of the study was to assess the way to extend the national approach to a broader geographic perspective while keeping objectives and purposes (i.e. national production and security of supply).

On an expanded market, the objective/ambition would be expressed in terms of the total quantity of renewable electricity (TWh) produced on the joint market.

The objective/ambition of each individual country would be expressed in terms of how much renewable electricity production each individual country is prepared *to finance*. Individual countries would no longer be able to determine where new investments should be made.

2. Reasons for expanding the electricity certificate market to more countries

Renewable electricity production objectives can be achieved with better cost efficiency. Calculations indicate that the resulting total system costs would be lower on a common Swedish/Norwegian market than on two separate markets.

A number of other benefits arise in the way in which the market operates (e.g. greater liquidity, reduced price swings, lesser political risks for the parties involved).

3. Requirements to be satisfied before expanding the existing electricity certificate market

An expanded electricity certificate market requires some changes if it is to operate effectively, to fulfil its objectives and to be accepted in the wider society.

Some factors listed below *must be* *co-ordinated between* the countries concerned:
the system must be based on quota obligations,

- the quota obligation applies to the user side,
- definite decisions are to be taken on:
    - declaration and cancellation dates
    - system life and long-term quota setting,
    - quota obligation fee,
    - the validity, value and life of certificates,
    - linking of the registers,
    - controlled exit from the market.

Moreover, it is advisable that the countries' ambition levels and quotas *should be* *determined* in such a way as to achieve stable pricing on the joint market. Avoiding substantial changes in price helps to create stability and the ability to look ahead on the original market, thus in turn creating confidence in the system and creating the right conditions for long-term investments. STEM suggested a model to produce a range of reasonable ambition levels. Opinion is that that, within this range, any country joining the system should be able to decide its own exact ambition level.

4. Long-term structural effects of an expansion of the market to include Norway

The long-term structural effects on investments and pricing depend on the aggregated ambition level on the joint market and on the production conditions in the individual countries. STEM performed model calculations to illustrate these effects.

The worked example using the lower aggregated ambition level suggests that a greater proportion of certificate-entitled electricity production would probably occur in Norway (from hydro power and wind power), rather than in Sweden. Electricity certificate prices would be low, as the 'cheap' electricity production would suffice to meet the objectives.

The worked example for a higher aggregated ambition level suggests that Sweden would produce more renewable electricity, entitled to certificates, than would Norway, as Swedish offshore wind power and bio-fuelled power would be cheaper than the more expensive Norwegian wind power alternatives. Electricity certificate prices would be higher when more expensive production facilities are required.

5. Short term uncertainties for Swedish parties

In the short term, expansion of the market to include Norway would involve some uncertainties for Swedish parties. The main short-term effects on the Swedish market of creating a joint market with Norway would be primarily pricing uncertainty, which could affect willingness to invest in the short term.

6. Needs of legislative changes for an expanded market

Legislative changes would be needed for an expanded market. The Agency points out that several changes would be required in the Act (2003:113) concerning Electricity Certificates and in the Ordinance (2003:120) concerning Electricity Certificates.

7. EU legislative aspects of an expanded market

The Swedish National Board of Trade[11] is of the opinion that there should not be a problem if only two countries participate at first, although they feel that this arrangement should be checked with the European Commission. The proposal also needs to be reviewed in the light of Directive 98/34/EC, relevant to information procedures between EU EAA and decentralised national Agencies
Departures from the requirements of Directive 2001/77/EC, relevant to the promotion of electricity produced from renewable sources in the internal electricity market, could possibly occur and they

[11] The National Board of Trade is the central Authority having jurisdiction for foreign trade and trade policy.

will have to be motivated. Advice was form National Board of Trade of careful accomplishment of this task .

5.3 Preliminary studies within EU projects

5.3.1 Forewords

At present level of experience on White Certificate schemes, need is felt for in-depth analysis of the consequences of two alternative possible approaches:

- implementing directly and locally energy savings projects (with consequent local benefits but with all the costs involved by that the operational aspects of the performed project) without trading or at most with national trading of White Certificates
- buying energy efficiency certificates abroad (avoiding then the costs for a direct implementation of an energy savings project but with a possible loss of social/economic advantages which otherwise could be gained)

This part of the document then examines whether benefits obtained from energy savings projects are in conflict with international trading of White Certificates.
The following considerations rely on presentation n. 9 of the present workshop and of the paper of ref. [12]) presented at the first international workshop of EU EIE EuroWhiteCert project.

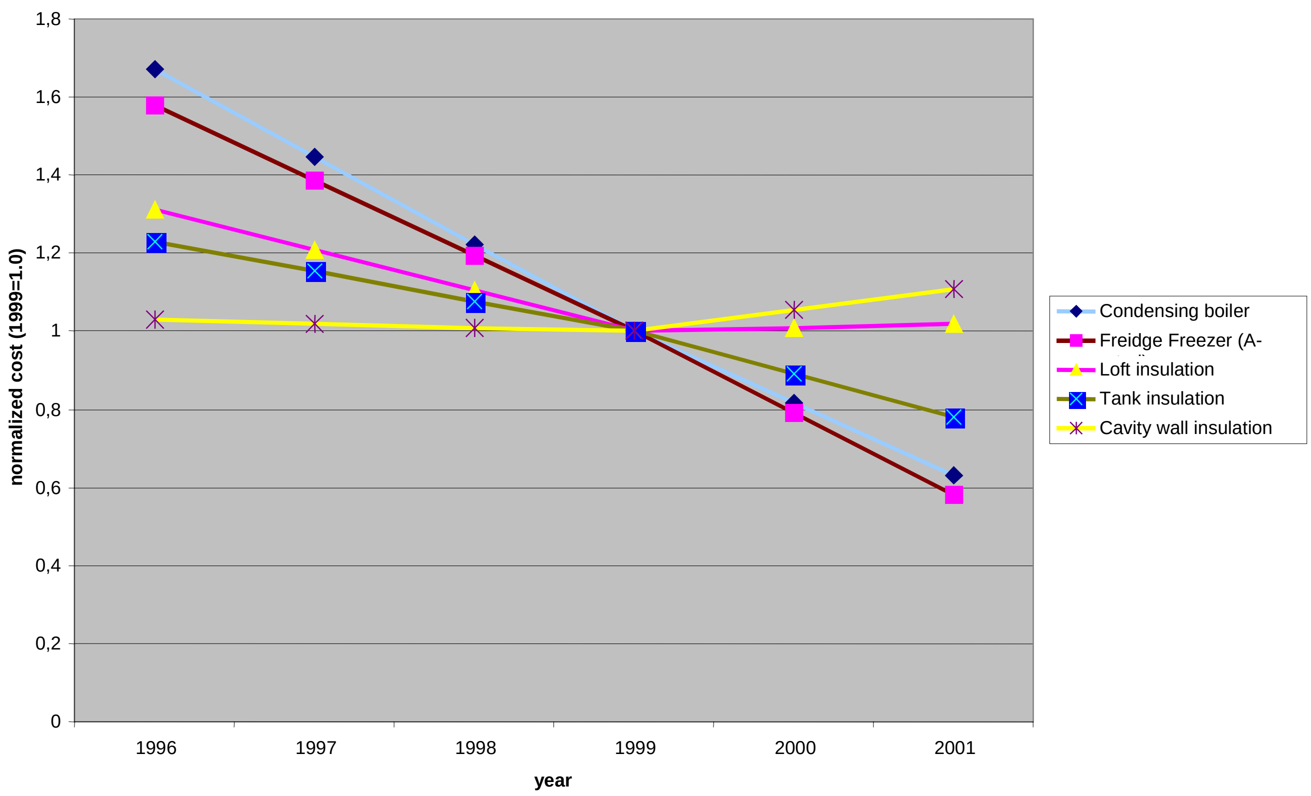
5.3.2 Energy efficiency without international trading

In-house performed energy savings measures bring about some local benefits at both private and societal levels.

