Assessment of White Certificate Schemes and Their Integration into the Carbon Markets

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ABSTRACT

Recently a number of countries have introduced market-based instruments to foster energy efficiency improvements. Some of these schemes are based on quantified energy savings targets for energy distributors or suppliers, coupled with a certification of the energy savings (via white certificates), and a possibility to trade certificates. This policy instrument often targets parts of the sectors (e.g. power generation) that are subject to carbon reduction targets (mainly under cap-and-trade schemes). The paper presents an up-to-date review of white certificate schemes in Europe, and analyses results achieved so far. It discusses design and operational features that are key to achieve the overall saving targets. Delineation of the scheme in terms of eligible projects, technologies and parties, institutional structure and processes to support the scheme are among the issues discussed. The paper analyses the arguments for and against integration of white certificates with CO_2 emission trading in order to achieve the maximum environmental benefit as well as a high degree of economic efficiency, and evaluates the implications of integration in practice.

Introduction

Energy efficiency is a sound part of the environmental and climate change agenda and contributes to meeting the goals of improved security of energy supply, economic efficiency and increased business competitiveness coupled with job creation and improved consumers' welfare. The Green Paper on Energy Efficiency states that by 2020 the EU could save at least 20 % of its energy consumption in a cost-effective manner (European Commission 2005) and lists a number of options to achieve this. The Directive on Energy End-Use Efficiency and Energy Services aims at fostering cost effective improvement of energy end use efficiency and at transforming and promoting the market for energy services.

The other main direction in EU energy policy is to restructure electricity and gas markets. A new Directive was adopted in June 2003 on market liberalization (2003/54/EC) and all customers will be able to choose their supplier by 1 July 2007 at the latest. The effects of liberalization on energy efficiency are versatile: falling prices give rise to short term approaches from suppliers focused on maximizing turnover and may make suppliers hostile to action beyond the consumer's meter. At the same time improved efficiency at the demand side may be fostered by suppliers trying to retain consumers and attract new ones by offering energy services as 'added value' to an otherwise homogenous commodity such as electricity.

A key policy challenge is to establish long-term synergies between the energy sector liberalization and end-use energy efficiency. A possible market-based policy portfolio oriented towards end-use energy efficiency could comprise **energy-savings quota** for some category of operators (distributors, suppliers, consumers, etc.) coupled with a trading system for energy-efficiency measures resulting in energy savings. The savings would be verified by the regulator and **certified by means of the so-called "white" certificates** (tradable certificates for energy savings). In the sections to follow we make an overview of the elements of schemes that involve energy savings targets and a possibility to trade certified energy savings or savings obligations, of the different arrangements of these in the three existing schemes in Europe. While these schemes are conceptually similar, the implementation shows some marked differences.

Tradable Certificates for Energy Savings: Review of European Experiences

A tradable certificate for energy savings (TCES) portfolio involves four key elements (Bertoldi & Rezessy 2006, Bertoldi et al. 2005b, Langniss & Praetorius 2003, Pavan 2002,2003): (a) the creation and framing of the demand; (b) the tradable instrument (certificate) and the rules for trading; (c) institutional infrastructure to support the scheme and the market (measurement and verification, evaluation methods and rules for issuing certificates, a data management and certificate tracking system and a registry); (d) cost recovery mechanism in some cases.

White Certificate Schemes: Basic Features of National Schemes

Variations of this policy mix have been introduced in Italy, Great Britain, and since January 2006, also in France. In the Flemish region of Belgium there are savings obligations imposed on electricity distributors without certificate trading option. The first scheme in the world with a white certificate trading element has been introduced in New South Wales (Australia); it is however a GHG trading system that has an end-use energy efficiency element.

In **Italy** energy savings targets are combined with tradable certificates for energy savings issued to distributors and energy service companies, as well as with a cost recovery mechanism via electricity and gas tariffs or dedicated funds in some circumstances. The targets are expressed in primary energy consumption and imposed on electricity and gas grid distribution companies with more than 100,000 customers as of end of 2001. For the time being targets are set on an annual basis for the period 2005-2009. Targets for the post-2009 period are expected to be fixed by the Government by the end of 2006. Current targets are just for savings achieved each year and do not include expected savings in the future. In the fifth year of the current phase approximately 3 Mtoe of primary energy savings/year are projected to be realized, of which 1.6 Mtoe/year by electricity distributors and 1.3 Mtoe/year by natural gas distributors. On the whole, the mechanism is planned to deliver energy savings equivalent to 5,8 millions toe in the five year target period. The Italian scheme became operational in January 2005 (Pavan 2002,2004,2005).

