IJCCR

www.ijccr.org · ISSN: 1325-9547

Joachain, H. & Klopfert, F. (2012). Emerging trend of complementary currencies systems as policy instruments for environmental purposes: changes ahead? *International Journal of Community Currency Research 16*(D), 156-168. https://doi.org/10.15133/j.ijccr.2012.022

International Journal of Community Currency Research

Volume 16 (2012) Section D 156-168

EMERGING TREND OF COMPLEMENTARY CURRENCIES SYSTEMS AS POLICY INSTRUMENTS 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, which provides the framework for the research presented in this paper, 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 new CC-SM instruments should promote behavioural changes in everyday life as well as encourage households to invest in energy efficiency. The idea behind the project is not to miss the opportunity of including an incentive scheme for behavioural change should a significant SM roll-out take place.

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 towards sustainability. To this purpose, projects which have pioneered this path in Europe were analysed. However, although this emerging trend for CC systems 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.

In this paper, we would like to contribute to the research on CC as policy instruments for environmental sustainability by presenting a selection of such CC systems and by proposing a taxonomy of their constitutive parameters. The resulting hierarchical classification of parameters is also intended to serve as a building tool for designing similar CC systems. However, in our view, "going down the bones" of CC systems, as it is done with the taxonomy, is not enough to make such CC systems thrive. Indeed, beyond the systematic list of parameters that will define the global architecture of the system, attention should also be given to "flesh" (e.g. expectations from stakeholders and carriers of the system) and "soul" (e.g. the conceptual framework used to build the system).

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To cite this article: Joachain, H. and Klopfert, F. (2012) ' Emerging trend of complementary currencies systems as policy instruments for environmental purposes: changes ahead?' *International Journal of Community Currency Research* 16 (D) 156-168 <www.ijccr.net> ISSN 1325-9547

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[1], which provides the framework for the research presented in this paper, is building on this emerging trend. The aim of the INESPO project is indeed to design 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 new CC-SM instruments should promote behavioural changes in everyday life as well as encourage households to invest in energy efficiency. The idea behind the project is not to miss the opportunity of including an incentive scheme for behavioural change should a significant SM roll-out take place.

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 towards sustainability. To this purpose, projects which have pioneered this path in Europe were analysed. However, although this emerging trend for CC systems 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.

As the process of designing the new CC-SM instrument was further carried on, the need for such a taxonomy was increasingly felt. Indeed, it seemed difficult to go on without a systematic and clear understanding of all the parameters of the CC system we had to build. The needed taxonomy was thus developed by first systematically analysing a selection of projects that had already used CC as policy instruments for sustainability. The aim was then to identify, during an iterative process, the main independent parameters of the CC architectures and sorting out the logical sequence for defining them when designing a new CC-SM instrument.

In this paper, we would like to contribute to the research on CC as policy instruments for environmental sustainability by presenting a selection of such CC systems and by proposing a taxonomy of their constitutive parameters. The resulting hierarchical classification of parameters is also intended to serve as a building tool for designing similar CC systems. The paper is structured as follows. The next section describes a selection of projects (NU-Spaarpas, E-portemonnee and Torekes) that have already used CC as policy instrument for behavioural change towards sustainability, as well as two proposals that have similar objectives but have not been implemented yet (Biwa Kippu and Tradable Energy Quotas). The following section is dedicated to presenting the taxonomy of constitutive parameters of such systems. In the last section, it is argued that other dimensions should also be taken into account, when developing CC systems as policy instruments, with a special focus on conceptual frameworks for behavioural changes. Indeed, although not always being explicitly defined in projects, the way to frame behavioural changes can have a major influence on the way a project is built.

USING COMPLEMENTARY CURRENCIES AS POLICY INSTRUMENTS FOR BEHAVIOURAL CHANGES TOWARDS SUSTAINABILITY

Three projects were initially selected as highly representative of CC systems with sustainability aims. In the following paragraphs, those three projects (NU-Spaarpas, E-portemonnee and Torekes) which have pioneered the emerging trend of using CC as policy instruments for more sustainable behaviours in Europe are presented. However, in the process of building the taxonomy, two other projects were also considered. Although there were only in the form of proposals (Biwa Kippu and Tradable Energy Quotas or TEQs), they introduced new concepts that widened the range of key parameters to include in 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 product that was identified as 'green' than when purchasing another 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 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

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. Website: www.inespo.be

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, 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. Indeed, 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 (see Joachain et al. 2009).