At a private level, any EE scheme tend to encourage highly cost-efficient energy savings projects. Some evidences of positive outcomes in this sense come from experiences gained in GREAT BRITAIN after completion of GREAT BRITAIN 1994-1998 EE Programme, which was analysed ex-post by the GREAT BRITAIN National Audit Office. The analysis (see ref. [12]) showed that economic benefits occurred four times greater than the total costs, owing substantially to a low average cost of saving a unit of energy (1.8 p/kWh) compared with the price of electricity (7.1 p/kWh on-peak; 2.7 p/kWh off-peak).
Moreover, a more dynamic exploitation of energy efficient equipment fostered by EE scheme leads to market transformations phenomena (see also below) and is bound to bring about costs reduction of technologies (decreases from 30% to 50% are reasonably expected).

At a societal level, benefits arise in environmental and social externalities:
1. A reduction occurs in environmental effects
2. Standard and comfort conditions are improved, in particular for low income customers
3. Greater opportunities for employment occur. Two significant examples are pointed out below:
   - In **Germany**, Trade Unions, Government, NGO and employers federations are cooperating under the push of EE programmed, with the aim of renovating about 300,000 apartments and of creating about 200,000 job places.
   - ESCO industry can rely on increased business and greater involvement of specialised personnel

4. Technology improvements are encouraged, which involve relevant market transformation at national level. Quantitative evidences of this fact can be obtained from **GREAT BRITAIN** experiences, where the market transformation brought about remarkable decrease in the real costs of energy efficiency measures. According to the data shown by DEFRA in connection to concluded schemes for energy efficiency (the so called Energy Efficiency Standard of Performance – EESoP 1, 2 and 3), this decrease (actually, a small increase for cavity wall insulation) is expressed in costs trend of EE measures from 1996 to 2001, normalised at the unit value at the year 1999, as it is shown in the below Fig. 9.



1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
normalized cost (1999=1.0)
1996
1997
1998
1999
2000
2001
year
Condensing boiler
Freidge Freezer (A-
Loft insulation
Tank insulation
Cavity wall insulation

Fig. 9 – GREAT BRITAIN costs of energy efficiency measures

5. Cost reductions for saved kWh occur, due to delaying the need for new power generation and network infrastructures. An evaluation relevant to the Italian system showed an increase of the external costs from generating 1kWh of electricity in a power plan oil fuelled (see ref. [13]), as in the following Tab. 11.

	L/kWh '95	L/kWh 2005	€ cents 2005
external environmental costs	16,6	20,2	1,0
reduction of Gross Natiopnal Product due to expenditure for oil import	26,8	32,7	1,7
political risk of oil-dependency	*8,9*		
Total external costs		52,9	2,7

Tab. 11 - External costs from generating 1kWh of electricity

These data can give an idea of the avoided costs (and then, of the related benefits) obtained from displacing the generation of 1 kWh of electricity by means of energy efficiency measures.

6. Finally, chance exists to reduce market prices of energy through a more elastic demand curve

5.3.3 Energy efficiency with international trading of White Certificates

On the other side, energy efficiency measures involving international trading are expected to bring about significant additional benefits, hopefully complementary and not in conflict with those already obtained without any trading. This is nor so obvious as it was remarked for in-house projects and the matter is being deepened. The present debate led to the following comments.

At a private level, the most remarkable voices to be examined are the following:

1. Avoided costs to perform an energy savings projects. An obliged agent could not be in the condition of performing such projects and a chance to buy abroad low cost White Certificates could be attractive to comply with his obligations. This is an advantage for the private.
2. Cost-efficiency of energy savings. No special need would be of pursuing these requirements, since trading mechanisms rather than energy economy drive the private decisions at this level. This is an advantage for the private but a loss of effectiveness at a wider social level.
3. Transaction costs of trading. The costs of setting up and running a market could be considerably high (see sect. 4.3.3). This could be a disadvantage for the private.

Low income customers. Special focus on this category of customers would not be possible under a certificate trading arrangement. This could be a disadvantage for the private.

At a societal level,

1. Trading can potentially create cross-subsides between customer classes. For instance, in Italy all customer classes will contribute to funding the energy savings programmes, though savings may be concentrated only on large customers.
2. Inability to deal in a focused way with low income customers programmes brings disadvantages also from the social viewpoint
3. In international trading, many of the social, environmental and technological advantages (pointed out in sect. 5.3.2) which can be normally expected in absence of trading, are likely to be lost.

5.3.4 Remarks

The preliminary analysis performed allows for some preliminary remarks, which must be considered more as warnings that actual *alarms* for the moment.

- The matter is worth being analysed more deeply, since chances of conflict may actually arise between private and public requirements when energy savings are traded across the national borders. In other words, international trading may threaten the fulfilment of some national goals which could be otherwise attained with in-house energy savings projects.

- When speaking of advantages and disadvantages of trading, it should be specified very well the perimeter enclosing the interested actors in the trading itself:
  - An international market envisages very likely benefits within the overall international involved perimeter. Danger is that too an extensive international market, though beneficial from a overall viewpoint, turns out not to be evenly so advantageous for some of the involved Countries of for some of the involved actors
  - In particular, international trading very probably brings about losses of societal benefits (otherwise present without trading) at a national level, since it prevents for complete exploitation of the local potentiality of energy savings and the related advantages.
  - Nevertheless, beside these social inconveniences, an actor who bears the obligation to save energy (e.g. an ESCO) could find more convenient and cheaper to buy White Certificates in other Countries than performing a savings measure on his own. Thus, regional distribution of cost-effective EE measures drive the White Certificates market.

6 MAIN REMARKS ON PRESENTATIONS AND FURTHER COMMENTS

Some further remarks are reported below.

A former group of remarks were a consequence of the discussions held in the Panel Session which closed the workshop (see par. 6.1); owing to the widely open character of the workshop, they represent an extensive overview of the opinions of specialists and stakeholders involved in the subject of White Certificates, which complemented and enriched the contribution of the Task experts.

Another group of remarks followed from contributions of the Task experts (see. par.6.2), mainly expressed during the more restricted experts' meeting. They represent the specialists' views of the Countries involved in the Task on the main handled issues; these remarks are also focused to the most correct and efficient diffusion of the gained knowledge through the planned deliverables of the Task.

6.1 Panel discussion: national or international systems of certificates?

The round table focused four main aspects:

1. Why energy efficiency and White Certificates? (see par. 6.1.1)
2. Compliance and transaction costs (see par. 6.1.2)
3. A pan-European or a national White Certificates scheme? (see par. 6.1.3)
4. Experiences, conclusions and recommendations (see par. 6.1.4)

The positions of the European Countries concerned at present with White Certificates policies are below reported in comparison.

6.1.1 Rationale for Energy Efficiency and of the choice of a White Certificates system

Benefits from increasing EE are rather clear for **GREAT BRITAIN**. They are consistent with the great interest of reducing energy intensity and for policies suitable to cope with climate changes. White Certificates make operations in EE more straightforward also for companies who do not have EE in their core business and they are an efficient tool in simplifying the market of EE obligations.

A White Certificates scheme has been preferred in **France** for its lower public budget burden than other policy instruments. A White Certificates scheme fastens the diffusion of efficient technologies. It involves operators who are directly engaged with efficient equipment dealers.
White Certifications link energy savings, which is not a product but an attribute (a really subjective one, sometimes) of a product, with an objective economic value

By increasing EE, awareness is created in relation to environmental and economic problems arising from inefficient use of energy. There is an extra or added social value in increasing EE.
Netherlands thinks that White Certificates, if devised with suitable features, can promote efficient investments in the EE sector

Benefits can be straightforward for increasing EE, but less clear when it comes to the performance of White Certificates schemes. This sill has to be analysed. It is clear that people or society is in favour of increasing EE but concerns are anyway whether White Certificates can be more efficient than other policy instruments

6.1.2 Compliance and transaction costs

Transaction costs deserve more attention. It has to be considered that obliged parties could face several transaction costs at once. In addition, transparency of the entire scheme may play a critical role in giving confidence to the market and to its agents. Of course, it depends on the peculiar national features of the considered market, where other issues (e.g. the level of competitiveness and similar factors) can play a more deciding role than transparency itself. Looking for instance at an already experimented market, as **in GREAT BRITAIN**, no specific evidence is given of these costs[12] so far, being their quota *sunk* in the overall commercial relationship between supplier and end-user according to competition requirements. In other words, transaction costs can be remarkable if considered out-of-the context, but energy suppliers could be reluctant anyway to transfer part or all of these costs to their clients and then to risk loosing market shares. In fact, a trading scheme on Energy Efficiency Certificates is bound to penalise the supplier who is not capable of attaining market economy in his EE project and is oblige to transfer too high and not competitive costs to the end-user.

