Emerging trend of complementary currencies systems as policy instrument for environmental purposes: changes ahead?

Hélène Joachain and Frédéric Klopfert

Using complementary currencies systems as policy instruments for environmental purposes is a trend that seems to be progressively emerging in Europe. The Belgian Science Policy INESPO Project, in the framework of which the research presented in this paper was carried out, is building on this emerging trend. The aim of the INESPO project is indeed to build new instruments for energy saving policies in the household sector based on the innovative coupling of Complementary Currencies (CC) and Smart Meters (SM). This CC-SM instrument is intended to promote both behavioural changes in everyday life and investment decisions leading to increased energy efficiency.

In order to gain insights for the design of the CC part of the instrument, a first step was to turn to projects that had already used in the past CC as policy instrument for behavioural change. Two projects (NU-Spaarpas and E-portemonnee) that have pioneered this path in Europe were analysed to this purpose. This analysis revealed that, although those two projects had not been left unnoticed by academics, no taxonomy of their constitutive parameters had been developed yet.

This paper is intended to contribute to the research on CC as policy instrument for environmental sustainability by proposing such a taxonomy for those CC projects. The resulting hierarchical classification of parameters has already been tested as a building tool during the design phase of the INESPO project. In the process, it became evident that the conceptual frameworks used to understand and explain behaviours had a major impact on the design of the CC-SM instrument and could lead to very different choices for key parameters of the system.

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1 Innovative Instruments for Energy Saving Policies (INESPO) project carried out in the framework of the Science for a Sustainable Development Programme of the Belgian Science Policy under grant INESPO SD/EN/09
Emerging trend of complementary currencies systems as policy instrument for environmental purposes: changes ahead?

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Abstract

Using complementary currencies systems as policy instruments for environmental purposes is a trend that seems to be progressively emerging in Europe. The Belgian Science Policy INESPO Project\(^2\), in the framework of which the research presented in this paper was carried out, is building on this emerging trend. The aim of the INESPO project is indeed to build new instruments for energy saving policies in the household sector based on the innovative coupling of Complementary Currencies (CC) and Smart Meters (SM). This CC-SM instrument is intended to promote both behavioural changes in everyday life and investment decisions leading to increased energy efficiency.

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This paper is intended to contribute to the research on CC as policy instrument for environmental sustainability by proposing such a taxonomy for those CC projects. The resulting hierarchical classification of parameters has already been tested as a building tool during the design phase of the INESPO project. In the process, it became evident that the conceptual frameworks used to understand and explain behaviours had a major impact on the design of the CC-SM instrument and could lead to very different choices for key parameters of the system.

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Introduction

In the classification they propose for complementary currency systems, Bernard Lietaer and Margrit Kennedy (2008) underline the very small number of projects with environmental aims they could list at the time of their writing. Indeed, using complementary currency systems for environmental purposes is a trend that seems to be only progressively emerging in Europe.

The Belgian Science Policy INESPO Project\(^3\), in the framework of which the research presented in this paper was carried out, is building on this emerging trend. The aim of the INESPO project is indeed to build new instruments for energy saving policies in the household sector based on the innovative coupling of Complementary Currencies (CC) and Smart Meters (SM). According to the rationale of the project, the CC-SM instruments should be designed in a way to promote both behavioural changes in everyday life and energy efficiency investment decisions for households.

One of the core tasks of the INESPO project is thus to design new policy instruments that integrates CC and SM. In order to gain insights for the design of the CC part of the instrument, a first step was to turn to projects that had in the past already used CC as policy instrument for behavioural change. Two projects (NU-Spaarpas and E-portemonnee) that have pioneered this path in Europe were analysed to this purpose. However, although those two projects had not been left unnoticed by academics (see, for instance Seyfang, 2006 for an insightful discussion on the contribution of NU-Spaarpas to sustainable consumption, or Blanc 2010 and Blanc and Fare, 2010 for a system typology), it appeared that, to the best of our knowledge, no taxonomy of their constitutive parameters had been developed yet.

The objective of this paper is thus to contribute to the research on CC as policy instrument for environmental sustainability by proposing a taxonomy of constitutive parameters for such CC projects. The resulting hierarchical classification of parameters is also intended to serve as a building tool for the design of the CC-SM instrument that has to be developed in the framework of the INESPO project. The paper is structured as follows. The next section briefly describes the two projects (NU-Spaarpas and E-portemonnee) that have already used CC as policy instrument for behavioural change. The following section is dedicated to presenting the taxonomy of constitutive parameters that was developed by systematically analysing both projects (NU-Spaarpas and E-portemonnee) as well as a third project (Biwa Kippu) and comparing the resulting parameters to what was needed in order to build the CC-SM instrument for the INESPO project. In the last section, the importance of the conceptual frameworks for the design of CC systems aiming at behavioural changes is discussed.

