Experts' opinion on Energy Saving Obligations per se and their optimal design elements in particular

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Abstract

Energy savings obligations (ESO) are an innovative policy instruments aiming at increases in energy efficiency. ESO have first been proposed by the EU directive 2006/32/EC. In June 2011, a draft directive on energy efficiency was released by the Commission envisaging a scheme of ESO at the national level. Expert interviews were chosen as the scientific method most applicable on the set of problems. Experts were chosen based on the methodology applied in Rezessy (2007) and Steuwer (2009). Statements were categorised in order to evaluate the phase of implementation, the impacts and the functioning of the schemes, the importance of specific design elements and their modes of action. Finally, the aspects experts clearly agree upon are summarised.

1. Overview

Energy savings obligations (ESO) are an innovative policy instruments aiming at increases in energy efficiency. ESO have first been proposed by the EU directive 2006/32/EC on Energy Services (ESD). The climate package 2020 does not insist on increases in energy efficiency and leaves it to the member states to what extent they apply energy efficiency in order to reach their renewable energy target (2009/28/EC, explanatory statement no. 18). Despite of this liberty given to the member states, the need to raise energy efficiency increases with the binding requirements defined in the climate package (20% reduction of CO_2 emissions, 20% share of sources of renewable energy). At the moment, a draft directive on energy efficiency complementing and partly repealing directive 2006/32/EC was proposed by the Commission (COM(2011)370). It envisages ESO schemes at the national level which oblige the suppliers[2] to save additional 1.5 % p.a. of final energy consumption.

In Europe, ESO schemes are already in force in Great Britain, Denmark, France, Italy and the Flemish region of Belgium. Great Britain introduced an ESO scheme called Energy

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[2] In this paper, a supplier is defined as an energy utility supplying any kind of energy carrier. The definition comprises network companies and retailer. DSOs are defined as regulated gas or electricity network companies; retailers are competing suppliers selling any kind of energy carrier.

Efficiency Standard of Performance (EESOP) in 1994. In terms of the size of the obligation, three periods of larger ESO schemes have been operating since 2002 and will do so until the end of 2012 resulting in the next scheme called 'ECO'. Great Britain obliged the 'big 6' electricity and gas suppliers operating in the country. They are allowed to implement energy efficiency measures only in the residential sector and recover their costs via the price of energy sold. Italy obliged its electricity and gas network companies, allowing them to recover their costs via pre-defined network tariffs. Although the scheme is open to all sectors, measures are preliminary implemented in the domestic sector. France installed its scheme in 2006 obliging electricity, gas, LPG and oil retailers. The French scheme excludes plants covered by the EU emissions trading scheme (ETS); however, the majority of measures is implemented in the domestic sector. Denmark obliges network companies for electricity, gas, and district heating. Oil retailers voluntarily joined the scheme. A significant part of the measures is implemented in sectors other than the domestic one. Flanders runs a small scheme which is not very well documented. Consequently it was neglected in the expert interviews. In the beginning of 2011 it became clear that Poland will install a scheme of white certificates.

The Ph.D. project 'EnergieZer' analyses the opportunities of implementing an ESO scheme in Austria. Basic literature on ESO schemes in force include results of the WhiteCertProject (http://www.ewc.polimi.it/), the special issue on white certificates of the journal Energy Efficiency (4/2008), Bertoldi et al. (2010) and Moser (2011a).

2. Methodology

Literature consulted on the methodology of expert interviews were Albers et al. (2009), Mayring (2000 and 2007), Meuser and Nagel (1991), and Mieg and Näf (2005). Expert interviews normally are semi-structured to guarantee for flexibility without compromising comparability. Expert interviews were chosen as the scientific method most applicable on the set of problems:

- There was a need to have detailed information on the layout/design and functioning of existing ESO schemes in order to be able to draw conclusions for the installation of a scheme in Austria. Information on the political positions and backgrounds in order to support the understanding of the installation and the performance of the various schemes were needed, too.
- Poland is envisaging the installation of a white certificate scheme. There is hardly any data available leaving the Polish interviews to be half exploring and half constructive.
- Schemes cannot be compared due to differing potentials for energy efficiency improvements and policy instruments in force. Value statements should provide qualitative valuation of the schemes. Interviewees are asked to list advantages and disadvantages of the schemes, especially of the scheme in the country they live in.

They are asked for further improvements of the schemes if they were able to implement these. They are asked for major corrections in the scheme's phase of installation if they hypothetically could turn back time and install the scheme again having today's knowledge.

Steuwer (2009) prepared a study similar to the international part of the author's project 'EnergieZer'. In her Ph.D. thesis 'Energy Saving Obligations and Tradable White Certificates: Purposes and outcomes' she conducted 30 semi-standardised interviews. Rezessy (2007) prepared a case study for Hungary in course of the 'EuroWhiteCert Project'. She conducted 13 semi-structured face-to-face interviews at the national level. Merging the numbers it was decided that at least 13 national interviews and at least 17 international interviews should be conducted.

Interview

As there were at least 17 international experts to be interviewed the countries and categories the experts should come from are of importance:

Schemes: Due to having been the first schemes implemented the British and the Italian schemes were chosen to be investigated. France also runs a rather big scheme as does Denmark. Obligations were put on electricity suppliers in the Flemish region of Belgium, but the scheme is small and poorly documented. On the other hand Poland plans to install a scheme which allows focusing on the political and socioeconomic aspects of the phase of the scheme's installation.

Categories of experts: The category 'science/research' was chosen as the author expected the insights gained to be rather unbiased and the interviewees' ability to express the circumstances in clear socioeconomic or technical terms. Moreover, the scientists were expected to have broad knowledge about the energy efficiency potentials, policy instruments in force, and other (social) impacts of the scheme. The category 'authorities' summarises the governmental departments responsible of installing and running the scheme, the bodies administering the scheme (i.e. in most cases this is the energy market regulator), and assisting bodies conducting standardisation of measures and secondary research. Finally, the category 'implementing' subsumes obliged suppliers and ESCOs.

Given this schemes and categories, a raster with 15 cells could be drawn, with the necessity to 'fill' the cells with the (at least 17) interview conducted.

Table 1: Raster for choosing international experts and the number of experts interviewed

	UK	IT	FR	DK	PL	other
Science	3	2	1	0	1	1
Authorities	1	1	1	1	0	
Implementing	1	1	2	2	1	

Semi-structured interview: The questions for each individual expert were prepared based on the hypotheses developed. As the experts' background varied significantly it did not seem target-orientated to pose the same set of questions to all of them. One of the interviews' uniform parts asked for a general valuation of the schemes and their advantages and disadvantages. The country the interviewee belonged to was then looked at in detail. Another uniform part concretely asked for the interviewee's opinion on statements in order to test some of the hypotheses.

