Reviewing successful and/or innovative policies to drive an energy efficiency strategy: case study for France

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Abstract

Information available worldwide about energy efficiency policies and programmes has become abundant. A major problem for practitioners is how to use this large amount of material for improving their domestic practices. This paper presents the results of a study by Enerdata on behalf of the French Agency for Energy Efficiency and Environment (ADEME), whose objectives were to build a catalogue of innovative energy efficiency measures and to highlight their potential and the degree to which they could be implemented in the French context. The study covered all sectors except the services (covered in a separate study). A grading system, based on the ADEME priorities, was used to compare and rank 47 measures selected out of 108, so that the practitioners can easily identify their strengths and weaknesses. In parallel, qualitative analysis was also done. The highest-ranking measures were detected in the industry and transport; the reason was that these sectors required lower public support than other sectors such as the residential sector. The study has been used by ADEME to identify foreign best practices and thus to strengthen its policy benchmarking.

Introduction

There are several databases gathering information on energy efficiency policies and programmes at the European level (*e.g.* National Energy Efficiency Action Plans (NEEAPs)[1], Mesures d'Utilisation Rationnelle de l'Energie (MURE)[2] or Buildings Performance Institute Europe (BPIE)[3] databases) and at the global level (*e.g.* the databases of International Energy Agency (IEA)[4] and World Energy Council (WEC)[5], the proceedings of American Council for an Energy Efficiency Economy (ACEEE)[6] and European Council for an Energy Efficiency Economy (ECEEE)[7], *etc.*). They offer rich material about good practices and innovative measures which help in decision making, especially in defining strategies or a bouquet of measures. But how can we refine such plethora of resources to inform the implementers and decision-makers effectively? On the one hand, there are thousands of pages providing information about programmes and policies at different levels of details.

[1] http://ec.europa.eu/energy/efficiency/end-use_en.htm
[2] http://www.isisrome.com/mure/index.htm
[3] http://www.buildingsdata.eu/
[4] http://www.iea.org/policiesandmeasures/energyefficiency/
[5] http://www.wec-policies.enerdata.eu
[6] http://www.aceee.org/proceedings
[7] http://www.eceee.org/conference_proceedings

Reviewing them is quite time consuming and implementers can rarely do it on a systematic basis. The literatures provide syntheses (*e.g*. de la Rue du Can et al. 2011, Murphy et al. 2012), but by essence, these are focused on a given topic which may not fit the needs of other implementers. On the other hand, there are platforms where decision makers and implementers may share their experience (*e.g*. the Concerted Actions of the European Commission[8]). However the energy efficiency activities are now so diverse that it is impossible for these platforms to cover all sectors and types of instruments. Moreover, due to practical constraints (time available for discussions, very few funding to prepare detailed case studies, etc.), the experience sharing is often reduced to bilateral contacts on a limited number of cases. This paper presents the results and conclusions of a study performed by Enerdata for the French Agency for Energy Efficiency and Environment (ADEME) (Enerdata, 2012), whose objectives were to build a catalogue of innovative energy efficiency policies or programmes and to highlight their potential and the degree to which they could be implemented fully or partially in the French context. After presenting the background of this study and the methodology employed to build this catalogue, we present some examples of outputs and we discuss the difficulties encountered and the value-addition of the study (taking into consideration ADEME's perspective). Finally we summarize the main conclusions from this review.

Background and methodology

As in most OECD (Organisation for Economic Co-operation and Development) countries, the French energy consumption is still increasing, despite a recent slowing down of this growth. Significant energy savings still have to be achieved in order to meet the current French target in terms of energy efficiency for 2020 and beyond. Recent analyses (MEDDTL 2011a) have shown that the current efforts will not be enough to realise the target (ODYSSEE-MURE, 2012). Meanwhile, the public budget is facing strong restrictions. Decision-makers and implementers are therefore looking for examples of innovative measures which may complement or improve the strategies and packages presented in the second French NEEAP. Due to the numerous activities it is involved in (*e.g.* the Concerted Action for the Energy Services Directive), ADEME has access to a large overview of measures in other countries that may be relevant in the French context. However, the information is often too succinct; and the need of refining the information available was the main rationale for the study done by Enerdata. In parallel, the General Directorate for Energy and Climate had launched a new round of consultation to propose additional measures for energy efficiency. ADEME has taken part in this process as the advising agency for the ministry. In order to meet these expectations and to have regular exchanges between the consultants and ADEME, the study has been organized in three stages, whose main components are described further on: 1) A literature review to identify a large sample of measures potentially relevant for France, classified by target sectors and types of policy instruments (around one hundred of them); 2) An analysis of a selection of 47 measures presented in a standardized format highlighting their main characteristics, potentials and levels of their implementation in the French context; 3) Recommendations, including a multi-criteria grading and ranking.

