

NEWSLETTER

2th edition
March 2018

Object: a novel transdisciplinary Energy Retrofit conceptual framework (TERCF)

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SUMMARY

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Dear Readers,

We are glad to send you the 2st edition of CmapER newsletter!

With this publication we want to keep you informed on all activities and results that will be realized by the project during next 24 months period.

In this 2st edition we'll introduce the progress about the elaboration of a novel conceptual framework to facilitate the management of complexity inherent in Energy Retrofit (ER).

On the last pages of the newsletter you can find some more information on Marie-Sklodowska Curie Action IF programme through which you can realize similar initiatives.

Hoping you would appreciate our work, we wish you pleasant reading!

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i CmpER introduction

Energy retrofit of existing buildings is complex. This complexity mainly emanates from the need to integrate disciplinary knowledge and expertise, both technological and managerial, in an interdisciplinary context to find buildable solutions that improve actual energy performance. However, training and education in professional silos, and the resultant fragmentation of the industry, is a significant barrier to integration. This lack of integration during the design, construction and operation stages of a building's life cycle is one of the reasons behind the 'performance gap'. This proposal aims to close this gap by presenting the framework for a two-year Marie Curie Individual Fellowship.

TEAM

Maurizio Sibilla: Marie Curie Fellow

Dr Maurizio Sibilla is a Marie Curie Fellow at the School of the Built Environment, Oxford Brookes University, UK. From 2012 to 2017 he was post-doctoral researcher at the Department of Planning Design Technology of Architecture at Sapienza University of Rome. His work experience over the past years has focused on the construction of a bridge between technology and the design culture, focusing his interest in the area of environmental technologies where he has carried out relevant academic and professional activities.

Esra Kurul: Marie Curie Supervisor

Dr Esra Kurul is a Reader at the School of the Built Environment, Oxford Brookes University, UK. Esra's research is inter-disciplinary and wherever appropriate it is undertaken in collaboration with the industry. Her current research interests include inter-disciplinary collaboration to achieve sustainability in the built environment, adaptation of businesses to Climate Change, and the relationship between social capital and the effective management of knowledge.



ii **CmapER: Towards a novel transdisciplinary energy retrofit conceptual framework**

We describe the progress of the first work package of a H2020 Marie Skłodowska-Curie project. The purpose is to examine the transdisciplinary (multidisciplinary and interdisciplinary) practices, which involve the energy retrofit of existing buildings within the UK context. Currently, energy retrofit is recognized as a relevant strategy in order to improve the environmental and energy qualities both buildings and cities. Nevertheless, the lack of integration among disciplines is considered as one of the key reasons behind the performance gap between the design aspirations and performance in use. A literature review was conducted through a qualitative approach. The aim was to identify emerging lines of inquiry in Energy Retrofit. The findings are presented in the form of a new conceptual framework, which identifies the need to develop capabilities to manage the complexity inherent these projects. Future steps are also presented, which seek to move from a conceptual framework to an integrated learning platform. This platform will be exploited in designing technological solutions for deep energy retrofit as a step towards managing complexity.

Energy Retrofit (ER) concept plays an important role in the transition to low carbon cities, because buildings make a substantial contribution of total energy demand. In an analysis of UK carbon agenda, several studies reported that buildings accounted for 18% of greenhouse gas (GHG) emissions in 2015, with 75% of this share attributable to residences, 15% to commercial buildings and 10% to public sector buildings. Additionally, in another major study the Committee on Climate Change¹ showed that over two thirds of the buildings that will exist in the UK in 2050 have already been built and, in particular, over three quarters of the 28 million dwellings in the UK were built before 1980. With regard to this scenario, Mohareb and Kennedy² argue that the successful long-term reduction of energy demand and related GHG emissions will require that high-performance buildings

¹ Committee on Climate Change, The Climate Change Act and UK regulations, 2015, www.theccc.org.uk/tackling-climate-change/the-legal-landscape/global-action-on-climate-change/.

²Mohareb EA, Kennedy CA., Scenarios of technology adoption towards low-carbon cities, *Energy Policy*, (2014), 66, pp. 685-693



replace the existing energy-intensive building stock. However, within the scenario of the low carbon cities transition, ER concept is expanding its own traditional meaning, becoming even more a transdisciplinary topic in order to improve collaborative, and interactive research approaches³ and reduce the performance gap between the design aspirations and performance in use⁴.

The central question in this study asks: what is the significance of integrated process in the context of ER project? And how it can be managed?