In **Great Britain**, the Energy Efficiency Commitment (EEC) runs in 3-year cycles from 2002 to 2011. EEC-1 program required that all gas and electricity suppliers with 15,000 or more domestic customers deliver a certain quantity of 'fuel standardized energy benefits' by assisting customers to take energy-efficiency measures in their homes. The overall savings target was 62 fuel standardized TWh[1] and the total delivered savings reached 86.8 TWh (Mansero 2005). In EEC-2 (2005-2008) the threshold for obligation has been increased to 50,000 domestic customers. The target has been increased to 130 TWh. Due to carrying over of savings from EEC-1 already in 2005 more than a quarter of this target has already been achieved. Certificate trading is not a feature of the scheme in Great Britain.

[1] Energy savings are discounted over the lifetime of the measure and then standardized according to the carbon content of the fuel saved.

In the **French** system obligations are set for energy suppliers delivering electricity, gas, domestic fuel (not for transport), cooling and heating for stationary applications; a threshold for the imposition of a savings target is set at 0.4 TWh/year (5,000 liters in case of domestic fuel) The obliged actors have received targets in proportion to their market sales in the residential and tertiary sectors. The obligation covers the period 2006-2008; annual adjustments are made to take into account variations in the market. The system excludes plants under the EU ETS Directive and fuel substitution between fossil fuels, as well as energy savings resulting only from measures implemented to comply with current legislation. The total target for the first three years is 54 TWh (in final energy) cumulated over the life of the energy efficiency actions with a 4 % discount rate. The expected cost of action is below 20 Euro/MWh (Baudry & Monjon 2005).

Table 1 summarizes the basic features of the three major European white certificate systems in place. The section to follow provides an expanded discussion on some operational aspects.

Table 1. Features of White Certificate Systems in Europe

	UK (EEC 2, 2005-2008)	Italy	France
Unit of target	TWh fuel weighted energy benefits	toe, annual	TWh
Duration of current phase	2005-2008	2005-2009	2006-2008
Sectoral coverage for eligible projects	Residential consumers only	All consumers	All consumers
Restrictions on compliance	50 % from 'priority group' (low income consumers on social benefits).	50 % from reduction in own energy vector (electricity and gas).	
Obliged parties	Electricity and gas suppliers above 50,000 residential customers served	Electricity and gas distributors above 100,000 customers served	Electricity, gas, LPG, heat, cold and heating fuel suppliers above energy sales of 0.4 TWh/year
Trading	No certificates; Obligations can be traded; Savings can be traded after own obligation met; No spot market; One-way trade in national emission trading scheme;	Certificate trade; Spot market sessions; OTC trading;	Certificate trade, only bilateral exchange
Institutional structure	Energy regulator OFGEM	Energy regulator AEEG + electricity market operator GME	Ministry of Industry + French Agency for Energy Management (ADEME)
Penalty	No specific guidance on how penalty would be calculated; The penalty can arrive up to 10 % of the supplier's turnover.	Fixed by the Regulator taking into account, *inter alia*, the actual possibility to meet the target (i.e. number of certificates issued as compared to the annual target), the magnitude of the non-compliance, the state of affairs of the non-compliant party.	0.02 Euro/kWh

White Certificate Schemes: Project Eligibility and Implementation Details

Below we review details and first experiences with the following parameters of the existing European white certificate schemes: (a) eligible projects allowed; (b) institutional infrastructure and processes to support the scheme; and (c) certificate delineation, trading rules and tools to stabilize the market. A comprehensive discussion of these and other design and operational features is available in Bertoldi & Rezessy 2006.

Eligible projects. In *Italy*, projects in all end-use sectors are eligible. At least half of the target set for each single year should be achieved by reduction of the supplied energy vector, *i.e.* electricity and gas uses (a.k.a. the "50 % constraint") (Pavan 2002). The remaining share can be achieved via primary energy savings in all the other end-use sectors. There is an illustrative list of eligible projects. Energy savings projects contribute to the achievement of targets for up to 5 years (with only some exceptions). Only savings that are achieved over and above spontaneous market trends and legislative requirements counts against the targets (additionality).