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. According to the published results of the project, NU-Spaarpas included 10,000 cardholders and 100 participating shops at its peak time (van Sambeek and Kampers, 2004). The project came to a premature halt end 2003. This was mostly due, according to one of 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 chip 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, 2006). In order to do so, the system functions with two lists: a list of sustainable actions, the "Earning list" ("Verdienlijst") (e.g. switching to green electricity, following composting courses, placing a 'no junk mail' sign on the mail box) and a list of rewards, the "Silver list" ("Verzilverlijst) (e.g. entrance tickets for the municipal swimming pool, tickets for public transportation, 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, 2006). 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. According to the published results for this trial phase, one family out of 5 has obtained / used E-portemonnee points (Bond Beter Leefmilieu, 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. It is the Belgian electronic Identity card that is used as a means of identifying the participants in order to manage their E-portemonnee accounts.

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 (see Joachain et al. 2009).

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 local municipalities 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 "Silver list"). In line with this, public authorities are heading the project, and have decision power at most of the management levels of the project.

Torekes

The CC project Torekes, which was initiated at the end of 2010 in a deprived area of the City of Gent (Belgium), has mixed social and environmental objectives. Indeed, the aim of this project is to revitalize the area of Rabot-Blaisantvest which is, according to official figures (City of Gent, wijkfiches, Rabot-Blaisantvest), one of the most densely populated and poorest area of the City (e.g. population is 6 times denser, number of asylum-seekers and non-Belgian residents is more than twice higher, unemployment rate is much higher and revenues much lower than on average in

the rest of Gent). By rewarding actions that contribute to a greener environment and improve social cohesion, the Torekes is willing to improve the quality of life in this area. In order to achieve this, the 'two lists principle', as in E-portemonnee, has been favoured: a list of "To do" ("Te doen") and a list of "Presents" ("Kado's") (see www.torekes.be).

The social and environmental aspects of this project are, of course, reflected in the choices made for both lists. The "To do list" ("Te doen") explains how residents of Rabot-Blaisantvest can obtain CC units (called Torekes). This list includes items related to caring for one's street (e.g. re-painting the front of one's house or putting a plant tub on the window sill), or contributing to the improvement of the area (e.g. participating to 'cleanup days' or taking care of the community barbecue). Residents of Rabot-Blaisantvest can also be rewarded for helping others to do sports (e.g. as football trainer for kids or by coaching adult for jogging), and for doing something for the environment (e.g. switching to green electricity, placing a no junk mail sign on their letterbox). In turn, they can use their Torekes for a list of "Presents" like public transportation tickets or to go to the movies. Torekes can also be spent in shops (e.g. groceries, bakeries, bike shops, second hand shops) and to do sports. But the most innovative, and probably one of the greatest success of this project is to propose Torekes as the only means of payment accepted for renting a small plot in community gardens that are participating to the project.

Torekes results from the joined initiative of non-profit organisations and the City of Gent. The Flemish Region is backing the project that they view as a pilot experiment for using CC as policy instrument for social innovation. This pilot project is intended to run until end 2012. The first results gathered after six months show that around 1 household out of 10 in the area have been in touch with Torekes. Details are also provided on how Torekes were obtained and used. Two facts stand out from those detailed results. On the obtaining side, collective actions (like 'cleanup days') organised by neighbour association or schools have encountered an enormous success. On the using side, Torekes have mainly been spent in shops, which could be expected, but the other great favourite was the renting of a plot in the community gardens (Torekes, verslag, 2011). This success of collective actions and community gardens is all the more interesting as it is the result of co-building this project with experienced local associations. Besides, as it is argued by a participating non-profit organisation, the fact that community gardens could only be rented in Torekes was a key motivator for residents to participate (Bienstman, 2011). This illustrates how offering a reward that is well in phase with the participants' needs and that can only be obtained with CC units is a powerful reinforcer for a CC system.

Another view on the question: tickets and quotas

The proposal that was made by Lietaer and Takada to public authorities in Shiga Prefecture (Japan) stems from another rationale than NU-Spaarpas, E-portemonnee and Torekes. Indeed, the idea behind this proposal was to develop a new policy instrument that could contribute to restoring the ecosystem of Lake Biwa without bringing an additional burden to public finance. A short description of the proposed scheme, as presented in Lietaer and Takada (2010) is given in the following paragraphs. Each family has to contribute to the system by providing a given number of "tickets" (named Biwa Kippu) to public authorities each year. Some exceptions are foreseen (e.g. for people with disabilities). The Prefecture of Shiga issues the tickets and selects the activities through which families can earn those Biwa Kippus. No payment in Yen is accepted by the Prefecture in place of the tickets, but Biwa Kippus can be exchanged between families (on a free market basis). Non-profit organisations also play a role in the scheme, either by achieving some of the tasks and earning Biwa Kippus or by acting as intermediaries between public authorities and the residents (e.g. organising and supervising some of the proposed activities).