In the prior stage, the Energy Retrofit concept was analysed in order to understand how the transdisciplinary approach are involving the Energy Retrofit concept. The term “transdisciplinary” was defined pointing out how it involves both multidisciplinary and interdisciplinary approaches⁵, and how it requires new cognitive skills and habits of the stakeholders and experts which are involved in mutual and joint learning processes⁶. In this prior stage, the data were collected through a literature review of 136 peer-reviewed journal papers. A grounded theory method combined with cognitive technique mapping was applied in order to identify specific transdisciplinary issues from the literature. The results obtained from this preliminary analysis on Energy Retrofit are showed in Figure 1. It concerns a TERCF, which is characterised by 5 categories, 15 lines of research and 50 main concepts. This TERCF is the starting point of this paper.

The second step was based on an integration of literature review in order to assess and expand the Transdisciplinary Energy Retrofit Conceptual Framework (TERCF). As result of selecting process, 77 journal papers were integrated, which will be focused on ER in UK country.

³ Wiek A, Walter AI., A transdisciplinary approach for formalized integrated planning and decision-making in complex systems. *European Journal of Operational Research*, (2009), 197(1), pp.360-370.

⁴ de Wilde P, Tian W, Management of thermal performance risks in buildings subject to climate change, *Build Environment*, (2012), 55, pp.167-177

⁵ Koutsikouri D, Austin S, Dainty A, Critical success factors in collaborative multi-disciplinary design projects, *Journal of Engineering Design and Technology*, (2008), 6(3), pp.198-226

⁶ Wiek A, Walter AI., A transdisciplinary approach for formalized integrated planning and decision-making in complex systems. *European Journal of Operational Research*, (2009), 197(1), pp.360-370



As main result, this work outlines 15 integrated themes and discusses on how these integrated themes are able to reinforce and contextualize such TERCF. In doing so, this work provides a justification about the methodological approached adopted, which combines a grounded theory method with cognitive technique mapping and promotes a novel transdisciplinary energy retrofit conceptual framework as a first step in order to develop an innovative learning platform for knowledge integration in ER.

The most striking result to emerge from the data is that the relationships among concept start to be clarified. Following the cognitive mapping technique the integrated themes were articulated in concepts and linking phrases. (Figure 2)

A natural progression of this work is to define all the relationships among the concepts proposed in to the TERCF. In next stage, 10 case study will be taken into account in order to reveal other relevant relationships among the concepts.