Energy savings accredited by the Regulator so far come from generation and distribution systems for various energy carriers (29%); households electricity consumption (28%); energy consumption for heating purposes in the households and the commercial sector (20%) and public lighting (19%). The remaining share comes from reductions of industrial energy consumption (4%). On the basis of energy savings accredited so far it can be said that both the overall target for the electricity distribution sector and the total target for the natural gas sector have already been achieved, with a *surplus* of certificates to be banked for the following years. The largest part of these savings comes from early actions. Therefore much more 'new' projects will be needed in order to guarantee the achievement of the targets for future years.

In *Great Britain* only activities concerning domestic users are eligible; at least 50% of the energy savings must be targeted at customers that receive income related benefits or tax credits (a.k.a. "priority group"). Projects can be related to electricity, gas, coal, oil and LPG. Suppliers can achieve improvements in relation to any domestic consumers in the UK. A non-exclusive list of measures is included within the illustrative mix for EEC 2005-2008. Measures that are related to the reduction of energy vectors other than the one supplied by the obliged party are allowed. Experience from EEC-1 in Great Britain shows that a significant share (56 %) of the 86.8 TWh of savings delivered in the period 2002-2005 come from building insulation (wall and loft). CFLs accounted for a quarter of the savings achieved, followed by appliances (11 %) and heating measures (9 %) (Mansero 2005). CFLs accounted for the largest number of projects undertaken (almost 40 million measures related to CFL installation in EEC-1), followed by wet and cold appliances (Lees 2005). All suppliers, but two – who went into administration and administrative receivership – achieved their targets; six suppliers exceeded their targets in EEC-1 and carried out their additional savings to EEC-2. Suppliers can receive a 50%-uplift on the savings of energy efficiency measures that are promoted through energy service activities. This uplift is limited to 10 % of the overall activity.

Apart from plants under the EU ETS Directive, fuel substitution between fossil fuels and measures resulting just from measures implemented only to conform to current legislation, no other restrictions on compliance are foreseen in the *French* scheme. Any economic actor can implement projects and get savings certified, as long as savings are above 3 GWh over the lifetime of a project. Actions must be additional relative to their usual activity; there is a possibility to pool savings from similar actions to reach the threshold. All energies (incl. fuel) and all the sectors (incl. transports and excluding installations covered by ETS) are eligible. Certification of projects implemented by bodies, which do not have savings obligation, is allowed but only after considering the impact of a project on their business turnover: if impact on business turnover is identified, then certification of savings is allowed only for innovative products and services. 'Innovative' product in this discourse means that its efficiency is at least 20 % higher compared to standard equipment and its market share is below 5 %.

Institutional infrastructure and processes to support the scheme. A sound institutional structure is needed for a white certificate system to function, including administrative bodies to manage the system as well as processes such as verification, certification and market operation, transaction registry, detection and penalization of non-compliance.

Under the EEC in Great Britain the regulator OFGEM manages project evaluation and approval, verifies savings and manages the data. In Italy the regulator AEEG implements the scheme; the marketplace is organized and managed by the electricity market operator GME according to rules and criteria approved by AEEG. GME issues and registers certificates upon specific request by AEEG, organizes market sessions, and registers bilateral over-the-counter contracts according to rules set by AEEG (Pavan 2002). In France certificates are issued by the Ministry of Industry, while the French Agency for Environment and Energy Management and ATEE are in charge of the definition of standardised actions.

Baseline definition and additionality criterion are two issues of particular importance for the proper evaluation of actual energy savings realized. To determine the energy savings resulting from an energy efficiency activity, the eventual energy consumption has to be compared to a **baseline** (reference situation) without additional saving efforts. **Additionality** refers to certification of *genuine* and *durable* increases in the level of energy efficiency beyond what would have occurred in the absence of the energy efficiency intervention, for instance only due to technical and market development trends and policies in place[2].

In *Great Britain*, the Department for Environment, Food and Rural Affairs (DEFRA) requires suppliers to demonstrate additionality. Concerns have been raised that energy suppliers can claim towards their EEC target the total energy savings that flow from a partnership project regardless of the actual financial contribution made by the supplier.

