Learning from the field: analysing foreign experience feedbacks to enrich the development of a programme for the renovation of multifamily housing in Geneva

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Abstract

Local authorities or other local stakeholders are increasingly involved in the implementation of energy efficiency policies, and in particular for the renovation of buildings. They can have more flexibility in their action plans, compared to national institutions. They often take the lead to experiment new approaches and are therefore key sources of policy innovation. However, their means are smaller and they encounter difficulties in transforming pilot projects into large dissemination schemes.

This paper presents a detailed review of 9 local and/or innovative initiatives aimed at boosting the renovation of dwellings, and in particular of multifamily housing, mostly in France, but also in Austria, Germany, the Netherlands and Switzerland. This sample is not meant to be representative. The case studies were selected based on the interest they have raised in other local authorities or countries, and to have a diversity of approaches: from tailored support requiring a strong involvement of the homeowners to turnkey renovation services.

The analysis is structured according to the support offered along the customer journey: 1) general information; 2) targeted technical advice; 3) financial engineering; 4) preparation of the works and selection of the professionals; 5) implementation of the works; 6) validation and follow-up. While in the past the initiatives tended to focus on some of these steps, the recent initiatives increasingly cover the whole journey. The case studies bring interesting experience feedback for each of these steps.

Most of these schemes aimed at a renovation rate between one to ten thousand dwellings per year. The achievements vary and highlight key lessons learnt for experience sharing. This study was indeed made for the Public Energy Utility of Geneva and Geneva Cantonal Office of Energy in order to feed thoughts for the further deployment of an energy renovation programme.

Introduction

Local authorities, and more generally local initiatives, take an increasing role in the implementation of energy efficiency programmes. This can be seen for example in the development of the Covenant of Mayors in Europe (JRC, 2016) or in the worldwide initiative of the C40 Cities Climate Leadership Group (Trencher et al., 2016).

Local authorities can have more flexibility in their action plans, compared to national institutions. They often take the lead in testing new approaches and are key sources of policy innovation. But their means are smaller and they have often encountered difficulties in transforming pilot projects into large dissemination schemes.

This paper presents a detailed review of 9 local and/or innovative initiatives aimed at boosting the renovation of dwellings, and in particular of multifamily housing. This study was made for the Public Energy Utility of Geneva and the Geneva Cantonal Office of Energy in order to feed thoughts for the further deployment of an energy renovation programme.

After briefly summarising the background of the study, the paper explains the objectives and methodology of the study. The 9 case studies are then introduced before providing the

lessons learnt from their analysis, structured according to the framework used to analyse the case studies.

Background of the study

GENEVAN BACKGROUND

A long term vision for Geneva: the 2,000 Watts society without nuclear[1]

The 2,000 Watts society is a long term vision for a sustainable and fair energy supply[2]:

- ecological use of the resources and fighting against climate change;
- efficient use of the resources needed for the economic development and well-being of the inhabitants;
- fair distribution of the energy resources available at the world level.

The 2,000 Watts society advocate to divide by 3 the energy consumption, to reduce CO_2 emissions by a factor of 7, and to multiply by 3 the share of renewable energy sources. This means a radical transformation of a society previously built upon fossil fuels.

The cantonal energy strategy is founded on three pillars:

- the management and reduction of energy demand;
- the valued use of the energy resources of the territory, through major projects enabling the Canton to organise the transition from an oil-based society towards a society supplied by indigenous energy sources;
- the mobilisation of all public and private stakeholders (municipalities, private and institutional building owners, energy suppliers and distributors, large energy consumers) in order to integrate the current and future energy issues in the projects they are responsible for.

SIG (public energy utility of Geneva): a major actor serving the energy policy

SIG (*Services Industriels de Genève*) is a Swiss local utility. It supplies water, gas, electricity and heat for the 250 000 customers of the Geneva canton. It treats sewage, recovers wastes and offers services in the energy and telecommunication fields. Its activities aim to promote "less and better" consumption in order to contribute to a sustainable development.

THE TEPI PROJECT

Purpose of the project

SIG and OCEN (Geneva Cantonal Office of Energy) launched the TEPI project in partnership (TEPI means "Energy Transition of the Geneva Building Stock"). TEPI's objective is to further examine possible options for improvement and to activate, through a programme, the means of actions enabling to speed up the energy renovation of buildings.

The purpose of TEPI is to reduce significantly the energy consumption of buildings in the Geneva area. The meaning of the "energy transition of the Geneva building stock" shall be read in this way.

This project, co-supervised by OCEN and SIG, is an opportunity for the Geneva Canton to set up a synergy between different stakeholders in order to address these issues.