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\(^{3}\) Innovative Instruments for Energy Saving Policies (INESPO) project carried out in the framework of the Science for a Sustainable Development Programme of the Belgian Science Policy under grant INESPO SD/EN/09
Using Complementary Currencies as policy instruments for behavioural changes: lessons from the past

Three projects were initially selected as highly representative of CC systems with environmental aims. In the following paragraphs, two projects that have pioneered this emerging trend in Europe (NU-Spaarpas and E-portemonnee) are analysed. It did not seem appropriate, however, to perform the same analysis with the third selected project (Biwa Kippu), amongst others, because it was but a proposal at this stage. However, the insights gained from this third system will be introduced when necessary for the taxonomy.

NU-Spaarpas

NU-Spaarpas was launched in the City of Rotterdam (NL) as a loyalty card scheme to be used in participating independent retail shops (van Sambeek and Kampers, 2004). This CC system aimed at promoting ‘greener’ consumption and behaviour. The basic principle of the system was that when a card holder bought a product in a participating shop, he was rewarded with more points when purchasing a ‘green’ product than when purchasing a regular product. Besides, some eco-friendly behaviours, like recycling, were also rewarded with points. The points earned could then be used for a variety of products and services like ‘gifts’ in the participating shops, entrance tickets for events or one-day passes for public transportation.

A complementary objective of the project was to strengthen the competitiveness of local small and medium enterprises by offering them the advantages of belonging to a large-scale loyalty scheme. Since ‘green’ products were granted more points, it could also be expected that shops would be interested in proposing (more) of those products.

The NU-Spaarpas project started in May 2002, after a development phase headed by a private consultancy firm. Important financial resources were necessary to develop and run the project, with costs related to human resources and promotion, as well as to technology development and hardware. Those costs were mostly covered by the European Commission in the framework of the LIFE III Environmental Programme and by the Province of South Holland (van Sambeek and Kampers, 2004). The role of public authorities was not limited to funding the project, however, and local authorities also actively supported it. Indeed, three departments of the Rotterdam Municipal authorities were involved in the NU-Spaarpas project.

Another striking characteristic of the NU card scheme was its strong private component. As said before, the project was designed and headed by a private consultancy firm. Besides, a partnership was established with a cooperative bank, and, most importantly, the private sector played a key role in the loyalty scheme, with a number of participating small and medium enterprises that peaked around 80 in June 2003 (van Sambeek and Kampers, 2004). The NU project can thus been framed as an ‘eco-business-behavioural’ project, originating in a private initiative that succeeded in finding public and private support.

Designed in a top-down fashion, the project targeted the ‘grey masses’ of consumers that were neither pro-environmental, nor anti-environmental. This explains the openness regarding the list of shops participating to the scheme, and the products rewarded with
points. All kinds of products were rewarded in the loyalty scheme, whether ‘green’ or not, with the products identified as ‘green’ receiving more points. This position was also adopted to target a large basis of consumers. At its peak time, the project included 10,000 cardholders and 100 participating shops. The project came to a premature halt end 2003. This was mostly due, according to the leaders of the consultancy firm, to a change of political majority (see Joachain et al. 2009).

E-portemonnee

The project E-portemonnee, which was initiated in Overpelt (Province of Limburg, BE) with the name ‘Zet milieu op de kaart’ (literally put the environment on the ship card) is another case that illustrates the emerging trend to use CC systems as instruments for sustainability policies. The aim of this CC system, which is still running, is to promote sustainable behaviours (Bond Beter Leefmilieu, 2005). In order to do so, the system functions with two lists: a list of sustainable actions (e.g. switching to green electricity, following composting courses, placing a ‘no pub’ sign on the mail box) and a list of rewards (e.g. entrance tickets for the municipal swimming pool, tickets for public transports, energy saving lamp bulbs). By performing the targeted sustainable actions from the first list, participants earn points that they can use to obtain services or products from the second list.

This project, which is also fairly recent, was jointly set up by a non-profit organisation and ‘Afvalintercommunale Limburg.net’ (i.e. the structure put in place by the towns/cities of the Province of Limburg for waste management). In 2003, the project was accepted for financial support by the Flemish Government, on top of the financing and resources provided by Limburg.net, with a total budget lower than 100,000 Euros (Bond Beter Leefmilieu, 2005). After a development phase, the project was launched in November 2005 in the town of Overpelt for a trial period that lasted until 31 October 2006. Building on the success of this trial phase, Overpelt carried on with the project and 5 other towns in the Province of Limburg joined E-portemonnee as well.