Another proposal that presents some similarities with Biwa Kippu is the Tradable Energy Quotas (TEQs) that was pioneered by Fleming. This proposal was able to raise interest from public authorities in the UK and led to a report published in association with The All Party Parliamentary Group on Peak Oil (Fleming and Chamberlin, 2011). This type of schemes also became an object of research for the academic community that explored, amongst others, its link to complementary currencies (Seyfang, 2007). In TEQs scheme, as explained in Fleming and Chamberlin (2011), public authorities play a central role by defining a 'Carbon budget' and issuing TEQs units accordingly to individuals. Every adult receives an equal 'free entitlement' of units in a TEQs account, while other economic actors have to bid for their units. Units are used when buying energy (i.e. a calculated number of units is deducted when buying electricity, petrol, etc.). It is foreseen in the scheme to lower the 'Carbon budget' every year in order to bring UK into a more sustainable trajectory regarding the problematic of climate change and peak oil.

As this brief description shows, Biwa Kippu and TEQs are built around a model that is very different than the one used for NU-Spaarpas, E-portemonnee and Torekes. Indeed, whether by using 'tickets' or 'quotas', public authorities are regulating the contribution of households/ individuals to reach specific objectives. In the case of Biwa Kippu, the system sounds like a 'tax in CC' or rather given the nature of the contribution that is asked from families, a kind of "civil service". However, bearing in mind the possibility of families to buy Biwa Kippus with Yen, on a free market basis, this system can also be viewed as a kind of tax that families can pay either in Yen (at a price that will be determined by the market) or by giving some of their time to the restoration of the ecosystem of the lake. Regarding TEQs, targets are set by public authorities regarding carbon emissions (i.e. the 'Carbon budget') which determine, in turn, the quotas allocated to each adult in the country. If the quota is exceeded, participants have to bid

for their extra units, which brings market mechanisms back into play, as is also the case of Biwa Kippu.

In both proposals, participation is mandatory and it is expected that, amongst other reasons, individuals will be motivated to participate on the basis of their willingness to comply with the regulations set by public authorities. Both projects are also based on a top-down approach imposed by public authorities. Biwa Kippu and TEQs are proposals for systems that have not been put in place yet. It is not the purpose of this paper to explore the feasibility of such systems or the many issues that would go along with their application. Rather, they have been taken into account as theoretical alternatives to projects like NU-Spaarpas, E-portemonnee and Torekes where participants act on a voluntary basis and are rewarded for performing the desired behaviours.

DEVELOPING A TAXONOMY: METHODOLOGY AND RESULTING HIERARCHICAL CLASSIFICATION

Methodology

The previous section highlights the fact that CC systems used as policy instruments for behavioural changes towards sustainability display similarities but can also be designed in very different ways regarding objectives, architecture and management. Bearing in mind the main goal of the INESPO project, which is to design new policy instruments that integrate CC and SM, it seemed crucial to gain a clearer view on the constitutive parameters of those CC systems. Indeed, in the literature, useful descriptions of NU-Spaarpas, E-portemonnee and Torekes were found, as well as different system typologies. This, together with interviews that we carried out, provided a mix of information regarding how those systems were set up, their functioning, the actors involved, the form of the currency they used, etc. However, what was lacking in order to design the INESPO system was a systematic and hierarchical classification of the constitutive parameters of those systems.

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, 1987) and, on the other hand, developing a taxonomy also provides a checklist of parameters to build CC systems, which is precisely what is needed for INESPO.

It was thus requested to literally go 'down the bones' of those CC systems to come up with a well-structured list of parameters that could be used for designing the INESPO systems. In order to do this, we proceeded in an iterative manner, with feed-back at each stage between the parameters that resulted from the systematic analysis of the selected systems (i.e. NU-Spaarpas, E-portemonnee, and Torekes) and the parameters that were identified as necessary to build the new INESPO CC system. Besides, proposal (i.e. Biwa Kippu and TEQs) were also taken into account for the alternative choices they provide compared to already implemented systems.

This taxonomy was thus developed for CC systems that are used as policy instruments for behavioural change towards sustainability. In doing this, the objective was on the one hand to provide a systematic classification of parameters for existing systems, and, on the other hand, to serve as a tool for building similar systems, as was experimented with INESPO. The question of whether, and to which extent, this taxonomy could be usefully applied to and perhaps used as a building tool for other kinds of CC systems than those considered in the framework of this research deserves further investigations.

Taxonomy of constitutive parameters for CC systems

The work carried out to build the taxonomy sheds light on two main aspects of CC systems: their objective(s) and their architecture. Indeed, setting clear objectives for the CC system is an all-important step that involves discussions, and sometimes co-creation between developers and carriers of the project, as well as stakeholders. The architecture itself which is the object of the taxonomy presented in the following paragraphs will have to reflect those objectives.