Pre-test: During the preparation of the expert interviews a German expert who conducts research on ESO was contacted. Due to his research on the opportunities of implementing an ESO scheme in Germany he was well informed about the European schemes in force. Therefore, the author decided to conduct an interview with him. Aside of the knowledge provided there were two further reasons to choose him to be the pre-test interviewee. First, his mother tongue was German, which allowed for focussing even more on the content. Second, the pre-test interview did not fit in the raster and thus is no loss.

The pre-test showed the necessity to adopt the guidelines. International experts are not informed about the situation in Austria so they cannot reply on questions concerning the optimal scheme implementation. As a result questions were either deleted or changed significantly. Moreover the pre-test has shown that experts avoided balancing evaluations of the European ESO schemes in force.

The experts answered the questions anonymously. First, it was obvious that some answers would not have been made or cannot be made if name and organisation were listed. Consequently, the experts are identified via their position in the raster.

Outcome

Interviews: Interviewees were recruited at conferences or via E-Mail. Experts revealed a high willingness to have an interview which is typical for 'experts' according to the methodological literature. Interviews were conducted either face-to-face or via phone. One interviewee refused to be recorded. The interviews were transcribed at the earliest date possible after accomplishment.

Internal/external validity: Interviewees were asked to back up their statements with explanations in order to provide argumentative causal contexts. Nonetheless many of the statements needed quantitative and argumentative checking. In general, external validity is a problem of qualitative research. Moreover, in this project, it was not necessarily the number of experts which was small but the number of ESO schemes already in force. Their distinct design does not even allow for quantitative evaluation emphasising a theoretic-argumentative approach.

Missing cells: Interviews have not been conducted for two raster cells. It proved to be difficult to reach any Polish interviewee, and in addition, language difficulties and lack of detailed information hampered locating experts. Besides, the Polish ESO scheme had not passed legislation when the interviewees were contacted. So there were no authorities actually

involved in the scheme. In general, the Polish interviews should focus on data gathering. People and organisations involved in the Danish scheme were very accessible. Authorities and implementing parties act very aligned. Both publish papers, also in scientific journals, some of those in cooperation with persons belonging to another category. Due to the harmony in the scheme and the scientific activity of the persons interviewed, the author refused to look for persons exclusively fitting this cell.

Personal remarks: Experts' explanations summarise the essentials of the various schemes. Moreover, they discuss praxis-related details which are not described in any type of literature but are important obstacles for the functioning of schemes. Explanations are faster, more detailed, and more comprehensive than most of literature research would allow for. Finally, it proved positive to tell the interviewees that they or–in some cases–the organisation they belong to will not be named in the interpretation. They often reassuringly asked about the secrecy of their statements, especially when political tasks or methods of proceeding were discussed. (To be clear: none of the statements testified conflicts with the law.)

Categories for interpretation

Steuwer (2009), who conducted a study similar to the international part of the author's one, categorised the answers as 'perceived purposes', 'mode of actions', and 'significance of design choices'. In contrast, the author intends to evaluate the schemes as a whole and the individual design elements in particular, so Steuwer's approach was incorporated in the author's final categories. Experts' statements may show up in more than one category.

Perceived purposes is subdivided in the expert's opinion on political decisions, their personnel evaluation of the European ESO schemes in force, and the impacts the schemes had.

Significance of design choices is subdivided in 'design choices' and 'type of actor obliged' as many design choices are depending on this initial choice.

Modes of action are considered country-specific thus answers are allocated to the subcategory 'country' (cf. annex).

3. Results: evaluation of the ESO schemes design elements

Statements and information presented require basic knowledge of the ESO schemes described. Abbreviations in brackets denote the expert interviewed. They are consciously kept vague as interviews were conducted anonymously.

Political drivers/hindrances and implementation of ESO

When a scheme is installed there are two things to focus on: financing and delivery (FE1). Suppliers do have negotiation power (GR). Political negotiations may result in ineffective/inefficient ESO schemes (GR, FR) which cause low savings and high transaction

costs. The additionality of an ESO scheme installed depends on the number and intensity of other policy instruments in force which address the same target areas (FR). Nevertheless, additionality and financing the savings have to be differentiated (FE1). Although the better part of the measures' costs in the French scheme are financed via tax rebates many projects would not have been implemented if the ESO scheme was not in force (FS).

British suppliers are generally against being obliged. They probably try to influence the size of the target and some subobligations (US). Retailers oppose to provide data on the costs of measures as this is some kind of sensitive commercial information (US). Suppliers do have very strong negotiation power (UR2). Due to high earnings in 2008 new taxes should have been imposed on suppliers as they had received EU-ETS certificates for free. Finally the obligation was increased instead (UR3).

Italian DSOs completely opposed the ESO scheme. They argued that they did not have customer contact and that the scheme would be costly concerning their revenue flows. They took the scheme to the administrative court. However, they abandoned this strategy and concentrate on increases in cost recovery and the penalty regime due to the currently problematic supply-demand-situation (IS).

The **French** government held a strong position on implementing ESO. The installer industry and the business federation lobbied in favour of ESO (FE1). As all companies, suppliers generally dislike being obliged or restricted. However, some companies (the ESCOs) inside the utilities' holdings welcome the obligation. Nevertheless they agree with the opinion that the company should not actively enforce the obligation (FE2). Although suppliers would have found other ways to cope with the obligation the availability (and eligibility) of tax rebates helped paving the way (FS). In the second period French gas and electricity suppliers oppose the inclusion of transport fuel retailers as they implement measures in other areas (households) and energy carriers (electricity and gas). As an alternative, suppliers supposed to put up a parallel scheme which is not interacting (FE2).

In **Denmark** there is a well-functioning dialog with the DSOs; however, district heating companies and oil suppliers disapproved with the scheme (DS).

The **Polish** suppliers did not really oppose the ESO scheme as they knew that a policy instrument addressing efficiency was to be introduced. Nevertheless they did not favour an ESO scheme (PE).

Evaluation of ESO schemes in force

Given the circumstances in **Great Britain** the scheme is considered successful (GR, US, IR1) as it manages to keep the costs of implementation low and concentrate on a few measures and the residential sector only. Administration costs are low for both, obliged suppliers and the regulator due to the small number of obliged actors. Deemed savings make the scheme easy to administer. The scheme seems to be very effective in fostering market transformation. It supports the realisation of the most economic measures as the full lifetime is accounted for (IR1, UR2). In 2012 suppliers struggle to comply with the increased obligation in the Carbon emissions reduction target (CERT) extension period as they expect

the efficiency market's capacity to be too small. Moreover, most of the suppliers are lacking behind the super priority group target (UE).