Concrete objectives and scope

The project is part of a strategy whose global objective is to reduce the thermal energy consumption per capita (fuel and heat) by 37 % in 2035 compared to the 2000 consumption level.

The specific objectives of the TEPI project are:

- to launch a programme for the energy renovation of buildings, to be fully operational and sustainable by 2017;
- to increase the number and quality of energy renovations done each year;
- to contribute significantly to the reduction of thermal energy consumption per capita (fuel and heat).

The TEPI study is focused on the reduction in energy demand, by renovating the building envelopes and replacing, optimising the heating systems. Integration of local renewable energy resources (solar, geothermal, biomass, waste heat) is also taken into account.

Methodology of the TEPI project

The components of the programme are based on key previous studies:

- reports of studies previously done on these issues;
- a large consultation of the stakeholders involved in the building sector;
- an in-depth study about the barriers and drivers for renovation from the viewpoints of the different types of building owners;
- an analysis of the legal and fiscal context;
- a detailed benchmarking study, reviewing other local programmes for energy renovation.

This paper is about this last study.

Presentation of the study

OBJECTIVE AND SCOPE OF THE STUDY

The objective was to review 10 programmes promoting the energy renovation of buildings that could provide interesting insights for the TEPI project. The focus was therefore on local and/or innovative programmes. Moreover, a previous analysis of the Genevan building stock showed that the first priority for TEPI should be multifamily/collective housing that was consequently the priority focus for the case studies as well.

A key specification for the study was that the analysis of the case studies should be done in a systematic way, so that they can be compared.

1. The Canton of Geneva has asserted its determination not to import electricity from Swiss or foreign nuclear plants.

2. http://ge.ch/energie/contexte-legal.

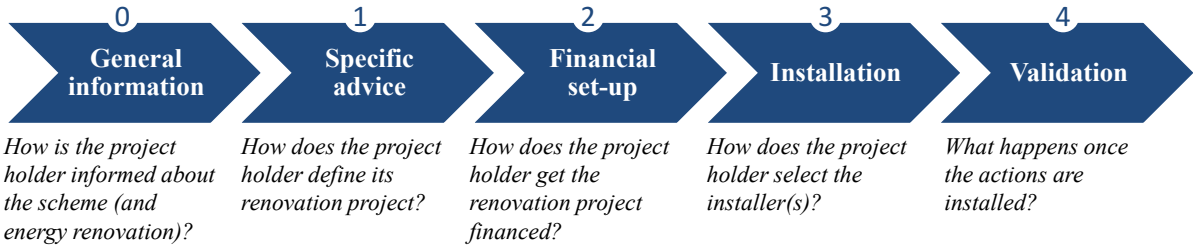

Figure 1. Analysis framework.

METHODOLOGY OF THE STUDY

The methodology was structured in four stages: 1) selection of the case studies; 2) definition of the analysis framework; 3) analysis of each case study; 4) cross-comparisons of the case studies to identify lessons learnt and to make propositions for the TEPI project.

Selection of the case studies

The study didn't aim at being exhaustive or representative. The criteria used to select the case studies were defined according to the objectives of the study:

- priority on programmes targeting multifamily buildings/ collective housing;
- preference given to cases having similarities with the Genevan context (neighbouring countries, urban areas, etc.);
- preference given to programmes having proved to be successful and/or including innovative approaches;
- the whole set of case studies should provide experience feedbacks for each of the steps identified in the analysis framework (see below);
- the cases should be documented enough to make possible a paper-based review;
- the programme should be still in operation.

These two last criteria were included because the time and resources available for the study did not make possible to include interviews. The initial objective of the study was to identify the most interesting cases for further contacts between the TEPI team (OCEN and SIG) and the managers of the programmes reviewed.

Analysis framework

It was chosen to analyse the programmes by adopting the perspective of their implementation, from the project owner[3] point of view, looking at the whole chain from the information of the building owner (or occupant) to the validation of the action implemented. This approach enables to provide a comprehensive analysis following the structure of the programme implementation.

We used the same structure as developed in (Broc et al., 2015), shown in Figure 1.

The case studies also included a short description of the actors and means of the programme, and an analysis of its background (history, specificities). Data about the achievements were collected when available. Finally, all information available about experience feedbacks (from evaluations, articles in newspapers, etc.) were summarised to form the lessons learnt for each case study, highlighting what lessons are mostly specific to the case and what lessons could be easily transferred to other cases.

Presentation of the case studies

The 9 case studies presented in this paper[4] were programmes promoting the energy renovation of residential buildings. It would not be possible to describe them all in this paper. Table 1 introduces them by specifying their target area, the targeted type(s) of buildings, when they started and their maturity. The last column provides sources where more information can be found for each programme (mostly in national language).