Taking a broad look at the taxonomy, we see that the architecture of the CC systems rests on three main pillars for which the following terminology was chosen: the rules, the user access points and the management (see figure 1). Each pillar is constituted by one or more blocks of parameters and, as could be expected, there is an important number of parameters within each block. When building a new system, choices will thus have to be made for all those parameters of the architecture, so that they all contribute to the objective(s) which must be well-defined before developing any CC system. However, in this paper, we will concentrate on those parameters that are the most visible for the participants to the CC systems and that belong to the pillar we have called the rules.

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, in the phase of 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.

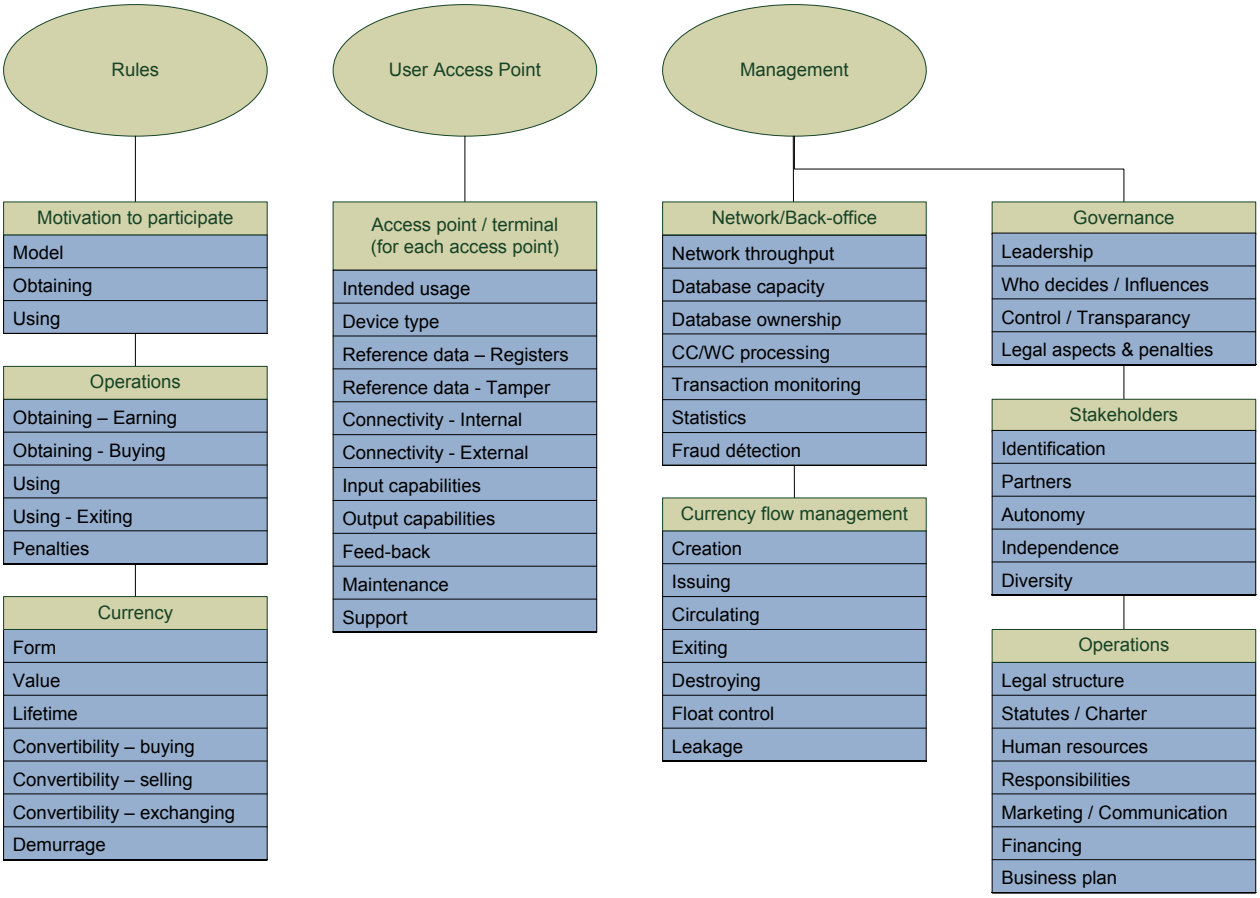

Figure 1: hierarchical classification of parameters for the CC systems

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.

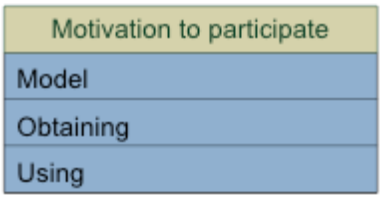

Figure 2

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 could be viewed as a "push" mechanism: CC units are given to those who are participating on a voluntary basis to the CC system. Since we are working with CC as policy instruments, we opted for the terminology of rewarding for this type of model. The term voluntary 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 scheme 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 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, as it is also the case for the Torekes project. However, CC systems are in a process of rapid and continuous evolution, and new choices are emerging for the model. Indeed, as explained in the first section, 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 (in this case, ticket") at the end of a given period. The public authorities determine how those CC units can be earned, and establishe 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 ecosystem of the lake Biwa.