Even more so than in the case of NU-Spaarpas, public authorities played a central role in the development and implementation of E-portemonnee. Limburg.net was very active in bringing the project to life, and the Flemish authorities provided financial support. Besides, and most importantly, the implementation of the project took place at the level of the participating towns. Indeed, the decision to enter the scheme, as well as the financing and operating of the CC system was in the hands of municipal authorities. Each participating town had to build its own set of two lists, one with the actions rewarded, and one with the communal services and products offered. In this sense, E-portemonnee is very much anchored in the local community and used as an instrument for sustainability policies.

Compared to NU-Spaarpas, a major similarity is the use of the scheme as a policy instrument in a top-down approach with an important part played by public authorities. However there are striking differences in the exclusive focus on behavioural changes, and the leading role of public authorities in E-portemonnee. Indeed, the consumption aspect is, to a great extent, absent from E-portemonnee: it is mostly everyday life actions that the project is aiming at changing. There is no loyalty scheme attached to E-portemonnee and hence, no economic development objective for local SME’s. The role of the private sector is limited principally to sponsoring the project (e.g. through offering products for the reward list). In line with this,
public authorities are heading the project, and have decision power at most of the management levels of the project.

Developing a taxonomy: methodology and resulting hierarchical classification

Methodology

This brief description of both systems highlights the fact that CC systems used as policy instruments for behavioural changes towards sustainability can show similarities but also be designed in very different ways regarding objectives, architecture and management. Indeed, many parameters have to be defined in order to build a CC system, such as the form and value of the currency, how CC units can be obtained and used, the rationale to motivate people to get on-board, etc. This shed light on the necessity to classify the constitutive parameters of those CC systems in a systematic and hierarchical manner. Taxonomy, although best known in the realm of biology, seemed the most appropriated methodology to develop such a hierarchical classification of CC parameters. Indeed, on the one hand taxonomy is also used in social sciences (see, for instance, for a taxonomy of intrinsic motivations for learning, Malone and Lepper, 1998) and, on the other hand, developing taxonomy can result in a checklist of parameters to build CC systems, which is precisely what is needed for INESPO.

We have thus developed such taxonomy of constitutive parameters of CC systems in the framework of the INESPO project. The development of such a taxonomy proved indeed to be a necessary step before being able to concentrate on the core task of the INESPO project which is to build a new policy instrument that integrates CC and SM in order to promote energy savings in the household sector. The process of developing such a taxonomy rested on the systematic analysis of two previous systems (NU-Spaarpas and E-portemonnee), plus a third system (Biwa Kippu) that was only at the stage of proposal at the time of this writing. Another major input was the identification of parameters requested to build the new CC-SM instrument. We proceeded in an iterative manner, with feed-back at each stage between what was identified for existing CC systems and what was necessary to build the new INESPO CC system. The double objective of classifying the parameters identified for existing systems in a systematic way and serving as a building tool for the new INESPO system set very clearly the framework in which this taxonomy was developed.

Other methodologies were used in complement to the taxonomy for specific parts of the INESPO instrument (UML methodology for the technical part and stakeholders analysis for instance). It is also foreseen to carry a dynamic system analysis in a later stage of the INESPO project. However, this paper will concentrate on presenting the taxonomy, with special attention to what we have called “the rules” of the CC system.
Taxonomy of constitutive parameters for CC systems

The work carried out to build a hierarchical classification of constitutive elements of the analysed CC systems shed light on two main aspects of CC systems: their objectives and their architecture. In this paper, we will focus on the architecture of the system, for which we have identified three main pillars (see figure 1). The following terminology was chosen for those three pillars: the rules, the user access points and the management.

![Diagram of hierarchical classification of parameters for the CC systems](image)

### Rules

The rules relate mostly to what people will see and understand from the CC system. They comprise three main blocks of parameters that have to deal with: the motivation to participate, the operations and the currency itself.

Indeed, when designing a CC system, the first logical step, once the objective(s) are set, is to decide how to motivate people to get on-board. The next step is then to design the functioning of the system accordingly, and then to choose the parameters for the currency itself. All those choices are interrelated in the sense that they create dependencies, and should all contribute to build a consistent CC system.
Motivation to participate

According to what is shown in Figure 2, three main parameters are impacting the motivation to participate to CC systems: the model chosen, as well as the rationale to obtain and use the CC units.

