Implementation and evaluation of energy end-use efficiency policies and energy services in Europe

The EuroWhiteCert project and the special case of white certificates

June 4, 2007 – La Colle sur Loup (France)
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The EuroWhiteCert project in brief…

EuroWhiteCert PROJECT

Project Objectives

Overall goal of the project

- support the conceptual and technical development of tradable white certificates schemes covering energy savings and energy efficiency

Detailed project objectives

- analyse the potential advantages of a white certificate scheme and ways to cope with difficult aspects, including interactions/integration with other certificate trading schemes (e.g. RES) and markets (e.g. carbon)
- test the white certificate concept in practice through a pilot action.
- give recommendations for the for the assessment, implementation and operation of tradable white certificate (TWC) schemes.

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Project parties

- Politecnico di Milano, Dipartimento di Energetica (eERG) -IT (coordinator)
- Energy for Sustainable Development Ltd (ESD) - UK
- Ecofys b.v. – NL
- Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW) – DE
- The Government Institute for Economic Research (VATT)– FI
- Lund Universitet (ULUND) - SE
- ARMINES – FR
- Center for Energy Efficiency (EnEffect) - BG
- Centre for Renewable Energy Sources (CRES)– GR
- ISR-University of Coimbra (ISR-UC) - PT
- Österreichische Energieagentur - Austrian Energy Agency (A.E.A) - AT
- Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici (APAT) - IT
- Agence De l'Environnement et de la Maîtrise de l'Energie (ADEME) – FR
- Central European University (CEU) - HU
- ESD Bulgaria Ltd - BG

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Project Work Packages

WP 1

Project Coordination

WP 2: Review and analysis of existing national and regional certificate schemes

WP 3: Interactions and integration of white certificates with other energy policy tools

WP 4: Pilot implementation phase

- Creation of a database of 50 EE projects
- M&V methodology (guidelines)
- Identification of market participant types
- Test of different TWC scheme designs

WP 5:
Recommendations for the assessment, implementation and operation of TWCs

WP 6

Info Dissemination

Duration: January 2005- April 2007

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Results Achieved

- Package of recommendations for the assessment and implementation of TWC schemes, addressing potential interactions with other tradable certificate schemes
- Analysis of TWC offer potentially available in EU Member States based on a real sample of 50 energy efficiency projects and programmes implemented in EU.
- Comparative assessment of existing methodologies for Measurement and Verification (M&V) of energy savings and their applicability to TWCs
- Guidelines for the emission of white certificates common to various EU countries.
- Assessment of functioning of a certificate market common to various EU countries under alternative experimental designs.
- Estimations of theoretical maximum size of a white certificate market and of primary energy and CO2 savings achievable with white certificates in EU member countries
- Relative performance of TWC schemes in comparison with other energy policy instruments was investigated.

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PRESENTATION OUTLINE

- Review and analysis of existing European certificate schemes (WP2+WP5)
- Analysis of interaction between TWC schemes and other policy instruments (WP2+WP3+WP5)
- Implementation of a pilot test mainly focused on the TWC supply side (WP2+WP3+WP4)
- Recommendations the for the assessment, implementation and operation of TWC schemes (WP2+WP3+WP4+WP5)

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Review and analysis of existing European certificate schemes (WP2+WP4+WP5)

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Main aspects considered:

- The concept and justification/rationale of certificate schemes
- Design of certificate schemes
- Measurement and verification
- Transaction costs of certificate schemes
- Early experiences on TWCs

Schemes considered:

- White Certificate Scheme in France
- White Certificate Scheme in Italy
- White Certificate Scheme in Great Britain
- Green Certificate Scheme in the Netherlands
- Green Certificate Scheme in the UK
- Green Certificate Scheme in Poland
- Green Certificate Scheme in Belgium
- Green Certificate Scheme in Sweden
- Green Certificate Scheme in Romania
- Green Certificate Scheme in Austria
- Green Certificate Scheme in Italy

Source: report produced under WP2 by Ecofys

Justification/rationale for implementing TWC schemes

In countries where TWCs are already in place it is found that justification/rationale for implementing TWC schemes (as an alternative to other energy efficiency policy instruments) typically is:

-Higher cost-effectiveness in the achievement of given saving targets
-Creation of incentives to privately finance energy efficiency (ESCOs, etc.)
-Saving of public money (if compared with subsidies for energy efficiency)
-Avoidance of energy price distortion between sectors (if compared with energy taxes)
-Avoidance of the very high transaction costs typically caused by the introduction of energy performance standards
-Higher consistency with liberalized energy markets

Nevertheless a lack of ex-ante evaluations analysing potential effects of TWC schemes is identified in most of these countries.