This opens up, at least theoretically, a second possibility for the model that can be viewed as a "pull" mechanism: residents are required to provide a certain number of CC units at the end of a given period. Bearing in mind the fact that this taxonomy is primarily built for CC as a policy instrument, we opted for the terminology of regulatory for this kind of model. The regulatory model is indeed close to the mechanism of a tax or a civil service. As a variant, we have seen that it is also possible to work with CC units allocated to citizens according to specific targets (e.g. in a similar way as in the TEQs proposal, for instance). In the framework of the INESPO project, this would come down to sestting energy consumption targets for households and allocating a given number of CC units to them. Regulatory models differ radically from rewarding models in a least two ways: the participation is mandatory and they use the willingness to comply with the regulation as a motivating factor. As can be expected, the choice between a rewarding and a regulatory model is thus a crucial one that will orient the system on two very different paths, right from the beginning of the design phase.

Obtaining and Using

Going a step further in the analysis brings us to the rationale that has to be chosen for what we have termed obtaining and using the CC units. Bearing in mind the fact that CC units are not always earned – for instance, in some systems it can be foreseen that CC units are also bought – the denomination obtaining seemed best to encompass all the possible ways of getting CC units. In the same way, systems can foresee that the obtained CC units are spent in bakery shop or redeemed for public transportation tickets or even converted back to Euros, for instance. The term using seemed thus the most adequate to reflect all the possible uses of CC units, from to user viewpoint.

It must be underlined that, at this stage of the design, we are still working with the rationale that will be used to determine how CC units can be obtained and used, in order to motivate participants, and not the actual obtaining and using lists, for instance. This rationale will provide clear guidelines of what is or is not acceptable in order to build those lists at a later stage of the system design. In the case of E-portemonnee, for instance, the rationale for obtaining points could be defined as promoting behaviours that contribute to environmental sustainability. The specific aspects of environmental sustainability that would be tackled (e.g. waste, mobility, energy, water) as well as the actions rewarded on the obtaining list (e.g. using public transportation or switching to green energy) would be defined at a later stage by each participating municipality.

Turning back to the design of the new CC-SM instrument in the project INESPO and supposing it was opted for a rewarding model in the first place; a possible rationale for the obtaining parameter is to strictly stay in line with the energy saving objectives of the project. This sets a clear agenda for defining the obtaining list at a later stage of the system design (operation). Actions or investments can be accepted or rejected for the obtaining list in so far as they do or do not lead to energy savings (e.g. insulating the home would be on the obtaining list whereas switching to green electricity would not).

A more inclusive rationale might be chosen for using CC units. Indeed, in order to motivate participants, it can be foreseen that CC units be used not only for investments that lead to energy saving, but also to receive tickets to go to the movies, for instance of to pay for green electricity (provided an agreement is set with energy suppliers of course). In this process of enlarging the base for using the CC units, special attention should however be devoted to avoiding a rebound effect.

For systems based on a rewarding model, it is straightforward that the rationale for using CC units (i.e. what is proposed as a reward) is essential to motivate people to get on-board. This can be illustrated with the Torekes project. Indeed, in the co-creation process of the project with stakeholders and non-profit organisations, it was possible to identify the renting of a plot in the community gardens as important for many residents. Proposing this in the using list proved a great motivator for people to get onboard.

However, the importance of the rationale for obtaining CC units should not be underestimated as a motivational factor or as a disincentive. Indeed, the obtaining 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, which led to an inclusive rationale for obtaining the CC units (e.g. CC units could also be earned when buying other products than the products and services identified as 'green', although the scheme had sustainability objectives).

Different elements will impact the rationale for obtaining and using the CC units. Besides the model, other factors could also have an influence, such as the scope of the project (e.g. inclusive project or focused 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 needs for objective measurement, for evidence of the desired behaviours as well as technological constraints also have to be taken into account, and will often limit the possibilities.

Clearly, a trade-off will be necessary at this point between the objectives of the project, the technological constraints, and what makes sense to the participants. A balance will also have to be found between developing the attractiveness of the system and staying in line with the objectives of the project (e.g. avoiding a rebound effect).

For systems based on a regulatory model, since none have been deployed yet, it is only possible to conjecture about key elements for obtaining and using CC units in such a configuration. In this respect, the rationale to calculate the number of CC units received as a target for consumption in

a TEQs like system (obtaining) or the number of CC units due by residents in a Biwa like system (using) seems absolutely crucial. Bearing in mind the mandatory participation to such systems, criteria to do the actual computation 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 received and the practicalities of the system.