Literature review

The main sources used were the policy databases mentioned above, complemented by literature reviews in the Intelligent Energy Europe databases[9] and inputs from ADEME studies and benchmarking activities. Special efforts were made as regards to the measures targeting the agricultural sector, as it was not well covered by the French strategy so far. Likewise, a particular attention was given on cross-sector approaches, taking into account the possible interactions among the sectors.

Typology used to process the information

The initial typology employed is for an initial screening and selection of measures. This typology was based on the usual categories of policy instruments (incentives, fiscal, regulation, information, *etc*.). This initial categorization was complemented by setting two other criteria to give a more precise utility of the measures: the target, defined as the combination of the sector (*e.g*. residential) and the end-use(s) or the technology (*e.g*. space heating) and the sub-type of policy instruments (*e.g*. for fiscal measures: carbon dioxide (CO_2) taxes, tax credits, Value Added Taxes (VAT) reductions, *etc*.). According to the ADEME requirement, a second typology has then been defined for each main sector (residential, industry, transport, agriculture[10]) using the same three criteria (type, sub-type and target). The modalities for each criterion have been updated using an iterative process and based on the discussions between ADEME and the consultants. This structure has been chosen in order to make the catalogue of measures easier to use in future by the different ADEME services.

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[8] For information, please see: http://www.esd-ca.eu/

[9] For more information please see: http://www.eaci-projects.eu/iee/page/Page.jsp

[10] The service sector had been covered by a previous separate study, see ADEME (2011) for more details.

Selection of measures to be studied in details

The main priority was to find innovative and/or complementary measures compared to the French context in 2012. This was analyzed through the review of the French strategy (mainly as defined in the 2nd French NEEAP) and of the national potentials for energy savings[11]. Based on the available information (MEDDTL, 2011a), space heating in the residential buildings and road transportation are the end-use/sub-sector holding the largest energy saving potential. During the first stage of the study, 108 measures have been identified as potentially relevant, with a larger number of measures for the transport (36) and residential (26) sectors as explained above, compared to industry (17), agriculture (9) and cross-sector measures (20). A selection was then made according to the following criteria: 1) prioritizing the measures having high energy saving potentials or which can help realise the targets not yet achieved in France, 2) prioritizing measures implemented in countries which have achieved significant energy savings in the target sectors, and 3) ensuring a set of measures with a large diversity (in terms of policy instruments and targets). Eventually the measures were mostly selected from European countries as they have more similar contexts, especially in the residential sector, making the implementation in France more likely. The preliminary analysis of the French context and these criteria ensured that the measures selected were both innovative (meaning here not yet implemented in France) and promising (meaning here representing a significant energy saving potential). The selection was made through discussions between ADEME and the consultants with final decision taken by ADEME. As an example the measures studied for the residential sector are listed in Table 2.

Analysis of the measures selected

The description of the measures done in previous stage includes the following criteria/information in addition to the ones used in stage 1: duration/timing of the measure, actors involved, territorial level, background/short history of the measure, brief policy theory, evaluation system, impact of the measure (in terms of energy and carbon dioxide (CO2) savings), public cost of the measure, investment induced, efficiency of the measure (here ratio between the public cost and the energy or CO2 savings), leverage effect (in terms of investments), experience feedback, main strengths and weaknesses, transferability to France, references and contacts. These criteria were chosen based on the consultants' expertise and so that the measure can be easily understood (*e.g.*, background, policy theory) and assessed according to ADEME's priority (public costs, impact, efficiency, implementation). In stage 2?, each measure was then analysed in a form based on the aforesaid criteria with a 2-page maximum limit. In stage 3, each measure was summarized in a 1-page template including a spider graph (see below) to form a synthetic catalogue. If necessary, the user can easily refer to more detailed information using the 2-page forms followed by the references and contacts.