The (potential) disincentives, although not being a parameter per se, are to some extent the counterpart of the choices made for the model, as well as for the rationale for obtaining and using the CC units. They should therefore be integrated as a parameter of analysis for existing systems and an important element to consider when building new systems. It should also be noted that (potential) disincentives are not only created by the choices of model, obtaining and using parameters, but can also result, for instance from technological choices that can make the CC system too slow, difficult to use, not reliable, etc. We will not investigate this parameter in further details and rather concentrate on the three main parameters we have identified for the motivation to participate, the model as well as the obtaining-using question.

Model

The model describes what kind of rationale is used for the system as a whole to motivate people to participate. A first possibility is to use what we have termed a “push model”: CC units are given to those who are participating on a voluntary basis to the CC system. In the case of a policy instrument, we opted for the terminology of rewarding model. The term voluntary model was rejected because it did not allow differentiating such top-down policy instruments from grassroots CC systems based on reciprocity (e.g. LETS, Time Banks) that are also voluntary systems. E-portemonnee is a very good example of such a rewarding model: CC-units are given to participants to reward sustainable behaviours (e.g. composting, switching to green electricity, etc.). NU-Spaarpas, with its dual policy instrument-loyalty card structure is slightly more complex. However, it can be argued that both parts of the NU-Spaarpas system are built on a rewarding model. Indeed, this is rather straightforward for the policy-instrument part of the system (e.g. participants receive points for recycling). Regarding the loyalty card part of the system, it can also be considered as a rewarding system, with the difference that shops participating to the scheme are giving (and financing) CC units and not public authorities.

The experiences of E-portemonnee and NU-Spaarpas do not seem to offer much of a choice regarding the model used: they both are built on a rewarding model. However, CC systems are in a process of rapid and continuous evolution, and new choices are emerging for the model. Indeed, a proposal was made in 2010 for a CC system (Biwa Kippu) that would serve as an environmental policy instrument in Japan, but based on a very different approach. Indeed, Lietaer and Takada (2010) proposed a CC scheme to restore the ecosystem of Lake Biwa in Shiga Prefecture that would not rest on a voluntary basis. In essence, the idea behind this type of model is that public authorities make it mandatory to handle in a certain number of CC units at the end of a given period. The public authorities determine how those CC units can be earned, and establishes a proper mechanism to allocate the CC units. In the case of Lake Biwa, the proposal was built around the obligation of earning the CC units through activities to restore the eco system of the lake.
This opens up, at least theoretically, a second possibility for the model that was termed the “pull model”: citizens are required to provide a certain number of CC units at the end of a given period. In the case of a policy instrument, we opted for the terminology of regulatory model for this kind of model. The regulatory model is indeed close to the mechanism of a tax or a civil service. As a variant, it is also possible to work with quotas of CC units allotted to citizens in what is then termed a regulatory model based on quotas.

Obtaining and Using

Going a step further in the analysis brings us to the rationale that has to be chosen for obtaining and using the CC units. This rationale will provide clear guidelines of what is or is not acceptable in order to build the actual obtaining and using lists that will be used to operate the CC system. Taking the example of INESPO, for instance, we see that if we build the system on a rewarding model, a possible rationale can be to strictly stay in line with the energy saving objectives for obtaining the CC units and to be more inclusive regarding the using of the CC units. When building the obtaining and using lists in the operational block of the system, this would set a clear agenda: only actions or investments that lead to energy savings can be on the obtaining list, whereas rewards such as tickets for the movies or paying for green electricity (provided an agreement is concluded with energy suppliers) can be considered. It is rather straightforward that the model chosen (rewarding or regulatory) will impact the rationale that has to be chosen for obtaining and using the CC units. Besides the choice of the model, other factors will also influence this choice, such as the scope of the project (e.g. inclusive project or focus on a specific target group) or the desired perception for the project (e.g. a project that makes sense as consistently promoting environmental friendly behaviours, energy saving behaviours, neighbourhood enhancing behaviours, care for the elderly behaviours, etc.). The need for objective measurement and proof of the desired behaviours as well as technological constraints also has to be taken into account, and will often limit the possibilities.

For systems based on a rewarding model, it is straightforward that the rationale to build the using list (i.e. what is proposed as a reward) is essential to motivate people to get on-board. However, the importance of the obtaining list (how the CC units can be earned) should not be underestimated as a motivational factor or as a disincentive. Indeed, the earning process can most probably draw boundaries in the public, with some being receptive to what is proposed and others more reluctant. In NU-Spaarpas, for instance, there was an objective of reaching the ‘grey masses’ in the project, that led to an inclusive rationale for obtaining the CC units (e.g. CC units could also be earned when buying non ‘green’ products and services, although the scheme was targeting more sustainability).