WHERE AND WHO IS INVOLVED

The mix of case studies gave coverage at various geographical scales (cities, regions, countries). Most of the programmes focus on urban areas (focus of the study). Likewise, the focus on multifamily housing meant that co-owned buildings were a frequent target in the case studies. 7 programmes were initiated and managed by local authorities. 1 programme was created by the State to test innovative approaches involving housing associations (EnergieSprong). And 1 case was the analysis of the asset management strategy of a front-runner social landlord (OPAC 38). This case was particularly interesting for the Genevan context, as a significant share of the Genevan housing stock is owned by institutional landlords that have objectives similar to social landlords.

HOW THESE PROGRAMMES WERE DEVELOPED

In most of the cases, an experimentation phase or pilot project was used ahead of launching the programme, to prepare a progressive roll-out. The programmes were often tested first on pilot neighbourhoods before extending the target areas. The development of a large partnership was a key part of most of the programmes. Networks of local authorities, national agencies and energy suppliers often brought additional sources of funding and communication. Professional associations of property agents and

3. In the programmes reviewed, the project owner could be private building owners, a housing association or similar body (for publicly-owned dwellings). The renovation projects could not be owned by the tenants in any of the cases.

4. In addition to the 9 cases presented here, the study included another case, the KfW urban energy renovation programme, not presented here as it has a different approach. It is a national programme supporting the development of local initiatives. For more details, see http://www.energetische-stadtsanierung.info/.

Table 1. Overview of the 9 case studies.

Name (and target area)	Targeted type(s) of buildings	Period and maturity	Source
MurMur (Urban area of Grenoble Alpes Métropole, France)	Co-owned buildings built over 1945-1975 (+ other co-owned buildings and individual houses for MurMur II)	MurMur I: 2010–2014; MurMur II: 2016–2020 (+ previous pilot projects) → **mature**	(Grenoble Alpes Métropole, 2015)
Ecorénovons Paris (City of Paris, France)	Private dwellings (with a priority on co-owned buildings)	May 2016–2021 (+ previous pilot projects) → **full-size roll-out on-going**	(Paris, 2016)
Ecoreno'v (Urban area of Grand Lyon, France)	Private dwellings (with a priority on co-owned buildings) built before 1990	Launched at the end of 2015 after a pilot phase → **full-size roll-out on-going**	(Grand Lyon, 2016)
Picardie Pass Rénovation (Picardy Region, France)	Private dwellings (with an initial priority on individual houses, then extended to co-owned buildings)	Experimentation over 2014-2017 → **progressive roll-out on-going**	(CityInvest, 2015a)
Energies Posit'IF (Paris Region, France)	Multifamily buildings built before 1990	Launched early 2013 → **full-size roll-out on-going**	(CityInvest, 2015b)
Onex Renov (Onex municipality, Switzerland)	Large multifamily buildings built over 1960–1980	Launched early 2016 → **pilot project**	(Onex, 2016)
EnergieSprong (the Netherlands)	First projects with housing associations, then open to all buildings	Experimental programme launched in 2010 → **full-size roll-out on-going**	(van den Munckhof and van Erck, 2015)
Thermoprofit (Styria Region, Austria)	All buildings (programme mostly used for big renovation projects)	Launched in 2001 → **mature**	(ManagEnergy, 2005)
OPAC 38 (social housing body for the Isere department, France)	Social housing (all types of dwellings)	Energy issues integrated in the assett management strategy since early 1990's → **mature**	(OPAC 38, 2016)

building companies were key target stakeholders, respectively as major links with the co-owners and to ensure an offer will be available to match the demand under the conditions set by the programmes (energy performance and quality requirements).

OBJECTIVES AND PITCH

While most of the programmes were initially developed within action plans or strategies to save energy and reduce CO_2 emissions, the institutional communication often emphasises that the programmes will contribute to the local economic development and help maintaining or creating local jobs. Alleviating fuel poverty was also a frequent objective. More specifically, some programmes aim as well at improving the buildings or neighbourhood standing, improving the living conditions, making up for the lack of service offer from the market, or favouring leverage effects.

Energy savings and comfort improvement are the main arguments used in the communication to reach the dwelling owners, in particular the owner-occupiers. Increasing the asset value, taking advantage of financial incentives and anticipating upcoming regulations are complementary arguments often used towards landlords. It is noticeable that the environmental and climate benefits are most often implicitly presented as a bonus.

MEANS, TARGETS AND ACHIEVEMENTS

The upfront investment to set up the programmes is all the more important that the support/service provided is comprehensive (see details below), and in particular when including an option of third-party financing (need to have initial capital). Likewise, the managing teams vary from 3 to 30 full-time equivalents. The budget for public incentives (when included) is usually between €5 and 10 million per year.