For the same above reasons, streamlined procedures need to be explored in order to reduce administrative costs involved in the considered EE schemes.

Design features are quite critical in deciding whether or not the scheme can be efficient and reduce the costs for obliged parties. The level of penalty and flow of information are very relevant.

6.1.3 A pan-European or a national White Certificates scheme?

The concept of a White Certificates scheme featured to attain a EU-wide validity has been considered with increasing attention for many years and some EU-funded projects have been completed within SAVE programme (the White&Green project, see ref. [5]) or are still under way in the EIE programme (the EuroWhiteCert project, see ref. [6]). Advantages are envisaged from the economic point of view, owing to a larger potential for energy savings projects and greater flexibility in implementing them. However, a critical issue is to find common national objectives, in terms of both nature of savings (primary or final energy, CO_2 related savings, etc) and quantities. Apart from the challanges associated to the harmonisation of M&V methodologies, convergence on views on this matter is considered a really complicated process at both political and technical levels.

The types and levels of benefits depend very much on the border of the analysis considered (see also chap. 5) to identify the addressees of an energy savings project. In fact, if reference for costs is done to the actor who bears the obligation to save energy, then it might be cheaper to buy a certificate in another country; the conclusion could be the opposite in case the cost/benefits ratio were considered from a wider societal viewpoint.

[12] Even if reasonable conjectures can be done (see e.g. 4.3.2)

Complexity in this matter is particularly challenging when monitoring and verification of energy savings are considered. In fact, as it was repeatedly remarked, evaluation rather than measurement can only be reasonably undertaken for energy savings and the adopted approaches are strongly dependent on the specific national views. In other words, unlike REC procedures, the subjective sides underlying the evaluation of the energy savings connected to a project are even amplified by the national specificities. This is particularly critical in the cases when the amount of saved energy (or number of certificates delivered) possibly depends (as in France) on the specific targeted geographical area (e.g. to cope with problems of local grid congestion or new building capacity).
However, the idea of common approaches in view of pan-European exchanges may possibly have chances of success for a selected short list of projects for which harmonised *lines of attack* can be identified (see also learned lesson by experts' experience in the Task activity in par. 6.2.3).

Very definite positions are stated in favour of priority securing national interests over an international scheme. In other words, need was felt for a national exploitation of energy savings benefits earlier than any extra-national operations. These requirements are also connected to the opportunity to exploit the national potential of energy savings as much as possible prior to any extra-national purchase of them by White Certificates trading.

By looking at the former UK ETS and its harmonisation into the current EU-CO_2 ETS, many difficulties were faced (see par. 2.2.3 in ref. [1] and relevant annexes). The analysis of these difficulties could act as a guideline to cope with the more complicated process relevant to White Certificates.

6.1.4 Experiences, conclusions and recommendations

Transparent, clear and simple rules of a White Certificates scheme are highly desired, in particular on the political side, to be able to rely on stakeholders' consensus as much as possible and to favour straightforward implementation of this policy.

Strong involvement of industry should be considered since the beginning of the process of establishing a White Certificates trading scheme and its rules on standard evaluation procedures. Participation of manufacturers in particular, as most interested operators in boosting energy efficient technologies, should assured as well.

Development is required of databases on technical characteristics and costs of high efficiency equipment and improvement on standards on performance and efficiency. Energy suppliers must be encouraged in undertaking long-term energy sayings projects.

6.2 Experts' contributions: comparisons among different national procedures to evaluate energy savings in EE projects

6.2.1 Forewords

Shared opinion exists that standard procedures for the evaluation of energy savings of eligible EE measures facilitate the implementation of a White Certificates scheme and make up a suitable and acceptable alternative to M&V operations based on measurements. Such an approach is adopted at

present in GREAT BRITAIN and Italy, even if with different features, and it will be likely to be considered in France.
A decision was taken in last experts' meeting to carry out a review of the available standard procedures, in order to improve the understanding of the national peculiarities and to give practical contributions for common approaches and criteria in view of international exchange of White Certificates.

The experts were asked to point out three procedures used at national level to evaluate the energy savings (toe or TWh or other) resulting from Energy Efficiency measures. To have a common platform, a use as wide as possible of similar classes of measures (at least one common measure) was suggested:

- Use of high efficiency electrical appliances (refrigerators, freezers, dishwashers, washing machines)
- Use of compact fluorescent light bulbs
- Wall insulation

For each measure, the criteria for quantitative savings evaluations were required, together with the evaluation of investment and information costs for implementing the measure and avoided operation costs due to the greater efficiency
All the experts were invited to contribute: GREAT BRITAIN and Italy according to their present experiences, other Countries on the base of future plans or expectations.

A first benchmark is considered below

6.2.2 Results of the benchmark

France, Italy and Netherlands synthesised the requested information into the annexed tables, where the energy and cost data were associated to the selected measures.

6.2.2.1 Remarks on the French contribution

France synthesised the requested information into the annexed Tab. 12 , where the energy and cost data were associated to the selected measures. It must be remarked that all these information **are to be considered for internal use of the task and only as reference "work" values,** since several **energy savings measures** are still under discussion among ADEME, Ministry of Industry and Professional Associations: an agreement exists about the measures involving household high efficiency electrical appliances, whereas negotiations are under way about projects relevant to building, in particular about the way of defining the eligible measures and the baseline. For these reasons **these data can be subject to modifications with no engagement of any part.**

Measure identification	Lifetime (years)	Specific criteria	Energy Savings (kWh saved actualised overlifetime)	Method	Remarks	Over-cost by appliance (euros)
CFL	7,5	No	205	Comparison with an incandescent lamp. Current market of CFL is taken into account.	Replacement of an incandescent lamp for 70% and of a CFL for 30%	4
Washing machine A+	10	No	114	Comparison with the current sales of washing machines.	/	270
Refrigerator A+	10	No	486	Comparison with the current sales of washing machines.		121
Deep freeze A+	10	No	368	Comparison with the current sales of washing machines.		118
Refrigerator+deep freeze A+	10	No	493	Comparison with the current sales of washing machines.		46
Roof insulation (climatic zone= H1) 1m²	35	Electricity with weak insulation of the loft	380	Comparison with the current sate of the stock of the houses		200/m²
		Electricity without insulated loft	1360	idem		200/m²
		Fossil combustible with of weak insulation the loft	620	idem		320/m²
		Fossil combustible without insulated loft	2150	idem		320/m²
Roof insulation (climatic zone= H2) 1 m²	35	Electricity with weak insulation of the loft	310	idem		200/m²
		Electricity without insulated loft	1110	idem		200/m²
		Fossil combustible with weak insulation of the loft	510	idem		320/m²

Measure identification	Lifetime (years)	Specific criteria	Energy Savings (kWh saved actualised overlifetime)	Method	Remarks	Over-cost by appliance (euros)
		Fossil combustible without insulated loft	1760			320/m²
Roof insulation (climatic zone= H3) 1m²	35	Electricity with weak insulation of the loft	210			200/m²
		Electricity without insulated loft	740			200/m²
		Fossil combustible with weak insulation of the loft	1170			320/m²
		Fossil combustible without insulated loft	340			320/m²

Tab. 12 – Preliminary data on envisaged French energy savings measures

Though it is not mandatory in France, CFL will be classified according their relevant efficiency. The definition of this standard at present is under way.

The most common French choice criteria for the **baseline** to be considered in these procedures was the “current sales”. Some data containing sales statistics exist, being updated quite regularly. ADEME is referring to the most recent of these data to define the baselines for the procedures under development. Further updating of the baseline can be performed regularly scheduled in the future.