Clearly, a trade-off will be necessary at this point between the objectives of the project, the need for objective measurement, technological constraints, and what makes sense to the participants. Similarly, when deciding about the rewards, a balance will also have to be found between attractiveness and staying in line with the objectives of the project (e.g. avoiding a rebound effect).

Since no CC system based on a regulatory model has been deployed yet, it is only possible to conjecture what would be a key point would such a system ever exist in the future. In this respect, the way to calculate how many CC units are due by the citizen (or the quotas
allotted to the citizens) seems absolutely crucial. Since a regulatory model would relate the use of CC to a tax system, criteria to do the actual calculation should be based on objective data and perceived as fair and socially acceptable by the citizen. In this case too, it is very probable that a trade-off would be necessary at some point between taking into account all the parameters that can have an impact on the calculation of the CC units due or quota and the practicalities of the system.

**Operation**

In a very practical sense, the operational aspects of the CC system translate the vision that was created for the system in the former block (motivation) into rules that will apply to the participants. This section is focusing on the parameters for the operational aspects of the CC system, as seen from the user point of view. Other operational aspects of the system (technical, financial, legal, management, etc.) are covered in the third pillar. In this sense, it could be assimilated to translating the “internal rules” of the project into “external rules” as they should be understood by participants.

A first and central rule to be understood by participants is how they can earn their CC units. A key step in the operation block is thus to define what people must do for obtaining CC units. Typically in the case of a rewarding model, this obtaining mechanism will be defined by a list of behaviours and the number of CC units that each behaviour gives right to (obtaining–earning). It can also be foreseen that CC units be directly bought with State-issued currency, eventually at a discounted rate (obtaining–buying).

In the case of E-portemonnee, the obtaining – earning list was adapted for each participating town but would typically comprises behaviours like switching to/using green electricity, following composting course/composting, placing/using a condensation boiler, using reusable nappies, placing a ‘no pub’ sign on the mail box, etc. In the E-portemonnee system, there is an correspondence in points for each rewarded behaviour (e.g. using 100% green electricity is worth 300 points per year). In the case of NU-Spaarpas, buying in participating shops allowed to earn points, with more points being given for ‘green products’, and rules were also established for other behaviours (e.g. related to recycling).

Once the rules have been established regarding how to obtain CC units, the trajectory of those CC units in the system has to be defined (using, using-cycling, using-exiting). Most importantly, the designers of the system should decide whether the CC units should be encouraged to cycle in the system, or not. There seems to be opposite rationale between encouraging cycling and direct exiting. Indeed, cycling seems more related to a system designed to foster exchanges (e.g. WIR in Switzerland, Chiemgauer in Germany or RES in Belgium), while direct exiting seems more appropriate to CC systems used as behavioural changes policy instruments that do not include the direct participation of shops in the systems (e.g. E-portemonnee in Belgium). The number of actors and dependencies between them (e.g. shops buying and selling items to each others) could be a limitative factor for cycling, while the goods and services proposed as a reward, or the easiness of conversion seems to be more central for direct exiting.
Finally a penalty can (or not) be foreseen for those trying to cheat the system, which should be clear to all participants.

**Currency**

As for the operational aspects of the CC system, choices have to be made regarding the currency itself. Those choices will literally determine how the CC system is looking like from a user’s point of view. What will they have in their hand? NU points stored on a chip card, paper notes, or E-portemonnee points stored remotely on an electronic account in a database but that they can access via their Identity Card?

**Form**

The form describes the unit of account chosen, as well as the vehicle chosen for circulation of the CC units. A determinant choice for this parameter is whether to use paper notes or electronic money. Electronic money can either be stored on a smart card, or remotely in a database, with the necessity for identification of the owner. Several possibilities exist for identification, like identity card (E-portemonnee), a smart card (NU-Spaarpas), a SIM card (mobile phone), a password, biometric systems, etc. Different aspects will influence the decision taken regarding the form of the CC, amongst which, the traceability of the CC units requested for security or monitoring reasons, or, on the contrary, avoided in order to protect privacy. The practicality of the system will also play a role in the decision, as well as other factors like technical constraints, the acceptability of the system by some stakeholder (e.g. merchants, intermediaries) if any, the level of security requested and the overall transactions costs. Taking the user’s point of view into consideration will lead to taking other aspects into consideration like user-friendliness and acceptability.