The magnitude of the target is often about 1,000 dwellings renovated/year, except for EnergieSprong whose initial objectives were quasi-exponential (2,000 dwellings renovated over 2010–2015, then 10,000 over 2015–2016 and 110,000 over 2015–2020).

As most of the programmes are very recent (for their full-size roll-out), it is difficult to assess whether they are on the way to meet their targets. MurMur achieved its target for its first period (2010–2014) with about 4,500 dwellings renovated (representing a renovation rate of 0,8 %/year of the targeted building stock). Energie Posit'IF and Pircardie Pass Renovation saw promising take offs, and were indeed successful in getting an additional funding source at the European level[5]. At the opposite, Thermoprofit remained with a few exemplary projects implemented per year. And EnergieSprong reported only 253 houses renovated over 2013–2015.

COST DATA

When available, the cost data show average renovation costs per dwelling from €9,000 to 60,000 (and even €65,000 for EnergieSprong). The analysis of the cost data would require further

5. See respectively http://eib.europa.eu/projects/pipelines/pipeline/20140196 and http://eib.europa.eu/projects/pipelines/pipeline/20140158.

investigation because the scope of the costs is not always explicit (with/without VAT; full costs/marginal energy efficiency costs; costs of works only or also the costs of the preparatory studies and post-installation services, etc.).

The data available can however already confirm the importance of three parameters: the type of dwelling (house/apartment), the state of the building before works, and the targeted level of energy performance. The costs increase with the level of energy performance, but not linearly. The last kWh saved appear to be the most costly (in particular beyond a 50 % reduction in energy consumption).

The local programmes have usually a closer monitoring of the cost data, compared to national programmes where aggregated data are difficult to interpret. The detailed data are rarely publicly available, but they represent a rich material for further investigation. For example, MurMur and Ecorénovons Paris include an observatory of the costs, with two main objectives:

- collecting data to improve the estimations of costs when advising the project owners;
- monitoring cost trends to detect possible inflationary effects due to the programme (in particular when financial incentives are offered).

Entering into a detailed analysis of the cost data was beyond the scope of the study. But further investigations would be very interesting. For example, about possible correlations between costs and level of energy performance, or about cost trends over time.

Lessons learned from the case studies

The cross-comparisons of the case studies led to a revision of the analysis framework used to represent the implementation chain of the programmes (from Figure 1 to Figure 2). The main changes are that the financial set-up is most often addressed jointly with the stage of technical advice, and that two components (programme of works and financing plan) and two decision times appear to be key in the development process of the renovation projects.

The different options presented in the figure above for the main steps are discussed further on. For most of the options, the differences between the programmes are due to the degree of freedom let to the project owner vs. the degree of delegation included in the support service provided by the programme.

INFORMATION: FROM INTEREST TO COMMITMENT

The programmes use various means and ways of communication to reach their targets. In general, the strategy includes a broad communication about the benefits of energy renovation. This communication also aims at leading project owners to a kind of "one-stop shop", that can be a website or a single phone number for example. The project owners then receive tailored information about the support service included in the programme.

The experience feedbacks show that the main difficulty lies in transforming the interest of project owners in actual commitment to implement works. The demand for information is usually high enough. However, the drop-out rate can be about 50 % between the step of tailored technical and financial advice and the step of implementing works. Drop-out rates are higher in the case of co-ownership, because the decision-making process is often long (1 or 2 years) and the decision needs a majority to be taken. Drop-out rates are also higher when the level of targeted energy performance is higher, because it is often more difficult to gather the required funding.

DEFINITION OF THE SCENARIO OF WORKS

The grading between freedom and delegation can be analysed according to 5 levels:

- free scenario: case of the asset manager acting on its own initiative (OPAC 38);
- guided scenario: cases where the project owner receives technical advice with recommendations, but remain free to choose the actions;
- imposed criteria: cases where criteria are imposed for the incentives, about the reduction in energy consumption (Ecorénovons Paris) or about specific actions (ventilation for Ecoréno'v Grand Lyon);
- predefined action packages: cases where the incentives are related to predefined action packages;