Experts' opinions on the **Italian** scheme differ but tend to be negative. Some consider it as 'not successful' or 'not fully satisfying' (GR, PE). Also authorities say that 'it is hard to manage and control' (IS). However, the year-by-year monitoring and evaluation allowed for quick interventions/improvements (in contrast to other schemes which have three-year periods) (IR1, IS). The ESO scheme stimulated the development of new business models and connections between different types of businesses like DSOs, the commercial sector and banks. Activity on the ESCO market was stimulated (IR1, IS). One expert concludes that in general the scheme works well: 'solely the cost recovery is causing troubles' (IR1). In the beginning (2007/2008), Italian DSOs 'made a fortune' as they delivered savings for 35 Euro per toe saved but received 100 Euro (UR2). In 2010 ESCOs did not sell certificates to the DSOs as they speculated on increases in the cost recovery. DSOs did not even comply with the extent of 60 % necessary not to be penalised. Although penalties are a reason to buy certificates despite of their price being higher than the cost recovery, companies prefer to go to court. If the network company's point is justified the scheme will collapse (IE, IS, IR1). In 2011 the scheme needed to be deeply modified in order to increase market liquidity. Lifetimes are taken into account and new measures are added including grid losses and CHP. However, the latter means a shift away from energy end-use (IR1).

The **French** scheme is 'not fully satisfying' (PE). Suppliers state that the French scheme does not work well at present (FE1). Authorities state that the scheme works well as it has triggered training, certification of equipment, market entries and the inclusion of efficiency in the suppliers' strategies. The first period of the French scheme has been a phase of learning and transformation (FS). In France, administration costs are relatively high due to the vertical trading option, the high number of measures standardised, and the option to implement measures in other sectors (IR1).

Denmark 'is improving' as they changed to account for the lifetime of measures. Nevertheless they still do not account for the accurate lifetime. Thus the costs of savings are still hardly comparable. However, the scheme is considered 'robust' (IR1, UR2).

The **Flemish** scheme is considered 'peculiar'. Information about the scheme and the measurement and verification methods are hardly available (IR1). Savings are 'probably accredited on the generous side' (UR2).

Impacts of ESO schemes in force

Competitive ESCO markets (markets for energy efficiency improvements) are essential and tender procedures are of avail for cost minimisation (UR3). ESO schemes stimulate activity on the ESCO market (IR1). High activity on the ESCO market increases the ESCO's prices (IE). The French installer industry is very fragmented. The ESO scheme drastically increases demand while the number of installers remains more or less the same. Thus installers can charge high prices and receive windfall profits (FE1). Marketing and information stimulate the supply side and accelerate the implementation of measures (FE1).

The French suppliers participating in the first period supported the training of insulation workers, helped to define and to certify high-quality equipment and increased professionalism (FS). In Italy the definition on ESCOs was a broad one, now ESCOs are certified (IS).

EDF cannot statistically detect the scheme's impact on the sales. GDF can statistically detect the impact of the ESO scheme (FE1, FE2).

ESO schemes are supposed to support the **transformation of energy suppliers** to energy service suppliers. The ESD 2006/32/EC mentions that retailers have not competed with products or services which may increase demand-side efficiency (reason 9). Moreover, retailers' losses due to improvements in energy efficiency should be balanced by disclosing a new market branch focussing on energy efficiency: 'Gas suppliers should look at replacing the gas sales through some other means' (US). Experts' opinions on ESO schemes' success in transforming the strategies of obliged suppliers differ and are very country-specific:

A **British** supplier states that it realises that there is a shift towards a low carbon future and people using less energy. The supplier has built up its own insulation business in order to meet the obligation. This is probably due to the fact that the supplier had had 'a strong service arm' before being obliged. 'Different suppliers look in different ways' at the obligation; suppliers' approaches differ and there is no typical way to deal with the obligation (US).

Italian DSOs have not been active in implementing measures implying that they do and will not change to energy service suppliers (IR1).

In **France**, the suppliers' marketing strategy was to sell 'comfort'. Selling two different images is hard to realise, so the marketing strategy has changed to selling 'efficiency' only. The ESO scheme increases the earnings of the holding's ESCO. However, this does not balance the losses of reduced energy sales (FE2).

Danish suppliers face low margins on the electricity market. They can earn a lot more by offering energy management (DE2).

Actors obliged

It is debatable whether suppliers are the right actors to be obliged, i.e. whether ESO really can deliver measures at a lower cost than other instruments like efficiency funds. However, obligating suppliers may be justified by applying the polluter-pays-principle (FR). Firms do try to comply with the obligation at minimum costs. This proposition also holds if competition is low due to the shareholders' claim for profits (GR). Generators are too far away from the customer and would have problems to deliver the measures. Moreover, people know the suppliers but they do not know the generators (US).

Distributional effects: In Denmark 500 DSOs are obliged. Excluding DSOs means excluding final customers so there is no threshold concerning the size of the company (DE1). (The associations are obliged, not the individual DSOs and district heating companies.) The British scheme focuses on electricity and gas as the UK is a gas-heated nation. Every household has electrical connection and 85 % are heated with gas. When electricity-heated

homes are considered too the residual share drops to less than 10 %. The regulator has (had) no authority in the remaining energy carriers like LPG, oil and solids. However, all energy carriers were eligible as savings (UR2).

Number of actors obliged: There is a trade-off between the number of obliged parties and the costs of administering the scheme. The British scheme obliges only six suppliers (GR, DS, IR1, UR2). In France, so many parties (EDF, GDF, '1,000s of oil retailers') were obliged in order to allocate the obligation to all energy sources used in the residential and service sector. This wide allocation was not done due to concern about distributional effects. Distributional effects are not important for EDF and GDF as they are not allowed to recover the costs. The oil retailers are represented by the association ECOFUEL which manages the obligation and delivers the certificates (FE1). The Danish decision to oblige the associations implies that individual efforts are not controlled for (DS, DE2). Denmark's scheme is more complicated to administer as there are so many distributors who have to cooperate in order to cope with the scheme (UR2).

Customer contact: Direct customer contact is considered an important issue. DSOs do not have direct customer contact (GR), retailers have direct contact to final customers (FS). Obliged actors have to carry out commercial activities (DS). As retailers have commercial networks the obligation would better fit to them (FE1). In Italy, DSOs have not been active in implementing measures, so activity on the ESCO market was stimulated (IR1).