Grading and ranking system

The stage 3 led to a ranking of the measures to complement their description by a prioritization. A grading system was thus defined using 5 criteria: effectiveness of the measure, impact, efficiency, leverage effect, implementation. A scale from 1 (lowest score) to 4 (highest) was defined for each criterion using thresholds except for the effectiveness and the feasibility which are not quantitative indicators (see Table 1 below). All scales have been discussed with ADEME. When quantitative details were not available (*e.g.* for costs or impacts), the score was based on Enerdata experts' conservative assessment.

The grading was used in two ways. First to create spider graphs showing the scores for each criterion. And second to give a final grade using an equal weighting of two criteria only (impact and efficiency) as these appear to be the biggest priorities for ADEME, in addition to the transferability. A final ranking was made using first the final grade and then the transferability score (when measures have the same final grade). This ranking was discussed with ADEME experts who took the final decisions. According to ADEME's needs, the ranking has been made for each target covered by the study (see Table 2). Specific ranking or sorting could also be made using the spreadsheet where all information has been registered.

Table 1. Scales used for the grading system.

Criterion	Scale
Effectiveness	*standard scores attributed to the types of policy instruments, based on expert judgements* 4 for regulations and norms 3 for financial incentives, taxes and energy efficiency tariffs 2 for training & education, energy audits, voluntary agreements, labeling 1 for information campaign

[11] For more information please see savings potentials database for the European Commission: http://www.eepotential.eu/esd.php

Impact	*thresholds = ratio between the reported annual energy savings and the targeted annual energy consumption* 4 for very high impact (= ratio >5% for all sectors except for transport: >2%) 3 for high impact (ratio =] 2 ; 5]% for all sectors except for transport:] 0,5 ; 2]%) 2 for moderate impact (ratio =] 0,5 ; 2]% for all sectors except for transport:] 0,1 ; 0,5]%) 1 for low impact (= ratio <0,5% for all sectors except for transport: <0,1%)
Efficiency	*assessments in italics are for the cases where no quantitative information is available*[12] 4 for a ratio < 50 € / toe saved 3 for a ratio [50 – 500[€ / toe saved *or if the public cost is low and the energy savings are likely to be high* 2 for a ratio [500 – 1200[€ / toe saved *or if the public cost and the energy savings are likely to be moderate* 1 for a ratio > 1200 € / toe saved *or if the public cost is high and the energy savings are likely to be low*
Leverage effect	*ratio between the private investments induced and the public costs (qualitative assessment in italics)* 4 for very high effect, ratio > 10 3 for high effect, ratio between] 5 ; 10] *or if high private investments* 2 for moderate effect, ratio between] 1 ; 5] *or if moderate private investments* 1 for low effect, ratio between < 1 *or if low private investments*
Transferability	*assessment based on the difficulty and time needed to implement the measures into the French context* 4 for a measure that could be immediately implemented in France 3 for a measure that should be possible to implement in France without major difficulties 2 for a measure difficult to implement in France now but with a good medium-term potential 1 for a measure presenting major difficulties for its implementation in France

Results

From the 108 measures detected in stage 1, 47 were analyzed in stage 2 and then scored and ranked in stage 3. These measures cover the residential (16), industry (13), transport (11) and agriculture (4) sectors, plus 3 transversal measures. About the types of policy instruments, 15 measures correspond to voluntary agreements, 9 to financial incentives, 8 to regulations and 7 to fiscal measures. In terms of countries, the Netherlands (6 measures), Switzerland (5) and Germany (5) provided most of the cases, followed by UK (4) and Belgium (3). In total, 24 countries are represented, of which 16 from the EU, 21 from the OECD, plus Brazil and Singapore.