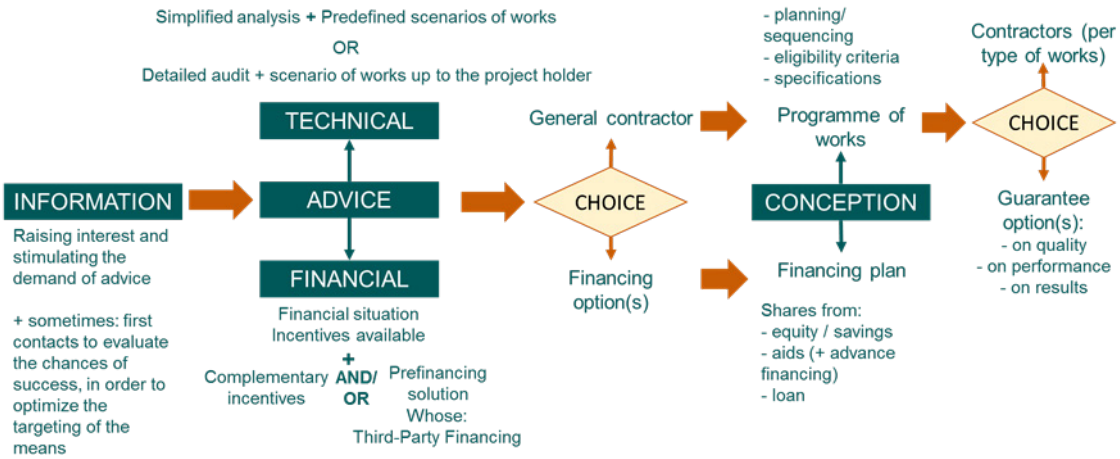

Figure 2. Updated analysis framework of the implementation chain.

- delegated scenario: the owner chooses a general contractor from the start that takes over the entire process, including the definition of the scenario of works.

The degree of freedom is more important when the local programme does not provide its own financial incentive (Onex Rénove). The degree of delegation is the highest when including a guarantee on performance (Thermoprofit) or result (EnergieSprong). Imposed criteria are used when targeting a heterogeneous building stock. Predefined action packages are used when targeting a more homogeneous building stock.

Onex Rénove is the only programme explicitly providing advice for sequencing the works over time, by identifying what works will be needed and when (based on the construction period).

FINANCIAL ADVICE: PROMOTING A "MARGINAL COST" THINKING

The costs of the works represent a major investment for most owners, in particular when a high level of energy performance is targeted (for example, between €10,000 and 30,000/dwelling to reduce the energy consumption by 20 to 50 %). The payback time for insulation actions is usually long (20 or more years). This remains a major explanation of the reluctance of owners to invest in energy renovation works.

Most of the programmes therefore try to take advantage of "natural opportunities", i.e. when renovation works are needed anyway (for example, restoration of the façade, repairs of the roof). This makes possible to calculate the costs related to energy efficiency in terms of marginal costs (or "energy efficiency extra-costs"), by comparing a scenario with "regular" works and a scenario including energy efficiency works. The experience feedbacks prove that the energy savings can rarely pay back for the full costs of works. However, they can pay back for a large share, or even the whole, energy efficiency extra-costs.

In addition to providing advice about the estimation of the costs of the works, the programmes also help the project owners to build their financing plan, by identifying the different sources of funding available, and sometimes also by offering third-party financing options or direct grants from the programme (Figure 4).

Two options are distinguished for the Picardie Pass Rénovation and for Energie Posit'IF:

- technical option: the project owner finances his/her project and the programme provides a support for selecting the contractors and for monitoring the works;
- financing option: the programme pre-finances and take over the whole project (selection of the contractors, supervision and validation of the works).

PREPARING THE WORKS: A SUPPORT IS STILL NEEDED ONCE THE MAIN DECISION IS TAKEN

The decision to implement renovation works is a first success from the programme viewpoint, but it is also the beginning of an adventure for the project owners: specification of the programme of works, selection of the contractors, supervision of the works, etc.

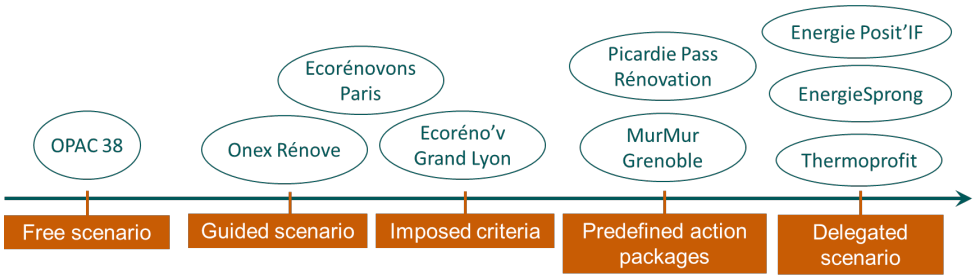

Figure 3. Options for the definition of the scenario of works.