In *Italy*, as already mentioned, savings have to go over and above spontaneous market trends and/or legislative requirements (Pavan 2004,2005). For stipulated savings and engineering methods calculation (see explanation below) the additionality criterion is embedded in the choice of the baseline/reference technology within the deemed savings calculation and the engineering evaluation algorithm respectively. For projects not covered by deemed savings or engineering methods, project developers have to demonstrate additionality within their methodological proposal, that has to be approved by the Regulator before it can actually be applied. The accepted technological baseline is the average technology sold at the national level to produce the same level of energy service (unless more stringent legislative requirements exist).

[2] In practice projects tend to have a mix of public and private benefits, but the cost of disaggregating these benefits and precisely accounting for the exact share of no-regret measures in a larger action may be prohibitively high. One way of overcoming this problem would be to place an objectively defined discount factor on investments, which accounts for these private benefits. Minimum efficiency requirements or current sale weighted average efficiency levels, electricity price and the effects of the EU ETS and other policies in place (such as taxation or standards) should also be accounted for in the baseline to ensure genuine additional savings.

The *Italian* scheme uses three **valuation (measurement and verification, M&V) approaches**: (a) a deemed savings approach with default factors for free riding, delivery mechanism and persistence, and that does not require on-field measurements; (b) an engineering approach, with some on-field measurement, and (c) a third approach based on monitoring plans whereby energy savings are quantified via a comparison of measured or calculated consumptions before and after the project, taking into account changed framework conditions (e.g. climatic conditions, occupancy levels, production levels); in the latter case all monitoring plans must be submitted for pre-approval to the regulatory authority AEEG and must conform with pre-determined criteria (e.g. sample size, criteria to choose the measurement technology, etc.) (Pavan 2004,2005). Most of the projects submitted to date are of the deemed saving and engineering method variety. There is ex-post verification and certification of actual energy savings achieved on a yearly basis[3] (Oikonomou et al. 2004 and references herein).

In *Great Britain* the savings of a project are calculated and set when a project is submitted based on a standardized estimate taking into consideration the technology used, weighted for fuel type and discounted over the lifetime of the measure. There is limited ex-post verification of the energy savings carried out by the Government although this work would not affect the way energy savings are accredited in the current scheme; the monitoring work affects the energy savings accredited in future schemes. In Great Britain a discount factor of 3.5 % over the lifetime of the measure is applied, while in France the discount factor is 4 %. In the British and in the French schemes the discount factor refers to actualizing the annual savings for different measures with different life spans. In Great Britain saving estimations take into account the likely proportion of the investment to be taken up by improved comfort ('comfort factors' adjustment of carbon benefits), as well as dead-weight factors to account for the effect of investments that would be made anyway.

Energy savings can be determined by metering or estimating energy consumption **before** and comparing it to the consumption **after** the implementation of one or more energy efficiency improvement measures adjusting for external factors such as occupancy levels, level of production etc. Certificates can therefore be issued either *ex-post* and thus they represent the energy saved over a certain period of time, or they can be issued *ex-ante* and thus represent the *estimation* of the energy to be saved over a certain period of time. With regard to ex-post certification there are different options: the saved energy resulting from an energy efficiency measure could be measured at *the end of a predetermined period* (e.g. after 1 year) or *over the lifetime of the project* (which has to be accurately assessed). The latter option will make the system more comparable to a green certificate: the certificate has a unique time of issue attached to it, indicates the period over which and the location where energy has been saved, and by whom it has been saved (initial owner of the certificate). Ex post certification will however probably increase validation efforts and verification costs. Alternatively, for projects that can be monitored through a standard savings approach, certificates can be granted *in advance* (*ex ante)* of the actual energy savings delivery. This will mitigate liquidity constraints of project implementers and allow them to finance new projects. If underperformance is detected at the end of the lifetime of the measure, the underperforming project owner should be asked to cover the shortage with certificates purchased on the spot market[4].

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[3] E.g. in the case of CHP the plant operator has to prove that the plant has run a certain number of hours, etc.

[4] One should note however that this suggestion is rather difficult to implement in practice for two main reasons. First, it requires the monitoring and evaluation of the actual energy performance of the project in order to allow the comparison between the lifetime energy savings accredited in advance and the real savings. Second, most of the

Depending on the design of the scheme the role of the regulator may or may not include the issue of certificates and verification of savings. For instance, third parties may be licensed to evaluate and approve projects, verify savings and issue certificates. The role of the regulator would then be to accredit third parties and audit their performance. It is not so crucial which body issues the certificates provided that these are based on verified data, which can come from the energy regulator (as is the case in Italy) or from a certified verifier.