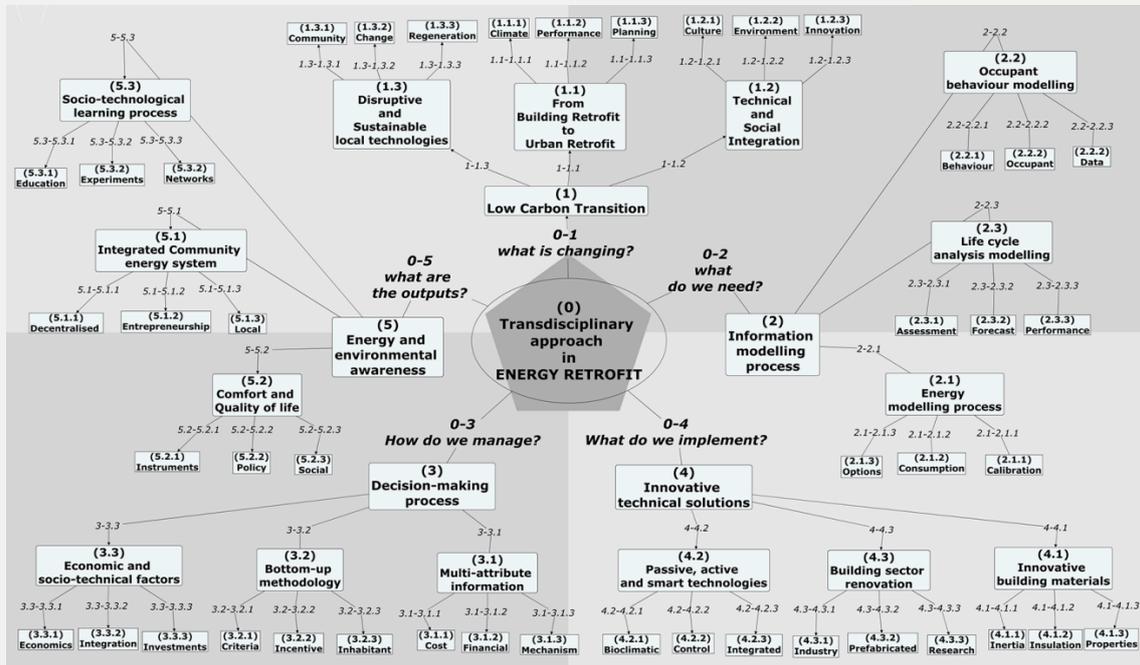


Figure 1. Transdisciplinary ER Conceptual Framework

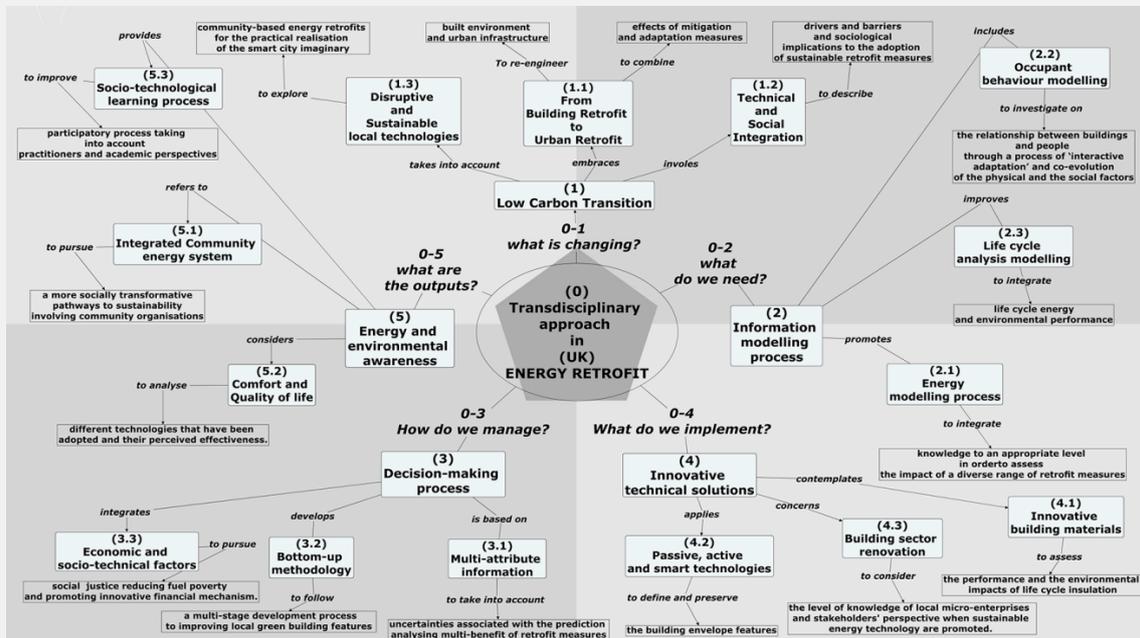


Figure 2. Transdisciplinary ER Conceptual Framework combined with integrated themes.



iii Marie-Sklodowska Curie Action Individual Fellowship

The Marie Skłodowska-Curie actions, named after the double Nobel Prize winning Polish-French scientist famed for her work on radioactivity, support researchers at all stages of their careers, irrespective of nationality. Researchers working across all disciplines, from life-saving healthcare to 'blue-sky' science, are eligible for funding. The MSCA also support industrial doctorates, combining academic research study with work in companies, and other innovative training that enhances employability and career development.

In addition to generous research funding, scientists have the possibility to gain experience abroad and in the private sector, and to complete their training with competences or disciplines useful for their careers.

Who can apply?

This action is meant to support the best, most promising individual researchers from anywhere in the world.

Only experienced researchers can apply. This means you will have your doctoral degree or at least four years' full-time research experience by the time of the call deadline.

What can be funded?

All research areas can be funded except those covered by the EURATOM Treaty as referred to in article 4 and Annex I.

Mobility across borders is a must. Cross-sectoral mobility is also encouraged.

What does the funding cover?

The grant provides an allowance to cover your living, travel and family costs. The grant is awarded to your host organisation, usually a university, research centre or a company in Europe. The research costs and overheads of the host organisation(s) are also supported.

European Fellowships last from one to two years.

How do I apply?

You submit a research proposal, including your CV. The proposal is written jointly with your chosen host organisation(s) (a university, a research centre or a company).

Proposals are submitted in reply to a call for proposals