Examples of outputs

Table 2. Example of final ranking for the targets within the residential sector.

Target	Title of the measure (and country or areas)	Final grade (/8)	Transferability (/4)
Existing buildings	Green Deal (Great Britain)	7	4
	PACE (Property Assessed Clean Energy) (California then 23 states of the US)	5	1
	Klima: aktiv Leben (Austria)	4	4
	Voluntary agreements with the building industry (Meer met Minder) (the Netherlands)	4	2
	Refurbishments at the neighborhood level (Blok voor Blok) (the Netherlands)	4	2
	KfW (Kreditanstalt für Wiederaufbau) funds for eco-efficient refurbishments (Germany)	3	4
	LESA (Landlord's Energy Saving Allowance) (UK)	3	3
Rented dwellings	Minimum energy performance requirements for rented dwellings (Belgium - Brussels)	5	4
	Mandatory hydraulic balancing and thermostatic valves (Slovakia)	2	4
Social housing or low income households	Voluntary agreement with housing corporations (the Netherlands)	4	3
	Supporting Australian Households' package (complement to the carbon tax) (Australia)	4	2
	CESP (Community Energy Saving Programme) (Great Britain)	2	4
	Retrofit NYC Block by Block for low income households (New York city)	2	2
Appliances	Electricity levy to fund energy efficiency programmes, initially for CFL (New Zealand)	5	2
	Eco-Point Program for Green Home Appliances (Japan)	4	2
	Scrap Premium for appliances' replacement (Czech Republic)	2	4

Top measures per sector

According to their final grade and therefore to the criteria used in this study, the top measures for the French context would be (per sector and decreasing grade):

For the residential sector (top 3 out of 16):

[12]Whenever quantitative information was not available, assessments were made according to expert (in charge of measure implementation)'s point of view (during phone interviews or email exchanges). We asked them to qualify these indicators between high/medium/low.

- The Green Deal (Great Britain, final grade: 7/8 ; transferability: 4/4) explores an innovative funding mechanism based on long term third-party financing for buildings refurbishments, but uncertainties remain on the actual involvement of the private sector in the scheme (as it is yet to be started fully).
- Minimum energy performance requirements for rented dwellings (Belgium - Brussels, 5/8 ; 4/4) will be added to the current regulation against unsanitary housing. The implementation should start in 2015, as it requires discussions with the actors about key aspects.
- An electricity levy (New Zealand, 5/8 ; 2/4) has been used to fund energy efficiency programmes, initially for Compact Fluorescent Light bulbs (CFL) for 2006-2008 and then for other purposes. This may be politically sensitive as energy prices are already increasing; hence has the low transferability.

In addition, it should be noted that an increasing number of measures is targeting or including special provisions for low income households (case of 5 measures studied) as well as emerging trends of minimum energy requirements for rented dwellings (Belgium, UK) and local approaches for refurbishments (Community Energy Saving Programme (CESP) in Great Britain and Block by Block in the Netherlands).

For the transport sector (top 3 out of 11):

- The programme Klima:aktiv mobil (Austria, 8/8 ; 3/4) is a package of measures covering different targets (in terms of actors, transport uses and users) and actions (promotion of cycling or car sharing, eco-driving, information about car performances, etc.), with a monitoring system which is one of its main strengths.
- Decreasing the speed limitation on highways (Spain, 8/8 ; 3/4) has a direct and significant impact, but is very difficult to get accepted. It has been only temporary (March – June 2011) and justified by a sharp increase of the oil price for the Spanish supply.
- The High Occupancy Vehicles Lanes (HOVL) (Canada - Ontario, 8/8 ; 2/4) are lanes dedicated to car sharing and public transportation. To increase the acceptability of this measure, a new lane is often needed, which would be rarely possible in France. Besides, the legal conditions for this measure have to be checked.

In addition, the Packstation Service developed by DHL (Germany, 5/8 ; 3/4) should be highlighted as an original measure, mainly because it is implemented by a private actor and it is related to the e-commerce. The Packstations are lockers where households or companies can send or get their parcels at anytime, optimizing the ultimate part of the delivery.