Source: report produced under WP5 by Mundaca and Neij, ULUND

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White certificate schemes considered

Country	Great Britain	Italy	France
Starting date of scheme	**April 2002**	**January 2005**	**July 2006**
Energy saving target	The first phase of the EEC (April 2002-March 2005) involved a target of 62 TWh (fuel standardised). EEC phase 2 runs from April 2005 to March 2008 and entails an overall energy saving target of 130 TWh (lifetime cumulated and 3.5% discounted savings).	At the end of the first five years of the scheme (2005-2009), annual primary energy savings should be equal to 5,8 millions toe (lifetime cumulated and not discounted), equivalent to approximately 68 TWh.	54 TWh of final energy for the first three years (2006-2009, (cumulated over the lifetime of the actions and 4% discounted).
Obligated parties	Gas and electricity suppliers	Electricity and gas grid distribution companies	Energy suppliers delivering electricity, gas, domestic fuel (not for transport), cooling and heating for stationary applications
Sectors covered	Residential sector only.	Projects can be realised in all energy end-use sectors (plus intermediate uses in the gas sector), but at least 50% of savings should be achieved via a reduction of electricity and gas end-uses.	All, including transport, that are not already covered by the EU ETS
Eligible participating parties	Gas and electricity suppliers only can achieve accredited savings	Only gas and electricity grid companies or ESCos can get certificates	Any economic actor can undertake energy saving actions and get certificates

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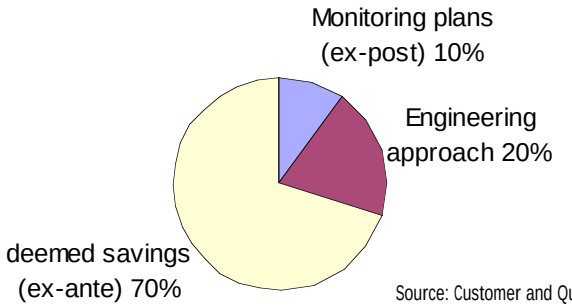
Approaches to Measurement and Verification of energy savings in the TWC schemes considered

Country	Measurement and verification systems in place
Great Britain	The regulator, the Office of Gas and Electricity Markets (OFGEM) assesses and approves all measures suppliers take and Defra (the UK Government Department for the Environment, Food and Rural Affairs) developed a 'Target-setting Model' for determining the energy savings attributed to different measures using an ex ante approach.
Italy	AEEG, the Italian Regulatory Authority for Electricity and Gas, uses three evaluation approaches: • Default value (where the energy saving is defined using an ex-ante approach) • Engineering approach (some on-field measurements) • An energy monitoring plan (an ex-post approach)
France	ADEME (French Agency for Environment and Energy Management) and ATEE (Association Technique Energie Environment) are in charge of defining standardised actions and setting related methodologies for calculation of the savings achieved. Actions by eligible parties that are not standard are also permitted. Savings are validated by the French High Council for Energy.

M&V approach adopted (% of certified savings) in Italy during the first obligation period (2005)



Source: Customer and Quality Service Directorate, DSM Unit, Italian Authority for the Electric Energy and Gas "First Annual Report on the Mechanism of Energy Efficiency Titles", October 31, 2006

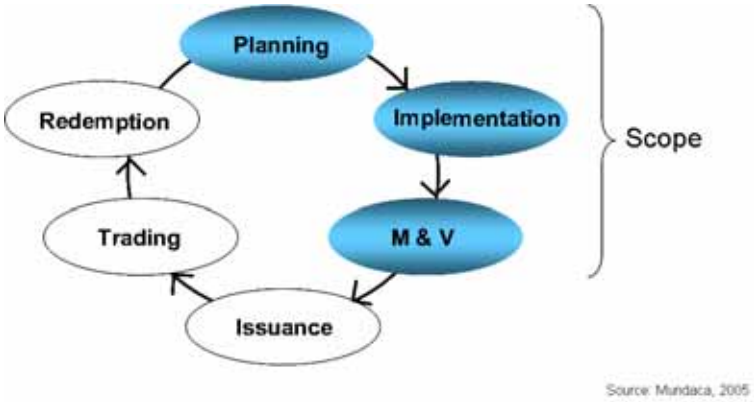
Main differences in the M&V methodologies adopted in the countries considered:

1) Ex-ante, ex-post, mixed ex-ante/ex-post methodologies are adopted (due also to the different energy sectors and technologies addressed in the countries)
2) Unit of measures employed to measure energy savings are different
3) Definition of additionality of energy efficiency (EE) measures is different

Transaction costs (TCs)

Two research initiatives investigated TCs affecting the development of EE projects (i.e. planning + implementation + M&V).

Life cycle of TWCs



Main outcomes

Scale of such TCs may range from approximately 10 up to 40% of total direct investment costs and can affect TWC scheme performance.

There is a negative direct correlation between the burden of TCs and the size and performance of projects.

TCs arising during EE project planning phase may range from 5 to 20% of total direct investment costs (in particular finding information on customers willing to implement EE measures seems critical).

Source: reports on transaction costs produced under WP3 and WP4 by Mundaca and Neij, ULUND

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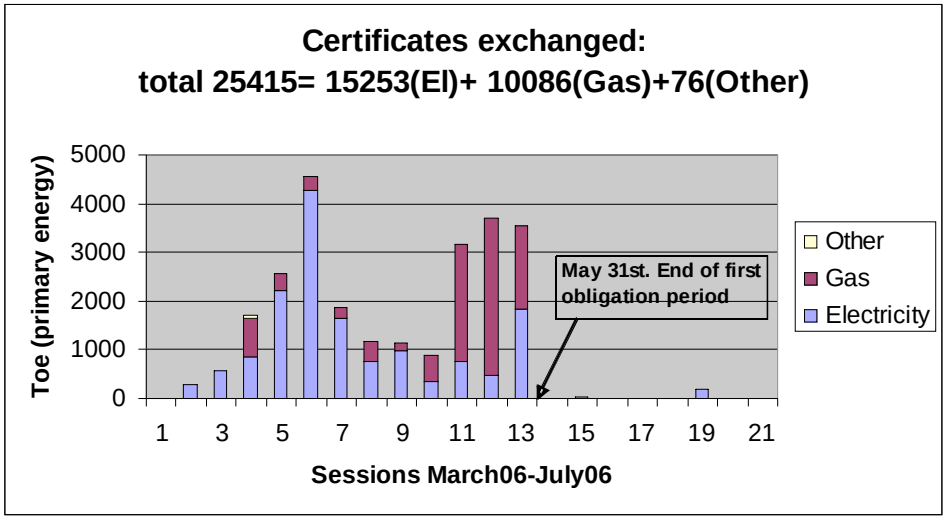
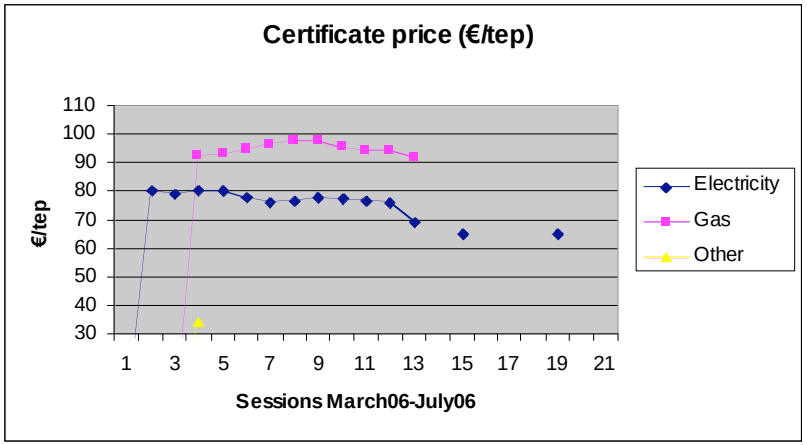
Early experiences on trading

Italian TWC market performances as on May 31, 2006





1 **TWC** = 1 toe = 1 tep of primary energy saved

Completely anonymous certificates of three types :

Type I : electricity consumption reduction;

Type II : gas consumption reduction;

Type III : reduced consumption of other energy types

Market actor	Number
Electricity and gas grid distribution companies	32
ESCOs	79
Traders	7
Total	**118**

Notice that 145,567 certificates (corresponding to 93% of the total saving target for 2005) were totally exchanged and 83% of these were exchanged outside the organized market through bilateral contracts.