6.2.2.2 Remarks on the Italian contribution

Italy synthesised the requested information into the annexed Tab. 13.

MEASURE (installation of)	Reference Physical Unit	Yearly Primary Energy Saving	Imple-mentation Cost	Yearly Energy Cost Saving	Lifetime of the measure	Specific yearly net Benefit	Lifetime cumulated Final Energy Savings
						Discount rate=	6.00%
	[RPU]	[toe/yr/RPU]	[€/PRU]	[€/yr/RPU]	[Years]	[€/toe]	[kWh/RPU]
Freezer class A	1 Freezer	0.0290	146	26.10	10	216.40	970
Refrigerator class A	1 Refrigerator	0.0260	133	23.40	10	206.32	870
Washing machine class A	1 Washing machine	0.0079	174	7.11	10	-2,090.41	264
Dish washer class A	1 Dish washer	0.0092	126	8.28	10	-965.15	308
CFL for Residential	1 Lamp	0.0146	10	14.14	6	829.20	326
Wall insulation Residential - Zone A & B (k=1.1-1.3)	1 m^2 of insulated wall	0.0006	22	0.48	30	-1,804.05	96
Wall insulation Residential - Zone C (k=1.1-1.3)	1 m^2 of insulated wall	0.0012	22	0.96	30	-501.42	192
Wall insulation Residential - Zone D (k=1.1-1.3)	1 m^2 of insulated wall	0.0023	26	1.84	30	-7.88	368
Wall insulation Residential - Zone E (k=1.1-1.3)	1 m^2 of insulated wall	0.0039	26	3.12	30	324.06	624
Wall insulation Residential - Zone F (k=1.1-1.3)	1 m^2 of insulated wall	0.0062	26	4.97	30	501.07	992
Wall insulation Hospitals - Zone A & B (k=1.1-1.3)	1 m^2 of insulated wall	0.0011	22	0.48	30	-985.90	176
Wall insulation Hospitals - Zone C (k=1.1-1.3)	1 m^2 of insulated wall	0.0018	22	0.78	30	-433.27	288
Wall insulation Hospitals - Zone D (k=1.1-1.3)	1 m^2 of insulated wall	0.0030	26	1.31	30	-185.15	480
Wall insulation Hospitals - Zone E (k=1.1-1.3)	1 m^2 of insulated wall	0.0046	26	2.00	30	30.61	736
Wall insulation Hospitals - Zone F (k=1.1-1.3)	1 m^2 of insulated wall	0.0067	26	2.92	30	157.40	1,072
Wall insulation Office Bldgs - Zone A & B (k=1.1-1.3)	1 m^2 of insulated wall	0.0005	22	0.22	30	-2,691.16	80
Wall insulation Office Bldgs - Zone C (k=1.1-1.3)	1 m^2 of insulated wall	0.0010	22	0.44	30	-1,128.01	160
Wall insulation Office Bldgs - Zone D (k=1.1-1.3)	1 m^2 of insulated wall	0.0020	26	0.87	30	-495.30	320
Wall insulation Office Bldgs - Zone E (k=1.1-1.3)	1 m^2 of insulated wall	0.0033	26	1.44	30	-128.76	528
Wall insulation Office Bldgs - Zone F (k=1.1-1.3)	1 m^2 of insulated wall	0.0049	26	2.13	30	55.38	784

		Primary	Final	
Energy Conversion Factors	for electricity:	1 toe=	4,545 kWh_e	
	for heat:	1 toe=	11,628 kWh_t	
Energy Rates (average 2003. tax included)	Electricity residential:	1 toe=	900 €	(yearly consumption: 3,500 kWh)
	Nat. Gas residential.:	1 toe=	801 €	(yearly consumption: 2,199 m^3)
	Nat. Gas non resid:	1 toe=	435 €	(yearly consumption: 1,09958 m^3)

Tab. 13 - Preliminary data on envisaged Italian energy savings measures

The data of column " Lifetime cumulated Final Energy Savings " (coloured in blue) give the balance between yearly cost savings (positive) and annual amount of actualised costs, all related to data of column " Yearly Primary Energy Saving" (coloured in green). Cases of specific yearly net benefits with a negative value were pointed out (e.g. washing machines, wall insulation in hot climatic zones). This was a consequence of high implementation costs not offset by energy cost savings; fostering these measures would require some incentives to the end-user from the organisation launching the energy saving programme.

The following comments give grater details on it.

Minimum performance standards exist in Italy, relevant in particular to the building sector (building insulation must comply with minimal requirements specified by law). Another standard of this kind is relevant to minimum efficiency boiler labelling: at least 1 star is mandatory. Finally, an obligation exists on labelling electrical appliances, though no obligation exists on a minimum performance on this kind of equipment.
Pros and cons of tightening the requirements of energy efficiency standards deserve great attention. In fact, such an approach would lead inexorably to higher investment costs; yet, convenient benefits/costs ratio could be attained in contexts where high energy costs occur.

Baseline adopted in the standardised procedures adopted in Italy is founded on:

- existing mandatory standards (e.g. see ref.[**[4]**) in the case of energy savings projects in buildings (heating, insulation, etc):
- average of sales (updated at 2002) for energy savings projects based on substitution with high efficiency boilers or high efficiency electric appliances. The adoption of this criterion allows for evaluation of an "average" consume of the "average" equipment existing on the market; this criterion is dependent on the market share and on the present technological development[13] and need of periodic updating of baseline is then required to keep significance to the whole evaluation process.

As for the latter above point, some more details should be considered. In fact, the matter of baseline requires particular attention when procedures involving equipment substitution are considered. As a result of wide national debates, a base principle was assumed in Italy that the driver for a substitution is obsolescence of an equipment rather than its possible low efficiency; in other words, the end-user is assumed to carry on a substitution of an equipment since it is old and not in view of higher efficiency. These reasons motivated the performed choice of the baseline for the energy savings and for the possible additional implementation costs of a project, which was assumed as the "average" equipment[14] existing on the market and evidenced by recent sales data.

The evaluation of the **benefits/costs ratio** depends on the choice criteria of the baseline in a quite critical and determinant way[15] and modulation of baseline in standardised procedures can be even used as a tool to foster specific energy saving measures and to steer national energy policies. Beside these

[13] To this purpose, a continuous and remarkable drift of the market towards *class A* efficiency is under way in Italy, owing mainly to the a definite position of the equipment sellers in this sense.
[14] Which represents the equipment that the end-user would buy anyway in substitution of his obsolete one.
[15] In fact, in this case the costs of substitution are given by the cost of the efficient equipment minus the market cost of the average equipment; this value is strongly dependent on how the average value is determined.

choices, which can be affected by some sort of arbitrary approach, other circumstances make it difficult to reliably evaluate the incremental costs of an efficient equipment with respect to a less efficient one: the fact that the greater costs of high efficiency devices depend on a mix of attributes (greater functionality, particularly attractive design, others) not related with efficiency but whose cost components often hide and mask the bare efficiency costs.

As for **lifetime of the measures**, the Italian scheme considers annual energy saving and awards White Certificates only for the first 5 years (8 in some cases), which are issued yearly against the annual savings by means of the evaluation procedures. This mechanism encourages short-term energy saving projects; nevertheless, long term projects must not be disregarded if they can produce high savings in the early years (and meaningful amounts of White Certificates) and remarkable medium-term savings, which compensate anyway the implementation investments.
No actualisation of the energy savings obtained in different periods through a discount rate coefficient is considered in the Italian scheme, since yearly savings are considered in principle. Regardless of national choices about the discount rate, advantages of actualisation were remarked, since this approach relies on requirements of a prizing mechanisms for projects triggering early energy saving with respect to medium/long-term ones. Fore these reasons, the Italian table also shows cumulated savings over the lifetime of the measures. A discount rate of 6% was assumed; this reasonable but somehow arbitrary value complies with harmonisation requirements with the contributions of the other Countries.