For the industry sector (top 3 out of 13):

- The Learning Energy Efficiency Networks (LEEN Gmbh) (Germany, 8/8 ; 3/4) are voluntary agreements for medium-sized companies organized in local networks committing to 4-year targets and sharing an energy manager. It is inspired by a similar system in Switzerland, where the networks are structured by sector of activity (and not by territory like in Germany).
- Large companies committing to energy efficiency can have a CO_2 tax exemption (Switzerland, 8/8 ; 2/4). This has been successful mainly for large companies, already covered in France by the Emission Trading Scheme. Moreover, this requires a reliable monitoring system.
- The Flemish Energy Benchmarking Covenant (Belgium – Flanders, 8/8 ; 2/4) is inspired by a similar Dutch voluntary agreement, with commitment to 4-year action plans whose targets are based on the benchmarking. The supporting measures (energy tax reductions and an annual confidential monitoring) may not be applicable in the French context.

In addition, a few interesting measures for Small and Medium Enterprises (SME) have been detected (especially in Switzerland and Sweden).

For the agriculture sector (top 1 out of 4):

- The Covenant Clean and efficient Agrosectors (the Netherlands, 5/8 ; 2/4) is a voluntary agreement with long term objectives supported by financial incentives and with an independent monitoring. The incentives used could not be the same in France, due to differences in the energy taxation.

For the transversal measures (top 1 out of 3):

- The Climate Cent (Switzerland, 8/8 ; 1/4) is a levy on fuel oil, managed by a dedicated foundation and used to fund mitigation or adaptation projects in Switzerland or abroad. Priority is on projects for mobility, buildings and heat recovery. But the main criterion to select the projects is their efficiency (cost/CO2 savings). As fuel prices are increasing, this measure would be very sensitive in France where the level of taxes on fuel oil is already high.

Discussions of the results

Evaluation of the measures and data reliability - Among the 47 measures studied in stage 2, about 54% included an ex-ante assessment, while an ex-post evaluation was available for only 26%. And about 20% of the measures had no information about assessments at all. Most of the measures could thus be assessed based on quantitative data. But there was very few information about the reliability/uncertainties of the data. More specifically, a general lack of evaluation has been observed for measures in the transport sector while almost all measures in the industry sector include a monitoring system, mainly stated in annual reports by the participating companies.

Comparability of the indicators and reliability of the grading and ranking system - In addition to the reliability issue, the comparison of the indicators associated to the measures takes into account the differences in the costs, energy savings, *etc*. And special care should be taken when considering the potential of measures without quantitative data yet or with quantitative data not clearly documented. Due to the differences in availability and reliability of quantitative data among the measures, their grading does include a part of subjectivity. The clear definition of the grading scales together with the discussion of the results aimed at increasing the consistency of the grading and at adapting it to ADEME objectives. Other actors may have different points of view and should then adapt their own list of criteria and grading scale. The most important is to keep the system simple enough and to make it as transparent as possible, so that it can be easily understood and verified by other users.

Availability of information - The development of regular reporting exercises such as NEEAPs and the increasing importance given to energy efficiency as a key component of energy policies and as an economic activity improves the availability of relevant information (especially in English, and not only in national language!) as well as with a better level of details. In particular, this makes it easier to screen the main components of the energy efficiency strategies of each country in order to identify the major new measures and/or the most successful ones. Nevertheless, the level and quality of data directly available remain very inconsistent, especially country (due to differences in monitoring and evaluation practices) or sector specific information (see above comment about industry and transport). It is therefore necessary to complement the literature review with direct feedback from implementers or sector-experts.

Specific difficulty of looking at innovative measures - By essence, innovative measures are recent and therefore a detailed feedback is rarely available. More trail and testing is often required to observe real achievements and to better understand the mechanisms. However the rationales, the level of expectations and the early feedback from the design and launch of the measures already form a rich enough material to find promising measures that will be interesting to follow up. This is especially useful for future benchmarking updates.

