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Evaluating the complex governance arrangements surrounding energy retrofitting programs: The case of collective ownership buildings in France

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ABSTRACT

It is generally accepted that energy retrofitting of existing buildings is a major challenge for CO_2 emission mitigation policies in most countries. The obstacles are numerous with the main issues being well known although not all having clear solutions. The case of collectively owned properties (COP) is probably one of the more difficult challenges. The existing laws and financial assistance are not sufficient to overcome all the barriers to improving the energy use performance of COP. As such, 'actors' coaches' become indispensable at the local level to accompany COP wishing to undergo an energy retrofit.

The major outcome of the paper is the development of evaluation mechanisms of the coaching process. The paper analyzes the arrangement of specific stakeholders acting at the local level as "coaches" or "facilitators" for the co-owners, their associations and their trustees, through technical and financial support. The aims of this paper are:

- To identify how to evaluate the effectiveness of this coaching,
- To try to explain why so few buildings have been retrofit for energy conservation,
- To present case studies from the Eurometropole of Strasbourg highlighting the complexities of achieving a retrofit for COP.

1. Introduction

Climate change represents one of the main scientific and political challenges of our time [1]. The energy situation of existing buildings is similar in most Western countries and energy retrofitting of existing buildings is a major challenge for achieving CO_2 emission mitigation policies. According to the IPCC [2], in 2010, the building sector accounted for approximately 19% of energy-related CO_2 emissions. In the EU, this sector is responsible for 13.2% of all greenhouse gas (GHG) emissions. From an energy consumption point of view, buildings account for 16–50% of total worldwide energy consumption [3]. In Europe, 40% of energy consumption is related to buildings [4]. In France, this sector consumes more than 40% of the total energy use and contributes to nearly a quarter of the national GHG emissions. This sector represents, however, a strong potential for relatively rapid energy savings in the near future [5].

At the European level, Energy Roadmap 2050 [6] concludes that 'higher energy efficiency potential in new and existing buildings is key for achieving a sustainable energy future in the EU, contributing significantly to the reduction of energy demand, the increased energy supply security and an increased competitiveness. Actions related to more ecologically conscious decisions can save 5–7% in energy use (via

Abbreviations: ADEME, French Environment and Energy Agency – Agence de l'environnement et de la maîtrise de l'énergie; ALUR, Access to Housing and Urban Renovation – Accès au Logement et un Urbanisme Rénové; AMO, consulting; ANAH, National Housing Agency – Agence Nationale de l'Habitat; BBC, Low Energy Building – Bâtiment Basse Consommation; EMS, Eurometropole of Strasbourg – Eurométropole de Strasbourg; FNAIM, National Real Estate Federation – Fédération Nationale de l'Immobilier; HLM, Rent-controlled housing; INSEE, National Institute of Statistics and Economic Studies – Institut National de la Statistique et des Etudes Economiques; NGO, Non-governmental organization; OPAH, Housing Improvement Operation Program – Opération Programmée d'Amélioration de l'Habitat; PCT, Territorial Climate Plan – Plan Climat Territorial; PLH, Local Housing Program – Programme Local de l'Habitat; PLU, Urbanism Local Plan – Plan Local d'Urbanisme; POPAC, Preventive Operational Program for the Support of Condominiums – Programme Opérationnel Préventif d'Accompagnement des Copropriétés; QPV, Prioritized urban quarter – Quartier Prioritaire de la Ville; RT, Thermal Regulations – Réglementation Thermique; SRCAE, Energy Air and Climate Regional Plan – Schéma Régional Climat Air Energie; STH, Housing Technical Department – Service Technique de l'Habitat

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defrosting freezers, disconnecting unused applicances, etc.). A significant investment in energy retrofitting projects (replacing hotwater tanks and windows, improving insulation) can reduce energy use by 80% [7].

Until 2015, the national energy efficiency objectives for France were defined by the Grenelle Laws of August 3, 2009 and July 12, 2010, reflecting the commitments of the Kyoto Protocol and placed the required changes within a long-term vision (until 2050). These laws specify that "the national measures for the fight against climate change will prioritize the reduction of energy consumption of buildings". The energy savings potential in France involves 15 million housing units [7].

The French objectives for reducing the energy consumption of existing building are: 2012 – 12%, 2020 – 38% (with a goal of the complete renovation of 500,000 housing units per year from 2013 onwards) and 2050 −70 to −80% relative to 1990 levels [5]. Over the last few years, the actual pace of retrofitting reached only 120,000–350,000 units per year that were partially or totally renovated. This estimate is based on the information sources and methods that include energy retrofit projects (progressive or full renovations). Regardless of the estimate used, the number is very far from the initial goals for obtaining the objectives in 2020 [7]. To implement a large-scale program of energy retrofitting, the Act for Energy Transition towards Green Growth (LTECV) [8] fixed as a new objective the renovation of all real estate properties to the level of "BBC renovations" ("Bâtiment basse consommation" = low energy use building) until 2050. This label is based on the 'effinergie renovation'[1]; [9] that states that according to geographical area and altitude, the maximum consumption in primary energy varies around 80 kWh/m^2/year habitable surface (minimum = 64 kWh/m^2/year (southeastern of France, 0 m altitude), maximum = 120 kWh/m^2/year (northern and northeastern France, 800 m altitude)).