Transparency: 'Competitors' (retailers) do not publish their prices. However, transparency is not considered important if the market is a competitive one (FE1). Low rates of supplier switching do not necessarily imply lacking competition (DS). Public schemes offer transparency but cause costs (FE1).

Independency of sales: The type of supplier obliged in the scheme should be independent of the number of kWh delivered (IR1). Thus, DSOs may be obliged if network tariffs are independent of the number of kWh delivered (FR).

Market stability and regulation: DSOs are known and their number is not changing (DS). They are stable companies and it is possible to provide incentives via the cost recovery (IE, DE1). The obligation of retailers does not cause regulatory challenges (FR). However, in most countries there is a regulation of the network companies in force on which the obligation scheme can be set up upon (DS).

In Italy, the obligation is on the DSOs. When the ESO scheme was installed the retail market was 'less mature and less stable'. There were many market entries and exits, changes in the sizes of companies etc. (IS). Apart from that DSOs were chosen due to the fact that the implementation of the scheme was accompanied by the legislation on liberalisation (IE).

DSOs and retailers are not clearly separated in France. Especially in 2006, the network companies' future status was unclear and eventually not ready for the obligation scheme (FE1).

Since 1995 Danish suppliers perform DSM-measures. Starting with the deregulation of the market in 2000 DSOs were urged to conduct general information campaigns. The scheme

has been expanded in 2006. DSOs were chosen as obliged parties as the Danish regulation is comprehensive and the network companies are known. In contrast, retailers are not known and anybody may enter the market 'trading energy from his home office'. Unlike in the UK there are not 'big 6' suppliers in Denmark (DS).

Cost recovery: Penalties for network companies do not work (cf. evaluation of ESO schemes in force) (IE). Obliging the DSOs involves costs to control/measure for the right amount of cost recovery (DS). Compensation of DSOs means to guess the costs of a kWh saved 'and you cannot guess the right price' because 'they always deliver cheaper'. DSOs do not implement measures when the costs are greater than the compensation they receive. Thus the average cost is always below the compensation (UR2). (This proposition only holds for predefined cost recovery.) For retailers the obligation is a 'cost of business' (UR2).

Allocation of the obligation: If the scheme only addresses households the number of supplied households is a suitable number to allocate the total obligation to the suppliers. When the scheme is open to all sectors the allocation should be allocated based on the volumes of energy sold (GR). The Danish scheme obliges 60 electricity DSOs, 3 or 4 gas DSOs and a high number of district heating companies. The Danish energy associations' obligation is distributed among the members according to their sales/deliveries. The association of the district heating companies passes on the obligation internally (DE2).

ESO scheme design choices

Planning horizon: Suppliers and other companies need a long-term perspective (certainty) to build up new businesses or business models. British suppliers call for a long-term perspective on the insulation target (UE). French retailers did not stop to deliver savings in the intermediary period as their network of implementation partners would have collapsed and would have needed to be revived again (FE2).

Phase of implementation: Certificate schemes create new markets. It is not possible to kick-start markets, they have to be established and built up slowly ('it is a process'). In Denmark it took 20 years to build up the market. The efficiency market requires educated people and companies (DE2).

The first period of the French scheme may be considered a forerun-/learning/set-up-period testing the organisation. It was then 'decided' that the scheme works well as savings were visible, efficiency became a part of the suppliers' marketing strategy, the scheme triggered training, experiences, and ESCO market entries (FS). Although suppliers generally oppose obligations they helped to improve the ESO scheme's efficiency in order to keep their own costs down (FE2). The second period aims at the 2020 targets and therefore is by far more ambitious (FS).

In contrast to other schemes which have three-year periods the Italian regulator could monitor the evolution of the scheme year by year. Thus it was possible to realise the improvements necessary (IR1).

Size of obligation: The government or regulator should take into account the saving potentials (US). (As the government or regulator need not necessarily do so (cf. modes of

action – Italy) (IR1)). The obligation should to be based on the data available to the government or regulator (US). In the UK suppliers 'want to see a target that is achievable' due to the enormous penalties for non-compliance (up to 10 % of turnover) (UE). When the savings achieved are evaluated ex-post free-riding (i.e. dead weight) has to be accounted for. However, free-riding should not be accounted for when measures are implemented in order to simplify matters but it can be accounted for ex-ante when targets are set (UR2).

Measures/sectors to focus on: Addressing specific sectors/measures depends on the policy instruments already applied on (GR). Any measures generating significant improvements compared to the market average should be eligible in an ESO scheme (UR2). The scheme should not be restricted to certain areas but there should be incentives to make deep retrofits and to make these retrofits in the right order (i.e. first insulate, and then change the heating system). Regulation is not necessary as the market is expected to react to incentives like specific lifetimes (DE2).

However, most experts intensively argue in favour of concentrating on the building stock (FS, FE2, UR2, US). Reasons are that new buildings are regulated (US), regulation of the stock is complex due to the habitant's property rights, the savings remain for about 40-50 years, and retrofitting cannot be financed by the final customers as simple as other efficiency improvements, e.g. CFLs (GR). Large schemes should focus on large measures as, for example, smart metering combined with the installation of in-house displays is considered 'picking peanuts' by one expert (UR1). For this reason ESO schemes should enforce deep retrofits (FE2, DE2) by providing incentives to take care about the system's total efficiency as 'cherry picking' (realising the most cost-effective measures only) may trigger lost opportunities (FR).

Moreover, most experts argue in favour of concentrating on small customers like households and SME (UR3). 'White certificate schemes are best suited to small energy users such as residential and small businesses because the big ones are covered by the EU ETS anyway.' For intermediate energy consumers the bill is considered sufficiently large to deal with efficiency matters (UR2). The validity of this statement is limited as British experts argued in favour of this limitation. (In the UK the scheme is limited to the residential sector.) Nevertheless, other experts did not reject the author's hypothesis-testing statement of prioritising small customers.

Deemed savings: The most accurate way to determine the savings achieved is to install smart meters and then measure the savings. However, this implies high costs of monitoring (US). Standardised savings work very well in the small customer sector (UR2). There is a trade-off between the number of standardised measures and the costs of administration (IE). In France more than 200 measures are standardised. It would be more efficient to focus on 20-30 (FE1). Standardised saving values are defined in a consultation process, thus they are political decisions, i.e. compromises. Nevertheless savings are rather under-valued than over-valued as there are strong efforts not to over-estimate the savings. However, stakeholder consultation allows for corrections (FS). As the Italian DSOs do not implement measures but buy certificates from the market they do not try to influence the amount of

savings achievable in standardised measures (IS). Nevertheless the consultation process is 'very lively' due to ESCOs and installers (IS).