**Value**

The value is a critical choice for the architecture of the system, in the sense that it creates links (financial, symbolic, reference, etc.) between inside and outside the CC system.

The value describes the standard(s) in relation to which the CC units are evaluated. Those standards can be multiple, anchored in official currencies or not. The value can be also informal, in the sense that there is no strict relation to a given standard, but rather an informal evaluation (e.g. the number of CC units for the goods on the using list has been calculated with the rule of thumb that each CC unit is roughly equivalent to 0.10 Euro).

In the case of the INESPO project, for instance, the value of the CC unit could be defined as 1 kWh\textsubscript{p} (or 1 spared kWh\textsubscript{p}) for instance. In this sense, the value of the currency would be fixed vis-à-vis a physical unit. An alternative choice would be to define the value of the CC unit in relation to multiple standards, thus not only 1 INESPO = 1 kWh\textsubscript{p} (or 1 spared kWh\textsubscript{p}) but also in relation to behaviours like insulating or following energy education without having to necessary link such actions with precise energy savings.
**Lifetime – convertibility - demurrage**

Other parameters, like how long the CC units are valid (lifetime), whether or not it is convertible in official currency (convertibility for buying CC and convertibility for selling CC), or if it loses value / give interest with time (demurrage / interest) further determine the CC. They all convey important meanings that derive from the rationale chosen for the CC system. Convertibility, for instance, can open up the boundary of the system. However, if the system is too open (e.g. 1 unit = 1 euro), users will map the motivation to obtain points into motivation to earn money. On the other side, if the system is too isolated (CC units cannot be used in the outside world), the CC system can only work once a critical mass is reached.

**The other two pillars: User Access Point and Management**

This paper is focusing on the taxonomy related to the first pillar of CC systems (the Rules). Regarding the analysis of the two other pillars (User Access Point and Management), complementary instruments and methods have to be mobilized (e.g. UML diagram and stakeholder analysis) that will be developed in further publications. The objective of the following paragraphs is thus to give an overview of the blocks of parameters that are to be found in those pillars, as well as linking them with the questions arising from the building of the INESPO project.

**User Access Points**

User Access Point relates to devices where users interact with the CC system. This may include specific devices, such as a SM in the INESPO project, but also covers Web sites, Smartphones, payment terminals, etc. Beyond thinking in terms of what interactions are necessary or desirable, it is also a matter of defining where and how those interactions will take place. In the case of the INESPO project, with a combination of CC and SM one or more devices are required on which users will interact with the system. Each device must be conceived with a clear idea of its intended usage(s), such as the simple consultation of earned points, a feedback on energy consumption or an interface for exchanging points against goods or official currency in the case convertibility is foreseen. In the INESPO project, at least one device (device type) is always required for measuring the energy consumption: the smart meter that will be installed in each household. Other device types may be used for further interactions between the users and the CC-SM system, like mobile phones, personal computers or dedicated terminals used by merchants as a support for the CC earning and exchanging.

Each device needs to be clearly specified according to its major characteristics that we have organised in five groups: reference data, connectivity, input, output and maintenance.

**Reference data** relates to information that is critical for the calculation of allocating CC to users. Examples thereof are the measurement registers of the energy consumption or the
balances of the earned points in e-portemonnee. Depending on the criticality and the value of this data, a number of tamper protections may be required.

Devices will most generally be interconnected to the system and will therefore need some connectivity, either to communicate in-house, for example with a display in the kitchen for the feed-back of SM to the users, or externally using mobile, power line communication or broadband connections. The external connectivity requires a very special attention as it needs to consider both the technological aspects (wire or wireless, bandwidth, geographic coverage, reliability, investment and usage costs, etc.) and the privacy aspects (integrity, confidentiality, non-repudiation).

Equally important are the input capabilities of the device that determine what information the user may provide to the system and the output capabilities. The latter are of the utmost importance for providing a correct and effective feed-back (information media, format, frequency and motivation factor), one of the pillars for increasing energy awareness in the households.

Finally, maintenance and support aspects should not be overlooked, as technical failures are one of the most powerful disincentives in adopting a new system.