Source: "First Annual Report on the Mechanism of Energy Efficiency Titles", October 31, 2006, AEEG

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Early experiences on trading

Great Britain under the EEC1 (2002-2005)

- Two trades of obligation occurred, i.e. some energy suppliers preferred to pay another supplier for meeting their targets (no financial data available)

-Six energy suppliers purchased energy savings generated under other government programmes (e.g. Warm Front programme). These trades contributed to almost 15% of all cavity wall insulations implemented under the EEC1

Low volume of trading by suppliers can be explained in terms of the higher cost-effectiveness achievable when implementing own measures which could also determine the expansion of own product and customer portfolio and the gain of strategically important knowledge in a long-term prospective.

Very similar compliance costs and risks among obliged parties is likely to be another factor preventing trading between suppliers that moreover were the only parties allowed to trade.

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Source: report produced under WP5 by Mundaca and Neij, ULUND

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Interaction and integration of TWC schemes with other policy instruments (WP3+WP5)

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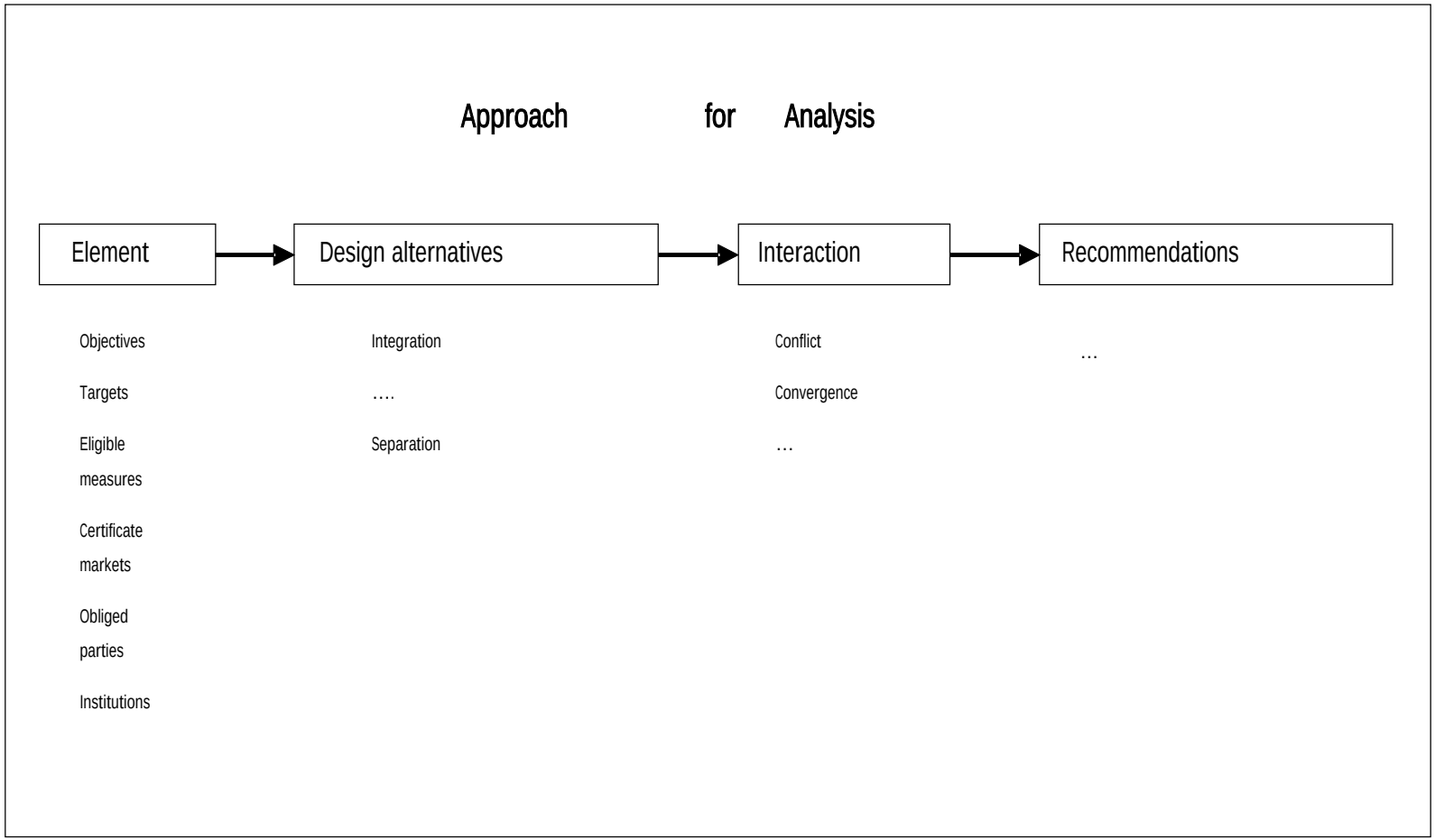
Main aspects considered:

- Interaction/integration with emission trade, notably EU-ETS
- Interaction/integration with tradable green certificates (TGC)
- Interaction/integration with other instruments for energy saving

TWC Interaction/integration with other policy instruments (2)



Source: reports produced under WP3 by ESD, APAT, ZSW, VATT

GENERAL CONCLUSIONS (1/2)

- Direct interaction between TWCs and EU-ETS is, in theory at least, limited by the fact that the two schemes cover different sectors

- Energy savings achieved as a result of a TWC scheme may reduce the ambition level of the overall targets for green electricity and reduce prices of TGCs when targets are formed as a share of overall electricity demand

-Measures encouraging energy efficiency (e.g. soft loans, energy audits, information and education campaigns) generally complement TWC schemes. Subsidies, tax deductions and voluntary agreements should be adapted to avoid overlaps.

-Interesting potential linkages between certification of buildings introduced through the EPBD and TWC do exist.

Source: reports produced under WP3 and WP5 by ESD, APAT, ZSW, VATT, ULUND

GENERAL CONCLUSIONS (2/2)

- It is recommended that, for the initial stages at least, TWC schemes are kept completely separated from the EU ETS and TGCs. It is important that EU Member States and obliged parties have time to understand the TWC scheme before increasing the complexity of the scheme further by introducing linkages with other schemes.
- In the long term EU-ETS integrated with TWCs may help improving performances of both schemes by, for example, boosting market liquidity and improving market stability.

- Extra administrative complexity of linking EU-ETS and TWCs should not be underestimated. An accurate assessment will have to be made of the embodied CO2 of a TWC and robust tracking and data management across the schemes should be ensured in order to avoid the risk of double crediting and generating two separate carbon allowances from a one-tonne decrease in physical emissions.

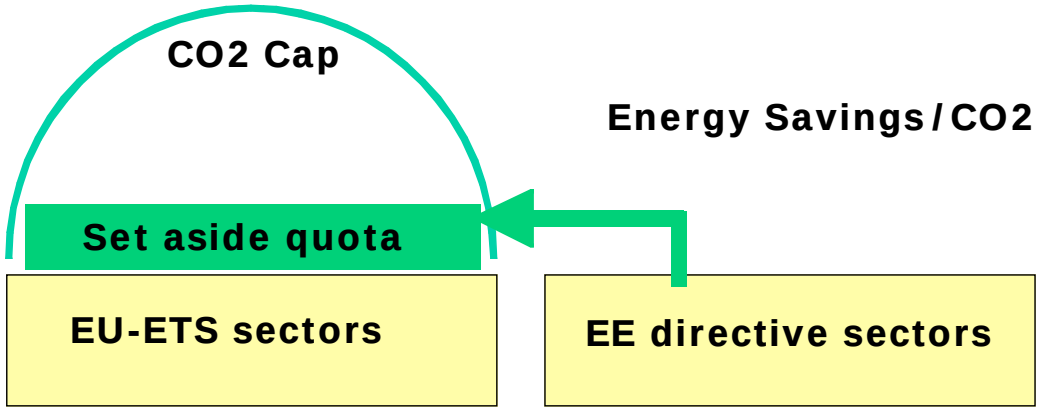
Source: reports produced under WP3 and WP5 by ESD, APAT, ZSW, VATT, ULUND

TWC Interaction/integration with other policy instruments (5)

One-way fungibility combined with set aside quotas might result the most interesting approach to harmonise TWCs and EU-ETS.