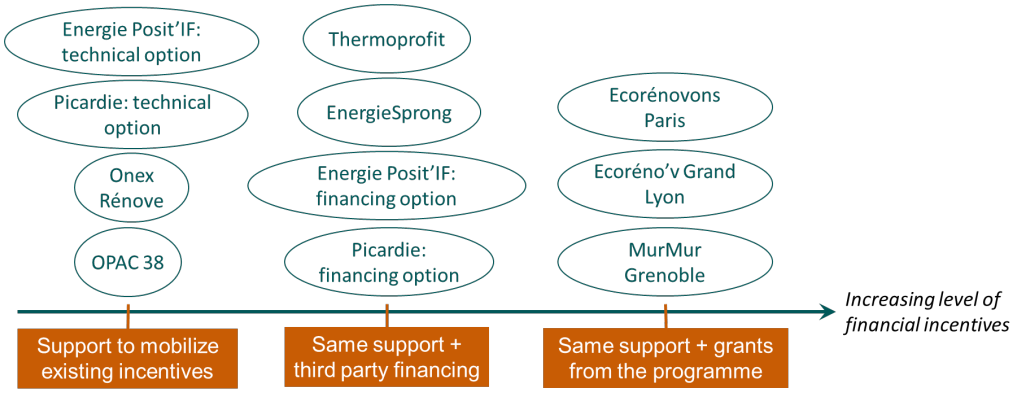

Figure 4. Support provided for building the financing plan.

Some programmes offer a service where all these tasks are taken over by the programme, acting as a general contractor. But in most cases, the project owner will have either to be the general contractor (for simple projects or when the project owner has the required skills, like asset managers for example) or to select a contractor.

The general contractor has a key role in the coordination between the different building trades operating on site. This is essential for the quality of the works, and consequently for achieving the targeted level of energy performance. Likewise, the project owners often relies on the general contractor when defining the specifications of the works. The general contractor is thus a key prescriber: he/she may promote as well as oppose options including energy efficiency improvements.

When renovating large buildings, a professional general contractor is often required and will be in most cases an architect. The experience feedbacks highlight that the architects may see the energy efficiency issues as constraints, and not as opportunities of improvement. MurMur provides a good example of actions towards general contractors. In particular through the definition of technical specifications that were discussed with architects and building professionals, or by developing ad-hoc training.

The programmes may also rely on existing or develop their own qualification, labelling or certification processes. These processes can then be used to communicate on a brand that is a strong tool to develop the confidence of the project owners in the building professionals. The lack of confidence was indeed identified as an important issue in many cases.

Another type of action towards the building industry is to promote consortia. In addition to favouring a better coordination between building trades, this is also meant to make possible for SMEs to bid for complex and/or large projects.

CHOICES OF THE CONTRACTORS AND OPTIONS OF SUPPORT SERVICE

Three main different options can be distinguished:

- the project owner is the main driver of the project: the owner has a high degree of autonomy and the programme provides a support with a high share of online tools (training, guidebooks);
- the programme provides a strengthened support: the owner receives a tailored support for preparing the specifications and selecting the contractors;
- the programme offers a full delegation: the programme acts as general contractor in a way similar to energy performance contracting.

The "strengthened support" option is related to a guarantee on works quality. The type of support offered is often defined according to an analysis or assumption about the capacities of the targeted project owners and about the complexity of the

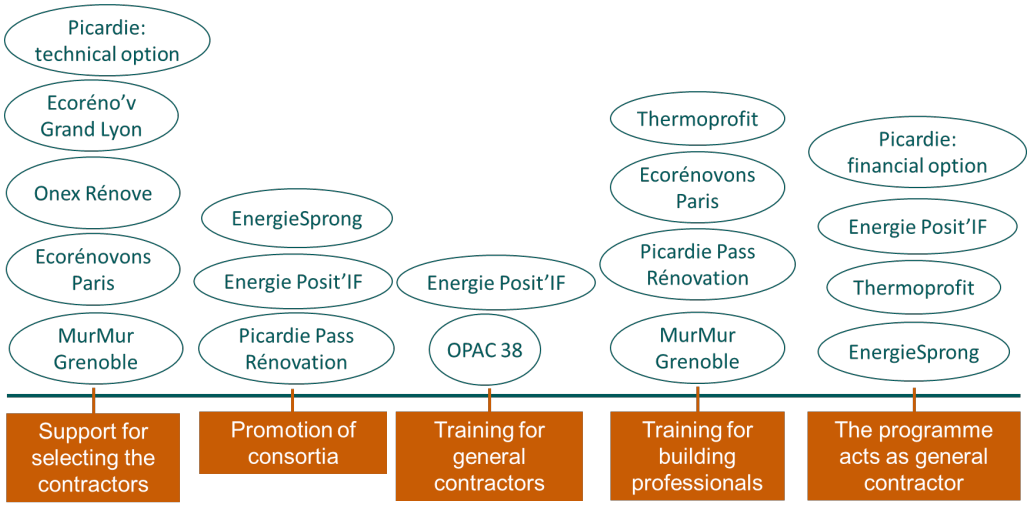

Figure 5. Services related to the preparation and implementation of the works.