Operations

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 participants, as shown in Figure 3. 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, devoted to the management. 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.

Figure 3

A first and central rule to be understood by participants is how they can obtain their CC units. This corresponds to a key step in the operation block which is based on the rationale defined in the motivation block. But here, the outcome will be to define what people must actually do for obtaining CC units. Typically in the case of a rewarding model, this will lead to a list of behaviours and the number of CC units that can be earned for each behaviour (obtaining–earning). It can also be foreseen that CC units be directly bought with State-issued currency (obtaining–buying).

In the case of E-portemonnee, the obtaining – earning list was adapted for each participating town but would typically comprise sustainable behaviours related to waste (e.g. following a composting course, using reusable nappies, placing a 'no junk mail sign' on the letterbox), to energy (e.g. placing/using a condensation boiler, switching to/ using green electricity), and to mobility (e.g. using public transportation). In the list, the equivalence in points for each action is given (e.g. using 100% green electricity is worth 300 points per year).

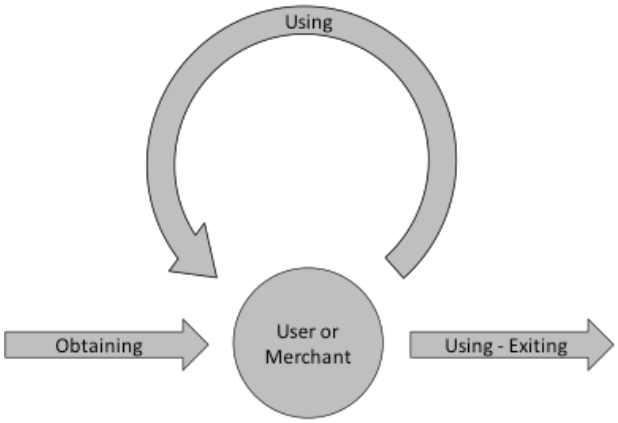

Figure 4

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, and using-exiting). Every time a CC unit is used but does not leave the system (e.g. CC units are used as a means of payment in a shop) the term using has been favoured. When using a CC unit means it is exiting the system (e.g. CC units are returned to the issuing authorities) the term using-exiting has been chosen. Indeed, in such a case, the CC units have finished their trajectory and are exiting in the system as shown in figure 4. Another major way for CC units to exit the system is when convertibility is foreseen for selling the CC units back to State-issued currency (see below in the currency section).

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 (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 attractiveness of goods and services proposed as a reward, or the easiness of conversion seems to be promoting direct exiting.

Finally penalties can be foreseen for those that do not follow the rules of the system (either by cheating or by negligence), 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 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, Torekes paper notes, or E-portemonnee points stored remotely on an elec-

tronic account in a database but that they can access via their Identity Card?

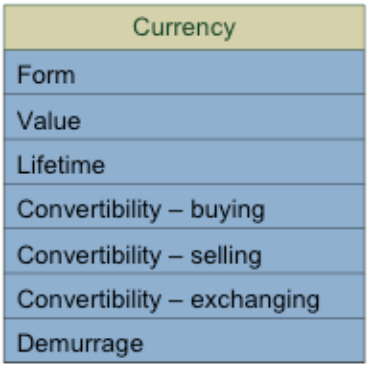

Figure 5

Form

The form describes the unit of account chosen, as well as the vehicle selected for circulation of the CC units. A determinant choice for this parameter is whether to use paper notes (as in Torekes) 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 paying special attention to other aspects 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 the inside and the outside of 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 State-issued 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 link (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 primary energy (or 1 spared kWhp) for instance. In this sense, the value of the currency would be anchored in 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 kWhp (or 1 spared kWhp) but also in relation to behaviours like insulating or following energy education courses; 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, convertibility for selling and convertibility to exchanging 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 CC units 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. ICT infrastructure use or development 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

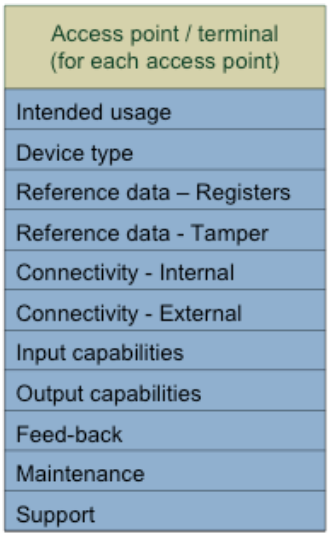

Figure 6

As shown in Figure 6, 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 nec-

essary 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 feed-back 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 how (e.g. keyboard, buttons), as well as the output capabilities (e.g. display). The latter are of the uttermost 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