For improving the energy efficiency of buildings, the central outcome of the policy strategy is to reduce heating requirements. Indeed, space heating accounts for 32% of end-use energy consumption. Water heating accounts for 24% [2]. A recent review [10] has confirmed this view and has shown that the various retrofitting strategies employed in sustainable housing renovations appear to be broadly similar across most Western countries. Insulation of the thermal envelope of the residence, replacement of windows and a better sealing of housing units to prevent heat loss are the most common strategies under consideration. Most of the existing European residential buildings were built between 1940 and 1970, and are generally poor in terms of energy efficiency and conservation [11]. In the United Kingdom, it is estimated that approx. 75% of all dwellings that will exist in the year 2050 exist already today [12]. As such, these residential buildings are of particular importance for effective GHG reductions and reduced energy consumption as they will continue to be used for some time into the future [13]. The replacement rate of existing buildings in Europe is very low at approximately between 1.0 to 3.0% per year [14]. Therefore, the current challenge is to improve the energy efficiency of existing housing units [2].

To reach this long-term goal of a complete energy-related retrofitting of all the real estate properties to the BBC standards by 2050, regional and local actions become increasingly important [14–18]. There has also been growing acknowledgment of the emerging role of cities in addressing climate change and a transition to a low-carbon, energy-efficient world [18]. Indeed, cities will play a critical role in this transition as they are responsible for nearly 70% of global CO_2 emissions, although they only account for half of the world's population [16]. Yet the objectives set in various local strategic plans for existing buildings remain very difficult to achieve. For example, based on the current rate of energy-related renovations, the retrofitting of public buildings of the Eurometropole of Strasbourg (EMS) will take 120 years to be completed [19]. Other example, Dall'O et al. [20] developed a procedure to evaluate the potential energy savings of retrofitting residential buildings in a municipality in Italy and found that the BAU (business as usual) scenario achieved only a reduction of 2.7%, while with the optimal scenario it would be possible to reach 24.8% of energy savings.

Thus, the achievement of the objectives displayed at European and national levels requires adapted tools and incentives for taking effective action to eliminate the multiple barriers that prevent the thermal retrofitting of buildings to a BBC level.

2. Background: barriers to energy retrofitting in France

The residential sector can be sub-divided according to many different criteria. For this study, we divided the sector based on building types depending on their different owners. Four "building-actor" subsystems could be identified: (1) public property housing managed by the local community; (2) social housing managed by social housing authorities; (3) collective ownership properties (COP) whose decisions are linked to the co-ownership association or executive council of co-owners; and (4) individual housing managed by a single owner. Each type of housing has specific issues and energy use challenges. Furthermore, apart from the case of private houses and co-ownership, a buildings' user rarely decides directly on actions to be taken or not taken for the benefit of the inhabitants. This complex situation leads to great heterogeneity both in the decision-making process and final decisions.

Moreover owners/actors do not always share the same vision, objectives or capacities for undertaking actions related to improving energy efficiency. They can serve or impede energy retrofitting projects depending on these personal interests. Opportunities for financial support also vary depending on their status as either renter or owner. In France, specific national financial assistance can be made available for social housing renewal specifically through the "Caisse des Dépôts et de Consignation" (CDC). A multi-year strategic plan for the retrofitting of social housing permits a scheduling and organization of the required work. Furthermore, improvements of the energy performance of a housing unit allow the owners to increase the rent value [21]. In addition, a time of return on investment of 30 years for a building is feasible for owners or managers that deal with large budgets. A large-scale push for energy conservation retrofitting of social housing (individual house types) is being launched through the "Horizon 2020" program for research and innovation launched by the European Commission. This project known as "EnergieSprong" or "GreenFlex" [22] aims to transplant in France (as well as the United Kingdom and Luxembourg) a Dutch model for renovating individual houses.

Public property benefits very often from multi-year investment plans within the commune. The French communes aim to be exemplary in terms of energy use and, as such, have clear objectives for the reduction of energy consumption (structured by the territorial climate plan, PCT), as well as having indicators and specific tools for following up on the measures put in place. However, even if the will is present, budgetary restrictions often impede reaching these objectives. Exemplary projects can be helped by the state by financing as stated in the national law for energy transition.

In the individual home, the decision-maker is four times out of five a household owner-occupant whose changes in life cycle (couple, children, retirement…) and housing projects (purchase, renovation…) produce many opportunities for energy retrofits [23]. A homeowner also benefits from multiple sources of assistance from the state (a tax credit for energy transition, an eco-loan having a zero rate of interest, a VAT at a reduced rate, a national housing agency (ANAH) program "Live Better ('Habiter Mieux')", assistance from energy suppliers, an exemption from property tax, as well as the aid of local communities). Since 2001, a network of energy info spaces (EIA), created by the

[1] Label created by the Alsace Region.