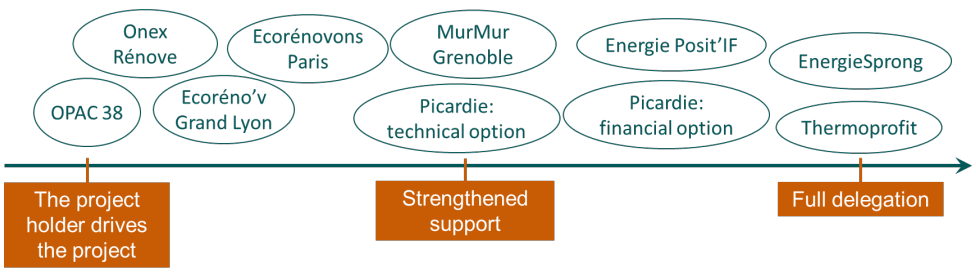

Figure 6. Options for the support service.

promoted renovation projects. It is for example assumed that an individual owner will need more support than a professional asset manager or a property agent.

IMPLEMENTATION OF THE WORKS: 1) HOW THE INHABITANTS ARE TAKEN INTO ACCOUNT

The inconveniences for the inhabitants due to the works are not much addressed in the documentation found about the programmes. This is one of the key ideas of EnergieSprong that developed an approach to deliver the renovation in a short time (about 10 days) by industrializing part of the works.

In addition to the usual inconveniences (temporary moving, noise, problems for accessing the building or for parking, etc.), other sources of negative apprehension may occur, in particular for tenants:

- fear of an increase in the rent that will not be compensated by the reduction of the energy bills;
- fear that changes or new technical systems will be imposed without consultation.

These tenant-related issues explain why OPAC 38 provides the more comprehensive experience feedback about exchanging with the inhabitants along the whole renovation process, from its conception up to the use of the buildings after works. For example, OPAC 38 pays particular attention to the balance sheet of the service charges so that the total of [rent + service charges] remains within the values communicated to the tenants.

Other cases show that the municipalities may play a role of mediator in case of conflicts between the tenants and the building owners.

The documentation about the programmes provide more details about the support they offer to the inhabitants once the works are completed. For example, Picardie Pass Rénovation includes an aftercare service for up to 5 years, through an annual visit and a building record. In most cases, one of the main objectives of the support "post-works" is to avoid too large rebound effects, by raising awareness of the inhabitants about how to use their dwellings to take advantage of its improvement.

IMPLEMENTATION OF THE WORKS: 2) SUPERVISION AND VALIDATION OF THE WORKS

The supervision and validation of the works are key issues from two perspectives:

- for each project, to ensure its quality and the satisfaction of the owner(s) and inhabitant(s);
- for the programme continuation, as any bad experience can quickly tarnish the reputation of the programme.

The experience feedbacks from OPAC 38 and MurMur show that it is important to work with the building professionals to find solutions to limit the risks and to detect the problems as early as possible along the works. Detecting defaults or failures once the works are completed is often a source of conflicts and it is rarely possible to find solutions.

This is why the programmes including guarantee on performance (Picardie Pass Rénovation, Energie Posit'IF) or results (EnergieSprong) include the supervision of the works by an expert of the programme. Ecoréno'v uses another approach by providing the project owners with a detailed technical documentation to help them supervise the key stages of the works.

OPAC 38, MurMur and Ecoréno'v also include actions about the optimization of the heating systems once the works are completed. The replacement of the heating system and/or a reduced heating demand thanks to improved insulation may indeed require a review of the operating conditions of the heating system.

COST AND COMMITMENT CONDITIONS FOR THE SUPPORT SERVICE

The cost of the support service has a fixed share (set up, minimum activity level like communication costs) and a variable share depending on the number of projects supported. Few data are available about these costs, partly because some of the programmes have just started their full-size roll-out. The ex-post evaluation of MurMur I estimated a cost of about €270/dwelling renovated. However the cost may vary a lot according to the type of support service offered from one programme to the other.

Only 3 of the 8 programmes offering a support service to the project owners include explicit participation fees to be paid by the project owner: €1,860/dwelling for the Picardie Pass Rénovation (complete support service from the initial technical advice to aftercare services), €450/building for Onex Rénove (detailed energy audit and recommendations) and fees which varied by project for Energie Posit'IF (also complete support service).

The two programmes offering turnkey solutions are particular cases. The development and marketing costs of the service are covered by the public budget (State for EnergieSprong, Region for Thermoprofit) and the project owner can have free advice before subscribing to the service. Then the costs of the support service are likely included in the cost of the contract (as for Energie Posit'IF). However, they are not detailed in the information found when making the case studies.