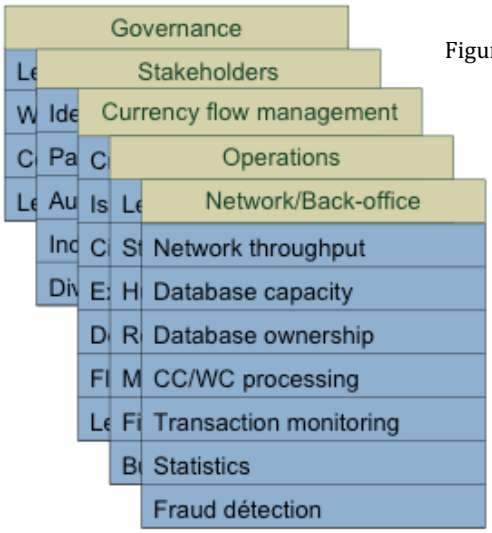

Figure 7

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 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 we will not expand in this publication.

DISCUSSION

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. It must be noted that, although there is 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. Furthermore, dynamic analysis of CC systems (stability, critical mass, etc.) is also necessary within this iterative process, but is outside the scope of this paper.

Bones, flesh and soul

In our view, "going down the bones" is not enough to make a CC system thrive. It provides a systematic list of parameters that will define the global architecture of the system. But, beyond this structure, the experience with CC systems shows that "flesh" is also needed, that comes from knowing more about the expectations of stakeholders and people that will be carriers of the system. In order to take this aspect into account in 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.

The Torekes project that was described in the first section of this paper offers some complementary insights on how to give flesh to CC systems used as policy instruments. Indeed, by linking the project to local non-profit organisations, Torekes could benefit from the field experience of those organisations. This contributed positively to the reflexion on what could motivate residents to participate (i.e. the community gardens, for instance). In turn, developing a new CC system also gave new stamina to the initiatives of the participating non-profit organisations. Experiences of grassroots CC systems might also provide many valuable insights on how to give flesh to CC systems (see, for instance, on this subject, the work of Rogers -www.valueforpeople.co.uk).

But bones and flesh are still not enough. We would like to argue, bringing the bones/flesh metaphor a step further that, for the type of projects considered in this paper, the way to frame behavioural change could well be viewed as the "soul" of such systems. In the following paragraphs we will illustrate this concept by showing how two different theoretical frameworks for behavioural changes might impact the design of a CC system, taking the example of the INESPO project.

Individual choices or social practices? The differences it makes in the design of the CC-SM instrument

While the way to frame behavioural change is not always explicit in the process of building a CC system, it should nevertheless be questioned, as it can act as an underground force that shapes the design of the system in one or the other direction. Indeed, many theories have been developed to explain behaviours. Most of them have been devoted to analysing the determinants of behaviours at the individual level (e.g. Ajzen, 1991; Triandis, 1977, 1980; Stern, 2000). Beyond the particularities of each theory, common denominators are to be found between them, like the central role played by individual choice and the linear causality chain between, in a simplified version, attitude, intention and behaviour. Of course, those theories have reached greater levels of complexity (e.g. by introducing the role of habits, for instance), and empirical studies have shed light on paradoxes and inconsistencies between attitude and behaviours.

It nevertheless remains that, in the light of 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.

Bearing this in mind, how could this conception of behavioural change affect the design of the new CC-SM instrument in the INESPO project?

In a framework based on individual choices, the objective of the project is to lower energy consumption for as many households as possible. Supposing the choice is made for a rewarding model, the CC-SM instrument is seen as mobilising two major strategies of behavioural change: rewarding through the CC part of the system and providing feed-back trough the SM part of the system. It might also be argued that the creation of the system itself could change the internal and external context in which the behavioural changes have to take place. Indeed, the setting up of such a system could be seen as a powerful way for public authorities to convey a message about energy consumption in the households.

In such a framework, the main focus is, most logically, on providing a highly motivating using list for the CC part of the system, a user-friendly feed-back through the SM displays and an effective marketing campaign for the project itself.

This conception of behavioural change has also an impact on the choices made for some key parameters of the CC system. For example, bearing in mind the objective of the CC-SM instrument to lower the energy consumption of each household, it follows that the obtaining-earning parameter is anchored in the difference of consumption, which we represent by $\Delta C = C_{i,y+1} - C_{i,y}$ (where $C_{i,y}$ stands for the energy consumption of household i during year y). This difference of consumption is measured by the SM technology.

In turn, since the obtaining-earning parameter is anchored in the difference in consumption of each household, it seems quite logical to link the value of the currency with the kWh (primary) energy saved, for instance.

This short sequence shows how the framework chosen for behavioural changes has a cascading effect on the objectives, focus and design of the system. In the next section we will see how by challenging the idea that energy saving is a matter of individual choices only, social practices theories can influence the design in a very different way.