A certain share of total allowances is kept by the EU ETS administrator and dedicated to certified CO2 emission reductions from energy saving measures in EE directive sectors

TWCs issued for energy saving measures in EE directive sectors may be converted into ETS allowances but not vice-versa



Source: report produced under WP3.1 by Gaudioso, APAT

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Implementation of a pilot test mainly focused on the TWC supply side (WP2+WP3+WP4)

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Main aspects considered:

- Creation of a database of real EE projects potentially eligible for an EU-wide TWC system
- Comparative assessment of existing methodologies for M&V and guidelines for the emission of white certificates common to various EU countries
- Identification of potential TWC buyer types and interview of a selection of potential buyers and stakeholders of TWC schemes.
- Gaming simulation of different TWC scheme designs covering various EU countries with the involvement of TWC demand side representatives.
- Assessment of the overall market potential of TWCs in EU member countries.

Creation of a database of 50 EE projects

Main scopes:

- analyse the EU TWC potential supply (which technological sectors? Which EE project promoters? Which costs for the energy saved?)
- provide indications for a M&V methodology common to various EU countries
- modelling the EU TWC supply for the gaming simulations

Countries covered: France, Italy, UK, the Netherlands, Portugal, Austria, Bulgaria, Hungary, Rumania.

Sectors: industry, non residential and residential buildings, transportation, networks and grids

Source: report produced under WP4.2 by ARMINES

Some key issues related to a certification system common to various EU countries

- TWC unit of measure should be commercial (final) energy savings (preferably not discounted over saving measure lifetime).
- Recognition of ex ante principle as the main principle
- Recognition of independence of certifiers
- Common understanding of additionality
- Common calculations, instead of the completely diverging methods of today

Source: Certification guide produced under WP4.1 by ARMINES and ISR-UC

M&V of energy savings

Ex post certification approach may result too costly for small projects (up to 20%), but guarantees “real” savings.

The potential domain of excellence of « ex post » approach is large savings and large investments, as the rate of transaction costs due to measurement and verification of savings tends to become lower.

To lower “transaction costs” due to Measurement and verification (M&V) of energy savings, TWC should be mostly awarded ex-ante and in only one package

Nevertheless there can be dangers associated with purely ex-ante schemes (like partial realisation of savings, poor additionality, etc.) if EE measure impact is not well understood.

In case of a large project with some uncertainties in the value of saved energy (depending e.g. on the production level in a factory), a “hybrid” certification approach could be the ideal solution (i.e. award ex-ante a share of the certificates and launch ex-post measurements for possible additional certificates if deemed profitable).

Source: Certification guide produced under WP4.1 by ARMINES and ISR-UC

Structuring TWC demand side and target group perspective

Categories addressed
Energy distributors and suppliers
Large energy consumers
State energy efficiency authorities
Businesses or other entities maintaining a green image
Business entities that have entered into voluntary agreements
Financial institutions active in energy efficiency

Countries covered with interviews: UK, France, Italy, Germany, Austria, Finland, Portugal, Hungary and Bulgaria.

Analysis general outcomes

- Experience of MBIs is mixed across EU Member States (MSs). This variation in experience would affect the speed with which a European-wide White Certificates scheme could be introduced.

- MSs have different priorities in terms of focussing effort for energy savings, often related to their perceived objectives of a WhC scheme.

Source: reports produced under WP3.4 and WP4.3 by ESD, CEU, ARMINES

Structuring TWC demand side and target group perspective

-an area of consensus is measures and technologies relating to buildings. There is less agreement in including transport and industry not covered by the EU ETS

-The option of bringing large energy consumers (e.g., SMEs, local authorities, large housing associations, etc.) under a direct saving obligation so increasing certificate liquidity was deemed complicated and ineffective.

- the possibility of generating demand for TWCs outside the scope of formal energy saving obligations appears very limited.

- Guidelines on TWC property right attribution regulating who gets certificates for which project constellations seem to be highly needed.

- International trade might be politically unacceptable for taking away local benefits and for the impossibility to create homogeneous certification rules.

- In FR and IT the scarce co-ordination among different energy policy instruments in place is pointed out.

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- In light of the above, a suggested 'first step' is for several MSs to develop their own schemes before integrating them into a possible pan-European scheme at a later date.