In the other case, the free access to the service was probably decided to avoid creating a barrier to the commitment of the project owners. However, this may lead to some funds being wasted or lost in negative 'spillovers', providing support to project owners who will not implement energy efficiency works. To limit this risk, the programmes include either a commitment charter (MurMur, Ecoréno'v) or a call for projects (Ecorénovons Paris).

Lessons learnt for Geneva

The study brought a concrete analysis framework and typology that could be adapted to the Genevan context when examining the different options possible for the future programme. The analysis framework is useful to take into account the different steps of a renovation project and to review how the options for the programme can help for each of this step. The typologies presented in the figures of this paper were crossed to identify the main categories of programmes, analysing further how the different options for each step could be combined.

The review of the case studies provided a "suggestion box" about the various options that can be used for each block of a programme, and examples about their possible combinations.

This review also gathered experience feedbacks about what can drive or hinder the implementation and success of renovation projects, and thus of a programme promoting renovation projects. These drivers and risks are key points of vigilance that

will make possible to anticipate possible problems in the development and deployment of the future programme.

The conclusions of the study confirmed the assumption of the Genevan stakeholders that there is no "silver bullet" to stimulate building renovations. The lessons gathered form a toolbox that is now used to complement the solutions to answer the specific needs of the Genevan stakeholders. It brought some new ideas that were not considered before, such as:

- developing a building passport or record to monitor the changes in the building over its lifetime;
- developing tools or services to help project owners in selecting contractors (for example by defining a label attesting the skills of the building professionals);
- encouraging consortia or networks of professionals;
- developing contracts for a whole service or solution, and not separate lots or packages;
- setting up internal energy commissions within the buildings to involve the occupants and the different owners (in case of co-ownership);
- making incentives conditional upon the achievement of energy performance criteria.

Conclusions and discussions

The programmes reviewed have similarities and complementarities. The case studies confirm that there is no silver bullet to speed up the number and quality of renovations. One of the key added values of the local programmes is to be able to match local specificities, for example in terms of building stock, or of needs for information and financing. Another added value is to gather a diversity of stakeholders to work together in a concrete way. The case of EnergieSprong also shows that major market transformations require a critical level of demand in order to be attractive to manufacturers and suppliers of energy efficiency solutions, which may be easier on a larger scale. Nevertheless, local initiatives may trigger changes in the renovation markets that are often local or regional markets with a large number of SMEs (and even single-person companies). For example, Picardie Pass Rénovation and Energies Posit'IF are stimulating the development of consortia of SMEs.

The case studies thus confirm that the local level is a scale that favours innovation. Most of the programmes can be considered pioneers for the solutions they develop. The efforts to scale up these initiatives are still recent, with most of the programmes being currently in a rolling out stage to progressively reach their full expected delivery speed. Only two cases (MurMur and OPAC 38) have already a multiyear experience of full-size and full-speed implementation.

The classical approach (with grants) used in MurMur achieved its target, and the overall experience of this programme (for the whole implementation process) seems to have been a source of inspiration for other French local programmes (e.g. Ecorénovons Paris and Ecoréno'v Grand Lyon). However, the magnitude of the target is then *de facto* limited by the public budget available. In contrast, the approaches offering fully integrated turnkey solutions (EnergieSprong and Thermoprofit) experienced difficulties scaling up beyond exemplary projects, due to high costs of the comprehensive service and ambitious energy efficiency requirements. The approaches offering an optional third party financing (Energie Posit'IF and Picardie Pass Rénovation) represent an intermediate level. They faced a difficult start, partly due to legal barriers to overcome and to the important information needs as the approach was new to most actors. They now seem to be reaching a promising roll out that will be very interesting to follow, to see if they achieve their initial expected speed.

It would be interesting to further investigate the reasons for project owners to drop out or to decide to implement works. So far, only OPAC 38 and MurMur have a history long enough to include an ex-post evaluation or survey. The coming years should provide complementary experience feedback from the other programmes.

The social housing body OPAC 38 provided a case example of a local and large asset manager (stock of more than 25,000 dwellings) investing €20 to 30 million for improving its buildings. Its planned asset management strategy also appeared to be a driver for the transformation of the local market for renovation, stimulating the training of building professionals and offering them projects to experiment innovative solutions. Large asset managers therefore appear to be key stakeholders for a renovation strategy at a local or regional level. First, because they have capacity and experience in making large investments. Second, because they are more used to consider long term investments, which is essential for renovation projects that have often long payback time. Third, because they are key customers for the local construction companies. They are thus in a position where they can encourage these companies to develop their skills and solutions for cost-effective renovation projects. All these reasons confirmed the assumption made by OCEN and SIG that the large Genevan asset managers should be key targets for the future programme of building renovation in Geneva.

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