As for the **accounting** of energy savings, primary energy was considered adopting toe (tons of oil equivalent) as unit of measure for it.
Moreover, a ratio of $0.22 \cdot 10^{-3}$ toe (primary energy) per kWh saved (final electric energy) is prescribed by the present Italian legislation; in other words, you have to save 4545 kWh of electricity in order to save 1 toe (this corresponds to a conventional electric power system efficiency of 39%).
Considering in particular the substitution of incandescent lamps with CFL lamps, details were give on the evaluation of the specific primary energy savings. A standard procedure was set up, which led to an average value of savings keeping into account:

- a suitable distribution of lighting in a typical house
- the hours of use of lighting for each room
- the probability of performing the substitution

The procedure is summarised in the following Tab. 14:

Case No	***Room***	P_{inc} *[W]*	P_{CFL} *[W]*	ΔP *[W]*	***Use*** *[h/yr]*	ΔFE_s *[kWh/yr/lamp]*	ΔPE_s *[10^{-3} toe/yr/lamp]*	***p*** *[%]*	$\Delta PE_{s,prob}$ *[10^{-3} toe/yr/lamp]*
1	Kitchen	*100*	*20*	*80*	*1200*	*96*	*21.12*	*30*	*6.34*
2	"	*75*	*15*	*60*	"	*72*	*15.84*	*10*	*1.58*
3	"	*60*	*11*	*49*	"	*58.8*	*12.94*	*5*	*0.65*
4	Living room	*100*	*20*	*80*	*800*	*64*	*14.08*	*20*	*2.82*
5	"	*75*	*15*	*60*	"	*48*	*10.56*	*5*	*0.53*
6	"	*60*	*11*	*49*	"	*39.2*	*8.62*	*5*	*0.43*
7	Bathroom	*60*	*11*	*49*	*300*	*14.7*	*3.23*	*10*	*0.32*
8	Bedroom	*40*	*9*	*31*	*300*	*9.3*	*2.05*	*10*	*0.2*
9	External	*100*	*20*	*80*	*2000*	*160*	*35.2*	*5*	*1.76*

Tab. 14 – Procedure to evaluating average energy savings for CFL lamps

In this table:

P_{inc} = Power of the used incandescent lamp
P_{CFL} = Power of the substituting CFL lamp
ΔP = Saved power per lamp
Use = Annual hours of use
ΔFE_s = Specific savings per lamp in final energy
ΔPE_s = Specific savings per lamp in primary energy
p = Probability of substitution
$\Delta PE_{s,prob}$ = Probability weighted specific savings per lamp in primary energy

The weighted average value of primary energy which can be attained for a single substitution is:

$$\overline{\Delta PE} = \sum_n \frac{\Delta PE_{s,n} \cdot p_n}{100} = 14.6 \cdot 10^{-3} \frac{toe}{year \cdot lamp}$$

In this particular case, this must considered a gross value. Assuming that the substitution of the lamps is the effects of a promotional campaign of the obliged party (e.g. who gives economic incentives for the purchase of a CFL), this gross value should be reduced to keep into account the free-ridership effects (i.e. the probability that the substitution would have been carried on by the user regardless of the promoted DSM measures) and the actual use of the CFL (i.e. the probability that the user actually installs the CFL[16]); these abatement values have been considered already in "Approach" of sect.3.2)

With reference to this measure, some different evaluation of the lifetime cumulated final energy savings with respect to the French results is a consequence of different assumptions for the specific implementation cost, of the lifetime and of the additionality (Italy: each CFL substitutes an incandescent lamp; France: 10 CFL substitute 7 incandescent lamps and 3 existing CFL).

[16] In the past, Enel carried on very massive free supplies of CFL to his clients; nevertheless, it turned out into a small number of actual substitution, owing to a possible scarce involvement of the user into the spirit of the DSM project.

6.2.2.3 Remarks on the Dutch contribution

Developments are in progress in the Dutch Ministry of Economic Affairs for a possible use of White Certificates in the next future.

A simple modelling with a discount rate of 6% (similar to the Italian table) for a period of 10 years (form 2000 to 2010) was carried on. Netherlands synthesised the requested information into the following

Tab. **15**. In this table:

A. Primary Energy Saved are to be referred to all the Dutch potential
B. Annual Cost are relevant to investments for the measures
C. Cost effectiveness depends on the difference between cumulated savings benefits (>0) and investment costs (<0)
D. Total Cost = A·C

Different RPU were used from the Italian tables; in particular:

- Measures relevant to the residential sector are expressed "per dwelling"
- Measures relevant to the service and office sectors are expressed "per m^2 of floor surface"
- Primary energy was considered for the savings evaluations.

These data were obtained by the use of the ICARUS model. This model involves energy efficiency data for all sectors in the Netherlands; in particular:

- a total of about 85 energy savings measures; among the others:
  - Wall insulation cavity construction
  - Wall insulation solid construction (internal./external)
  - Wall insulation (upgrades R_c 2,5-8)
  - CFL's (per room and general)
  - Dryer (Technical potential 2000-2020)
  - Dishwasher (Technical potential 2000-2020)
  - Washing machine (Technical potential 2000-2020)
  - Deepfreeze (Technical potential 2000-2020)
  - Combi fridge and freezer (Technical potential 2000-2020)
  - Energy efficient computers
  - Energy efficient faxes
  - Energy efficient copiers
  - Energy efficient printers
- 12 sectors were considered with more subsectors; among the others:
  - Households after1995
  - Households before1995
  - Education
  - Trade
  - Catering
  - Non office services
  - Service public offices before and after1995
  - Health

- Data on achievable energy savings, costs and penetration data per measure were made available
- Opt-in for user economic and energy price scenarios is allowed
- Modelling until 2020 can be performed and energy and price scenario can be evaluated

ICARUS is administrated by the Utrecht Centre for Energy Research, belonging to Utrecht University.
ICARUS is freeware and it is available on:
http://www.uce-uu.nl/showproject.php?id=2