Source: reports produced under WP3.4 and WP4.3 by ESD, CEU, ARMINES

Gaming simulation of different TWC scheme designs

Objective: investigate how a) the design of a possible EU-TWC scheme and b) TWC market actor behaviour may affect the market potential of TWCs

Countries involved: Austria, Bulgaria, Finland, Germany, Italy, Portugal, UK

EU-wide WhC market design simulated:

1)OTC (Over the Counter) international market consisting of TWC bilateral trades

2) EU trading platform of completely anonymous TWCs representing national surpluses traded internationally in one market session at the end of the obligation period simulated.

3) EU spot market of completely anonymous TWC fed by sale offers from obliged parties.

Players: representatives of energy suppliers and distributors (3) and EWC project partners (1 and 2) played obliged actors.

Gaming simulation of different TWC scheme designs

General conclusions:

Scarce interest towards international trading by actors playing obliged energy companies

The most cost-effective savings were achieved by energy companies that 1) did not buy on the EU market, 2) relied on implementation of EE projects within their customer portfolio, 3) regularly increased the amount of certificates owned, 4) did not result in possession of surpluses at the end of the simulated obligation period (TWC banking was not allowed)

Price speculation was registered in some cases

The market design allowing continuous international trading seems to be more favourable to the stimulation of TWC supply than final balancing or OTC bilateral trades.

Introducing a guaranteed TWC minimum price may increase activity on EE by obliged and eligible actors.

TWC market potential sensibly depends on existing barriers to EE like lack of information by end-users about the obligation scheme (and related opportunities) and lack of expertise by obliged actor about end-use EE projects. These barriers are very difficult to be simulated.

Source: report produced under WP4.3 by ARMINES and CEU

Macro-level assessment of the TWC market potential in EU

Method:

The least-cost solution for obliged parties to achieve a given saving target was explored through a numerical model

Base of data: energy saving potentials, level and spread in unit cost of energy saving options, energy retail prices in FI, NL, HU, UK and the EU-25

End-use sectors considered: services, households, and non-energy intensive industry

Main assessment outcomes:

Additional energy saving of about 120 TWh per year (or 290 TWh/y if high saving potential estimates are considered) for the EU-25 expected after a period of six years (if saving target is set at 85% of the saving potential)

120 TWh equals about 2.3% of final energy consumption in the sectors considered

Source: report produced under WP4.4 by Adriaan Perrels, VATT

Macro-level assessment of the TWC market potential in EU

In the household sector 70% of the 120 TWh saved would be achieved through improved (space) heating systems and ca. 30% through the use of improved electric applications (other than space heating).

In the service and industrial sectors the sharing of electricity savings would be larger.

CO2 emission reduction of 45 MT CO2 /year after 6 years
(100 MT CO2 /y in case of high saving potential estimates)

Taking the EU as a whole an average TWC price of about 25 €/MWh seems a reasonable indication for a first commitment period of 6 years and a uniform target set at 85% of the energy saving potential (60% of the potential is the minimum to ensure a positive TWC price in most EU countries)

Source: report produced under WP4.4 by Adriaan Perrels, VATT

Relative performance of TWCs in comparison to energy taxes

Under the right conditions TWCs can be more efficient than an energy tax.

The more ambitious saving targets get, and the more variation there is in energy saving unit-costs and end-use prices, the more scope there is for a TWC system to outperform an energy tax.

Countries that have already fairly high energy taxes, and no high unemployment, may be approaching the point where a TWC system gets an attractive alternative. Others with low energy taxes and significant unemployment could first set up energy taxation in combination with tax recycling through lowered income taxes or social security surcharges.

Source: report produced under WP4.4 by Adriaan Perrels, VATT

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Is a TWC scheme a justified policy choice?

Based on the results of the analyses performed, the EuroWhiteCert project consortium formulated key policy recommendations to guide the policy makers in their process of finding the right policy instruments for energy efficiency.

Analyses performed allowed formulating such policy recommendations according to the following criteria for the evaluation of TWC schemes:

- Economic efficiency
- Energy/environmental effectiveness
- Administrative burden
- Transaction costs
- Political feasibility

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Source: report produced under WP5 by Mundaca and Neij, ULUND

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Key policy recommendations will be discussed during the

EuroWhiteCert working group

starting at 14:00

THANKS FOR YOUR ATTENTION!

All EuroWhiteCert project reports will be soon available at

www.eurowhitecert.org

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