French suppliers state that deemed savings are under-valued for the case of condensing boilers (FE2). In Italy savings generated by the refurbishment of buildings were underestimated (IR1). In the UK insulation measures were overvalued by a factor of 2 (UR2). There are mistakes in the standardisation of savings but they are 'not a major problem' (IR1).

Further specifications: High additionality is achieved when measures are implemented in the group of energy poor households as they would not have implemented them elsewise (GR). Nevertheless additionality is not guaranteed in the British scheme as the priority group also comprehends households who cannot be considered energy poor by definition like elder people (UR3).

Administration: It is straightforward that administration costs can be kept low by designing the scheme as simple as possible. Given the circumstances the number of obliged actors should be minimised. Projects and measures should be categorised in order to minimise the cases that need individual evaluation/measurement of the savings achieved (GR). 'If you are setting something up focus on the desired outcome. Don't try to design the process' (UR2).

Certificate trading: In a theoretic model trading becomes important when the obligation exceeds 60 % of the existing saving potentials. When targets are lower the suppliers refuse to buy certificates at the market place as cost-effective measures are still available (and the market's transaction costs are avoided) (IR1). In praxis, cheap measures like CFL lead to compliance at low costs (UR2).

Spot market trading is not absolutely necessary but it supports cost-effectiveness as certificates can be sold anonymously (IR1). A low number of obliged actors allows for keeping the rules of trading simple (GR). In the UK trading should not be extended to vertical trading in order to avoid additional administrative costs (UR2). The 'big 6' trade horizontally (US).

Control mechanism: Monitoring can be done by installing a database on energy efficiency measures implemented and random 'dip checking'. Random checks are easy and cost-effective as suppliers normally only claim savings that have actually been implemented (UR2). Another way of checking is to install an energy efficiency 'map' which may be combined with the database. The suppliers have to feed in the data particularly pointing out the type of measure and the place it is implemented; then, the map is capable of indicating overlapping (UR2).

Constant evaluation of the ESO scheme: Ex-post evaluation of actual savings achieved by the ESO scheme is important (FE2). First, free-riding has to be accounted for (UR2). Different measures attract a different share of free-riders (FE1). Second, the effectiveness and efficiency of ESO are preliminarily depending on the mix of policy instruments in use. As soon as other policy instruments are in force the interactions with ESO are to be clarified (GR). Third, standardised values can be wrong due to various reasons concerning the method of implementation or customer's circumstances (e.g. no access to the roof to install

loft insulation) despite suppliers have accurately processed the information (UR2). Last, ex-post evaluation can also detect the rebound effect (UR2).

4. Conclusions

In the following, the aspects experts clearly agree with are summarised:

- Given the circumstances, the British scheme works best.
- Cost recovery causes problems in the Italian scheme.
- At the point of conducting the interviews (end of 2011) the Polish scheme's framework is still under construction.
- ESO stimulate the energy efficiency market.
- Actors need a long-term perspective.
- Depending on the initial situation ESO may require a phase of implementation.
- Obligations should be put on as few actors as possible. Actors attributable to a certain source of energy should act as a group if there are many of them.
- ESO schemes should focus on the stock of buildings, on small customers, and a small number of measures (20-30 is considered 'fair').
- Implementation should be controlled by random checking.
- Monitoring of the scheme's outcome is considered important.
- Advantages and administrative costs of trading are to be balanced.
- Statements suggest that redistribution effects should be considered.
- Costs vary depending on the type of measure implemented and, moreover, costs may vary for one type of measure implemented.

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6. Annex

Modes of action – Great Britain

The British scheme can be traced back until the 1980s. The gas act 1986 stated that suppliers have the 'duty to promote the efficient use of gas'. The electricity act 1989 said that the regulator has 'to determine standards of performance in connection with the promotion of the efficient use of electricity by consumers as ought to be achieved by suppliers'. The Energy Savings Trust was installed in the early 1990s as a result of the Rio Conference. It was the British main instrument to deliver CO_2 savings in the domestic sector. The savings trust implemented measures in the domestic sector (CHP and audits too) and was financed by a tariff levied via the price of energy. The gas market regulator Ofgas refused to levy the tariff while the electricity market regulator OFFER accepted to levy a tariff of one pound per household and year beginning in 1994. The tariff was then spent by the suppliers making the EESOP-1 the first ESO scheme (UR3). Policy instruments in force were limited to inconsiderable provisions concerning both, fundamental changes of a building's envelope and new buildings (US, UR3). However, provisions for new buildings are getting tighter and tighter. There is a government consultation about compulsory basic insulation when new

boilers or double-glazed windows are installed. The energy bill 2010 introduces minimum standards to buildings until 2018 if you rent them. The industry sector is involved in the carbon reduction commitment scheme. There are no policy instruments in force addressing small businesses. They might be included in forthcoming 'Green Deal' (US).

In the beginning, the British ESO scheme left the manner and the type of **implementation open to the suppliers**. The suppliers started large CFL campaigns. However, 'what the government really wanted' the suppliers to do is insulation. In the CERT extension period the suppliers have to deliver 68 % of the savings resulting from 'professionally installed insulation'. Additionally, the Super Priority Group target entered into force on 2011-04-01. These subtargets are considered 'inflexibilities' by the suppliers (UE).

Installers charge different prices from different suppliers (UR2). In Great Britain there is a 'fair' number of measures standardised (IE). Costs vary dramatically between some of the cheaper measures (UR2). 'In the UK door knocking seems the key way of going around and ask people if they need insulation and installing it.' Moreover there is installation work for local authorities and social housing providers (US).

DECC (DECC 2012a) published **recent figures on CERT**: 'It is estimated that at the start of January 2012 there are 26.7 million homes in Great Britain. Of these 23.3 million have lofts, 18.9 million have cavity walls with the remaining 7.8 million having solid walls. Through Government schemes since April 2008 (the start of CERT), there have been 3.8 million lofts insulated, 2.0 million cavity walls insulated and 58,000 solid walls insulated. Compared with October 2011, 370,000 more properties had loft insulation, 160,000 more had cavity wall insulation and 6,000 more had solid wall insulation. 14.1 million homes had loft insulation of at least 125mm (60 per cent of homes with lofts). 11.2 million homes had cavity wall insulation (59 per cent of homes with cavity walls). 122,000 homes had solid wall insulation (2 per cent of homes with solid walls).'