A: Discount rate 6% — C: Simulated period until 2010

Measure identification	Sector	Functional Unit	Lifetime	Energy Savings: electricity	Energy Savings: fuel (gas, oil, heat)	Cost data: Investment	Cost data: Operating and maintenance	A: Primary Energy Saved	B: Annual Cost	C: Cost effectiveness	D: Total Cost
			yrs	GJ/fu	GJ/fu	€/fu	€/fu	PJ	€/GJ/yr	€/GJ	M€
Wall insulation: cavity constr.	hh_dwellings <= 1995	dwellings	30		11,394	563,63636		13,28	4,39	-7,57	-100,55
Wall insulation: solid constr., external	hh_dwellings <= 1995	dwellings	30		21,522	3418,1818		0,00	14,11	2,14	75,06
Wall insulation: solid constr., internal	hh_dwellings <= 1995	dwellings	30		21,522	526,11219		35,06	2,17	-9,80	-343,46
Wall insulation: upgrading to Rc 2.5	hh_dwellings <= 1995	dwellings	30		2,532	3418,1818		14,50	119,92	107,95	1564,99
Wall insulation (Rc = 3)	hh_dwellings > 1995	dwellings	30		0,633	85,208633		0,88	11,96	-0,01	-0,01
Wall insulation (Rc = 3,5)	hh_dwellings > 1995	dwellings	30		1,0128	170,41727		1,41	14,95	2,98	4,19
Wall insulation (Rc = 5)	hh_dwellings > 1995	dwellings	30		1,7724	2180,8999		2,46	109,30	97,33	239,51
Wall insulation (Rc = 8), view 2020	hh_dwellings > 1995	dwellings	30		2,4054	2639,612		3,34	97,48	85,51	285,57
Compact Fluorescent Lamps, CFL's	Both dwellings	dwellings	8	20% rel.		31,8		5,40	0,48	-26,62	-143,81
Washing machine, technical potential (2010)	Both dwellings	dwellings	15	0,1		136		0,42	28,72	1,62	0,68
Dryer, technical potential (2010)	Both dwellings	dwellings	15	0,45		545		0,72	67,14	40,03	28,96
Dishwasher, technical potential (2010)	Both dwellings	dwellings	15	0,01		136		0,09	134,02	106,92	9,67
Refrigerator, technical potential (2010)	Both dwellings	dwellings	15	0,02		164		0,11	127,95	100,85	11,52
Deep freeze, technical potential (2010)	Both dwellings	dwellings	15	0,07		154		0,29	48,06	5,98	20,96
Combination refrigerator and freezer, tp 2010	Both dwellings	dwellings	15	0,2		195		3,13	28,98	1,88	5,87
Dryer, technical potential (2020)	Both dwellings	dwellings	15	0,6		545		2,74	53,71	26,61	72,90
Dishwasher, technical potential (2020)	Both dwellings	dwellings	15	0,06		136		1,19	30,93	3,83	4,54
Refrigerator, technical potential (2020)	Both dwellings	dwellings	15	0,05		164		0,87	51,18	24,08	20,83
Deep freeze, technical potential (2020)	Both dwellings	dwellings	15	0,2		154		2,51	16,57	-26,42	-10,53
Combination refrigerator and freezer, tp 2020	Both dwellings	dwellings	15	0,5		195		3,55	14,84	-12,26	-43,49
insulation of walls (RC=3)	serv_com_off < 1995	m2 floor surface	50		0,060135	5,25		0,96	13,11	5,53	5,29
insulation of walls (RC=4)	serv_com_off < 1995	m2 floor surface	50		0,076	16,36		0,33	32,32	24,74	31,80
insulation of walls (RC = 5)	serv_com_off < 1995	m2 floor surface	50		0,085	27,27		0,15	48,17	40,59	58,35
efficient fluoriscent lamps	serv_com_off < 1995	m2 floor surface	4	0,016		0,45		0,43	5,47	-9,10	-3,90
energy efficient computers	serv_com_off < 1995	m2 floor surface	10	11%		100E/GJ/yr		0,33	27,40	12,82	7,13
energy efficient printers	serv_com_off < 1995	m2 floor surface	10	2%		100E/GJ/yr		0,07	2,74	-11,84	-1,32
energy efficient copiers	serv_com_off < 1995	m2 floor surface	10	10%		10 E/GJ/yr		0,35	2,74	-11,84	-5,92
energy efficient faxes	serv_com_off < 1995	m2 floor surface	10	2%		10 E/GJ/yr		0,04	2,74	-11,84	-0,66
insulation of walls (RC=4)	serv_com_off > 1995	m2 floor surface	50		0,013	3,6363		0,38	42,00	34,42	12,96
insulation of walls (RC = 5)	serv_com_off > 1995	m2 floor surface	50		0,022	7,2727		0,26	49,63	42,05	26,79
insulation of walls (RC=3)	education	m2 floor surface	50		0,0633	5,4545455		2,39	12,94	5,29	12,66
insulation of walls (RC=4)	education	m2 floor surface	50		0,076	16,36		0,48	32,32	24,67	70,91
insulation of walls (RC = 5)	education	m2 floor surface	50		0,085	27,27		0,34	48,17	40,52	130,25
efficient fluoriscent lamps	education	m2 floor surface	4	0,002		0,45		0,14	43,35	28,77	3,96
energy efficient office appliances	education	m2 floor surface	10	10%		50 E/GJ/yr		0,17	13,70	-0,88	-0,23

Tab. 15 - Preliminary data on envisaged Dutch energy savings measures[17]

[17] The appliances for the other service sectors are not further analyzed since the data are identical with the once already shown.

Legenda for **Tab. 15**.

(yellow)	Means that these technologies were excluded from the final results of the model, since they could not provide additional savings.
	Nevertheless, the numbers that are shown here, refer to the case when they were stand alone, without being substituted by others

Conservation supply curves were also evaluated for residential and service/office sectors, relying on the data of the above points A. and C. They are shown in Fig. 10.

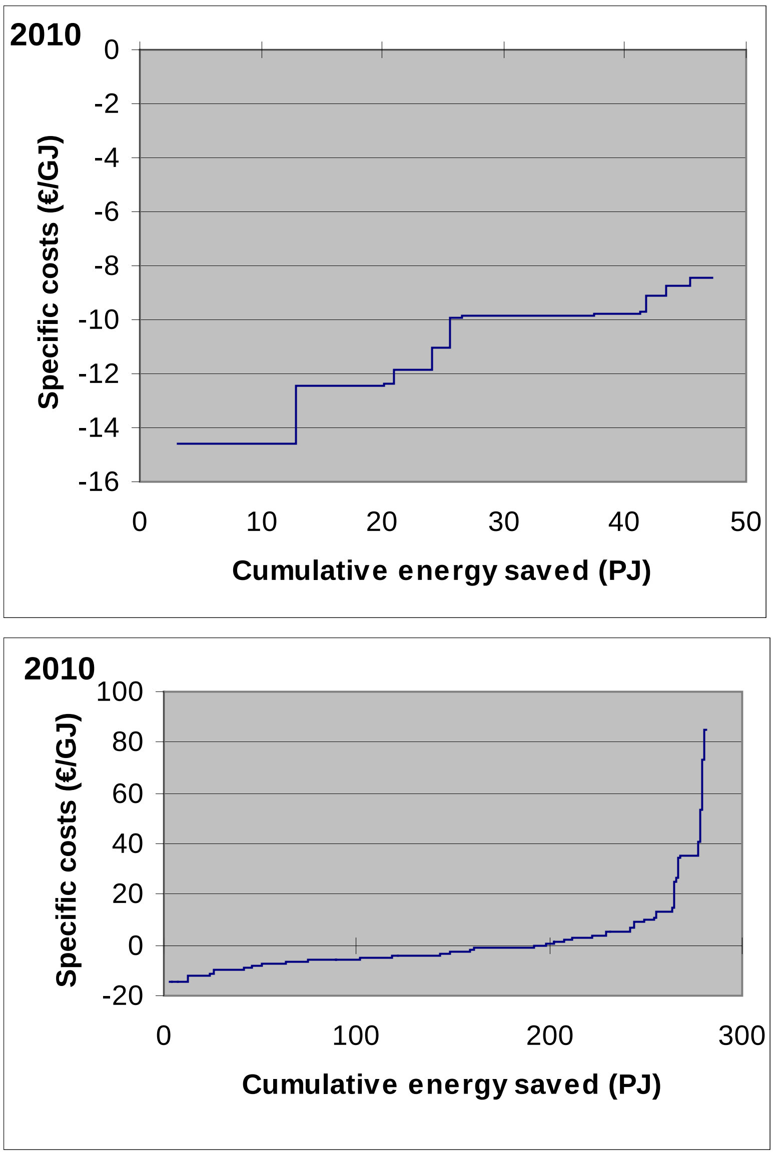


Fig. 10 – Dutch energy saving data: conservation Supply Curve

6.2.2.4 GREAT BRITAIN contribution

Some information of the kind of those processed by the other Countries is available on Tab. 16 and Tab. 17, where energy improvements in the Energy Efficiency Commitment (EEC) 2005-2008 and relevant cost/benefit analysis are shown.

After the first period of application 2002-2005, GREAT BRITAIN pointed out that the EEC gave a chance of better household appliances and equipment to residential users who otherwise could not afford these kind of products (the so-called *priority group* of clients).