**Management**

Setting-up adequate rules and developing efficient user access points are fundamental, but the entire system will not run very long unless it is correctly managed. Defining the governance is mainly about defining the organisation of the leadership (organs and the relations between them) and the decision process (who takes the decisions and how, which entities can influence them). But this is not sufficient: a well-defined control mechanism and re-evaluation process with associated transparency rules is needed must be planned straight from the beginning to ensure a permanent adequacy of the system to the main objectives. Other parameters, like the legal framework also have to be considered. Other blocks are equally important in the management pillar (Stakeholders, Currency flow management, Operations and Network/Back-office) on which will not expand in this publication.
Discussion and conclusion

In the preceding paragraphs, the idea was to go ‘down the bones’ of existing CC systems, in order to come up with a taxonomy of constitutive parameters that could also serve as a building tool for the INESPO system. This resulted in a hierarchical classification of parameters, with some playing a major role for the architecture of the system, as well as a logical sequence to design the new system. However, although there seems to be a logical sequence in the choice of parameters for the building of a system, some of them may only be defined within an iterative process. Indeed, decisions regarding parameters can influence what will be chosen for parameters within the same pillar or for parameters belonging to the two other pillars of the system. This pleads even further for an iterative process when building a CC system to ensure consistency between the different choices to be made. This pleads also for the need to carry out dynamic analysis of CC systems.

Bones, flesh and soul

In our view, “going down the bones” is not enough to make a CC system thrive. “Flesh” is also needed, that could come from knowing more about the expectations of stakeholders and people that will be carriers of the system. In the framework of the INESPO project, for instance, a better understanding of motivation factors and social acceptability of the system is foreseen through the organisation of focus groups. But bones and flesh are still not enough: we would like to argue in the following paragraphs that the conceptual framework used to understand behavioural changes itself, the “soul” of the system could deeply influence the perception of the potential of a CC system such as INESPO, as well as the choices made for the parameters (for a more in-depth analysis, see Joachain et al., 2011).

Although the purpose of this paper is not to enter into the details of the INESPO project, it must nevertheless be underlined that designing energy saving measures aiming at behavioural changes is already a major breakthrough in the current policy agenda. Indeed, up to now almost all efforts have been directed at energy efficiency. However, at least two factors combine that might lead policy makers to consider the role of behavioural changes in energy saving for the household sector. Firstly, despite continuous energy efficiency gains in the last ten years, household energy consumption is still growing (European Environment Agency, 2010). Secondly, many voices have risen to call attention to the importance of behaviours in energy related matters (Shove and Walker 2010, Maréchal 2010, Gram-Hansen, 2009, Anker-Nilssen, 2003 or Røpke 2001). This nonetheless leaves the question open of which framework will be used to understand the meaning and the determinants of energy consumption behaviours.

Individual choice and linearity

Building on the work of Bamberg and Schmidt (2003), two theories are taken into consideration in this section, not because those theories were built to explain energy consumption behaviour, but because they are commonly used to explain it. Those two theories are: Ajzen’s Theory of Planned Behaviour (Ajzen, 1991) and Triandis Theory of Interpersonal Behaviour (Triandis, 1977, 1980). Besides, it seemed also appropriate to take
the conceptual framework developed by the psychologist Stern to explain environmentally significant behaviour (Stern et al., 1999 and Stern, 2000) that is partly built on the Norm-Activation Model (Schwartz, 1977; Schwartz and Howard, 1981).

Beyond the particularities of each theory, common denominators make them, in our view, belong to a common paradigm. All three models try to integrate the complexity of understanding behaviour within the same individual choice – linear causality paradigm. This implies that individual choice is central for obtaining the desired energy savings. Besides, those theories suppose a linear causality chain between, in a simplified version, attitude, intention and behaviour. Of course, those theories have reached a greater level of complexity amongst other because empirical studies have shed light on paradoxes and inconsistencies between attitudes and behaviours, commonly referred to as the attitude-behaviour gap. But, by integrating more and more explanatory factors and determinants, those theories also leave the choice for policy-makers to select the ones that fit best with their own policy agenda. Taking into account the influence of mainstream economics in policy making, it is clear that the possibility of deploying innovative measures is limited.

According to such frameworks, the role of public authorities could be understood as finding and acting on determinants of individual choice, removing obstacles and favouring motivators so that people change their behaviours in a more environmental-friendly manner. In this light, the potential of the INESPO project would rest on the fact that the CC system acts as a rewarding system, while the coupling with the SM infrastructure provides feedback. The creation of the system itself might also be considered as changing the internal and external context in which the behavioural changes have to take place. The main focus in the choice of the parameters would be to concentrate on rewards that can motivate individuals, as well as providing a feed-back in the most user-friendly manner via the SM infrastructure and marketing the new system to create a positive perception of the project.

What remains unchallenged with such conceptual frameworks is that energy saving would be a matter of individual choices. It is necessary to turn to the emerging framework of social practices to challenge this main postulate.