In early 2012 the suppliers stated that they do not think that CERT is achievable. Two million cavity wall or loft insulation installs should be done in 2012. The suppliers estimated insulation industry capacity to be 1.3 million installs per year. As the ECO scheme will prefer solid wall insulation the amount of cavity wall and loft insulation will drop to some 800,000 as of 2013. This implies the industry should build up its capacity this year and then shrink the next year (UE).

British Gas has to deliver approximately **one third** of the UK target, the next largest share is about the half of that (UE, US). It employs **10 people in administering** the scheme. An unknown share of the savings is achieved by British Gas's own insulation company which employs 1,200 people (US).

Low-income customers 'would not get their fair share' although they contribute to the costs of the programme as suppliers would 'inevitably' implement measures at the homes of those customers who contribute the most (high-income households) (UR2). As a consequence, the '**priority group**' was invented in 1994. The priority group includes those 'genuinely' poor (35 % of the households) and people aged 70 and older who are not necessarily poor. In the end, 40 % of British households were included in the priority group. Consequently, the super-

priority group had to be introduced in order to take care of the most vulnerable households as the priority group was diluted by including 2 out of 5 British households). Nevertheless, given the instruments in force, the ESO scheme is considered a policy instrument to fight poverty (UR3).

For the suppliers it is **difficult to identify the priority group**. Accurate calculations on energy consumption and income are too complex. Consequently, certain benefits are used as proxies for energy poverty. In the past the measures supplied for the priority group have always been installed for free while the non-priority group had to pay for. However, about one year ago (interview conducted on 2012-02-24) British Gas has started to install the measures for free. Thus the priority group has no incentive to declare that it receives benefits. Another approach was to cross-match the suppliers' customer data to the governments list of beneficiaries. The supplier sent a list of its customers and the government then returned a list of those 'poor enough'. Recently a new approach was launched providing incentives to 'friends' of energy poor households. When the home of the energy poor household is insulated the friends will receive 50 pounds for indicating the poor household and the household will also receive 50 pounds. Most of the suppliers are lacking behind the super priority group target (UE).

In the UK, **ex-post evaluation of the scheme** showed that savings were less than expectations based on standardised savings suggested. Ex-post evaluation detected problems attributed to the implementation of the measures, customers' circumstances, and the rebound effect. The heat of light bulbs' replaced by CFLs was partly substituted by the heating system. CFLs were left on as they flicker when they are turned on and off. As an average British household lives at rather low indoor temperature these are likely to increase after installing insulation. Some customers did not have access to the roof to install loft insulation (UR2).

Modes of action – Italy

In 2005 some policy instruments addressing energy efficiency were in force. Any industrial company consuming more than 10.000 toe and any other company consuming more than 1.000 toe per year are obliged to have an energy manager (IE, IR1). However, the energy manager does not need to prove any expertise (IE). Moreover there were minimum standards for new buildings and tax rebates. Depending on the type of measure the tax rebate is about 20-55 % of the implementation costs (depreciated over ten years). Building refurbishments are subsidised with the rate of 55 %, and variable speed drives for motors are subsidised with a rebate of 20 % (IR1, IE).

In 2005 the electricity savings potential was estimated to be 20 % until 2020. However, the regulator does not necessarily take into account the savings potentials when the targets are set (IR1). When the Italian ESO scheme was introduced 'there were no other experiences to copy from' (IS). When measures are implemented Italian DSOs' business is not undermined as their network tariffs are independent of the kWh delivered (IR1, IR2).

As the Italian **DSOs** do not implement measures but buy certificates from the market they do not try to influence the savings achievable in standardised measures (IS). Nevertheless the consultation process is 'very lively' due to ESCOs and installers. However, DSOs try to achieve certification of quality (IS). Refurbishment measures are often measured via the monitoring approach which implies higher costs of measurement. There is a trade-off between the number of standardised measures and the costs of administration. In Italy there are too many measures standardised (IE). As certificates of types I, II and III have become interchangeable and cost recovery is available for all of them the differentiation among them is no longer necessary (IR1).

The amounts **traded** bilaterally and on the spot market are rather equal to each other. Some DSOs also contract out measures like in the UK (IS). Exclusively allowing for spot market trading is not considered a good idea as there are few actors on the demand side (oligopsony). OTC trading helps to match demand and supply. Moreover, there is an OTC forward-market reducing uncertainty. The spot market does not offer a forward market option (IS). Other experts consider centralised trading as unimportant. It would not cause any problems in the Italian scheme to trade the residual certificates bilaterally too. Trading via the exchange was installed to create a market-oriented image (IR2).

There was a surplus of **savings achieved** in Italy as long as CFLs were eligible. CFLs were simply posted to the households. Switching to refurbishment measures implies transaction costs for the persuasion of willing customers (IE). Italian DSOs can borrow 40 % of the savings. Only if they achieve less than the remaining 60 % of the obligation they are penalised (IS).

The **cost recovery** is now linked to gas and electricity market prices. ESCOs do not sell the certificates to obliged parties when they expect prices to increase (this behaviour can either be considered speculation or usual market strategy). Moreover, also the DSOs do not redeem the certificates (they can fall short of redeeming the certificates to an extent of 40 %) as they hope that the cost recovery increases (IR1). In other words the 'certificates are there' but ESCOs wait/speculate for higher prices when the cost recovery changes. Options to intervene were evaluated (middle of 2011): one option is to decrease the lifetime of the certificates but the certificate market is a key element of the Italian scheme and the regulator says it should not be disturbed (IS). The Italian scheme is a creation of the regulator thus the regulator has strong political incentives to keep the scheme running but the network companies' political influence is important and it can make the Italian scheme collapse (IE) so it would be a big problem if DSOs tried to boycott the scheme (IR1).

There is a consultation process on the definition of measures to allow for the generation of savings in other sectors like industry in order to increase the supply of certificates (IS). In 2011 the Italian scheme was **deeply modified** in order to increase market liquidity. Lifetimes of measures are now taken into account and new measures concerning CHP and grid losses were added (IR1). The savings are still credited for a period of 5 years but there is an uplift accounting for the real lifetime of savings. The new rule is a mix among the former Italian rule and the French/British ex-ante/one-shot rule (IS).