Possible EEC Measure	Total installations via EEC programmes (including 'deadweight')	Lifetime of measure	Net Energy Improvement (1)		Discounted aggregate energy improvement for lifetime of measure				Discounted aggregate energy improvement for lifetime - fuel standardised GWh				Total EEC target, lifetime-discounted and fuel-standardised
			Per year	Discounted aggregate (3.5%) over lifetime	Electricity	Gas	Coal	Oil	Electricity	Gas	Coal	Oil	
	M	Years	MWh/Unit/yr	MWh/unit	GWh	GWh	GWh	GWh	GWh	GWh	GWh	GWh	**TWh**
Cavity wall insulation - private	1.00	40	5.15	110.1	7,139	93,641	1,827	7,276	5,719	33,069	1,018	3,373	**43.2**
Cavity wall insulation - social	0.70	40	5.00	106.7	4,862	63,770	1,244	4,955	3,894	22,520	693	2,297	**29.4**
Loft ins - professional - private	0.70	30	2.71	49.8	2,280	29,901	583	2,323	1,826	10,559	325	1,077	**13.8**
Loft ins - professional - social	0.42	30	1.87	34.5	938	12,300	240	956	751	4,344	134	443	**5.7**
Loft insulation DIY	0.46	30	3.34	61.4	1,834	24,058	469	1,869	1,469	8,496	261	867	**11.1**
Glazing E to C rated (in m2)	4.50	20	0.03	0.4	112	1,474	29	115	90	521	16	53	**0.7**
B to A-rated boilers	1.00	15	1.15	13.3	0	13,293	0	0	0	4,694	0	0	**4.7**
A/B rated boilers (exceptions)	0.20	15	3.10	35.7	0	7,302	0	0	0	2,579	0	0	**2.6**
Fuel Switching	0.06	15	7.91	91.1	3,239	-6,128	8,470	0	2,595	-2,164	4,718	0	**5.1**
Heating controls - upgrade with boiler replacement	0.45	15	0.68	7.9	0	3,523	0	0	0	1,244	0	0	**1.2**
Heating controls - extra	0.09	15	1.88	21.7	129	1,698	33	132	104	600	18	61	**0.8**
CFLs - retail	9.75	16.0	0.01	0.1	3,758	-2,448	-48	-190	3,010	-864	-27	-88	**2.0**
CFLs - direct	32.64	16.0	0.01	0.1	12,583	-8,196	-160	-637	10,080	-2,895	-89	-295	**6.8**
Fridgesavers-type schemes	0.10	12	0.14	1.3	327	-176	-3	-14	262	-62	-2	-6	**0.2**
Appliances - Cold	0.88	12	0.06	0.6	1,251	-674	-13	-52	1,002	-238	-7	-24	**0.7**
Appliances - Wet	1.17	12	0.02	0.2	268	-7	0	-1	215	-3	0	0	**0.2**
Appliances - Set Top Boxes	0.50	8	0.01	0.1	138	-83	-2	-6	110	-29	-1	-3	**0.1**
Tank insulation - top-up	0.46	10	0.45	3.7	111	1,459	28	113	89	515	16	53	**0.7**
Draughtproofing	0.31	20	0.74	10.5	210	2,750	54	214	168	971	30	99	**1.3**
TOTAL					39,180	237,454	12,752	17,052	31,385	83,855	7,103	7,905	130.2

(1) including the heat replacement effect for CFLs and appliances

Tab. 16 – GREAT BRITAIN EEC 2005-2008: Basis of target

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1	2			3	4		5		6			7	8	9						10	11
Illustrative mix of possible EEC measures	Number of installations by 31 March 2008			Unit cost per measure	Supplier contribution to cost of measure		One-off consumer or landlord financial contribution		Non-ongoing impact on annual energy prices, average over EEC period - £M / £ per gas and electricity bill, and per household (excluding VAT)			Over-head costs (incl. in column 6), average annual £M	Ongoing annual energy benefit to house-holds in 2010	Ongoing annual energy benefits by 2010 - £M aggregate / £ per household p.a. (including VAT)						Adjustment for "comfort taking" allowance in EEC	Annual Carbon Saving in 2010
	Business As Usual subsidised by EEC (1)	Additional due to EEC programme (2)	Total		Priority Group (see Table 1A)	Other h'holds (see Table 1B)	Priority Group (see Table 1A)	Other h'holds (see Table 1B)						Priority Group		Other households		Total benefits	All GB house-holds		
	M	M	M	£	£	£	£	£	£M	£/bill (3)	£/hh (3)	£M	GWh	£M	£/hh	£M	£/hh	£M	£/hh	%	MtC/y
Cavity wall insulation - private	0.12	0.88	1.00	314	304	195	0	130	108	2.33	4.24	24.96	5,146	45	5.10	51	3.03	95	3.74	30	0.18
Cavity wall insulation - social	0.12	0.58	0.70	310	152	163	152	163	44	0.96	1.74	8.18	3,504	45	5.10	20	1.21	65	2.55	30	0.12
Loft ins - professional - private (4)	0.07	0.64	0.70	259	252	162	0	108	58	1.26	2.28	9.39	1,908	18	2.01	18	1.06	35	1.39	30	0.06
Loft ins - professional - social (4)	0.02	0.40	0.42	261	126	135	126	135	21	0.46	0.84	3.49	785	10	1.14	5	0.27	15	0.57	30	0.03
Loft insulation DIY (4)	0.23	0.23	0.46	132	75	80	50	53	14	0.30	0.54	1.53	1,535	3	0.36	25	1.52	28	1.12	30	0.03
Glazing E to C rated (in m^2)	0.00	4.50	4.50	10	7	6	2	4	10	0.22	0.20	0.60	122	1	0.14	1	0.06	2	0.09	30	0.00
B to A-rated boilers	0.08	0.93	1.00	50	50	50	0	0	20	0.43	0.78	3.33	1,154	10	1.19	8	0.50	19	0.74	0	0.06
A/B rated boilers (exceptions)	0.00	0.20	0.20	193	154	117	33	83	11	0.24	0.44	1.86	634	5	0.61	5	0.30	10	0.40	0	0.03
Fuel Switching (5)	0.00	0.06	0.06	1798	1595	728	177	1172	30	0.65	1.18	0.93	485	10	1.13	5	0.29	15	0.58	30	0.05
Heating controls - upgrade with boiler replacement	0.00	0.45	0.45	82	67	50	12	35	11	0.23	0.43	1.94	306	3	0.31	2	0.13	5	0.20	0	0.02
Heating controls - extra	0.00	0.09	0.09	134	111	82	20	58	4	0.08	0.15	0.67	173	2	0.20	1	0.09	3	0.13	0	0.01
CFLs - retail	5.92	3.83	9.7	3.70	1.11	1.11	2.59	2.59	4	0.09	0.17	0.65	89	1	0.13	17	1.03	18	0.72	0	0.01
CFLs - direct	12.00	20.64	32.6	3.90	3.90	1.95	0.00	1.95	33	0.71	1.29	5.44	297	18	2.03	43	2.60	61	2.40	0	0.05
Fridgesavers-type schemes	0.00	0.10	0.10	120	90	0	30	0	3	0.07	0.13	0.37	14	2	0.23	0	0.00	2	0.08	0	0.00
Appliances - Cold	0.00	0.88	0.88	20	20	20	0	0	7	0.14	0.26	0.88	53	1	0.11	7	0.41	8	0.31	0	0.01
Appliances - Wet	0.00	1.17	1.17	10	10	10	0	0	5	0.11	0.20	1.17	27	0	0.03	2	0.10	2	0.08	0	0.00
Appliances - Set Top Boxes	0.00	0.50	0.50	1.40	1.40	1.40	0	0	0	0.01	0.01	0.03	7	0	0.05	1	0.05	1	0.05	0	0.00
Tank insulation - top-up	0.28	0.18	0.46	13	11	8	2	5	2	0.04	0.08	0.55	206	2	0.26	2	0.09	4	0.15	0	0.00
Draughtproofing	0.00	0.31	0.31	95	81	55	14	40	9	0.20	0.37	2.25	227	2	0.28	2	0.10	4	0.17	30	0.01
Total EEC									396	£8.54	£15.33	68	16,670	180	£20.42	214	£12.82	394	£15.45		0.68

Tab. 17 – GREAT BRITAIN EEC 2005-08 - Illustrative mix of possible energy efficiency measures; costs and benefits analysis

6.2.3 General remarks

In conclusion, some general remarks can be expressed.

1. Quantitative comparisons among data of different Countries, to be meaningful, require harmonisation relevant to the following items:
   - Use of primary or final energy
   - Unit of measure of energy: toe, kWh, GJ, PJ
   - Physical reference unit:
     - integral data (e.g. per dwelling or per floor surface)
     - Specific data (e.g. per substituted appliance, per surface of insulated wall)
   - Yearly or cumulated savings
   - Discount rate

2. Harmonisation is particularly important in view of **international trading of White Certificates**, where a common and agreed value of saved energy must be assigned to a White Certificate regardless of the Country who produces it.