The emerging 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) a practice is to be understood as a routinised way of 'doing something' which different individuals reproduce at different times and places. We can thus talk about the practice of cooking, of

doing the laundry or, like Shove and Walker (2010), of the practice of showering for instance. Those practices consist of intertwined elements that belong, according to Shove and Pantzar (2005) to three main categories: images (meanings, symbols), skills (forms of competence, procedures) and stuff (materials, technology). Taking the example of cooking, for instance, this practice is thus related to images of good health, or sharing with friends, for instance, but also to cooking skills and stoves. Social practices theories are concerned with those routines of everyday life that are commonly shared, and how people 'make sense' of them.

Most importantly for our discussion, a major consequence of using a social practices framework is that the focus is shifted from energy consumption (which is mostly invisible to people) to the many meaningful activities that lead to energy consumption in a household.

Once again, the question has to be asked of how this very different view on behaviours could affect the design of the CC-SM instrument. Since practices are anchored in the reproduction of routines by different agents and at different times, social reproduction is thus what keeps practices alive. However, as underlined by Warde (2005, p. 141), "(Practices) are dynamic by virtue of their own internal logic of operation, as people in myriad situations adapt, improvise and experiment".

It follows that the role of public authorities could be reframed, compared to how it is conceived in a more individualistic conception of behaviours, in terms of promoting more sustainable paths for the evolution of practices. This is all the more relevant since the importance of public authorities in the evolution of practices linked to hygiene, for instance, has already been underlined in Shove and Walker (2010).

The objectives of the INESPO project are then shifted accordingly from lowering energy consumption in households to making energy consuming practices evolve in a more sustainable direction. This increases the focus on developing a better understanding of those energy consuming practices and how people make sense of them. Building on those insights, the obtaining-earning list would then propose alternative and less energy consuming practices, instead of being based on the difference in the aggregated consumption of the households.

In turn, it would not be logical anymore to link the value of the currency with the abstract notion of kWh energy saved, but rather to link it to practices on which people can have a self-reflexive view. If empirical studies show, for instance, that washing laundry at a high temperature and with a high frequency has a significant impact on household energy consumption, the target might then be to promote more sustainable practices in this field (e.g. washing at a lower temperature when possible or airing clothes to wash them less frequently), and to reward them with CC units accordingly.

Research is still necessary for using a social practices view on domestic energy consumption and there are many technical challenges in developing tools that provide a disaggregated measurement of energy consumption[2]. Besides, whatever the underlying theoretical framework, related societal risks, such as privacy issues or potential mission drifts, have to be seriously investigated.

Bearing this in mind, the objective of the preceding paragraphs is essentially to show how two different frameworks for behavioural change could lead to a different understanding of the objectives of a project, as well as to different choices for some of their constitutive parameters.

CONCLUSION

Changes can come from many places.

In the preceding paragraphs, we have shed light on CC systems that are precisely seeking to promote changes towards sustainability. To gain a better understanding of those CC systems, this paper has presented a taxonomy of their constitutive parameters that can, in turn, be used for building new similar systems. The taxonomy is based on three pillars: the rules, the user access points and the management. The rules, which have been the main focus of this paper, are in close connection to what people will see and understand from the CC system. There is a logical sequence to be followed when making choices for the parameters that constitute the rules. Firstly, the designers of the project have to decide about the manner to motivate people to get on-board (motivation to participate), then design the functioning of the system accordingly (operations) and then choose the parameters for the currency itself (currency). All those choices are interrelated, and create mutual dependencies.

Besides the taxonomy which can be used as a designing tool, we have argued that other dimensions have also to be taken into account when building such CC systems, and we have drawn more particularly the attention on the frameworks used to understand and explain behavioural change itself. Indeed, as was illustrated with some elements of the design of the CC-SM instrument, changing from a more individualistic framework to social practices theories could lead to very different choices for the some parameters of the CC system.

But the mere fact that public authorities are starting to experiment with some pilot projects, as presented in the first part of this paper, brings in itself seeds of change. It is too soon to conjecture what the future will be for such CC projects. Will public authorities carry on with experimenting new pilot projects? Will an innovative instrument such as the CC-SM cross the political agenda in case of significant SM deployment? Will existing pilot projects evolve into

2 See, for instance, Klopfert and Jossen (2011) on the Energy Consumption Advisor (ECA) project.

large scale policy instruments? The first results that were publicly released on the two projects that are currently running (E-portemonnee and Torekes) seem encouraging, but further research is needed to investigate their strengths and weaknesses in a more robust manner. Besides, other important issues such as their legal framework, for instance, will have to be dealt with, if those systems are to be developed into larger scale projects. But whatever the future of those projects might be, if CC systems are to become convincing instruments for sustainability policies, appropriate attention should be given to their bones, flesh and soul. This might, in turn, bring further changes to CC systems themselves.

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