Modes of action – France

Between June 2009 and January 2011 there was no obligation scheme in force. However, the Grenelle law was still in discussion and utilities were certain that there will be a subsequent period, so they carried on implementing measures according to the rules of the first period and banked the certificates (FE1, FE2). The suppliers hardly implemented measures in the first year of the first period. It took a lot of time to contact the implementers and **arrange the organisation** of the scheme. From the second year on more than 100,000 measures needed to be implemented per year. As a consequence the scheme could not be stopped after complying with the obligation. The whole partner network would have collapsed and would have needed to be relaunched. Banking of certificates in the intermediary period led to a win-win-situation as it also allowed the government to fix a high target. Suppliers are concerned about the third period as targets will not decrease but there will not be an intermediary period again. In the intermediary period the expansion of the target was extensively discussed. Finally, the target was increased by a multiplier of 6. This actually means an increase in the efforts by a multiplier of approximately 3 as the first year of the first period was the phase to put up the scheme (so 2 years remain) and measures implemented in the intermediary phase were banked (so period 2 actually endures 4.5 years) (FE2).

In France, also the energy parts of the gas and electricity **prices are regulated**. As GDF and EDF sell energy below market prices there are no market entries and retail market monopolies remain. In comparison to GDF's 'losses' (i.e. the difference between actual and market prices) the costs of the ESO schemes are negligible (FE2). EDF had the opportunity to increase the price of electricity by 0.5 % due to the ESO scheme. EDF has to propose price increases to the government which accepts or declines the proposal. However, EDF has never done so. Consequently, the scheme's costs and the price of electricity are not interconnected in France (FR). As EDF and GDF cannot or do not recover their costs the scheme decreases their profits. Of course this is not true for other actors, especially those obliged in the second period (oil, LPG, district heating, and transport fuel retailers) (FE1, FE2). Obligations for district heating suppliers are not very high. They may make profits after having complied with their obligation (which they have already done when the interview was conducted only six months after the start of the second period) (FE2).

It was clear that the ESO scheme would **co-exist with governmental tax rebates**. EDF and GDF do not receive cost recovery and measures are more cost-intensive than in the UK. In the UK, solid-wall insulation is conducted for 400 Euro. The usual measures in France like boilers, heat pumps or insulation measures cost about 1,000 Euro (FE1). Suppliers 'market the government tax rebates'. The tax rebates should be accounted for when the average costs per kWh saved are evaluated (UR2). However, obliged suppliers do not directly use governmental tax rebates but the customer does after having implemented the measure. The ESO scheme increases the earnings of the holding's ESCO but this does not balance the losses of reduced energy sales. The costs per kWh saved vary depending on the type of measure implemented. Moreover, costs also vary for one type of measure implemented. 'Of course there is an average' but due to the heterogeneity there are no typical costs of a type

of measure. The costs are not publicised (and the expert rejects to tell them) as the firms implementing the measures would aim at achieving at least these prices thereafter. In other words, every firm realising less than the average would push up the price leading to higher average and total costs. The costs depicted by the trading website emmy.fr are important as they constitute a basis for negotiations. When implementers or ESCOs charge this price the obliged supplier normally agrees with that. If the supplier financially supports a project this is done via free deliveries of energy as the supplier's costs are lower than the price (FE2).

The ESO scheme concentrates on the supply side. In order to stimulate the demand for measures there were marketing and awareness raising campaigns to inform the people on how to implement measures, do deep retrofits instead of fractional ones, etc. (FE1).

In France heating oil for domestic heating is especially used in rural areas. It is not considered a 'suitable' energy carrier in areas where other fuels are available. Thus fuel switching from oil to gas is enforced (due to lower costs and eco friendliness) although fuel switching is forbidden in general. However, the certificates prove savings achieved in comparison to a reference scenario, i.e. the energy carrier replaced is not controlled for (FE1).

In the first period the suppliers implemented measures in their own energy carrier, in the second period especially the fuel retailer's aim at electricity and gas (FE2) as they cannot conduct enough measures in their field. They do not have customer contact. Thus they work with subsidies and vouchers sold in supermarkets. (To guarantee for additionality customers need to prove to have logged in at the company's homepage.). It is hard to define measures in the transport sector (FS).

Measures addressing biomass are generally allowed. However, when doing so the application for subsidies is not allowed. As subsidies are 'more attractive' biomass is hardly saved (FE2).

There is a trade-off between the number of standardised measures and the costs of administration. In France there are **too many measures standardised** (more than 200). It would be more efficient to focus on 20-30 (FE1, IE). ADEME decided to focus on buildings and defined fewer standardises values for the industry sector. The measures there are more specific (i.e. more complicated to standardise savings) and implementation is more complex. Summing up, the focus on the residential sector was created by the administration. Additionally, the implementation of measures in the domestic and industry sector requires very different business models with one addressing the mass market and the other being very specific respectively (FE1).

GDF employs ten people being directly involved in the certificate scheme. Indirect costs of the ESO scheme are hardly catchable. The expert uses the marketing department as a showcase: as the whole marketing department markets efficiency, is it doing normal marketing or is it involved in the ESO scheme (FE2)?

There is no randomised control of the measures implemented. So the suppliers have to provide exact documentation (in paper) which suppliers expect to cost more than random checking. In the beginning of the first period, EDF lost 60-70% of the savings generated by

insulation measures due to inappropriate documentation. GDF lost about 50 %. EDF still loses 10-15 % (FE2).

Exchanging boilers was overvalued in the beginning of the French scheme. Normally the French scheme accounts for the savings of efficient appliances in comparison to the market average. When it comes to boilers the difference between the market average and the stock average is accounted for. So they accredit all the savings which would have been achieved anyway when the boiler is exchanged (UR2).

The French **certificates market is non-liquid** implying that the purchase of certificates in order to comply with the obligation is only a hypothetical option (FR).

In the second period the French scheme will address information-based instruments and energy poverty (FR).

Modes of action – Denmark

The Danish scheme was inspired by the British EESOP (DS). Denmark intended to reduce its energy consumption by real 4 % until 2020. Considering GDP growth this implies necessary savings of 10.5 PJ/a. The ESO scheme should contribute 6.1 PJ, the share of the electricity DSOs being 2.9 PJ (DE2). In early 2011, the Danish parliament voted in favour of the energy strategy 2050 which claims the nation's independence of fossil fuels in 2050. Moreover, it claims demand-side and supply-side measures. The main instrument mentioned is the ESO scheme and the expansion of the target by 50 % in 2013 and further 20 % in 2017. This means an expansion of approximately 75 % compared to 2011 (6.1 PJ/a) (DS).

Most DSOs and district heating companies are owned by the municipalities or customers (they genuinely own an unmarketable share). Thus DSOs are kind of a cooperative which is reasoned historically. Dong Energy is owned by the Danish state (DS, DE2). DSOs have a **strong incentive to participate in the scheme** as they earn '100 times' more per kWh saved compared to a kWh delivered (DE1). Cost recovery is levied via the tariff per kWh delivered. If tariffs are too high in one year they have to be reduced in the next one (payback of residual gains) (DE2, DS). Thus DSOs cannot achieve any profits in the ESO scheme. However, the ESCOs the savings are contracted to may achieve profits. And these ESCOs are mainly located in the same holding. However, the obliged DSOs are afraid of exorbitant costs as costs have to be published and customers (who are shareholders of the DSOs) may criticise their DSO. They also have the right to vote in the next general assembly (DE2).