Certificate delineation, trading rules and tools to stabilize the market. The certificate is an instrument that provides a guarantee that savings have been achieved. Each certificate should be unique, traceable, and at any time has a single owner. Certificates need to be a well-defined commodity that carries a property right over a certain amount of additional savings and guarantees that the benefit of these savings has not been accounted for elsewhere. Property rights must be clear and legally secured as it is unlikely that trades will occur if either party is unsure of ownership (Jaccard & Mao 2002).

Minimum project size may be applied for certification of savings in order to reduce transaction costs and encourage pooling of projects (Pavan 2002). The *size of a certificate* also has important implication on the number of parties that can offer certificates for sale (unless other restriction apply). In Italy certificates are expressed in primary energy saved and the unit is 1 tep. In France certification is allowed only above a threshold of 3 GWh of savings over the lifetime of a project (Baudry & Monjon 2005).

The *validity* and any associated inter-temporal flexibility embodied by *banking* and *borrowing* rules, the rules for *ownership transfer*, the *length of the compliance period* and expectations of market actors about policy stability and continuity will all influence the market for white certificates. A long certificate lifetime and **banking** increase the elasticity and flexibility of demand in the long term. To mitigate the uncertainties about the achievement of the quantified policy target within the pre-specified timeframe, banking for obliged parties may be allowed only once they achieve their own targets. As already mentioned, in Italy certificates are valid for up to five years, with a few exceptions (Pavan 2002). In Great Britain suppliers can carry over to EEC-2 all their excess savings from measures implemented under EEC; this refers to measures rather than savings. In France it has been proposed that the certificates' validity is at least 10 years. Borrowing is discouraged because it makes the attainment of a target uncertain and is against the ex-post logic of the white certificate scheme as applied in Italy, for instance.

Rules defining **trading parties** are also important for market liquidity. Provided that administrative and monitoring costs are not disproportionate, as many parties should be allowed in the scheme as possible, since this enhances the prospects of diversity in marginal abatement costs and lowers the risks of excessive market power (Pavan 2003). Parties that may be allowed to receive and sell certificates include obliged actors, exempt actors, ESCOs, consumers, market intermediaries, NGOs, even manufacturers of appliances. A key benefit of allowing many parties in the scheme is that new entrants may have the incentive to innovate and deliver energy efficiency solutions, which have a lower marginal cost.

In *Italy* certificates are issued by the electricity market operator upon request of the regulator AEEG to all distributors and their controlled companies and to energy service providers and ESCOs. Certificates are tradable via bilateral contracts or on a spot market organized and administered according to rules set out jointly by AEEG and the electricity market

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energy saving measures have quite long lifetimes: the comparison between real savings and accredited savings could be made only too many years in the future (and many years after the first compliance checks).

operator. There are three types of certificates and thus three markets– for electricity savings, for gas savings and for savings of other energy carriers. This differentiation is required in order to allow the enforcement of the '50% constraint'. The three types of certificates are only partially fungible. The first market sessions have been held in March 2006. For the time being, the volume of trade is lower than expected and the largest share of trading is occurring over the counter. Given that obliged distributors have, on average, a number of certificates lower that their obligation, it is likely that a large volume of trade will occur during the second half of May 2006 (the compliance check with the 2005 targets will be made by the Regulator in early June 2006).

In *France* any economic actor can make savings actions and get certificates as long as the savings are at least 3 GWh over the lifetime of a measure. Certificates are delivered after the programs are carried out but before the realization of energy savings (Baudry & Monjon 2005). In *Great Britain* there are no certificates in the strict sense of the word. The scheme covers obliged parties and no other party can receive verified savings that can be used to demonstrate compliance with the savings target: suppliers may trade among themselves either energy savings from approved measures *or* obligations, with written agreement from the regulator. There has been little interest in trading to date because energy savings can only be traded once the supplier's own energy saving target has been achieved. Suppliers are also allowed to trade excess energy savings into the national emission trading scheme as carbon savings. However the linking of carbon savings to the national emission trading scheme was never formalized. Suppliers have been allowed to carry savings over from EEC-1 to EEC-2: this is what all suppliers who exceeded their target have chosen to do.