3. **Harmonisation will be a challenge**, since Countries adopt different approaches such as:
   - different energy accounting systems (e.g. for discount rate, lifetime of a measure),
   - different conversion criteria from final to primary energy (that is utterly relevant for electricity), which are very site-specific; that is, they depend on the characteristics of the country electric generation system: in some Country, the amount of White Certificates corresponding to a given amount of saved energy depends also on the geographic site of savings (e.g. PACA districts in France)
   - different baseline criteria: the definition of the terms of reference for the calculation of the energy savings is the keystone which an evaluation procedure is built on: in fact, the perimeter including the eligible measures (and the related evaluations of their technical potential and penetration) is strongly dependent on the criteria adopted to choose the baseline

   For these reasons, not homogeneous comparisons are very likely to be expected and are almost inescapable.

4. Regardless of harmonisation, these kinds of comparisons encourage deeper insight on aspects, such as:
   - Where the different national procedures relevant to the same energy saving measure match and where conflict more frequently
   - Which evaluation criteria are assumed in different Countries for the same energy savings measure
   - Which the particular motivations and the national drivers are for such differences (e.g. security of supply, specific urgencies, etc)

   The gained knowledge is expected to translate into advantages in better definition and tuning of the national procedures for standardised evaluation of energy savings.

7 CLOSING REMARKS

7.1 Pros and cons of cross-border trading of White Certificates

The events of June 15th - 17th held in Lund in the frame of the Task XIV activities gave the chance to focus **pros and cons of** national Energy Efficiency systems where trading of White Certificates - when occurring - is confined at the most at a **national level**, versus a chance of wider **cross-border trading**. Profit was also taken of some learned lesson gained from experiences on Tradable Green Certificates gained in EU Northern Countries. Though all the experiences are still in progress, some definite positions and advice were expressed as warning for countries who are setting up or are tuning their national schemes on Energy savings with involvement of White Certificates trading. These positions can be summarised as it follows:

1. Advantages are envisaged in cross-border from the economic point of view, owing to a larger potential for energy savings projects and greater flexibility in implementing them.

2. However, a critical issue is to find common national objectives, in terms of both nature of savings (primary or final energy, CO_2 related savings, etc) and quantities. Convergence on views on this matter is considered a really complicated process.

3. The types and levels of benefits depend very much on the border of the analysis considered to identify the involved actors in an energy savings project.

4. With reference to costs for the actor who bears the obligation to save energy, it might be cheaper to buy a certificate in another country.

5. The conclusion could be the other extreme in case the cost/benefits ratio were considered from a wider societal viewpoint. In particular, international trading would very probably bring about losses of societal benefits at a national level, such as:
   - Local reduction of environmental effects
   - Local grater opportunities of employment
   - Local technological improvement
   - Avoided costs at national level for grid expansion

   (otherwise present without international trading), since it would prevent for complete exploitation of the local potentiality of energy savings and the related advantages. In other words, priority should be paid to securing national interests over an international scheme and to guarantee a national exploitation of energy savings benefits earlier than any extra-national operations.

6. Complexity in this matter is particularly challenging when monitoring and verification of energy savings are considered. In fact, unlike REC procedures, the subjective sides underlying the evaluation of the energy savings connected to a project are even amplified by the national specificities. This is particularly critical in the cases when the amount of saved energy (or number of certificates delivered) possibly depends (as in France) on the specific targeted geographical area (e.g. to cope with problems of local grid congestion or new building capacity).

7. However, the idea of common approaches in view of pan-European exchanges may possibly have chances of success for a selected short list of projects for which harmonised *lines of attack* can be identified.

7.2 Practical issues in White Certificates trading

A second (but not less important) subject of the workshop and of the side experts' meeting focused the different approaches of the participating Countries on **practical issues** (such as criteria for design and development of projects for energy efficient end-uses, valuation issues, monitoring mechanism and non-compliance regime, involved costs). The relevant contributions complemented the contents of the event. The main remarks are below summarised:

1. Quantitative comparisons among information given by the different Countries showed the differences in the approaches adopted to define the energy savings targets and to estimate the savings expected from the relevant EE measures. At present, the main differences are relevant to:
   - Use of primary or final energy
   - Unit of measure of saved energy: toe, kWh, GJ, PJ
   - Harmonisation factors among different energies
   - Physical reference unit for saved energy:
     - integral data (e.g. per dwelling or per floor surface)
     - Specific data (e.g. per substituted appliance, per surface of insulated wall)
   - Yearly or cumulated savings
   - Discount rate

2. Harmonisation among these criteria is useful for purpose of comparisons, but it becomes dramatically important in view of **international trading of White Certificates**, where a common and agreed value of saved energy must be assigned to a White Certificate regardless of the Country who produced it.

3. **Harmonisation will be a challenge**, since Countries adopt different approaches such as:
   - different energy accounting systems (e.g. for discount rate, lifetime of a measure),
   - different conversion criteria from final to primary energy (that is utterly relevant for electricity), which are very site-specific; that is, they depend on the characteristics of the country electric generation system: in some Country, the amount of White Certificates corresponding to a given amount of saved energy depends also on the geographic site of savings (e.g. PACA districts in France)
   - different baseline criteria: the definition of the terms of reference for the calculation of the energy savings is the keystone which an evaluation procedure is built on; in fact, the perimeter including the eligible measures (and the related evaluations of their technical potential and penetration) is strongly dependent on the criteria adopted to choose this baseline

   For these reasons, not homogeneous comparisons are very likely to be expected and are almost inescapable.

4. Regardless of harmonisation, comparisons are expected to gather deeper insight on aspects, such as:

- Where the different national procedures relevant to the same energy saving measure match and where they conflict more frequently
- Which evaluation criteria are assumed in different Countries for the same energy savings measure
- Which the particular motivations and the national drivers are for such differences (e.g. security of supply, specific urgencies, etc)

5. A continuously growing attention is being paid to ***transaction costs*** as a somehow hidden and less evident component – unlike direct costs - of the total costs of energy saving projects. Transaction costs are supplementary to those of plain realisation of the project and they make up a sort of significant overheads in undertaking all the phases of White Certificates lifecycle.

6. Transaction costs deserve more attention, even because they can be unexpectedly remarkable, but very often they are not given any specific evidence, being their quota *sunk* in the overall commercial relationship between supplier and end-user, according to competition requirements. Moreover, energy suppliers could be reluctant to transfer part or all of these costs to their clients and then to risk loosing market shares. In fact, a trading scheme on Energy Efficiency Certificates is bound to penalise the supplier who is not capable of meeting a given energy savings target and/or is obliged to transferring his cost inefficiencies to the end-user; however, high costsmay reduce his customer portfolio . For the same above reasons, streamlined procedures need to be explored in order to reduce administrative costs involved in the considered EE schemes .

The issues of additionality and of costs (transaction ones and others) will be matters of a joint presentation of the involved Countries during next workshop to be held in Groningen on October 27th 2005.

It should be remarked that the discussion on these subjects is still in progress. It must be considered that the current report represents a collection of opinions, gathered in the Paris event, only for internal use of the Task: than, this material has not a conclusive character but it rather represents a rational base for a future fully discussed and agreed Final Report.

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ANNEXES

- **Market Mechanisms for White Certificates: a IEA-DSM International Activity**
- **The Energy Efficiency Commitment (EEC) in Great Britain**
- **Energy Efficiency obligations: the Italian scheme**
- **White Certificates: the French System**
- **Introduction to and first experiences of Green Electricity Certificates in Sweden**
- **Prospects for a common Green Certificate market in Norway and Sweden**
- **RECS: Renewable Energy Certificates System**
- **Transaction Costs and White Certificates Schemes**
- **White Certificates: will local benefits and international trading be coherent?**
- **EuroWhiteCert: stepwise towards effective European Energy Efficiency Policy Portfolios Involving Certificates**

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