Value-addition of the study - Firstly, the study is complementary to the benchmarking activities of ADEME and offers the latter a ready-made dashboard. Secondly, the systematic search of information provides a comprehensive overview of the necessary measures. Some of the measures identified are well-known in the energy efficiency community (*e.g.* Green Deal), but some are more "hidden" good practices or ideas (*e.g.* DHL Packstations). In addition, the study developed a systematic description of each measure selected, making the key information readily available for practitioners. Altogether, this forms a global view of the current innovations or good examples according to the priority of an actor. Thirdly, the overview is complemented with a prioritization, which is very helpful to focus the efforts of experience sharing. Finally, the analyses of the catalogue also make it possible to understand the trends and dynamics in each sector. These are interesting to confront with the analyses of saving potentials or expectations. This may, for example, highlight the possible gaps in the strategies or unthought-of opportunities.

ADEME point of view - The study has been a very useful tool for the ADEME services at least in three ways. Firstly, it helps find the most relevant ideas of measures in order to focus the efforts of experience sharing and benchmarking. Secondly, it forms a rich and ready-to-use material in case of request for new measures on energy efficiency or for consultation process (*e.g.* Energy Efficiency Roundtable in 2011[13], National Debate for the Energy Transition currently[14]. Thirdly, it is also an appropriate resource for regular reporting and planning requirements like the NEEAP or the National Climate Plan (MEDDTL, 2011b). The involvement of ADEME experts in the supervising committee of the study has been an opportunity to discuss benchmarking practices, and especially how to assess the potential of foreign measures for the French context. In addition, it has supported and updated the usual benchmarking efforts. ADEME is currently thinking about how to keep this work alive. The objectives could be adapted from the experience feedback gained. In particular, the comparison of the measures found with the strategies implemented in France shows that the French efforts are already well-

[13] http://www.developpement-durable.gouv.fr/Introduction,27138.html
[14] http://www.transition-energetique.gouv.fr/

advanced, and therefore it is difficult to find measures that could be considered 100% innovative compared to the national context. In parallel, it could be interesting to look more into the details of very efficient measures that seem difficult to implement in France to analyse whether these conditions could evolve on a longer term.

Conclusions

The paper presents the results of a study by Enerdata on behalf of ADEME, whose objectives were to build a catalogue of innovative energy efficiency measures and to highlight their potential and the degree to which they could be implemented in the French context. The study covered all sectors except the services. A grading system, based on the ADEME priorities, was used to compare and rank 47 measures selected out of 108.

The average final grade per sector is higher for industry (6.2 out of 8 maximum?) and transports (5.5 our of ??) than for the residential sector (3.8 out of xx). This can be due to a larger number of measures for the residential sector, and because these measures require a higher level of public investments. Other final grading systems were used to test the robustness of this observation. When more criteria are included, the differences between the average per sector decrease, but the order remains the same. Looking at each criterion, the 8 measures with the highest score for their efficiency are all for the industry or transport sectors. The two next ones are transversal measures (Climate Cent in Switzerland and the Danish Energy Saving Trust). Similar observations can be made for the impact (in terms of energy savings). Regarding the leverage effect, industry holds again the highest scores (for measures in Switzerland and in Bulgaria), followed by the residential sector. About policy instruments, the analyses confirmed that regulations, voluntary agreements and tax-based funds are the ones demanding less public investment. The most represented instruments are financial incentives and then regulations for the residential sector, regulatory and organisational measures for the transport sector, and voluntary agreements for industry. Overall and based on the criteria used for this study, measures for industry are found to be the most promising, while the highest energy savings potential for France has been assessed in the residential sector. The main explanations seem to be the high level of funding needed for housing measures at a time of crisis. Several measures present innovative funding mechanisms, but they are still too recent to be correctly assessed (*e.g.* Green Deal) or would be difficult to implement in France (*e.g.* PACE due to differences in property tax systems). Moreover, many measures for the residential sector imply a reliable system of energy performance certificates, which still needs to be improved in France (*e.g.* before being used as a reference for minimum performance requirements). Even so, while the final grades are higher for industry, the feasibility seems better for the residential sector. The analysis of the success factors emphasises that the main instruments are often supported by complementary provisions (e.g. for ensuring compliance for regulations or providing incentives for voluntary agreements).

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