White Certificate Schemes and Carbon Markets: Assessment of Arguments for and against Integration

White certificate schemes and emission trading can be and already have been introduced in the energy sector in parallel. Projects that generate additional energy savings result in CO_2 emission reductions; these reductions can be calculated by means of average or project-specific emission factors and the respective carbon displacement value could be included in a certificate. This section analyses the arguments from an environmental and economic point of view for and against integrating white certificates in carbon trading as currently applied in the EU Emission Trading System (EU ETS) and at the additional challenges involved in this[5].

Arguments for Integration

The different integration options are: 1) the possibility to have different end-use sectors eligible in the two schemes (what is eligible under the white certificate scheme is not eligible under the ETS)[6]; this means that there is no integration, even if the energy saving certificates is translated in carbon savings; 2) to allow the integration the two schemes only if the energy savings target have been met (i.e. limited to certificates produced in excess of the obligation); 3) or to have a full one-way integration between the two schemes, by translating energy savings in

[5] See details about the EU ETS at http://europa.eu.int/comm/environment/climat/emission.htm.

[6] Although one could assume the white certificates is end-use oriented and ETS is supply side oriented, in fact both schemes cover, for example, CHP; in addition under the present ETS end-use measures are accounted by measuring the associated emissions reduction at the production plants (heat or electricity).

terms of avoided CO2 emissions (this will raise the issue of possible double counting- see below). Under "integration" the authors in this paper intend the possibility of having all the certified energy savings coming from the white certificates scheme, entering the carbon market, or a one-way fungibility (see Bertoldi 2006 for a long discussion on the issue).

The rationale for considering integration of white and green (or new renewable energy sources) certificates in emission trading is based on a few theoretical arguments. First, from a cost effectiveness perspective, integration of supply and demand compliance options within a carbon reduction/mitigation regime, such as a cap-and-trade scheme, should result in the lowest cost for society. Conversely applying different instruments to different parts of the sector (power generation and supply) increases the risk of undertaking high-cost carbon mitigation measures in one part, while ignoring lower cost options in another part of, for instance, the energy chain, which is not covered the carbon cap (e.g. household fuel use). Energy savings projects and energy efficiency investments are often very cost effective but the existence of a wide range of barriers to energy efficiency, including market failures, prevent their deployment. Barriers to the uptake of end-use energy efficiency measures in the EU ETS are discussed in Bertoldi et al. (2005a).

Therefore, white certificates can bring more – and possibly more cost efficient – carbon reductions from **sectors currently not covered by cap-and-trade systems,** such as the EU ETS. The concern of double counting, especially with regard to electricity savings, deserves special attention. In the case of the EU ETS if an *electricity saving* measure is taking place inside the EU, then a straightforward conversion of the electricity savings into CO_2 saving and "import" of these into the carbon market would result in the same amount of CO_2 being accounted for twice because electricity savings also reduce the emissions of the power generator. For this reason currently project credits are forbidden in the EU ETS when they lead directly or indirectly to emission reductions in installations covered by the EU ETS. Different and much less complicated is the case of non-electricity savings (for instance *savings in natural gas or heating oil*). A residential or tertiary building insulation project (in a building heated by a gas or oil boiler) brings **genuine and additional to EU ETS carbon reduction** that are otherwise not covered by the EU ETS and that can be accounted for via a white certificate and converted into an emission allowance, which can in principle be used in the EU ETS. Energy savings can technically be converted into carbon savings without a burdensome procedure, and could in principle be treated in a way similar to CERs resulting from CDMs[7].

Second, the issues of environmental equity and fairness will be addressed: integration of certificate systems in carbon markets would make it possible to credit the party that has actually undertaken measures that have directly resulted in carbon savings.

Third, in the case of the domestic projects coming from emissions not covered by the carbon cap in the EU ETS, such as household fuel use, the ability to do domestic projects can act as a "safety valve" for buyers in an ETS scheme by not limiting the source of allowances only to those with a surplus under their allocations (Langniss & Praetorius 2003).

Double counting can in principle be avoided if white certificates (project credits) are submitted to the governmental body of the respective country (e.g. the one in charge of the registry) that will have to subsequently (a) exchange it for allowances in the case the carbon cap is to be preserved intact (energy saving project credits are equal to the same amount of emission allowances redeemed) or (b) account for them for the purpose of offsetting the surplus emissions

[7] For CDMs it is possible to have end-use energy efficiency projects (e.g. a CFLs project in China), and this could enter the EU ETS through the linking Directive.

of the obliged party if the cap is exceeded. When project credits (allowances or certificates) are redeemed those parties under the carbon cap will be affected, which have ***indirectly*** benefited from emission reductions: e.g. power generators in case of electricity savings. Purely operational matters, like registries, can be managed in an integrated way (nevertheless separate registries will be required). However, linking requires robust tracking and data management across markets and will increase the administrative complexity.