The nascent framework of social practice theories

Theories of social practice can offer a rather different view on energy consumption in the households. Taking the definition proposed by Reckwitz (2002, p. 249) a practice is “a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge.” Practice theories do not follow the path of mainstream economic theories where the social is the product of the interest of rational individuals neither do they follow the path of social theories that place social order and norms at the forefront. In practice theories, the social is to be found in all the constitutive elements of practices (i.e. routinized bodily activities, mental activities, ‘things’, knowledge, etc). Regarding the aspect of knowledge, for instance, the social can be found in knowledge too, because it is not understood as single individuals‘ knowledge, but as collectively shared knowledge.
A striking difference with usual frameworks is the level at which the analysis is carried out. Unlike in ABC or economic theories, the analysis is not carried out at the level of the individual, neither is it carried out at the level of normative structure, as it is done when using sociological frameworks. The object of investigation is practice, as defined here above. This opens up a promising new field of research regarding household energy consumption (see, for instance, Shove and Walker, 2010, p. 472-473). Much theoretical and empirical work still has to be carried out, but even in its nascent state, social practice theories applied to energy saving in the households already provide innovative insights.

Using the social practice framework has implications for the potential of the INESPO project, and the design of its architecture. Indeed, social practice theories are anchored in the reproduction by different agents, at different times of routines implying interconnected forms of bodily and mental activities, as well as things and background knowledge. Social reproduction is thus what keeps practices alive. However, as underlined by Warde (2005, p. 141), when talking about practices: “They are dynamic by virtue of their own internal logic of operation, as people in myriad situations adapt, improvise and experiment”. The potential of the INESPO project might thus be reframed in terms of its capacity to make energy consumption practices evolve in a more sustainable direction. This involves, firstly, to understand and define energy-consuming practices performed in households, and secondly, to design the system in order to make those practices evolve.

Meaning is an aspect of social practice theories that could be promising in this respect. People do consume energy, but it is just a consequence of practices that are meaningful to them. Røpke (2009) stresses the importance of meaning which is, according to her, a key component of practices (together with competence and material aspects).

Closely related to the question of meaning, the question of the reward(s) offered by a practice sheds a new light some aspects of energy consumption. As Warde (2005, p. 148) points out, “it is not so much things in themselves, but rather the place within different practices that is afforded by the possession or control of goods and services which is the basis of contentment, social acceptability and recognition.” It follows that, if practices are meaningful to people, and carrying them in a skilful way offer them important rewards, people will go on doing them. Besides, the observed trend for practices is to multiply, in what Peterson has termed ‘omnivorousness’ (see, for instance, Peterson 1992 and 2005).

This might be one of the reasons why awareness raising campaigns about consuming less energy might not reach their targets. Indeed, if people are engaged in carrying out practices, of which energy consumption is merely a consequence, communicating about their energy consumption might not be the most relevant policy. A practical consequence of this for the INESPO project would be not to use the kWh as a reference for issuing the CC units, but rather, to the extent that the SM infrastructure allows objective measurement, to link the CC units earned with changes in practices. If empirical studies show, for instance, that washing laundry at high temperature and with a high frequency has a significant impact on household energy consumption, the target might then be to promote new practices in this field, and to reward them with CC units.
Conclusion

Changes can come from many places. The preceding paragraphs shed light on how an emerging conceptual framework like the social practice one could change the perceived potential and the choices made for the design of the INESPO project. This opens up a new agenda for research that might or not cross the policy-makers’ agenda. However the mere fact that CC systems are used as policy instruments has already brought changes.

Blanc (2010, p. 6) has termed the NU-Spaarpas scheme as “a forerunner of a fourth generation [of CC systems] that seems to be progressively emerging.” If the BIWA project or another project using a similar regulatory model is implemented, this would put such a CC system on a radically different path from the voluntary systems that prevailed up to now. This kind of system would not necessarily exclude a grassroots contribution, for instance in participating to establishing the list of actions for earning CC units. Arguably, such a regulatory system would have the advantage of mobilising a major fraction of the population while not weighting so much on public funding as a rewarding model. However, the social acceptability is a crucial point that cannot be overlooked and will depend, amongst others, on weighting the advantages and disadvantages of such a system against alternative solution to attain similar policy objectives.

It is too soon to conjecture about the future of systems based on a regulatory model. It is also probably too soon to know if conceptual frameworks based on social practice theories will change the agenda of policy makers, or even if policies aiming at behavioural changes will be put in place at all regarding energy savings. However if appropriate attention is given to bones, flesh and soul, CC systems might become convincing instruments for environmental policy, which might, in turn, bring further changes to CC systems themselves.
Bibliography