In complementation of the ESO scheme there is an efficiency fund which is accessible to final customers. It involves a tender procedure which is time-consuming and complex. Thus companies prefer to contact their suppliers directly (DE1).

A **large share of measures is realised in the industry sector** because bureaucratic efforts are low, potentials are high and suppliers are experienced in delivering in this sector (DE2, DS). In other schemes the majority of savings was realised in the domestic sector but this was preliminary related to the distribution of CFL. In doing so suppliers hardly had contact to the customers and additionality is doubtable. In Denmark, CFLs and appliances are not

eligible any more as the savings are too small. ‘We cannot use any of these tricks’ so it is easier to contact companies or authorities compared to a large number of households (DE2).

Until 2006 the electricity act banned the DSOs from implementing measures ‘beyond the customer’s meter’. Thus information activities were the only activities allowed. However, in relation to the time after, information did not deliver. Since 2006 subsidies have been allowed and DSOs provide approximately a 10 % financial support implying that customers invest the residual 90 % (DE1). Industrial enterprises may search for suppliers who are willing to implement the measures and contribute the most (DS). Measures taken cost 0.08 Euro per kWh saved in the first year (it remains unclear whether this figure accounts for the total investment or the DSO’s support) (DE1).

Another expert states that the DSOs are still not allowed to take actions ‘beyond the meter’. Thus a market consisting of third parties (ESCOs) has been stimulated. 50 % of the compliance is implemented by the ESCOs belonging to the same holding as the DSO does. The rest is implemented by direct customer support or via third parties like installers or consulting companies (DE2). Third parties state that obliged parties act as monopolies on the implementing market. They want to conduct a larger share of the measures implemented. They call for a public tender. However, some of these ESCOs are not competent in documenting or implementing measures. Certification of competent ESCOs is required. Then, the suppliers may contract out more savings because they then have the ‘liberty to choose best cost and best quality’ (DE2).

The supplier itself certifies the measures implemented (DE2). The Danish Energy Agency controls for the correctness of the savings. It randomly picks out suppliers and individual measures implemented. The inspections are conducted by consulting firms (DS). Experts’ opinions differ on penalties: One states that there is a penalty if documentation was not conducted according to the procedures. Another says that there is no monetary penalty but firms are concerned about their image (DS, DE2). With respect to the contracting of third parties one expert stresses that documentation of third parties’ savings may cause a lot of work if these parties are not competent (DE2).

The Danish scheme does not allow vertical trading. It does not permit horizontal trading. The trading actions are not controlled for (DS).

The Danish Energy Agency decides about the deemed savings. Obliged parties may ask whether a specific measure will be recognised. Two full time equivalents are working on the topic of savings (DS). **CFLs and appliances are not eligible** any more as the savings are too small. There still are deemed savings for boilers, etc. (DE2). In order to account for the lifetime of savings while keeping measurement and verification simple measures are grouped according to their lifetimes (less than 5 years, more than 5 and less than 10 years, and more than 10 years) (DE1). Additionality is an important aspect in the Danish scheme. The involvement of the supplier before the implementation of the measure has to be proven (DE1). Requirements for the documentation of measures have increased but ‘that‘s not a problem’ for suppliers (DE2). Suppliers are interested in accurate valuation of savings

achieved and support the evaluation of deemed savings as they are interested in holding up the scheme's creditability as they earn a lot with it (DE1).

Modes of action – Poland

Poland is willing to comply with the targets of the EU's **energy service directive** 2006/32/EG (PE). Except for EU regulation on labelling and ecodesign there have not been any other policy instruments in force. In 2010, there was a law on new buildings and buildings refurbishment. However, the law fainted as its provisions were not binding (PE). The policy instruments in force were 'absolutely insufficient' (underfunded) (PR). In order to comply with the ESD the parliament approved (the 16th version of) the energy efficiency act which focuses on the installation of an ESO scheme. Most of the act's provisions entered into force on 2011-08-11 but executive/operative regulation (to be fixed in decrees (PR)) is still in the consultation process. The scheme is prepared to run for three years (2013-2015; ESD compliance in 2016) although a long-time horizon of up to 15 years has been proposed by consultants. The Polish suppliers did not really oppose the ESO scheme as they knew that a policy instrument addressing efficiency was to be introduced. Nevertheless they did not favour an ESO scheme. The suppliers expect the energy costs to increase 'considerably'. An **increase in prices** will result in an increase in the rate of energy poverty which already is very high when the typical definition of spending 10 % of a household's income is applied (PE).

The Polish energy savings potential is concentrated in the buildings sector. ESCOs will apply for orders in a **tender procedure** which will be essential in the Polish scheme. However, there is no ESCO market in Poland and thus there are no ESCOs to bid in the tender (PE). ESCOs were meant to be 'promoted in a more feasible way' but this proposal was rejected (PR). The tender procedure is risky for the ESCO bidding and may be badly filled at the end of the procedure (PE). The best offers in terms of Zloty per kWh saved will win the tender ('some kind of auction') (PR).

In general the Polish scheme is copied from the Italian one. Nevertheless ('unfortunately') the Polish scheme **obliges the retailers** and the ESCO market is not 'so strong' (PE). Retailers of network-based energies (electricity, gas, district heating) will be obliged in the Polish scheme comprising one gas retailer, 12-20 electricity retailers, and approximately 600 district heating suppliers. Fuel retailers were meant to participate in the scheme but this proposal was rejected. The public sector was meant to be obliged to save 1 % of the energy consumed but this proposal was rejected by the ministry of finance (the ministry of the economy accepted it) (PR).

All savings should be evaluated by independent auditors. The bigger the saving the sooner the audit can be expected. White certificates can be generated by implementing any type of measure and energy carrier and independent of the sector (except for the EU-ETS) (PR).

Interactions between the Polish ESO scheme and other targets like EU-ETS, renewable energy targets, and CCS are expected. Poland has **many certificate schemes installed**. Red is CHP fuelled by coal, yellow is CHP fuelled by gas and small CHP fuelled by coal,

green is renewables, brown is biogas, and purple is methane from the mines. Aside of the white certificate scheme another supporting schemes will be set up as CCS is not expected to start without such a scheme. Summing up, Poland will then have seven interacting certificate schemes in the energy sector (PE).