Finally, if projects are eligible for different kinds of certificates, investors will feel more confident that there will be some way for them to obtain additional revenues from the sale of these and hedge against a wider range of prices on different markets. As long as there is a common register indicating when a certificate is sold or redeemed and **barring** the certificate and the energy saving behind a particular project **from other certification programs**, then projects are also credible against double-counting critics. There will be interaction on prices of carbon allowances and white certificates regardless of whether certain degree of integration of white certificates in emission trading is pursued or not.

Analysis of the Arguments against Integration

Despite the arguments outlined above, integration must be approached with great caution for a number of practical reasons and technical issues. First, one needs to carefully assess whether in seeking to preserve the delivery benefits and specific policy objectives of individual MBIs, an integrated scheme may becomes too complex in administrative and technical terms and therefore hard to manage and vulnerable to misreporting and other flaws. In addition it is not clear whether an integrated scheme can co-exist with CHP set-aside quotas used by some governments in the framework of the EU ETS. Third, energy efficiency meets multiple policy goals and local benefits, including security of supply and energy import reduction, employment creation and regional cohesion, poverty alleviation, and technological innovation and diffusion, which from a societal perspective may be equally important – if not more important in some cases and contexts – than climate change mitigation. Hence society might not be indifferent to the choice of implementing specific mitigation options because of high value of these co-benefits of renewables and energy efficiency[8]. **Therefore it might be inherently difficult to find a commonly agreed value so as to link the carbon, renewable energy and energy efficiency systems whose goals and objectives significantly differ.** In addition if – in line with economic text book arguments – cost effectiveness is the sole motivation of a carbon cap-and-trade scheme, pricing co-benefits of energy efficiency or renewables in the scheme may be undesirable for increasing its complexity and compliance costs. Fourth, savings certification is challenging with respect to measuring and verifying savings. It should however be pointed in this context that this issue has been solved for instance with the approval of methodologies for energy efficiency projects in the framework of CDM. Ongoing experiences with white certificates schemes such as the Italian one, and the various research projects and expert groups currently underway on this topic, could also be helpful to identify the major technical issues related to the measurement and verification of energy savings, to single out those issues that can be dealt with common rules and those that, on the contrary, need to be treated on a case-by-case basis (according to common criteria).

[8] The costs of renewables in terms of GHG mitigation are for most options much higher than for other GHG mitigation options and thus integration of green certificate systems in emission trading without a set-aside quota would significantly reduce the market for renewable technologies.

Last but not least, both carbon trading and white certificate systems have just commenced and it may therefore be advisable to leave them develop separately till more practical experience is accumulated. White certificate schemes, where they exist to date, differ in regard to fundamental design features, such as obliged parties, covered sectors and measures and unit of the target, which may further exacerbate the challenges of allowing in a common European carbon trading system white certificates that account for different values in different countries.

All these reasons along with double counting challenges make integration appear undesirable with regard to end-use electricity savings. Integrating white certificates coming from **non-electricity end-use energy saving measures in the sectors outside the EU ETS** however deserves more attention, for it holds opportunities for increasing the scope and outreach of emission trading in Europe as long as it does not jeopardize the delivery of non-CO2 benefits that are one of the goals of a sustainable energy policy.

Summary and Conclusions

This paper has described the concept, the main elements and the overarching issues related to the establishment and practical functioning of a system with tradable certificates for energy savings. It has provided an up-to-date review of white certificate schemes in Europe, discussing some key design and operational features, such as projects, implementer and technology eligibility and pointed out at key issues such as additionality, baseline setting and measurement and verification. It also has explored the implications of different certificate trading rules and how these can affect the actual structure of the certificate market. Finally the paper has provided an analysis of the arguments for and against integration of white certificates with a cap-and-trade emission mitigation regime, such as the EU ETS. At the current very early stage of carbon and energy saving certificate markets it look challenging to integrate the systems. Nevertheless the integration of project-based credits (white certificates) coming from non-electricity end-use energy saving measures in the sectors **outside** the EU ETS (such as domestic fuel) deserves more attention for it holds opportunities for increasing the scope and outreach of emission trading in Europe.

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